RoSPA
The Royal Society for the Prevention of Accidents

Working for a safer Scotland

Young Drivers at Work (Scotland) Black Box Pilot

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TRANSPORT SCOTLAND
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EXECUTIVE SUMMARY

Many employers are using telematics to monitor the at-work driving of their staff. This technology can significantly reduce crash rates, levels of risky driving behaviours, and fuel and accident costs[1], but research provides little detail of the practical issues employers face in using it, or how to best use the data and feedback to reduce risk and costs.

In 2012, the Scottish Government provided funding to RoSPA Scotland to conduct a pilot project to evaluate the practicalities and effectiveness of employers using telematics to monitor and improve the at-work driving of their young staff. The project was designed to explore the practical issues that employers face when seeking to use telematics, how they were or were not resolved, and how they were able to use the information the technology provides to improve their management of occupational road risk for young drivers at work.

Given the small sample size (of both employers and drivers) the pilot was mostly concerned with assessing the barriers employers need to overcome to make use of this technology; it is not a quantitative analysis of the effectiveness of telematics on driving behaviour.

The telematics, provided by MyDrive Solutions Ltd, was contained in a small device (a 'black box'), which was installed in the cars or small vans of participating employers that are driven for work by young (17 – 21 year old) drivers. It took a snapshot of the individual's driving every second, and generated a Safe Drive score, which shows how closely their driving matches that of a RoSPA Advanced Driver (i.e. a driver who has a Gold grade pass in RoSPA's Advanced Driving Test). Each driver had access to a personalised Driver's Portal through which they could view feedback about their driving.

Awareness of Telematics among Employers in Scotland

There is a challenge in raising awareness amongst employers of the potential role and benefits of using in-vehicle telematics. Over 6,000 employers, who had previously demonstrated an interest in at-work road safety, were sent information about the trial. However, only a very small proportion (46 organisations) responded to the invitation to participate. One reason may have been that the trial was specifically aimed at employers who had young drivers (aged 17 – 21 years) who drove for work.

32 organisations entered detailed negotiations about participating in the trial, but 21 were subsequently unable do so, mainly due to concerns from unions and staff associations, or difficulties in persuading their drivers to participate. Therefore, only 11 organisations participated in the trial, ranging from micro and small businesses, each with 1 to 4 drivers participating in the project, to Local Authorities, with up to 28 drivers.

An extensive and ongoing communication campaign will be needed to raise awareness amongst employers in Scotland about the potential road safety and financial benefits that in-vehicle telematics technology offers them.

[1] "Road Safety and In-vehicle Monitoring (Black Box) Technology", RoSPA, 2012, http://www.rospa.com/roadsafety/info/black-box-technology.pdf

Participants in the Trial

Initially, 69 vehicles in 11 different organisations were fitted with a small telematics device. However, this reduced to 57 vehicles because some drivers left their employers and some vehicles were sold or replaced by the employer during the project. Therefore, the results of the trial are based on telematics fitted in 57 cars and vans driven by young at-work drivers:

23 cars
15 small vans
14 medium vans
5 larger vans

Installing the Telematics Devices

Although the installation process was generally smooth, there were a few problems, which occurred mainly due to the availability of the vehicles into which the devices were to be fitted. The installation process is simple, but does need to be carefully planned and implemented. At-work drivers need to be incentivised, through a reward for attending the installation appointment, and/or a penalty for missing an appointment.

Effect on Driving

The telematics generated a Safe Drive score for each driver, which shows how closely their driving matches that of a RoSPA Advanced Driver (i.e. a driver who has a Gold grade pass in RoSPA's Advanced Driving Test). The analysis of their driving covered a nine month period, from 1st June 2013 to 1st February 2014.

Some of the young drivers drove different vehicles, which meant that the driving data recorded for their vehicles actually represented different drivers. When their scores are excluded from the analysis:

- 13 driver scores increased, indicating that the driving improved
- 3 driver scores decreased, indicating that the driving deteriorated
- 1 driver had no change in their scores

The variations in the driver scores may have been caused by a variety of factors, including, but not limited to, the use of the black box technology, variations in their driving tasks, and the routes and times of their journeys. Also, as the participants were young drivers, their abilities and experience would have been developing during the project.

The Driver's Portal

Each driver had access to a personalised Driver's Portal through which they could view feedback about their driving and their safe driving score. Use of the Driver's Portal was low during the project, with only 17 of the 57 participating drivers using it. These 17 drivers were employed by small companies and were each the only member of staff driving their vehicle.

There were several reasons for the low use of the portal:

1. Some of the young drivers did not have an email address or internet access at work to be able to access the portal.

2. The drivers were neither rewarded for improving their driving, nor penalised for poor driving, which reduced their incentive to view the feedback about their driving on the portal.

3. The Portal could not distinguish between the drivers of shared vehicles that were driven by more than one driver. It could not allocate the driving data and driving scores to the driver who was driving at the time the data was recorded, and so the drivers could not know if the data was relevant to them.

4. Some of the drivers did not think the information provided in the Portal was useful in helping them to improve their driving.

Drivers who have telematics as part of their insurance policy are incentivised to drive well by receiving a reward, such as a discount on their insurance premium, or a punishment, such as not receiving the discount. At-work drivers do not have these incentives, therefore, some form of incentive programme is needed for drivers who are using telematics in an at-work setting.

Managers Use of the Telematics Data

Only half of the managers reviewed their drivers' logs and/or reports. The companies in which the managers engaged more with drivers had better results than those in which the managers did not engage with their drivers' data. The managers who did not review their drivers' driving data said this was mainly because they did not have access to the portal, or they did not have time to review the data.

The design, accessibility and content of the Driver's Portal is crucial in encouraging and enabling the telematics data to be viewed, understood and then used to improve driving standards, and the management of occupational road risk.

Overall, the managers expressed mixed views about their experience of using black box technology. Apart from concerns about cost, the main barrier, in their view, is the need for the managers, and the drivers, to receive relevant and timely information about the nature of the driving, in a simple and accessible manner.

Shared Vehicles

One of the most significant difficulties the employers faced in using the telematics was the fact that some of their vehicles were driven by more than one driver, and some of their drivers drove more than one vehicle.

It is essential that the data from a vehicle can be allocated to the individual person who was driving that vehicle at the time the data was recorded. Employers who have vehicles that are driven by more than one member of staff, or who have staff who drive more than one vehicle, need some way of identifying who is driving when.

The practical method would seem to be for the means of identification to be built into the telematics technology. For example, some companies (not in this trial) use a key fob to identify each individual driver so the telematics data is accurately allocated to the right driver. However, this is likely to make the technology more expensive.

Another option is to use a smartphone app to record data, rather than a device fitted in the car, because the app would be related to the individual driver rather than the vehicle. In this case, the company would need to ensure that drivers did not use the Smartphone for other purposes while driving. We are not aware of any published research comparing the advantages and disadvantages of using smartphones to deliver telematics with using a device fitted to the vehicle, however, given the increasing use of smartphones for telematics, such research would be useful.

Conclusion

Telematics can improve driver behaviour, and enable driving to be easily monitored. However, awareness of the potential benefits of this technology needs to be raised amongst employers in Scotland. Employers also need help in knowing how best to secure agreement within their organisation to use telematics.

Obtaining the greatest effect, and value for money, from telematics requires regular reminders and communication to encourage drivers, and managers, to view the feedback about the driving recorded by the telematics.

Managers in companies also need help and guidance on how to actively use the information that the telematics provides to improve the safety of their drivers, and to improve their management of occupational road risk.

INTRODUCTION

In 2012, the Scottish Government provided funding to RoSPA Scotland to conduct a pilot project to evaluate the practicalities and effectiveness of employers using telematics to monitor and improve the at-work driving of their young staff. It was the first research of its kind in Scotland and aimed to inform work in Scotland with companies who employ young drivers, and support the implementation of Scotland's Road Safety Framework to 2020.

Many companies are starting to use telematics devices (black boxes) to monitor the at-work driving of their staff. Insurance companies are also increasingly using telematics to monitor how, where and when the young drivers who they insure are driving, to provide feedback to the individual drivers and, where necessary, to adjust their insurance premiums to incentivise them to improve their driving skills and drive more safely.

In work-related road safety, this technology offers the potential to:

- analyse the real driving behaviour and standards of staff who drive for work
- provide tailored, personalised feedback to drivers to help them improve their driving or reduce their exposure to high risk driving situations
- identify driver training and education needs of at-work drivers
- incentivise lower risk driving
- significantly reduce the company's costs.

Research[2] has shown that this type of technology can significantly reduce crash rates, levels of risky driving behaviours, and fuel and accident costs. However, published research provides little detail of the practical issues employers face in using the technology, nor how they use the data and feedback to inform the ways in which they can reduce risk and costs.

The aim of the project was to identify how best employers in Scotland can make use of this technology to help them keep their staff (and other road users) safer when they are driving for work. The project was designed to explore the practical issues that employers face when seeking to use telematics, how they were or were not resolved, and how they were able to use the information the technology provides to improve their management of occupational road risk, with particular attention to young drivers at work.

Given the small sample size (of both employers and drivers) the pilot was mostly concerned with assessing the barriers that employers would need to overcome in order to make use of this technology; it is not a quantitative analysis of the effectiveness of telematics on driving behaviour.

An Interim Report in August 2013 focussed on the recruitment of employers and drivers and the installation of the telematics in their vehicles. This Final Report includes the findings from the Interim Report and details of how the employers were able to use the technology, and how it affected the driving of the young at-work drivers who participated in the project.

[2] "Road Safety and In-vehicle Monitoring (Black Box) Technology", RoSPA, 2012, http://www.rospa.com/roadsafety/info/black-box-technology.pdf

THE TELEMATICS TECHNOLOGY

RoSPA's partner, MyDrive Solutions Ltd, provided the telematics technology. It takes a snapshot of the individual's driving every second, and scores the driver accordingly, including their level of aggression, smoothness, anticipation and consistency. It maps the driving onto the road network (for example, whether a driver is on a motorway or A-road, or approaching a roundabout) and driving conditions (for example, whether an individual is driving at night, in heavy congestion, or in treacherous weather conditions).

The software is contained in a small telematics device (a 'black box'), which MyDrive supplied and installed in the cars or small vans of participating employers that are driven for work by young (17 – 21 year old) drivers. The device was a Redtail VAM unit, which is widely used as a tracking device by many companies (although it did not operate as a tracker in this project). It is about the size of a mobile phone and was fitted by a professional installer at the driver's house or place of work. The box was fitted underneath the dashboard without any drilling and took around twenty minutes to install.

The box recorded data from each trip and sent it to MyDrive automatically at the end of the journey. It is not a tracking unit so neither MyDrive, RoSPA or the employer knew where the vehicle was in real-time while it was being driven. The data was stored securely and anonymously on MyDrive's systems.

The Driver's Portal

A key feature of any driver telematics software is the ability to provide the driver, and/or another party, such as an employer, with data and feedback on the nature of the driving. This enables them to understand their driving style and risk and can incentivise the driver to improve his or her driving and help the company to reduce the risks created and faced by its drivers, and its driving-related costs. This can enable the employers to:

- Identify and prioritise higher risk drivers and/or journeys
- Provide feedback to each individual driver to encourage self-improvement
- Motivate drivers and incentivise better driving
- Identify each driver's training needs
- Identify particular journeys, routes or vehicles that are higher risk, or more expensive in terms of fuel use
- Achieve better fuel efficiency
- Encourage competition between drivers to see who can improve their driving the most
- Help meet the employer's legal duties to manage their occupational road risk
- Improve the business performance of the company by reducing costs

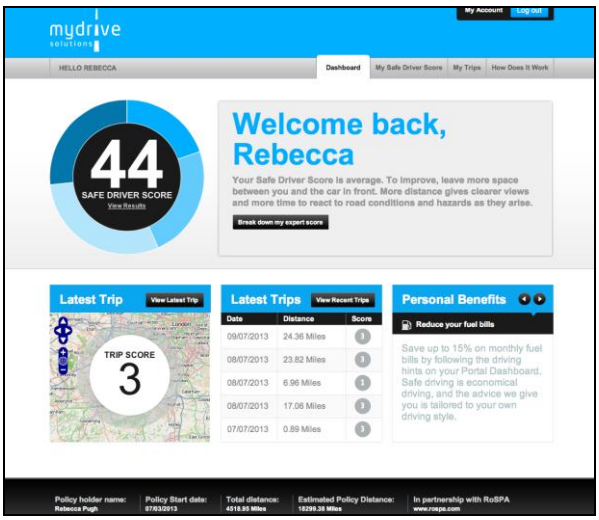
The employers and drivers in this pilot project were provided with a Driver's Portal through which they could view the results and analysis of the driving, along with advice on what the data means.

Participating drivers who supplied an email address were invited to register on their portal. They then had access to review their driving data and feedback on where and how they drove. The homepage of each Driver's Portal displayed two types of score: a Safe Drive Score and a Trip Score.

The Safe Drive score is a number out of 100 (eg, 44) and is calculated once the driver has completed 250 miles driving. It then measures continuous driving over a rolling 90 day period. The higher the score, the safer the driving.

The Trip score is given for each completed journey and is a score of 1 – 5.

Sample images from the Driver's Portal

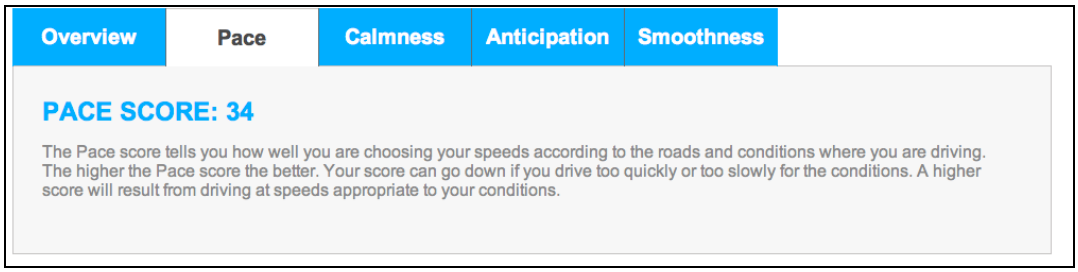


The telematics generated a Safe Drive score for each driver, which shows how closely their driving matches that of a RoSPA Advanced Driver (i.e. a driver who has a Gold grade pass in RoSPA's Advanced Driving Test). The score is calculated from a combination of four factors: Pace (appropriate speed for the conditions), Smoothness (braking and acceleration), Calmness (acceleration and cruising speeds – the opposite of aggressive driving) and Anticipation (braking patterns indicating good anticipation).

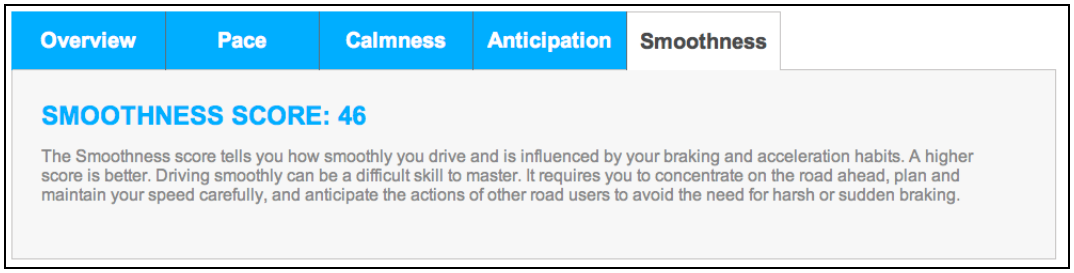
The Safe Drive Score is calculated once the driver has completed 250 miles of driving. It then measures continuous driving over a rolling 90 day period, with the score being adjusted accordingly. The telematics produced a new profile for each driver for every trip. The drivers, on average, made ten trips a day, which meant that in a month (20 working days) a driver would have made around 2,000 trips. Consequently, their driving profile was updated 2,000 times a month, i.e., after every trip.

Sample images from the Driver's Portal

Pace: Appropriate Use of Speed

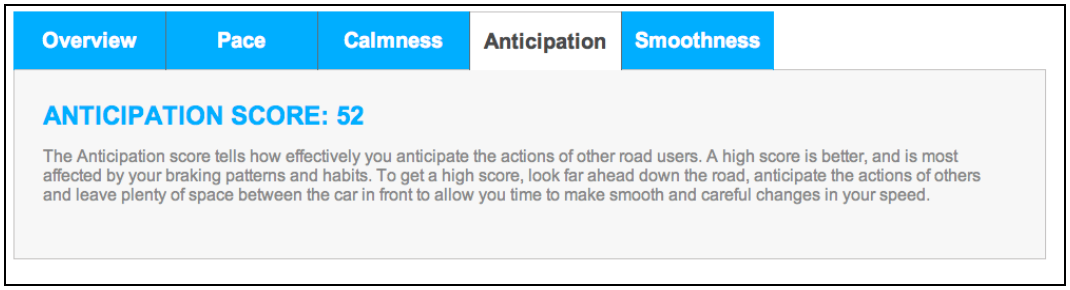


Smoothness: Braking and Acceleration



Calmness: High Speeds and Harsh Acceleration

Anticipation: Braking Habits at Speed, i.e. Reactionary Speed Changes



Young Adults' Views about Black Box Technology

To gain some insight into the views of young Scottish people about this type of technology, RoSPA conducted a questionnaire survey at West Drive 2012, asking year 6 and 7 (aged 16 and 17 years) High School pupils about their opinions of black box technology.

Just under 200 (199) pupils from years 5 & 6 completed the survey, with the vast majority (94%) being in favour of the technology. The reasons given by the young people are summarised below, and a full list of the reasons is provided at appendix 1.

For and Against Black Box Technology: the Young Adults Perspective

Votes '**for'** the technology were because it:

- Increases road safety
- Encourages good driving
- Promotes safer driving and as a result save lives.
- It will make young drivers more aware of their driving behaviours and the feedback will help them improve
- Reduce insurance costs/premiums
- Help identify good drivers from bad drivers
- Provide fairer insurance (based on your driving as an individual)

Votes **against** the technology were because it:

- Different people drive a car, which will disrupt the records made
- Restrict when one can drive
- Can make insurance more expensive
- is possible to circumvent the device

THE EMPLOYERS

An invitation to participate in the Black Box trial project was produced. It described the project, emphasising that there was no charge to the employers, with the equipment being supplied, installed and later removed free of charge. It also described the web portal that would be provided free, and illustrated some of the improvements to their staff's driving that could be expected from using this technology. A copy of the invitation is provided at Appendix 2.

Numbers and Type of Employers

RoSPA promoted the trial to employers in Scotland through a variety of avenues, including direct emails to:

- 175 companies in Scotland who won a RoSPA Safety and Health Award in 2012, including members of the Scottish Higher Performer's Forum.
- 250 organisations who are members of the Scottish Occupational Road Safety Alliance (ScORSA)
- Approximately 6,000 companies in Scotland who subscribe to RoSPA's safety e-newsletter, "Safety Connections"
- 90 delegates who attended the ScORSA St Andrews Seminar on 29 November 2012 (the delegates were representatives of their employers)
- Approximately 70 delegates who attended the RoSPA Scotland Occupational Health and Safety Congress on 19th September 2012 (the delegates were representatives of their employers)

The trial was also promoted by the Scottish Centre for Healthy Working Lives' Advisers in their contacts with Scottish employers, by RoSPA to its road safety contacts across Scotland (typically road safety officers in Local Authorities, Police Forces and the Fire and Rescue Service) and through "Constructionline", the UK register of pre-qualified local and national construction and related suppliers. However, it is not possible to measure how many employers received information about the trial via these routes.

Numbers who Expressed Interest

Despite the extensive promotion, which was mainly to companies who had already expressed an interest in managing occupational road risk or in health and safety, and despite the fact that the equipment and driver portal was provided free to the employers, the number of companies who expressed an interest in participating was relatively small.

One conclusion that may be drawn from this is that a carefully designed communications campaign is needed to raise awareness amongst employers of the benefits of this technology.

Although over 6,000 companies were sent promotional material about the project, only 46 organisations responded to the invitation to participate[3]. Of these, 12 indicated that they did not employ persons within the age group specified to drive (ie 17 to 25 years old) on behalf their organisation. In at least one case, this seemed to be a deliberate policy - 'Our business relies on expertise and experience, we have no employees in this category'.

Numbers who Entered Detailed Discussions

32 organisations entered into detailed discussions with RoSPA about participating in the project. 17 of these organisations provided an indication of driver numbers at the outset - a total of 212 young drivers who drove for work.

Numbers who Subsequently Dropped Out and Why

The difficulties faced by the organisations that wanted, and had agreed, to participate, continued during this phase. Concerns from unions and staff associations, and difficulties in recruiting drivers to participate, resulted in several companies dropping out of the trial.

Unsurprisingly, smaller organisations were quicker to finalise their internal discussion and to complete the installation process.

At an early stage, the role of staff associations and trade unions was identified as crucial to the use of this technology. RoSPA met with management and union representatives of one major employer to further explain the data that would be collected and how it could be used. The meeting resulted in a positive response, and the organisation continued to participate in the project, but with far fewer drivers than originally anticipated.

RoSPA discussed the concerns raised by the trade unions and staff associations with the Scottish Trades Union Council (STUC). The STUC had been pivotal in establishing the Scottish Occupational Road Safety Alliance (ScORSA) as they recognised the driving for work risks experienced by their affiliates and members. They expressed disappointment that some of the trade unionised employers and trade unions had raised concerns that had hindered their organisations participating in the pilot, but were not surprised that this was the case.

In the current climate, the STUC suggested that many of their members face increased pressure to get more done with less resource and any electronic surveillance of their work activity, whether in the workplace or in work vehicles, is understandably treated with suspicion. The STUC have committed to meet with RoSPA after the pilot project has concluded to share the results and the lessons learned and to explore how any difficulties could be overcome and communicate these outcomes to their affiliates.

[3] A Northern Ireland Assembly researcher also asked for further information for a member of the Northern Ireland Assembly.

Numbers and Types of Employers who Participated in the Project

Overall, of the 32 organisations that entered detailed negotiations about participating in the trial, 21 were subsequently unable do so, mainly due to concerns from unions and staff associations, or difficulties in persuading their drivers to participate. Therefore, only 11 organisations were eventually able to participate in the trial. However, during the negotiation phase within each organisation, which was particularly extensive in one case, they had to reduce the number of young drivers who would participate.

The 11 employers ranged from micro and small businesses, each with 1 to 4 drivers participating in the project, to Local Authorities, with up to 28 drivers participating in the project.

Initially 69 vehicles used by these 11 employers were fitted with a black box. However, as the project progressed, this reduced to 57 vehicles because some drivers left their employers and some vehicles were sold or replaced by the employer during the implementation phase of the project.

Therefore, the results of the trial are based on telematics fitted in 57 cars and vans, all driven by young at-work drivers:

23 cars
15 small vans
14 medium vans
5 larger vans

Employer's Workshop

In February 2013, RoSPA conducted a workshop with participating employers to provide an opportunity for them to share their experiences of the initial stages of the pilot.

During the workshop, the following issues were raised and discussed:

- There is potential for using telematics during recruitment because a candidate could bring their driving report along when applying for jobs involving driving as evidence of their good driving.
- The time period on the portal for the driving analysis would be a rolling 90 days.
- What's a good & bad score? Under 40 = bad, 40-60 =ok, 70 – 80 = good, 80+ = Advanced.[4] In the early results, one driver (a delivery driver on pay-by-delivery) was scoring under 20.
- Data protection was a major concern. Typical questions were 'can the police access the data?' and 'Can a manager monitor a driver's location in real-time?'
- Several delegates had had problems when their companies tried to use Trackers, and suggested that it is important to have a policy and information protocol, and to get legal advice, about the use of this technology. They said that their unions very concerned about tracking. This concern about vehicle tracking appeared to be a major barrier to accepting driver telematics.
- Telematics on apps might be an easy way to identify individual drivers, especially if vehicles are used by more than one driver.

There was a consensus within the group that companies found it time-consuming and difficult to get agreement from their Directors and from their drivers. It would help if there was a framework to guide organisations on the issues to consider, and to provide answers or templates on how to address common problems.

Participating organisations hoped that they and their individual drivers would assist in refining the business benefits messages from the use of Black Box Technology, and provide a pathway for other organisations to follow in relation to the successful introduction of Black Box Technology to their organisation.

[4] equivalent to a driver who had passed RoSPA's Advanced Driving Test at Gold grade within the previous three years

Manager's Survey

In January and February 2014, a qualitative survey of the participating managers was conducted to discuss:

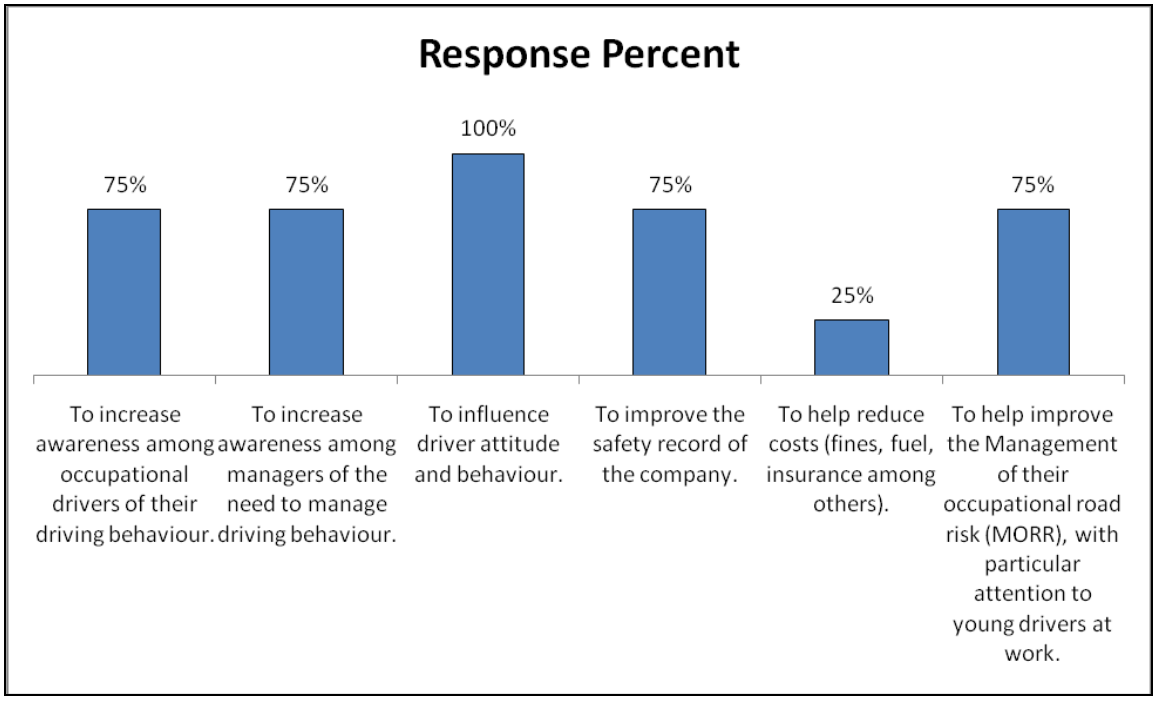
- Recruitment issues – a discussion of the issues faced in gaining agreement to use the technology and why it took longer than anticipated for decisions to be made
- Getting their drivers engaged – a description of how the employers recruited individual drivers to get involved and the problems they faced, and resolved.
- Installation issues – a description of the installation arrangements and any problems faced.
- whether and (if so) how the technology had any effect on driving, fuel, accidents, attitudes, awareness, etc)
- Barriers – a discussion of the problems employers faced in using the technology, including the Driver's Portal
- Employers' views – a summary of the employer's views and experiences of using the technology.

Agreement to use Telematics

The managers who provided feedback on Black Box Technology had no problems in gaining agreement to use the technology within their organisation. Only 25% of the managers found it took longer than they anticipated to gain agreement to use the technology. However, it should be remembered that many organisations who considered participating in the pilot project were unable to reach agreement on using the technology and so were not able to participate.

When asked why they participated in the project, the managers' answers were quite interesting. Before starting the project RoSPA anticipated that the companies participating would mainly be doing so in order to reduce their operating costs. However, the responses showed that this was the main motivation for only 25% of the companies when they agreed to participate in the project.

All respondents (100%) wanted to influence driving behaviour, whilst three-quarters (75%) of respondents also wanted to increase awareness among occupational drivers of their driving behaviour and among their managers of the need to manage driving behaviour. They also wanted to improve the safety record of the company and their management of occupational road risk (MORR).



Recruitment

When asked to describe how they recruited individual drivers to participate, each company had a different strategy. Some just asked the drivers to participate whilst others did not consult the drivers; the equipment was just fitted in pool vehicles and delivery vehicles. Some drivers were informed about the project and how they could benefit from it in detail, after having been identified by Directors in the company. They were then coached in the process. In smaller companies, the drivers volunteered to participate.

None of the managers had problems in the recruitment of drivers. But again, it must be remembered that the companies that had problems withdrew their participation.

Installation

Most (75%) of the managers stated that they had problems with the installation arrangements:

"The problems that arose were mainly ensuring vehicles were available when they were scheduled to be fitted. Logistically difficult but managed."

"The engineer found the geography of the Highlands challenging."

"In one vehicle the initial fitting did not work. It was ok after second engineer visit."

The Driver's Portal

According to the managers, the drivers who engaged with the portal did so after they heard about the benefits offered by the system, i.e., how the information could help them to improve their driving skills, reduce the number of accidents, fines and fuel consumption. The managers tried to encourage good driver behaviour. However, many drivers did not engage with the portal. The majority of those who did use the portal did so because they were requested to do so by their managers.

When asked about problems in using the technology, including the portal, 75% of the managers indicated they had a problem. Only 25% stated they did not have any problems. Some of the managers thought that the information available at the portal was not helpful in improving the drivers' behaviour. Some mentioned that some drivers could not log on or view their charts:

"*Information and access was sketchy.*"

"*Some of the drivers complained about being unable to log on and view their charts.*"

Managers Use of the Telematics Information

Only half of the managers reviewed their drivers' logs and/or reports. They reported that they found the information useful, because it:

- Identified driver / management concerns in specific areas of risk.
- Identified higher risk drivers and/or journeys.
- Identified journeys, routes or vehicles that are higher risk, or more expensive in terms of fuel use.
- Provided feedback to each individual driver to encourage self-improvement.
- Identified each driver's training needs.
- Increased awareness of road risk with the companies' drivers.
- Helped to improve the company's safety record.
- Helped to achieve better fuel efficiency.
- Helped the management of occupational road risk.
- Improved business performance of the company by reducing costs.

However, they did not actively use it:

- To assist with the delivery and development of occupational road safety within my organisation.
- At induction sessions with new drivers. Some companies didn't hire, whilst others didn't think this was relevant for the driver induction training.
- To optimize route(s).

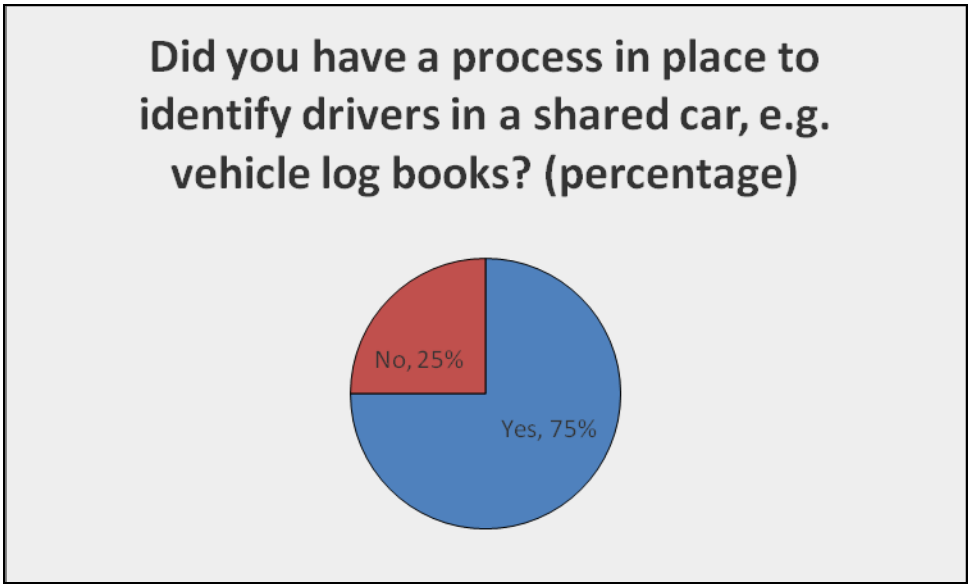
The managers who did not review their drivers' driving data said this was mainly because they did not have access to the portal, or they did not have time to review the data.

The changes to the drivers' scores suggest that the companies in which the managers engaged more with drivers had better results than those in which the managers did not engage with their drivers' data.

Shared Vehicles

One of the most significant difficulties the employers faced in using the telematics was the fact that some of their vehicles were driven by more than one driver, and some drivers drove more than one vehicle.

Three-quarters of the employers in this trial who had shared vehicles had a process in place for identifying who was driving each vehicle at different times. This was either driver log books or specifying which drivers would use the vehicle at different times of the day. However, these processes were not sufficient to allow the data on how the vehicles were being driven to be accurately allocated to the right driver.



One quarter of the employers with shared vehicles in this trial had no measures in place for identifying which vehicle was being driven by which driver at different times. As a result, the driving data from the telematics in these vehicles could not be allocated to the person who was driving it at the time the data was recorded.

Perhaps more importantly, it also meant that these employers had a significant weakness in their system for managing their occupational road risk, a fundamental aspect of which is knowing who is driving on behalf of the employer, when and where, and in which vehicle. It is essential that the data from a vehicle can be allocated to the individual person who was driving the vehicle at the time the data was recorded. In order to use telematics, employers who have vehicles that are driven by more than one member of staff, or who have staff who drive more than one vehicle, need some way of identifying who is driving when.

The most practical method would seem to be for the means of identification to be built into the telematics technology. For example, there are telematics systems that are linked to individual key fobs to identify each individual driver so the telematics data is accurately allocated to the right driver. However, this is likely to make the technology more expensive

Another option might be to use smartphone rather than a device fitted to the vehicle. However, we are not aware of any published research comparing the advantages and disadvantages of using smartphones to deliver telematics with using a device fitted to the vehicle. Given the increasing use of smartphones for this purpose, such research would be useful,

What Else would Help to Improve Driver Behaviour?

When asked, what else they thought would improve their drivers' behaviour, the managers made the following suggestions:

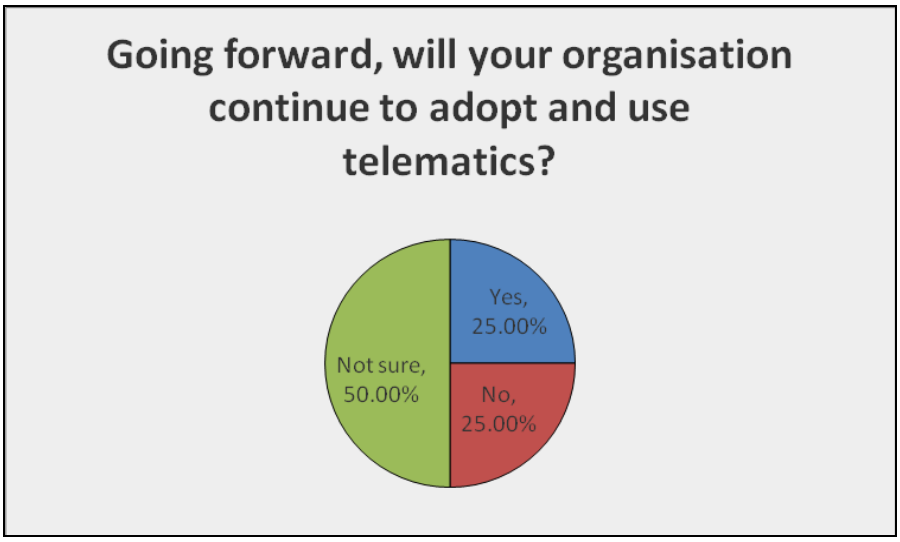
- Director Support
- Accountability of Drivers
- Black box technology in more vehicles
- Better access to their vehicle portal.

Overall Views of the Trial of Telematics

The managers expressed mixed views about their experience of using Black Box Technology:

- *"Identified drivers that needed additional training"*
- *"Very keen to improve standard of driving in business as people invariably think they are better than they are at driving."*
- *"Everybody thinks they are the best driver in the world until something happens"*
- *"Didn't really take off."*
- *"The portal was at times inaccessible. Little by way of constructive feedback."*
- *"I lost interest not long after it got installed due to finding accessing the information difficult!"*
- *"Complicated was looking for a simpler 'keep an eye on' system"*
- *"Difficult to interpret information"*

When asked whether their companies would continue to adopt black box technology, half of the managers who participated in the project were unsure, and one quarter said they would not continue to use the technology. Only one quarter of the managers said they would continue to use it.



The main reasons given by the companies who said they would not continue to use the technology, or who were unsure whether they would continue to use it, were:

- **Price** - they believed the technology is still too expensive with little benefit to justify the costs.
- **Portal ease of use** - the portal needs to be easier for managers and drivers to use.
- **Information easy to understand** - information should be simple to understand by everyone involved.
- **Relevance of information** - the information needs to be relevant so that managers and drivers would benefit from it. The managers would like to have access to their drivers' logs and/or reports without having to request the information every time they need it.

Apart from the comments about cost, the main barrier to these companies continuing to use this type of technology is the need for the managers, and the drivers, to receive relevant and timely information about the nature of the driving, in a simple and accessible manner.

THE DRIVERS

A qualitative survey of participating drivers was conducted to gather and explore their views and experiences on using black box technology in the trial. An analysis of their driving data was also conducted.

Initially, 69 drivers participated in the project, and so were driving vehicles with a black box installed. However, the number participating reduced to 57 because some cars were replaced by the employers and some drivers left their company. All the drivers (x male and x female) were aged up to 21 years old.

The telematics devices were fitted in a range of cars and vans driven for work by these young drivers:

Car Type	Number of Vehicles Used by Type	% of Vehicles in the Project
Car	23	40%
Small van	15	26%
Medium van	14	25%
Large van	5	9%
Total	57	100%

Reasons for Participating

Most of the drivers who participated in the project did so because their managers asked them to do so. Some of them were given information about the benefits of participating in the project, and some volunteered because they wanted to have an opportunity to improve their driving skills.

There were no barriers to participating in the project from the drivers' point of view. As mentioned previously in this report, the companies which had problems withdraw their participation.

Installation

In contrast to the views of the managers, the participating drivers reported that they did not have problems during installation process; only one driver mentioned the engineer had to make a second visit because the black box did not work properly after the first installation.

The Driver's Portal

Each driver was granted access to a Driver's Portal, by using their email address, through which they could, if they wanted, view feedback about their driving and their safe driving score. Some accessed the portal with more frequency than others and gave more feedback on the use of portal.

Some of the drivers reported technical difficulties in accessing the portal, and some did not think the information was useful for them. Their reasons were:

- Not all trips were recorded
- The contents were not specific enough for improving their driving behaviour.
- There were no indications of how the drivers could improve their scores, even though the portal provided a score.

Some of the managers did not have access to the portal and consequently to the information about their drivers, and so could not help their drivers to improve their scores and driving skills. This was mainly the case with local authorities, who had a large number of vehicles.

Effect on Driving

Some of the drivers believed the black box technology helped their company to reduce costs as the information helped them to identify journeys and routes that are more expensive in terms of fuel use.

However, some of the drivers did not think the black box had any effect on their driving skills or helped their managers to identify journeys, routes or vehicles that are higher risk.

"Not enough data provided to IMPROVE my score. A % rating against a couple of headings is not sufficient enough to improve."

"There was little consistency in scoring. I drove the same throughout the period yet my score was fluctuating between 1 and 5 with no reasoning for this. Obviously an indicator should be provided to prevent the same mistake occurring more than once."

The respondents believed that while younger drivers are statistically more at risk of driving poorly, the scheme should be aimed at a broader range of age groups. They thought that older drivers can have much worse driving behaviour than young drivers.

Some of the drivers believed that the project would not create an accurate picture of driving risk because it was aimed at one age group only. Some of the young drivers believe driver attitude does not depend on age. One driver commented:

"One has to drive the road daily and see the level and attitude of drivers that are twice my age."

Drivers also commented that the technology should be fitted to vehicles throughout the company and without prior warning to the drivers. In their opinion, this would guarantee to show that a driver is either responsible or not. One driver said:

"I don't believe that those with the knowledge that their cars are fitted will behave in the same manner as those without knowing."

To sum up, the drivers believe that unless the black boxes are installed in all vehicles in the company and without the drivers' knowledge, the data will be biased and their driving would be influenced by their knowledge of the existence of the box, affecting the way they drive. This, by itself, shows that the black box brings awareness to drivers provoking a change in their behaviour.

Driving Scores

In addition to the qualitative drivers' survey, their driving scores were also analysed.

The telematics generated a Safe Drive score for each driver, which shows how closely their driving matches that of a RoSPA Advanced Driver (i.e. a driver who has a Gold grade pass in RoSPA's Advanced Driving Test). The score is calculated from a combination of four factors: Pace (appropriate speed for the conditions), Smoothness (braking and acceleration), Calmness (acceleration and cruising speeds – the opposite of aggressive driving) and Anticipation (braking patterns indicating good anticipation).

The Safe Drive Score is calculated once the driver has completed 250 miles of driving. It then measures continuous driving over a rolling 90 day period, with the score being adjusted accordingly. The telematics produced a new profile for each driver for every trip. The drivers, on average, made ten trips a day, which meant that in a month (20 working days) a driver would have made around 2,000 trips. Consequently, their driving profile was updated 2,000 times a month, i.e., after every trip.

The drivers had their devices installed at different times, and it took them varying amounts of time to reach the initial 250 miles of driving. Therefore, the analysis of their driving covered a nine month period, from 1 June 2013 to 1 February 2014. By the start of this period, all the drivers had had their devices installed and had completed the initial 250 miles of driving.

During the period 1st June 2013 – 1st February 2014, 57 drivers participated in the project. However, some of the young drivers who participated drove different vehicles, which meant that the driving data recorded for their vehicles actually represented the driving of different drivers.

During the period 1st June 2013 – 1st February 2013, after the data of shared vehicles were excluded from the analysis:

- 13 driver scores increased, indicating that the driving improved
- 3 driver scores decreased, indicating that the driving deteriorated
- 1 driver had no change in their scores

The variations in the driver scores may have been caused by a variety of factors, including, but not limited to, the use of the black box technology. For instance, variations in the type of driving, and the routes and times for their journeys may have affected the driving scores. Also, as the participating drivers were all young drivers, their driving abilities and experience would have been developing during the timescale of the project.

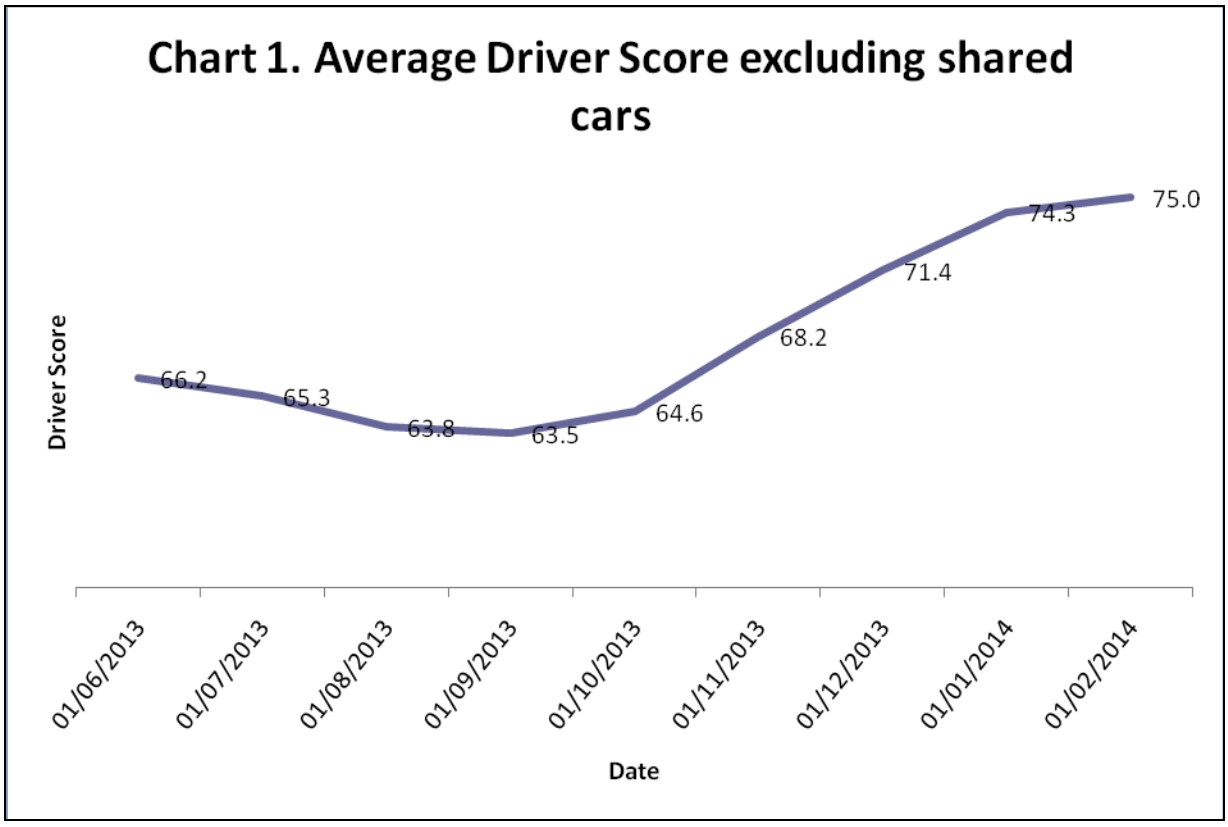
Drivers who started with a high score (for example, 90/100) because they were driving well to begin with, were unlikely to improve their score much further.

An analysis of the association between distance and scores for individual drivers showed that nine drivers have a strong positive correlation, i.e., the higher their mileage, the larger the improvement in their score. One driver's data, however, showed a strong negative association, in that the more distance they drove, the more their score reduced. Two drivers showed a mild positive association and five drivers showed no correlation (correlation coefficient close to zero).

It is worth noting that the correlation coefficient measures association between variables and not causation. It cannot define whether one variable causes the other's behaviour, but it suggests there is an association between the variables.

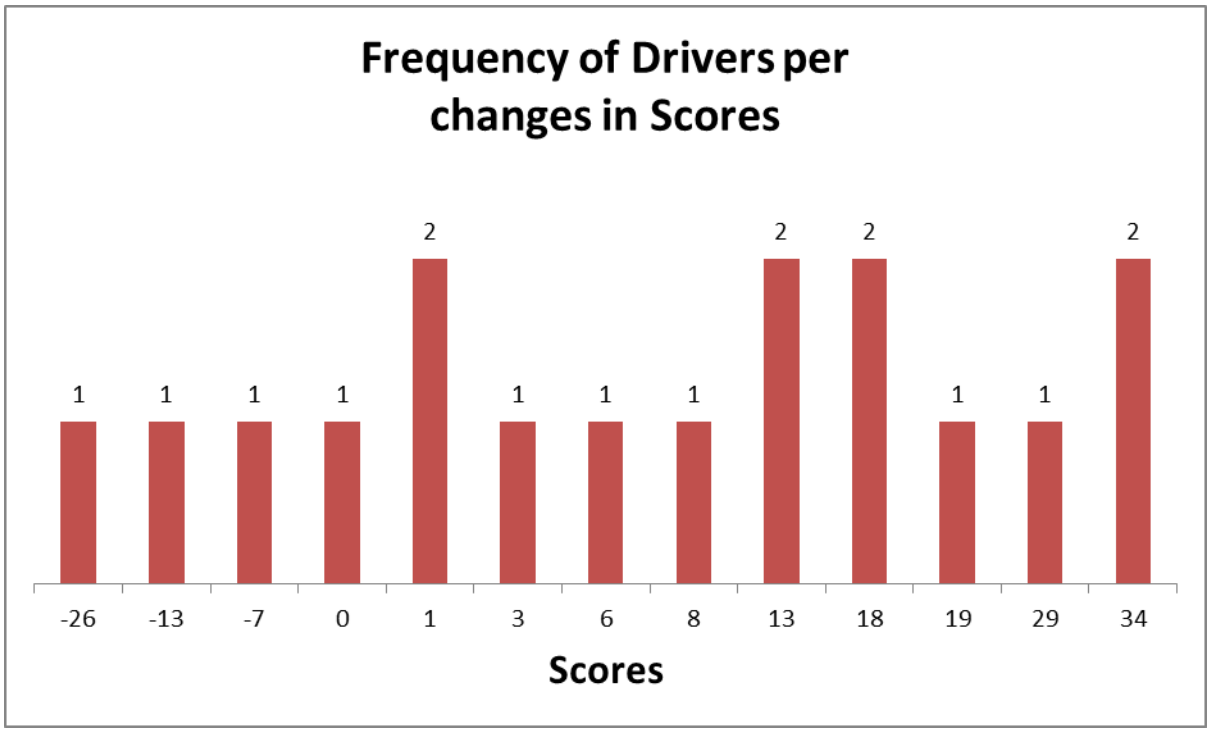
The table and individual graphs can be seen at Appendix 6, except for driver 6 as their average monthly score did not change.

Chart 1: Change in Average Driver Score, excluding those who drove shared vehicles, 01 June 2013 to 04 February 2014



From the start to the end of the project, drivers 4 and 16 were the ones with largest percentage change in their scores (42.5% and 38.6% respectively).

The table below shows the frequency of drivers according to the change in initial scores:



Use of the Driver's Portal

Use of the Driver's Portal was low during the project, with only 17 of the 57 participating drivers using it. All 17 of these drivers were employed by small companies and were each the only member of staff driving their vehicle.

There were several reasons for the low use of the portal:

1. Some of the young drivers did not have an email address or internet access at work to be able to access the portal.

2. The drivers were neither rewarded for improving their driving, nor penalised for poor driving, which reduced their incentive to view the feedback about their driving on the portal.

3. The Portal could not distinguish between the drivers of shared vehicles that were driven by more than one driver. It could not allocate the driving data and driving scores to the driver who was driving at the time the data was recorded, and so the drivers could not know if the data was relevant to them.

4. Some of the drivers did not think the information provided in the Portal was useful in helping them to improve their driving.

To encourage the drivers to use their portal, they were sent emails or texts with safety tips/messaging dependant on their score on a weekly basis. However use of the Driver's Portal remained low.

One manager used the portal on behalf of his drivers. However, the portal was not primarily intended for managers, but for individual drivers to be able to log in and view their own driving.

The driving scores of 3 of the 17 drivers who engaged with the portal, deteriorated (appendix 5 – driver 3, 12 and 13). It is interesting to note that drivers 12 and 13 work for the same company (appendix 7 – company 4).

When comparing the driving scores by company (appendix 7), the data suggests that the companies in which the managers engaged more with drivers had better results:

In company 1, one driver improved his driving score by 74%, which was the biggest percentage increase in this project by an individual driver. Three (75% of the participating drivers in company 1) improved their driving scores by 4%, 43% and 74% respectively. The driving score of one driver in company 1 deteriorated by 11%. This company intends to keep using telematics. The manager has engaged with his drivers and is very pleased with the results as he managed to reduce costs and help his young drivers to improve their skills.

In company 2, one driver had no difference in his monthly driving scores. The other two drivers slightly increased their scores by 1% and 3% respectively.

In company 3, the scores for their three participating drivers increased by 1%, 19% and 30% respectively.

In company 4, the driving scores show that only one driver improved his driving behaviour, by 43%. The driving scores of the other two participating drivers in this company deteriorated by 19% and 32% respectively.

In company 5, the driving of both participating drivers improved by 20% and 63% respectively.

The data above and the correlation analysis suggest that telematics can improve driver behaviour, and enable driving behaviour to be easily monitored. However, obtaining the greatest effect, and value for money, from telematics requires regular reminders and communication to encourage drivers, and managers, to view the feedback about the driving recorded by the telematics.

Options for doing this can include:

- Providing real-time feedback at the end of a journey, via an app
- Providing dynamic automated emails or texts, with safety tips/messaging dependant on score
- Conducting regular reviews with drivers and managers,
- Creating competition between drivers, for example by leaderboards or a driver's league.
- Linking a driver training or education programme to the telematics data
- Providing regular rewards for improving driving scores, and maintaining good scores
- Providing 'penalties' for poor or deteriorating scores

THE TELEMATICS PROVIDER

MyDrive Solutions Ltd supplied and installed the telematics software and 'black box' for this project. They also designed and managed the driver's portal through which the drivers could view feedback about their driving and see their driving scores. As part of the evaluation, MyDrive's project manager was asked to complete a short questionnaire to gather their experiences of:

- The Installation Phase
- Use of the technology, especially the Driver's Portal by both employers and drivers
- Any significant differences between reactions to, and use of, the technology in this project and other projects in which they have been involved.

Installation of the telematics devices

The devices were installed in the vehicles by MyDrive's installation partner, HPC, according to the following process:

1. RoSPA provided the contact details of the participating drivers
2. HPC contacted the drivers within 24 hours to agree the date, time and location to install the telematics. The driver was asked to suggest the time, date and location so that it was convenient for them, rather than it being imposed upon them. They were also given contact details if they needed to rearrange the appointment for any reason.
3. A text message was sent to the driver on the morning of the appointment to remind them to be at the pre-arranged location at the time agreed.
4. The installations were completed within 30 minutes (a time set as part of the installer's Service Level Agreement). Drivers signed at the beginning of the installation, then again at the end to agree no damage has been caused to their vehicle.
5. If HPC were unable to speak to the driver when they first called, they left a voicemail message. If they could not reach the driver after three calls, the job was cancelled and details passed back to RoSPA to re-engage with the driver

The majority of the installations were completed on time without problem. However, there were a few problems with some of the installations:

- Drivers were out on jobs when the installer arrived for the appointment
- Drivers changed their minds about wanting the boxes on the day of the appointment
- One company told the installers that the installations had already taken place, although this had not happened. On investigation, it was discovered that this company were also trialling telematics with another company that was not connected with this project, which led to the confusion.

Removing Black Boxes from Vehicles

Only one device has had to be removed from a vehicle in which it was fitted during the project, and this was as a result of the driver selling his car. A small number of other boxes were switched off, which means they were no longer able to collect data, but left in the vehicle.

How could the Installation Arrangements have been improved?

Overall, contacting the drivers to arrange an appointment within three calls, or getting them to call back, was difficult. The drivers were perfectly within their rights to re-arrange an appointment, which is often unavoidable in a work environment, but failed appointments incurred a call-out fee, that MyDrive had to pay.

MyDrive suggested that it would have been useful to keep the drivers' line managers aware of the appointments, so that they could encourage their drivers to attend their installation appointments, or to re-arrange them rather than miss them. This would have improved the percentage of successful installations.

MyDrive also felt that there was a significant difference between arranging to fit telematics in work vehicles and arranging to fit it in the vehicle of a driver who has taken out a telematics motor insurance policy for their own vehicle. With an insurance policy, the insurance is cancelled if the driver does not have the box installed, and therefore, the driver has a strong incentive to attend the appointment to have it installed. However, with the young at-work drivers in this project, this motivation did not exist, and there was no penalty if they failed to turn up for the installation appointment, or changed their mind at the last moment about having the telematics installed.

Based on their experience in this project, MyDrive felt that at-work drivers need to be incentivised (either through a reward for attending the installation appointment, or a penalty for missing an appointment or deciding not to have the telematics installed) to ensure that they book an appointment, arrive at the agreed time and place for the installation and have the device installed.

Use of the Driver's portal

MyDrive believe that use of the Driver's Portal was low because many of the young drivers did not have an email address or internet access at work to be able to access the portal., and the drivers were neither rewarded for improving their driving, nor penalised for poor driving, which reduced their incentive to view the feedback about their driving on the portal.

In their work supplying telematics linked to motor insurance for young drivers, MyDrive have found that providing feedback to drivers through a smartphone app is a superior solution than a web-based portal. They have found that providing scoring, map views, and dynamic messaging upon the completion of every trip to a driver via an app is an effective method of maintaining engagement with the drivers.

They have also found that providing feedback as soon as a trip is completed is very effective and allows safe driving tips to be read and understood in context of the trip that has just been completed. An app can still be used as a feedback mechanism, alongside a black-box to collect the data, or an app can be used as a data-collection device as well as a feedback mechanism.

How the telematics affects driver behaviour

MyDrive supply telematics for several motor insurance companies who then use the technology to provide telematics-based insurance for young drivers who they insure. Based on their experience from this, MyDrive have found that young driver's behaviour improves much more when they know their driving is monitored and analysed by their insurers. Research studies[5] have also found that driving improves more when drivers receive feedback about their driving. Their experience in providing telematics for insurance companies also suggests that driving behaviour improves when the driver is monitoring their own behaviour, although this is more so for conscientious drivers.

Differences between this project and other projects in which MyDrive have been involved

MyDrive believe that improvements in driving behaviour are significantly better when there are rewards given for good driving.

Drivers who have telematics as part of their insurance policy are encouraged to drive well to receive cash back, or discounts from their premiums. They are seeking ways to save their own money, and are, therefore, more motivated to engage with the telematics and adapt their driving to gain better scores. MyDrive reported that the most successful campaign that they have seen is one where the drivers are rewarded with cash-back or a free cradle for their phone, if they download the telematics app and get a good score.

However, at-work drivers do not have these incentives. MyDrive found that working with the fleets and young drivers at work in this project presented greater challenges in recruiting and motivating drivers to engage with the technology. They believe that this was because the drivers did not have the same motivation to engage with the technology because their employers paid for their driving costs, as is normal when driving for work. The drivers, therefore, did not have the same personal financial motivation as those using telematics for insurance purposes. MyDrive suggested that specific incentives for the drivers need to be part of the use of telematics in an at-work setting.

MyDrive also suggested that for employers who have vehicles that are driven by different members of staff, and who had drivers who drove different fleet vehicles, a smartphone app to record data would be a more practical option than a device retro-fitted in the vehicle because the app would be related to the individual driver rather than the vehicle.

[5] "Road Safety and In-vehicle Monitoring (Black Box) Technology", RoSPA, 2012, http://www.rospa.com/roadsafety/info/black-box-technology.pdf

CONCLUSIONS

Many employers are using telematics to monitor the at-work driving of their staff. This technology can significantly reduce crash rates, levels of risky driving behaviours, and fuel and accident costs[6], but research provides little detail of the practical issues employers face in using it, or how to best use the data and feedback to reduce risk and costs.

This project, funded by the Scottish Government, was designed to explore the practical issues that employers face when seeking to use telematics, how they were or were not resolved, and how they were able to use the information the technology provides to improve their management of occupational road risk for young drivers at work.

Given the small sample size (of both employers and drivers) the pilot was mostly concerned with assessing the barriers employers need to overcome to make use of this technology; it is not a quantitative analysis of the effectiveness of telematics on driving behaviour.

Awareness of Telematics among Employers in Scotland

The process of recruiting employers to participate in this trial identified that there is a challenge in raising awareness amongst employers of the potential role and benefits of using in-vehicle telematics.

The first finding from this project is that there is a challenge in raising awareness amongst employers of the potential role and benefits of using in-vehicle telematics. Over 6,000 employers, who had previously demonstrated an interest in at-work road safety, were sent information about the trial. However, only a very small proportion (46 organisations) responded to the invitation to participate. One reason may have been that the trial was specifically aimed at employers who had young drivers (aged 17 – 21 years) who drove for work.

Employers who are interested in using telematics technology must gain agreement within their organisation, and crucially with staff and their representatives. In this project, two-thirds of the employers (21 out of 32) who entered detailed negotiations about participating in the trial, were subsequently unable do so, mainly due to concerns from unions and staff associations, or difficulties in persuading their drivers to participate.

An extensive and ongoing communication campaign is needed to raise awareness amongst employers in Scotland about the potential road safety and financial benefits that in-vehicle telematics technology offers them.

Employers also need help in knowing how best to secure agreement within their organisation to use telematics. Engaging with the key individuals in staff associations and trade unions was crucial in securing agreement to use this technology. Although they may raise very legitimate concerns, these are not insurmountable.

[6] "Road Safety and In-vehicle Monitoring (Black Box) Technology", RoSPA, 2012, http://www.rospa.com/roadsafety/info/black-box-technology.pdf

Participants in the Trial

The 11 employers who participated in the pilot ranged from micro and small businesses, each with 1 to 4 drivers participating in the project, to Local Authorities, with up to 28 drivers participating in the project.

Initially, 69 vehicles were fitted with a small telematics device. However, as the project progressed, this reduced to 57 vehicles because some drivers left their employers and some vehicles were sold or replaced by the employer during the implementation phase of the project. Therefore, the results of the trial are based on telematics fitted in 57 cars and vans, all driven by young at-work drivers:

23 cars
15 small vans
14 medium vans
5 larger vans

Installing the Telematics Devices

Although the installation process was generally smooth, there were a few problems, which occurred mainly due to the availability of the vehicles into which the devices were to be fitted. The installation process is simple, but does need to be carefully planned and implemented. At-work drivers need to be incentivised, through a reward for attending the installation appointment, and/or a penalty for missing an appointment.

Effect on Driving

The telematics generated a Safe Drive score for each driver, which shows how closely their driving matches that of a RoSPA Advanced Driver (i.e. a driver who has a Gold grade pass in RoSPA's Advanced Driving Test). The analysis of their driving covered a nine month period, from 1st June 2013 to 1st February 2014.

However, some of the young drivers drove different vehicles, which meant that the driving data recorded for their vehicles actually represented different drivers. When their scores are excluded from the analysis:

- 13 driver scores increased, indicating that the driving improved
- 3 driver scores decreased, indicating that the driving deteriorated
- 1 driver had no change in their scores

The variations in the driver scores may have been caused by a variety of factors, including, but not limited to, the use of the black box technology, variations in their driving tasks, and the routes and times of their journeys. Also, as the participants were young drivers, their abilities and experience would have been developing during the project.

The Driver's Portal

Each driver had access to a personalised Driver's Portal through which they could, if they wanted, view feedback about their driving and their safe driving score. Use of the Driver's Portal was low during the project, with only 17 of the 57 participating drivers using it. All 17 of these drivers were employed by small companies and were each the only member of staff driving their vehicle.

The low use of the portal may have been because:

1. Some of the young drivers did not have an email address or internet access at work to be able to access the portal.
2. The drivers were neither rewarded for improving their driving, nor penalised for poor driving, which reduced their incentive to view the feedback about their driving on the portal.
3. The Portal could not distinguish between the drivers of shared vehicles that were driven by more than one driver. It could not allocate the driving data and driving scores to the driver who was driving at the time the data was recorded, and so the drivers could not know if the data was relevant to them.
4. Some of the drivers did not think the information provided in the Portal was useful in helping them to improve their driving.

To encourage the drivers to use their portal, they were sent emails or texts with safety tips/messaging dependant on their score on a weekly basis. However use of the Driver's Portal remained low.

Drivers who have telematics as part of their insurance policy are incentivised to drive well by receiving a reward, such as a discount on their insurance premium, or a punishment, such as not receiving the discount. However, at-work drivers do not have these incentives. Therefore, some form of incentive programme is needed for drivers who are using telematics in an at-work setting.

Other options for encouraging at-work drivers to regularly engage with the feedback about their driving can include:

- Providing real-time feedback at the end of a journey, via an app
- Providing dynamic automated emails or texts, with safety tips/messaging dependant on score
- Conducting regular reviews with drivers and managers,
- Creating competition between drivers, for example by leaderboards or a driver's league.
- Linking a driver training or education programme to the telematics data
- Providing regular rewards for improving driving scores, and maintaining good scores
- Providing 'penalties' for poor or deteriorating scores

Managers Use of the Telematics Data

Only half of the managers reviewed their drivers' logs and/or reports. The changes to the drivers' scores suggest that the companies in which the managers engaged more with drivers had better results than those in which the managers did not engage with their drivers' data.

It is clear from the feedback from both the managers and the drivers that the design, accessibility and content of the Driver's Portal is crucial in encouraging and enabling the telematics data to be viewed, understood and then used to improve driving standards, and the management of occupational road risk.

The managers who reviewed the data reported that they found it useful, because it:

- Identified driver / management concerns in specific areas of risk.
- Identified higher risk drivers and/or journeys.
- Identified journeys, routes or vehicles that are higher risk, or more expensive in terms of fuel use.
- Provided feedback to each individual driver to encourage self-improvement.
- Identified each driver's training needs.
- Increased awareness of road risk with their company's drivers.
- Helped to improve the company's safety record.
- Helped to achieve better fuel efficiency.
- Helped the management of occupational road risk.
- Improved business performance of the company by reducing costs.

However, they did not actively use the data:

- To assist with the delivery and development of occupational road safety within my organisation.
- At induction sessions with new drivers (although some companies did not recruit any new drivers during the trial).
- To optimize route(s).

The managers who did not review their drivers' driving data said this was mainly because they did not have access to the portal, or they did not have time to review the data.

Overall, the managers who participated in the project expressed mixed views about their experience of using black box technology. Apart from concerns about cost, the main barrier, in their view, is the need for the managers, and the drivers, to receive relevant and timely information about the nature of the driving, in a simple and accessible manner.

Obtaining the greatest effect, and value for money, from telematics requires regular reminders and communication to encourage drivers, and managers, to view the feedback about the driving recorded by the telematics.

Managers in companies also need help and guidance on how to actively use the information that the telematics provides to improve the safety of their drivers, and to improve their management of occupational road risk.

Shared Vehicles

One of the most significant difficulties the employers faced in using the telematics was the fact that some of their vehicles were driven by more than one driver, and some of their drivers drove more than one vehicle.

Three-quarters of the employers in this trial who had shared vehicles had a process in place for identifying who was driving each vehicle at different times. This was either driver log books or specifying which drivers would use the vehicle at different times of the day. However, these processes were not sufficient to allow the data on how the vehicles were being driven to be accurately allocated to the right driver.

One quarter of the employers with shared vehicles in this trial had no measures in place for identifying which vehicle was being driven by which driver at different times. As a result, the driving data from the telematics in these vehicles could not be allocated to the person who was driving it at the time the data was recorded.

Perhaps more importantly, it also meant that these employers had a significant weakness in their system for managing their occupational road risk, a fundamental aspect of which is knowing who is driving on behalf of the employer, when and where, and in which vehicle.

It is essential that the data from a vehicle can be allocated to the individual person who was driving the vehicle at the time the data was recorded. In order to use telematics, employers who have vehicles that are driven by more than one member of staff, or who have staff who drive more than one vehicle, need some way of identifying who is driving when.

The practical method would seem to be for the means of identification to be built into the telematics technology. For example, some companies (not in this trial) use a key fob to identify each individual driver so the telematics data is accurately allocated to the right driver. However, this is likely to make the technology more expensive.

Another option is to use a smartphone app to record data, rather than a device fitted in the car, because the app would be related to the individual driver rather than the vehicle. In this case, the company would need to ensure that drivers did not use the Smartphone for other purposes while driving. Research comparing the advantages and disadvantages of using smartphones to deliver telematics against using a device fitted to the vehicle would be useful. Research comparing the advantages and disadvantages of using smartphones to deliver telematics with using a device fitted to the vehicle would be useful,

RECOMMENDATIONS

Awareness
An ongoing communication programme is necessary to raise awareness amongst employers and Unions in Scotland about the potential road safety and financial benefits that in-vehicle telematics technology offers them.

Use of the Telematics Data
Issues around the confidentiality of the driving data, and how employers will use it, should be investigated and good practice developed.

Managers in companies need help and guidance on how to actively use the information that the telematics provides to improve the safety of their drivers, and to improve their management of occupational road risk.

Consultation with Companies
Good practice on the best ways to consult within a company when considering adopting the use of telematics should be developed to help employers gain agreement from all relevant parties, including staff and their representatives, within their organisation.

A framework to guide organisations on the issues to consider, and to provide answers or templates on how to address common problems, should be developed.

Installation
Advice for employers on the issues to consider when arranging for telematics to be installed in their vehicles should be developed.

Providing Feedback on Driving Performance
Guidance on the most effective ways of providing feedback on driving performance to the drivers and their managers should be developed.

The design, accessibility and content of the method of providing feedback about the driving is crucial in encouraging and enabling the telematics data to be viewed, understood and then used to improve driving standards, and the management of occupational road risk.

Incentives for Drivers
Options for incentivising at-work drivers to regularly engage with their driving feedback, and to use it to improve their driving, should be developed.

Shared Vehicles
Guidance on practical ways of identifying which driver is driving a shared-use vehicle should be developed, so that the driving data can be correctly allocated to the right driver. Research comparing the advantages and disadvantages of using smartphones to deliver telematics with using a device fitted to the vehicle would be useful,

Other Drivers
This trial was targeted at young at-work drivers. Similar trials should be conducted with all at-work drivers, irrespective of age or driving experience.

APPENDICES

Appendix 1: Survey of High School Pupils at West Drive 2012

Appendix 2: Invitation to Participate in the Trial

Appendix 3: Employer's Black Box Technology Workshop

Appendix 4: Letter to STUC

Appendix 5: Driving Scores of the Drivers who Engaged with the Driver's Portal

Appendix 6: Association between Cumulative Distance and Average Monthly Score for individual Drivers

Appendix 7: Graphs – Sample of Drivers Scores by Company

APPENDIX 1: SURVEY OF HIGH SCHOOL PUPILS AT WEST DRIVE 2012

BLACK BOX TECHNOLOGY VIEWS (FOR or AGAINST)

The views below are from Year 5 and 6 (ages 16 and 17 years) high school pupils who attended the West Drive event on the 28th – 30th of August 2012 at the Howden Park Centre in West Lothian.

17 Votes were **Against** the Technology

Reasons:

1. Due to the fact that people who share cars quite often may disrupt the readings
2. Shared vehicles can cause difficulties
3. Due to rising insurance premiums
4. I would use it but it gives the insurance companies too much control
5. Abuse of the device
6. Hacking possibilities
7. Restricts Night driving
8. You cannot always be driving safely
9. Because if you drive carelessly more than once it will make your insurance more expensive
10. You do not get to drive when you want

182 Votes were **For** the Technology

Reasons:

1. To see how you drive and can get better insurance
2. Cheaper car insurance and safer roads
3. Bring on safe driving and allows people to see how they drive
4. This technology will save many lives
5. Rewards good drivers
6. Highlights good drivers from bad
7. Promotes safer driving, money is an important factor and incentive for the youth
8. Safer driving and low insurance
9. It would reward good drivers and show bad drivers where they are going wrong
10. Improves driving therefore saving lives
11. Warns you and makes you a better driver
12. It would help drivers
13. Good idea
14. You can review how well you drive
15. Can save lives
16. Cheaper insurance
17. Safer driving and cheaper premiums
18. Become a better driver as you learn your mistakes and also cheaper insurance
19. Help you realise where you are weakest in your driving
20. Helps makes roads safer for you and the driver

21. Can track how good drivers are, safer roads
22. It means safer drivers can prove they are good drivers and get cheaper insurance
23. Good at helping realising your habits
24. Safer and you can't lie
25. It would improve motorist behaviour plus it might help the Police
26. Safer as it shows how good you are at driving and what you can do to improve
27. Believe it helps promote better driving
28. Helps improve driving and safer
29. Improved safety
30. Seems fair and a good idea
31. It will help drivers become aware of how safely they are driving and improve road safety everywhere
32. Beneficial for young drivers. And can bring down cost even if it is a little
33. The rate of boys with reckless driving will increase insurance. It will give a fair cost for each individual
34. Makes driver aware of their driving
35. Improves safety and makes you more conscious of your driving
36. Better for good drivers = Rewards
37. Better insurance
38. More conscious of driving and makes roads safer
39. Increases road safety and lowers insurance cost
40. Prevents accidents
41. It is the person's choice, not mandatory and they save money
42. It will influence more people to drive safely
43. As it lets you know how you drive, safely or not
44. Fairer for boys and girls
45. I think it is a brilliant idea as it can persuade people to drive better and gives them a chance to control their insurance
46. It means good drivers get better deals
47. Keeps insurance fair and specific to every person
48. It will stop bad drivers
49. It gives you a specific reason for your scoring and pin points your errors exactly
50. More accuracy for insurance costs and rewards safer drivers
51. Drivers that are safe deserve cheaper insurance
52. Lowers Female insurance
53. Increases road safety
54. Makes people aware of their driving
55. Encourages good driving
56. Helps improve driving with feedback and can get insurance down if it is good
57. Cheaper insurance for young driver
58. Lowers costs and a good way to see how you are driving

Summary

In summary, the votes '**for'** the technology were:

- Increases road safety
- Encourages good driving
- Promotes safer driving and as a result save lives.
- It will make young drivers more aware of their driving behaviours and will help improve from the feedback they get
- Insurance costs/premiums will be at a reduced cost
- Help identify good drivers from bad drivers
- Insurance will be fair (based on your driving as an individual)

And for those **against**:

- The issue of having different people drive a car will disrupt the records made
- Restrictions on when one can drive
- Insurance can become more expensive
- Abuse of the device

APPENDIX 2: INVITATION TO PARTICIPATE IN THE TRIAL

YOUNG DRIVERS AT WORK (SCOTLAND)
BLACK BOX PILOT

Invitation

To Join RoSPA Scotland's "Young Drivers At Work (Scotland) Black Box Pilot"

RoSPA Scotland invites you to participate in a unique and innovative pilot project, being conducted with funding from the Scottish Government, to evaluate the practicalities and effectiveness of employers using telematics to monitor and improve the at-work driving of their young staff. The project will run from June 2012 to July 2013, and there is no charge to participate.

Many companies are starting to use telematic devices (black boxes) to monitor the at-work driving of their staff. Insurance companies are also increasingly using black boxes to monitor how, where and when the young drivers who they insure are driving, to provide feedback to the individual drivers and, where necessary, to adjust their insurance premiums to incentivise them to undertake lower risk driving and improve their driving skills.

Research studies have shown that this type of technology can significantly reduce crash rates, levels of risky driving behaviours, and fuel and accident costs.

In work related road safety, this technology offers huge potential to:

- analyse the real driving behaviour and standards of staff who drive for work
- provide tailored, personalised feedback to drivers to help them improve their driving or reduce their exposure to high risk driving situations
- identify driver training and education needs of at-work drivers
- incentivise lower risk driving
- significantly reduce the company's costs

The aim of this pilot project is to identify how best employers in Scotland can make use of this type of technology to help them keep their staff (and other road users) safer when they are driving for work, to comply with their legal obligations to manage occupational road risk and to improve the efficiency of their business by reducing accident, fuel and other costs. The results will be used to promote the benefits of this type of technology throughout Scotland (and beyond) and to help other employers to adopt it.

If you participate in the project, RoSPA's partner, MyDrive Solutions Ltd, will supply and install a small telematics device in your cars or small vans that are driven for work by young (17 – 25 year old) drivers. The installation will be done by a professional installer who can come to the driver's house or place of work, and should take just twenty minutes. The box is fitted underneath the dashboard without any drilling and there should be no impact on the vehicle's warranty.

The box records GPS data from each trip and sends it to MyDrive automatically at the end of the journey. It is not a tracking unit so we will not know where the vehicle is while it is being driven. The device takes a snapshot of the individual's driving style every second, and scores the driver accordingly, including their level of aggression, smoothness, anticipation and consistency. It maps the driving onto the road network (for example, whether a driver is on a motorway or A-road, or approaching a roundabout) and driving conditions (for example, whether an individual is driving at night, in heavy congestion, or in treacherous weather conditions). You can stop the collection of data any time and your data will be kept securely and is anonymous on MyDrive's systems.

25 May 2012

YOUNG DRIVERS AT WORK (SCOTLAND) BLACK BOX PILOT

By monitoring driving every second, we develop an extremely detailed picture of the real-life driving style, habits and capability of each individual driver, thus allowing the risk to be assessed very easily and very accurately.

We will provide a web portal through which you and your drivers can view the results and analysis of the driving, along with advice on what the data means. This information can be used to:

- Identify and prioritise higher risk drivers and/or journeys
- Provide feedback to each individual driver to encourage self-improvement
- Motivate drivers and incentivise better driving
- Identify each driver's training needs rather than rely on broad, off the shelf, driver training
- Identify particular journeys, routes or vehicles that are higher risk, or more expensive in terms of fuel use
- Achieve better fuel efficiency
- Encourage competition between drivers to see who can improve their driving the most
- Help meet the employer's legal duties to manage their occupational road risk
- Improve the reputation of the company
- Improve the business performance of the company by reducing costs

As part of the project, RoSPA will be happy to provide advice on the options you might consider regarding drivers, driving behaviours or journeys that need to be improved, and to help you to draft a policy on the use of black boxes to manage your organisation's occupational road risk

Following the pilot, RoSPA will publish a report to show how well black box technology is able to help identify real-life driving habits of at-work drivers in order to feedback to the drivers and help employers identify high risk drivers and journeys, training needs or other management approaches to reducing their risk. We will also publish a good practice guide for employers on the use of black box technology.

This is the first research of its kind in Scotland and will help to inform future work in Scotland with companies who employ young drivers, and support the implementation of Scotland's Road Safety Framework to 2020.

For more information, or to join the project, please contact me at kbraidwood@rospa.com.

Many Thanks

Kathleen Braidwood
Road Safety Officer, Scotland
RoSPA Scotland

25 May 2012

YOUNG DRIVERS AT WORK (SCOTLAND) BLACK BOX PILOT

THE BLACK BOX

The device used in this pilot project is a Redtail VAM unit, which is widely used as a tracking device by many companies (although it will not operate as a tracker in this trial). It is about the size of a mobile phone and is fitted by a professional installer underneath the dashboard without any drilling and there should be no impact on the vehicle's warranty. Installation should take about 20 minutes.

RADIO SYSTEM

GSM SYSTEM	AUTOMOTIVE RATED QUAD BAND MODEM
GSM ANTENNA	INTERNAL
GPS SYSTEM	SIRF STAR III CHIPSET
GPS ANTENNA	INTERNAL OR EXTERNAL

DATA COMMUNICATIONS

EXTERNAL PORT	SERIAL
TIMING	INTERNAL RTC
DATA RATE	9600 BAUD
GPS DATA	LOCAL STREAMING OF GPS NMEA
GSM DATA	SUPPORTS STANDARD AT COMMANDS
GPRS	UDP OR TCP/IP
OVER THE AIR FIRMWARE UPDATES	YES, SUPPORTS * RTP MESSAGES

ENVIRONMENTAL/APPROVALS

VOLTAGE SUPPLY	12/24V OPERATION
POWER SUPPLY PROTECTION	OVER AND REVERSE VOLTAGE
LOAD DUMP	> 90V
CASEWORKS	IP66 AND IP67, OPTIONAL
E MARKING	72/245/EEC AMENDED TO 2006/28/EC
APPROVALS	CE/FCC/PTCRB/MULTIPLE CARRIERS
INTERNAL BACK-UP BATTERY	YES, OPTIONAL
TEMPERATURE RANGE**	-30°C TO +85°C

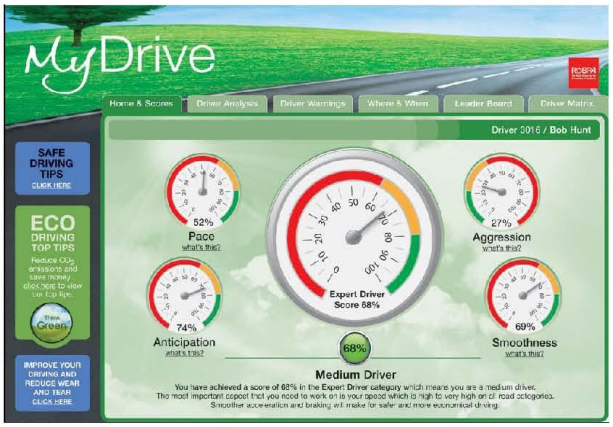
25 May 2012

YOUNG DRIVERS AT WORK (SCOTLAND) BLACK BOX PILOT

The Web Portal

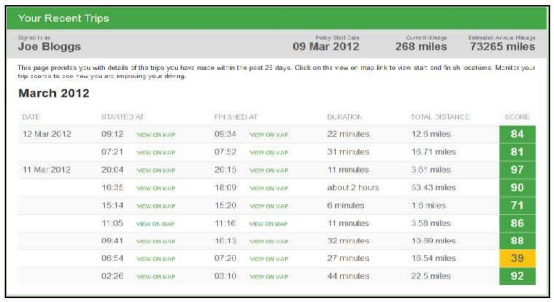
RoSPA will provide access to a web portal through which managers and drivers in the company can view the results of the data from the black box. This will be available from the end of August because the first few months of the project will be used to collect baseline data from each black box to compile a 'before' profile of each individual's driving.[1] This will be compared with their 'after' driving when they have access to the portal to see the analysis of how they are driving.

The portal is being specifically developed for this trial, but some images of the sort of information it will provide are below.



The dials are:

Pace:	Appropriate use of speed
Smoothness:	Braking and acceleration
Calmness:	High speeds and harsh acceleration
Anticipation:	Braking habits at speed, i.e. reactionary speed changes
Expert Driver score:	Overall score

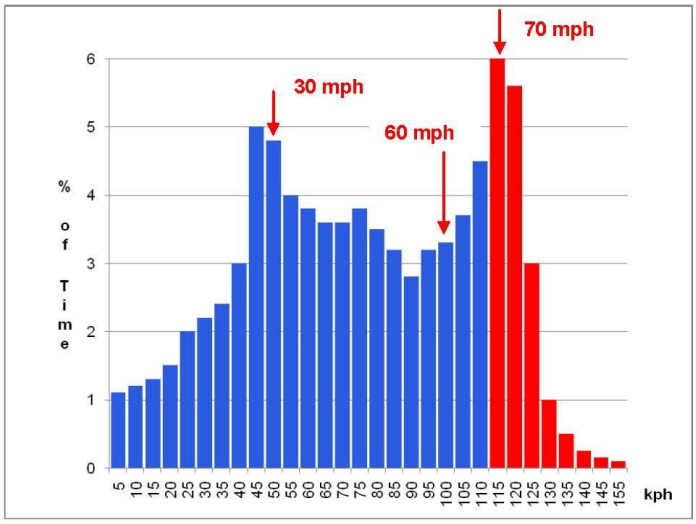


[1] Although the driver will know the black box has been fitted to their vehicle, experience shows that they forget about it without the reminders provided by the web portal. Therefore, their driving style during this 'before' period will be their normal driving style.

25 May 2012

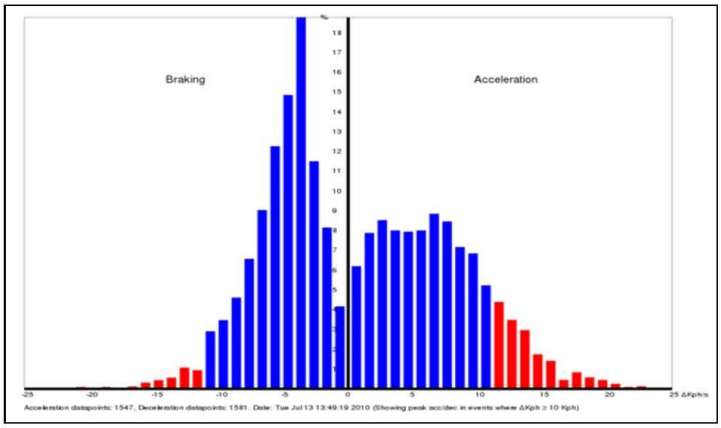
YOUNG DRIVERS AT WORK (SCOTLAND)
BLACK BOX PILOT

Proportion of Time Driving at Various Speeds: Driver A



Driver A often drives well above the national speed limit of 70 mph. S/he drives mostly in free-flow conditions as indicated by the relative low amount of time spent at low speeds. S/he does not stick to speed limits as shown by the wide distribution of speeds particularly at high speeds.

Acceleration and Deceleration: Driver A



Driver A has a strong preference for harsh acceleration with high variability, so is probably opportunistic and aggressive, with a suitably fast car to suite. Braking is more consistent but is often very harsh probably reacting to events and hazards at high speed showing a lack of anticipation.

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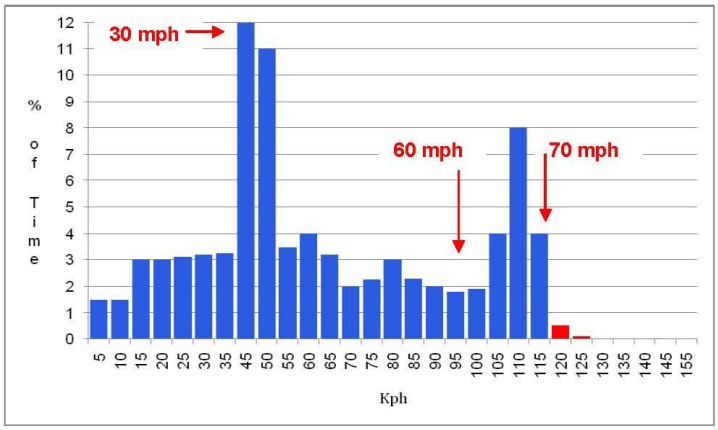
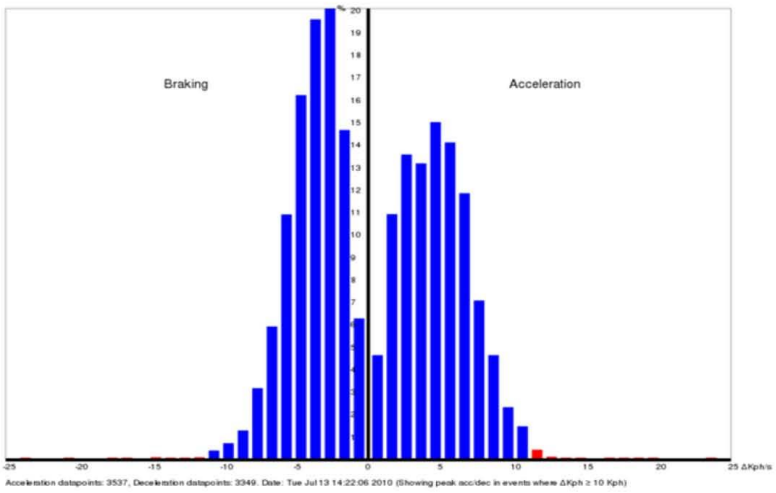
YOUNG DRIVERS AT WORK (SCOTLAND)
BLACK BOX PILOT

Proportion of Time Driving at Various Speeds: Driver B



Driver B does not habitually travel over the speed national limit, but does drive at a constant and moderate high speed (as shown by the peak on right) when conditions permit. Driver B also drives at close to the 30 mph speed limit (as shown by the left peak) but does not frequently exceed it. Driver B's driving style is deliberate and consistent.

Acceleration and Deceleration: Driver B



Driver B is very consistent, with moderate braking, probably as a result of good anticipation. Moderate and consistent acceleration shows careful control.

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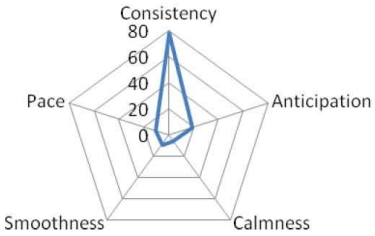
RoSPA The Royal Society for the Prevention of Accidents — Working for a safer Scotland

YOUNG DRIVERS AT WORK (SCOTLAND) BLACK BOX PILOT

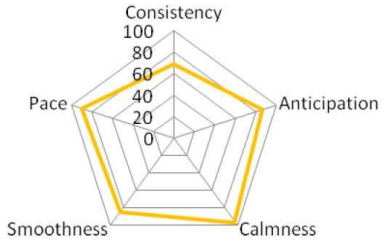
Calibrated scores for Consistency, Pace, Smoothness, Calmness & Anticipation

Driver A



Driver A has consistent poor scores for appropriate speed (pace), anticipation, smoothness and calmness.

Driver B



Driver B drives consistently at an appropriate speed, showing good anticipation, smoothness and calmness.

25 May 2012

APPENDIX 3: EMPLOYERS BLACK BOX TECHNOLOGY WORKSHOP

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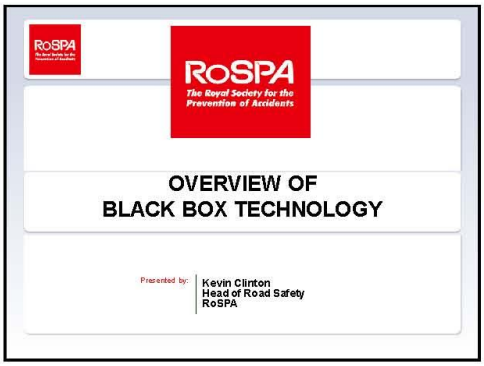
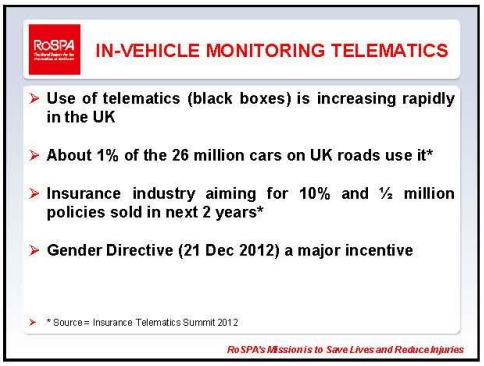
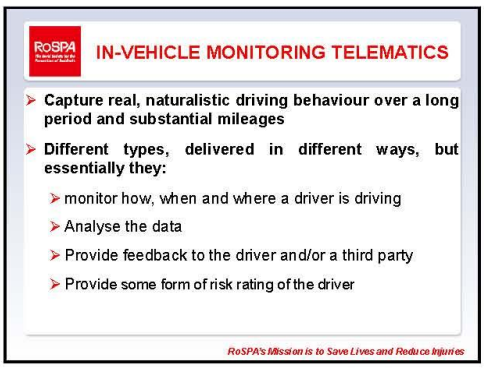
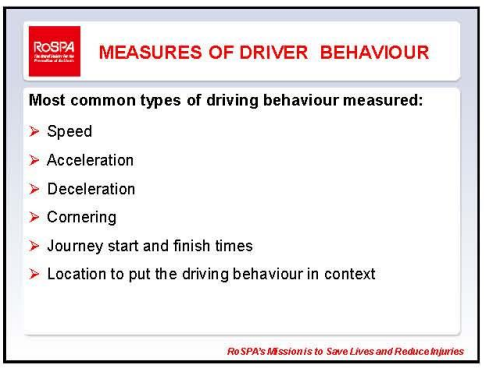
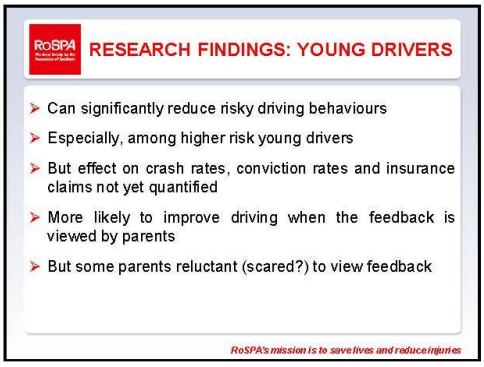
Overview of Black Box Technology
26 February 2013

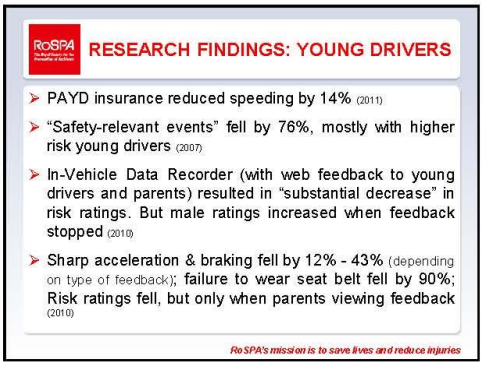












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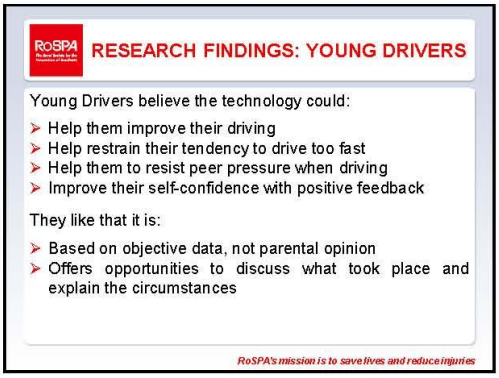
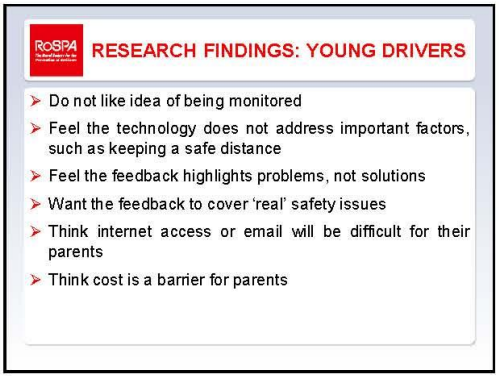
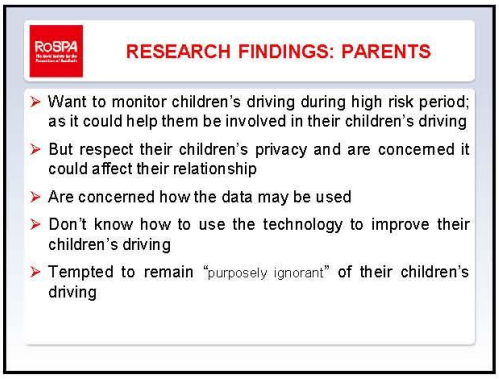
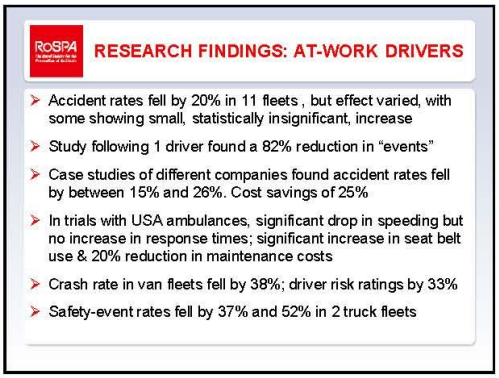
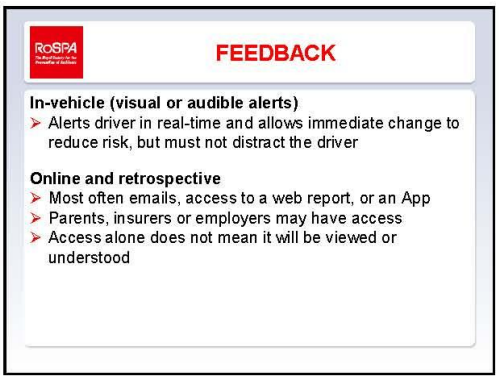
RoSPA Scotland
Overview of Black Box Technology
26 February 2013











RoSPA Scotland
Overview of Black Box Technology
26 February 2013

FEEDBACK AND REMEDIAL ACTIONS

Feedback

- Driving improves when feedback is given, but almost no detail about the nature of the feedback, how it's delivered and how it is 'received'.

Remedial Actions

- No research about how the data analysis is used to inform remedial actions, such as driver education, informing driver training needs, or changing driving tasks (e.g, journey routes)

FEEDBACK AND REMEDIAL ACTIONS

Need to develop best ways to:

- Provide feedback (access, content, presentation, level of detail)
- Help drivers to understand it and use it positively
- Help parents understand and feel able to use it positively (e.g., in discussions with their children)
- Help employers understand it and use it positively (e.g., discussions with drivers, prioritise & inform training, review driving tasks and management procedures)

NOTE ABOUT THE RESEARCH

- Most of the young driver research is from countries (e.g., USA, Israel) with Graduated Driver Licensing
- Some of the devices were Accident or Event Data Recorders
- Some of the devices were not typical of the devices used in the UK (e.g., some also had cameras)

NEXT STEPS: DATA

- Privacy — Who has access? Security (against hacking)
- Use — Can the data be used against the driver?
- Standards — Will help provide consistency and provide some privacy protection. Make data portability easier
- Portability — Can a driver use their data when seeking alternative insurance quotes?

RoSPA's mission is to save lives and reduce injuries

NEXT STEPS: DELIVERY

Black Box (Retro-fitted)
Positive: Accurate and reliable; tamper-proof (ish)
Negative: Expense and inconvenience of fitting, and removing (if required)

App
Positive: Much cheaper & more convenient
Negative: Less accurate and reliable; not tamper-proof; not everyone has a smartphone

Original Equipment
Positive: Cheaper, convenient, reliable, tamper-proof
Negative: Will take donkey's years

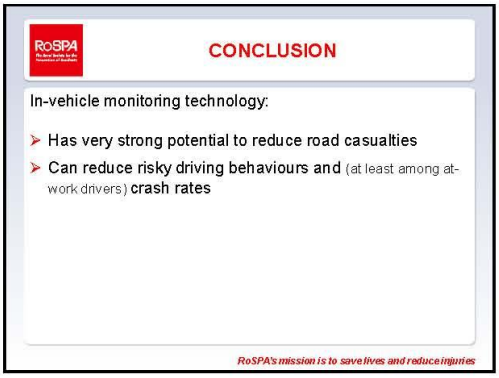
RoSPA's Mission is to Save Lives and Reduce Injuries

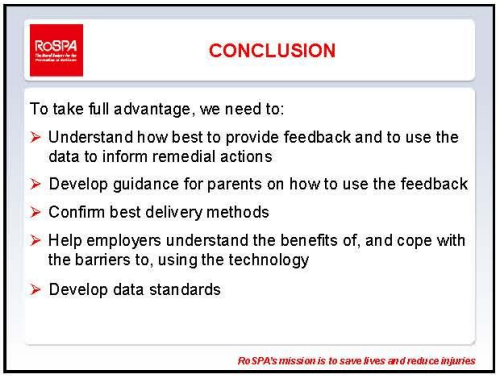
NEXT STEPS: RoSPA

- RoSPA :
  - ✓ Working with MyDrive & several insurance companies in UK and Ireland
  - ✓ Working with RoADAR and MyDrive to develop the baseline of good driving
  - ✓ Running Black Box and Young at Work Drivers pilot in Scotland
  - ✓ Introduced new trophy in MORR Awards for use of technology to cut work-related road accidents
  - ✓ Producing a Literature Review and Policy Paper, and other materials on "Road Safety and Black Box Technology"

RoSPA's Mission is to Save Lives and Reduce Injuries

RoSPA Scotland
Overview of Black Box Technology
26 February 2013





mydrive solutions

MyDrive 2012
Richard Jelbert
07973 827788

1

What makes MyDrive different?

mydrive solutions

We understand and make simple the complex science of driver behaviour

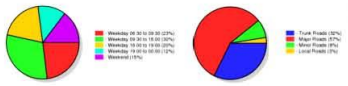
- Driving capability is a complex mix of cognitive and individual personality elements as well as skill and competence
- MyDrive combines the expertise from three different disciplines and organisations resulting in the development of our profiling engine
- MyDrive delivers calibrated, contextualised outputs which add real value

2

What are the components of accident risk?

mydrive solutions

- **Driving Style**
  Combination of personality traits and skill (situational awareness, ability to manage space, visual acuity, experience, Journey mission, attention & distractions, familiarity)
- **Road Context**
  Road types – generic road types and specific cases
  Hazards - bends, junctions, road controls (signs etc)
- **Conditions and Environment**
  Darkness, congestion, weather, setting, time, season



3

Telematics "black-box"

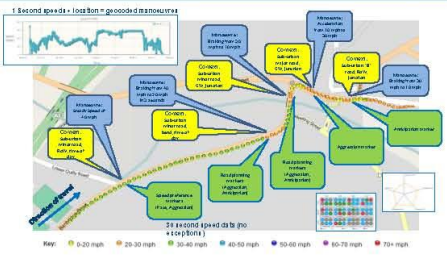
mydrive solutions

RADIO SYSTEM	
GSM SYSTEM	AUTOMOTIVE RATED QUAD BAND MODEM
GSM ANTENNA	INTERNAL
GPS SYSTEM	SIRF STAR III CHIPSET
GPS ANTENNA	INTERNAL OR EXTERNAL
DATA COMMUNICATIONS	
EXTERNAL PORT	SERIAL
TIMING	INTERNAL RTC
DATA RATE	9600 BAUD
GPS DATA	LOCAL STREAMING OF GPS NMEA
GSM DATA	SUPPORTS STANDARD AT COMMANDS
GPRS	UDP OR TCP/IP
OVER THE AIR FIRMWARE UPDATES	YES. SUPPORTS' RITE
ENVIRONMENTAL/APPROVALS	
VOLTAGE SUPPLY	12/24V OPERATION
POWER SUPPLY PROTECTION	OVER AND REVERSE VOLT
LOAD DUMP	= 90V
CASEWORKS	IP68 AND IP67. OPTIONAL
E MARKING	72/245/EEC AMENDED TO 2006/28/EC
APPROVALS	CE/FCC/PTCRB/MULTIPLE CARRIERS
INTERNAL BACK-UP BATTERY	YES. OPTIONAL
TEMPERATURE RANGE	-30°C TO +85°C

4

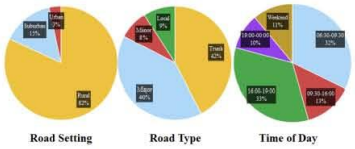
Location-contextualisation

mydrive solutions



Road Type, Road Setting and Time of Day

mydrive solutions



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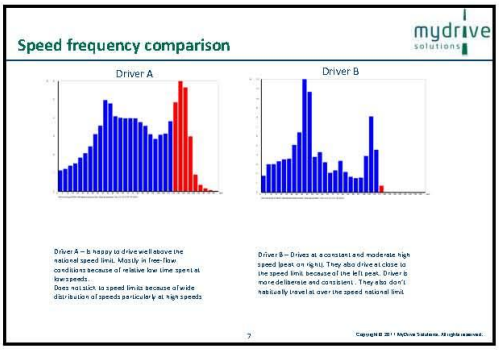
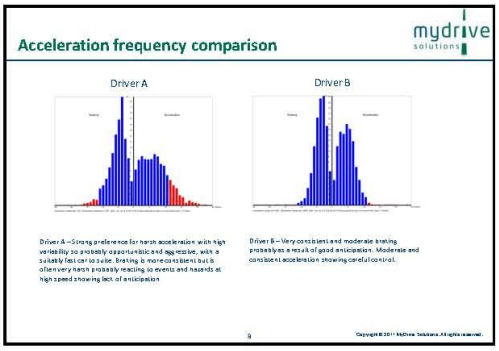
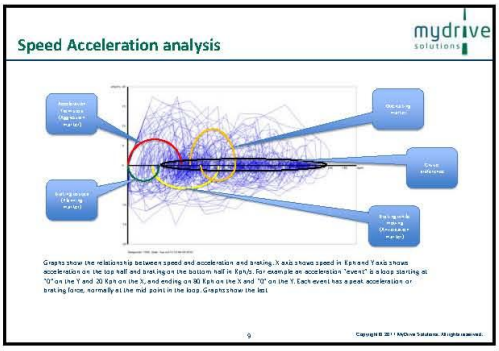
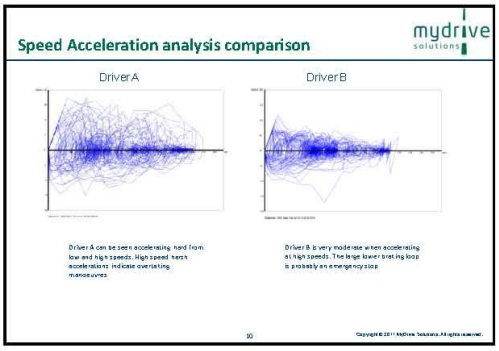
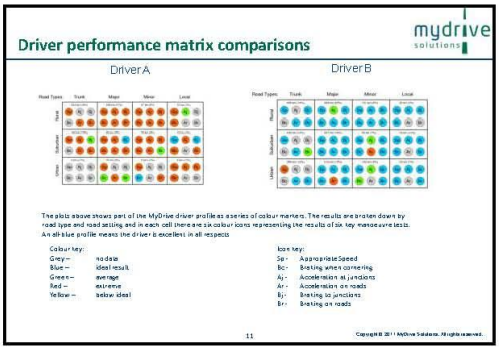
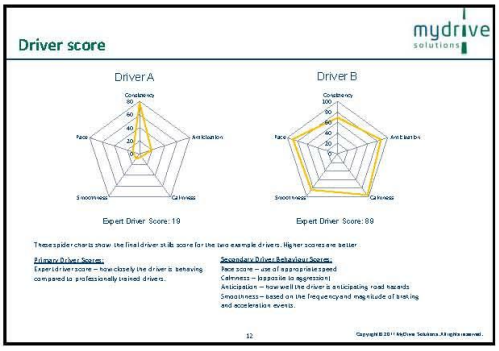

Speed frequency comparison
mydrive solutions
Driver A
Driver B
Driver A – Is happy to drive well above the national speed limit. Mostly in free-flow conditions because of relative low time spent at low speeds.
Does not stick to speed limits because of wide distribution of speeds particularly at high speeds
Driver B – Drives at a constant and moderate high speed (post on right). They also drive at close to the speed limit, because of the left peak. Driver B more deliberate and consistent. They also don't habitually travel at over the speed national limit.


Acceleration frequency comparison
mydrive solutions
Driver A
Driver B
Driver A – Strong preference for harsh acceleration with high variability so probably opportunistic and aggressive, with a suitably fast car to suite. Braking is more consistent but is often very harsh probably reacting to events and hazards at high speed showing lack of anticipation
Driver B – Very consistent and moderate braking, probably as a result of good anticipation. Moderate and consistent acceleration showing careful control.

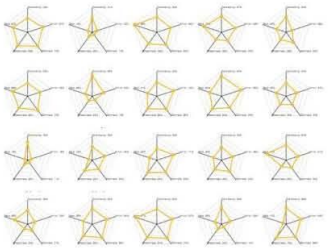

Speed Acceleration analysis
mydrive solutions
Graphs show the relationship between speed and acceleration and braking. X axis shows speed in Kph and Y axis shows acceleration on the top half and braking on the bottom half in Kph/s. For example an acceleration "event" is a loop starting at "0" on the Y and 20 Kph on the X, and ending on 80 Kph on the X and "0" on the Y. Each event has a peak acceleration or braking force, normally at the mid point in the loop. Graphs show the last


Speed Acceleration analysis comparison
mydrive solutions
Driver A
Driver B
Driver A can be seen accelerating hard from low and high speeds. High speed harsh accelerations indicate overtaking manoeuvres
Driver B is very moderate when accelerating at high speeds. The large lower breaking loop is probably an emergency stop

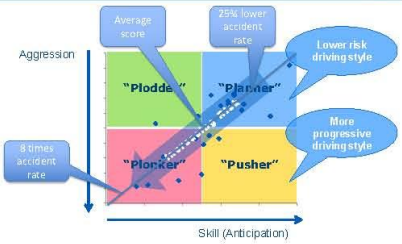

Driver performance matrix comparisons
mydrive solutions
Driver A
Driver B
The plots above shows part of the MyDrive driver profiles a series of colour markers. The results are broken down by road type and road setting and in each cell there are six colour icons representing the results of six key manoeuvre tests. An all-blue profile means the driver is excellent in all respects
Colour key:
Grey – no data
Blue – ideal result
Green – average
Red – extreme
Yellow – below ideal
Icon key:
Sp - Appropriate Speed
Bc - Braking when cornering
Aj - Acceleration at junctions
Ar - Acceleration on roads
Bj - Braking to junctions
Br - Braking on roads


Driver score
mydrive solutions
Driver A
Driver B
Consistency
Anticipation
Calmness
Smoothness
Pace
Expert Driver Score: 19
Expert Driver Score: 89
These spider charts show the final driver skills score for the two example drivers. Higher scores are better
Primary Driver Score:
Expert driver score – how closely the driver is behaving, compared to professionally trained drivers.
Secondary Driver Behaviour Scores:
Pace score – use of appropriate speed
Calmness – opposite to aggression)
Anticipation – how well the driver is anticipating road hazards
Smoothness – based on the frequency and magnitude of braking and acceleration events.

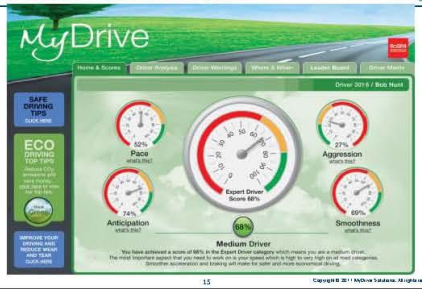
Calibrated scores for Consistency, Pace, Smoothness, Calmness & Anticipation



Driver classification



Driver Outputs – accessible via portal



Trip scores

Data replay for claims management

MyDrive as an enabling platform

- A MyDrive telematics solution and the resultant driver profiles enables many other services around the driver…
- Industry
  - Driver profiles made available to insurance companies allow for pay how you drive insurance, offering the very best drivers the lowest insurance rates.
  - Location based affiliate marketing deals might offer the driver local and relevant product deals
  - Personality profiling enables intelligent marketing and promotion, cross-sell and up-sell
- Government
  - Pay as you drive road tax option or congestion charging using the same telematics infrastructure
  - Blackspot road and junction identification based on actual data
  - Traffic flow data for road planning and traffic information
  - Route analysis for advanced social mobility analysis
  - CO2 monitoring and reduction opportunity
- The Driver
  - Immediate driver feedback encourages safer driving through self awareness. Also reduce fuel bills.
  - Opportunity to save money by accessing lower cost insurance and road tax
  - Access to local and relevant products and services (e.g. car sharing service)

APPENDIX 4: LETTER TO STUC

In June 2012 RoSPA Scotland received funding from the Scottish Government to conduct a Black Box Technology project with Young "At Work" Drivers in Scotland. The initial invitation to companies gained a great deal of positive interest with managers and occupational health and safety professionals who express their willingness to pursue this within their organisations.

There are many benefits to companies in the use of black box technology and these may be:

- Identify and prioritise higher risk journeys and/or drivers
- Identify particular journeys, routes or vehicles that are higher risk, or more expensive in terms of fuel use
- provide tailored, personalised feedback to drivers to help them improve their driving or reduce their exposure to high risk driving situations
- Motivate drivers and incentivise better driving
- Identify each driver's training needs rather than rely on broad, off the shelf, driver training
- Achieve better fuel efficiency
- Encourage competition between drivers to see who can improve their driving the most
- Help meet the employer's legal duties to manage their occupational road risk
- Improve the reputation of the company
- Improve the business performance of the company by reducing costs

However over the months a number of companies who were keen to participate in the project have withdrawn due to objections from trade unions and staff associations. This is a tremendous pity as In terms of work-related road safety, this technology offers huge potential to reduce the drivers' and companies crash risk and costs.

Despite some companies having withdrawn interest we do have others taking part in the project. Two of these companies managed to overcome the challenges by seeking volunteers for the project. We have three companies who are still waiting for union agreement and RoSPA has been invited to meet with one organisation along with their trade union representatives to try to identify the issues.

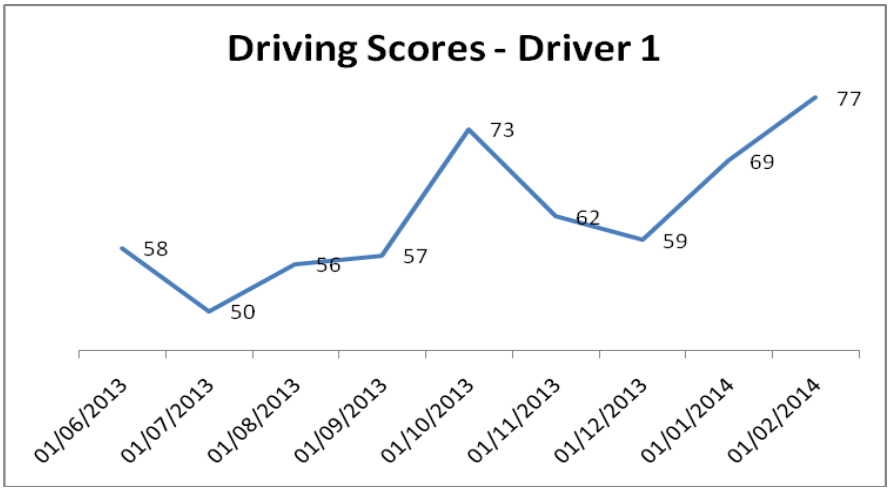
Some businesses have suggested that this project should be available for all ages and not just young drivers. RoSPA acknowledges that this is a valid point and one which will be included in our report. The black box technology would have provided undoubted benefits for drivers of all ages, however, on this occasion the funding was for Young "At Work" Driver (ages 17 to 25 years).

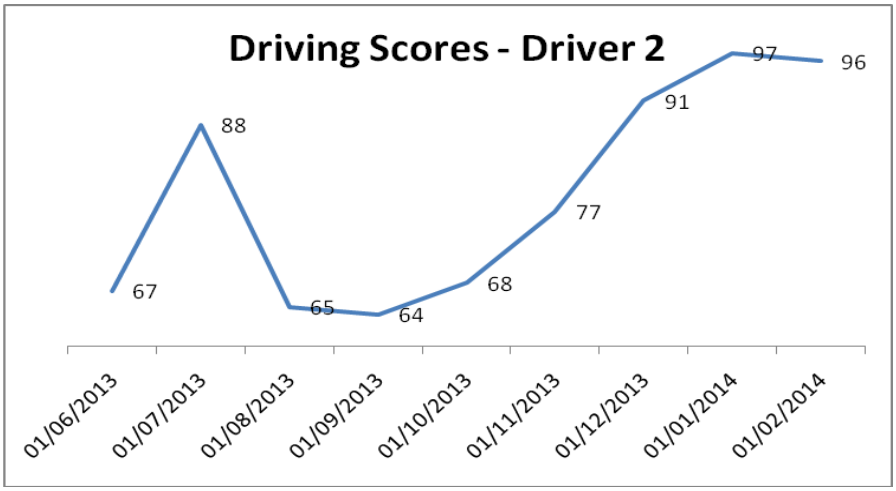
An aim of the project is to assist companies in drafting policies on the use of black boxes and help manage occupational road risk.

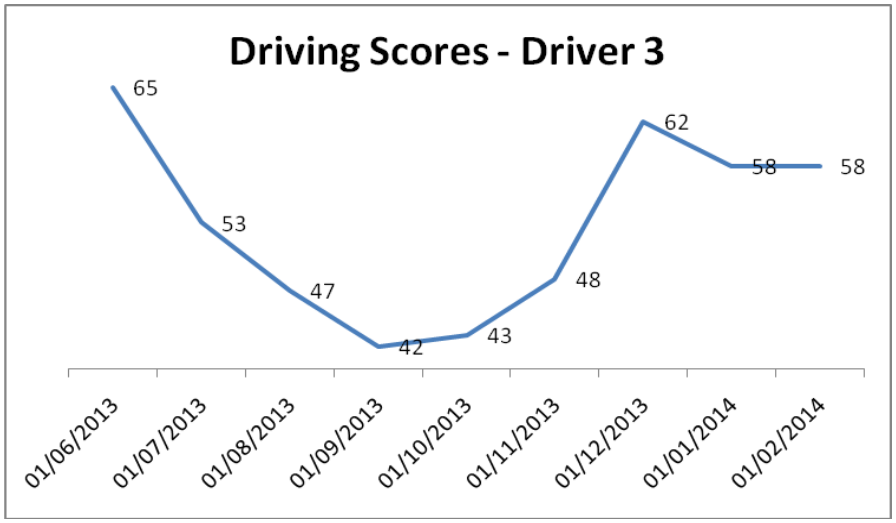
As we seek to put together our report on this project, and indeed, if possible, to encourage other companies to become involved, we would ask for your assistance in providing copies of the attached briefing paper to union representatives to help identify ways of overcome their concerns about the our project and its ultimate aim of making Scotland's road's safer for everyone.

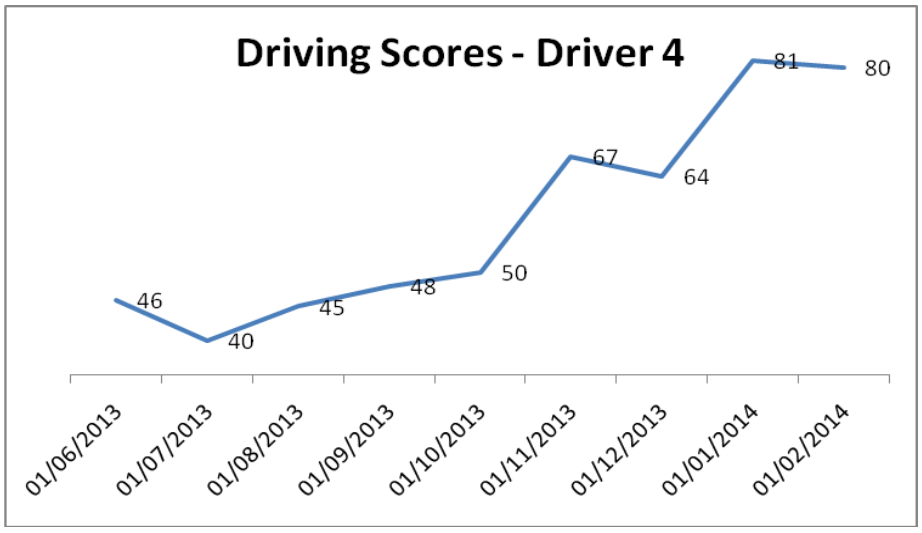
APPENDIX 5: DRIVING SCORES OF THE DRIVERS WHO ENGAGED WITH THE DRIVER'S PORTAL

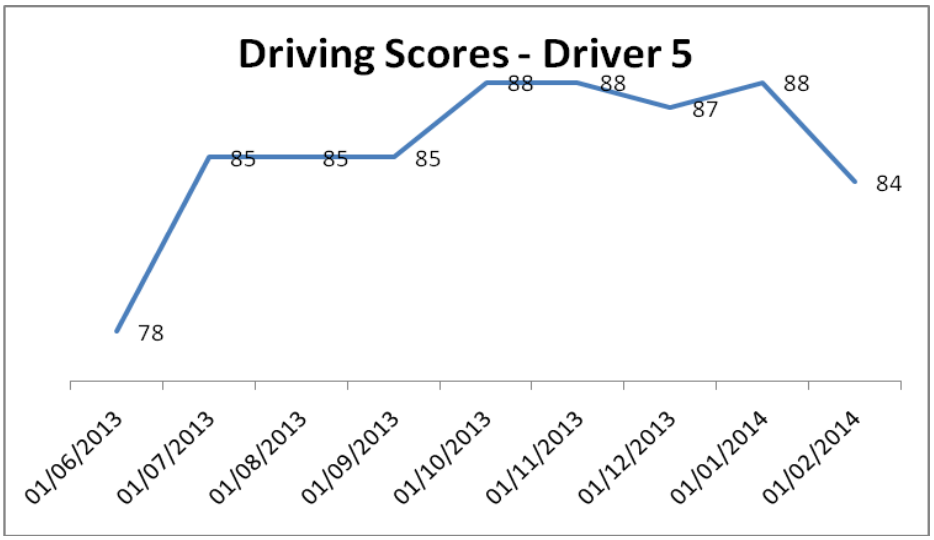
The data for these charts are from the last score in each month, so they show a monthly snapshot of each driver.

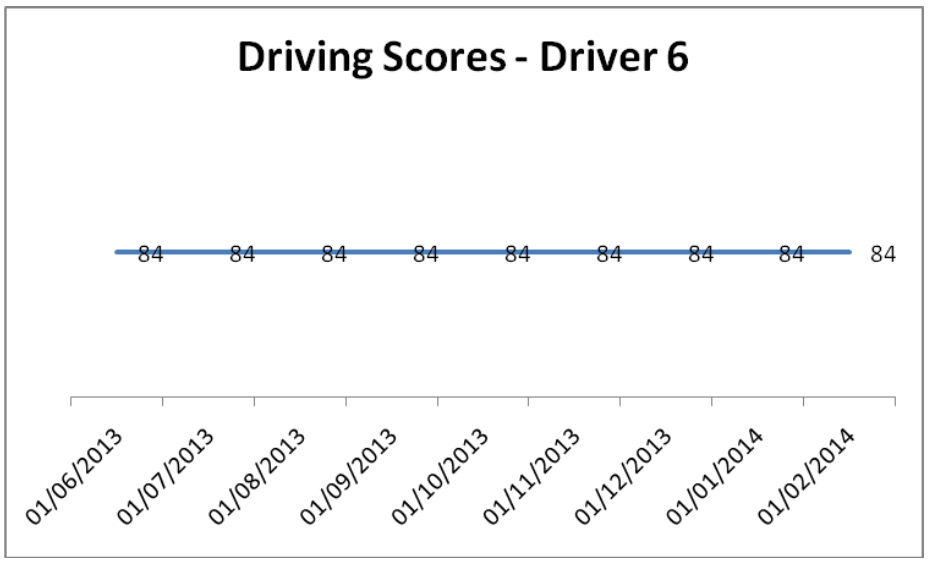




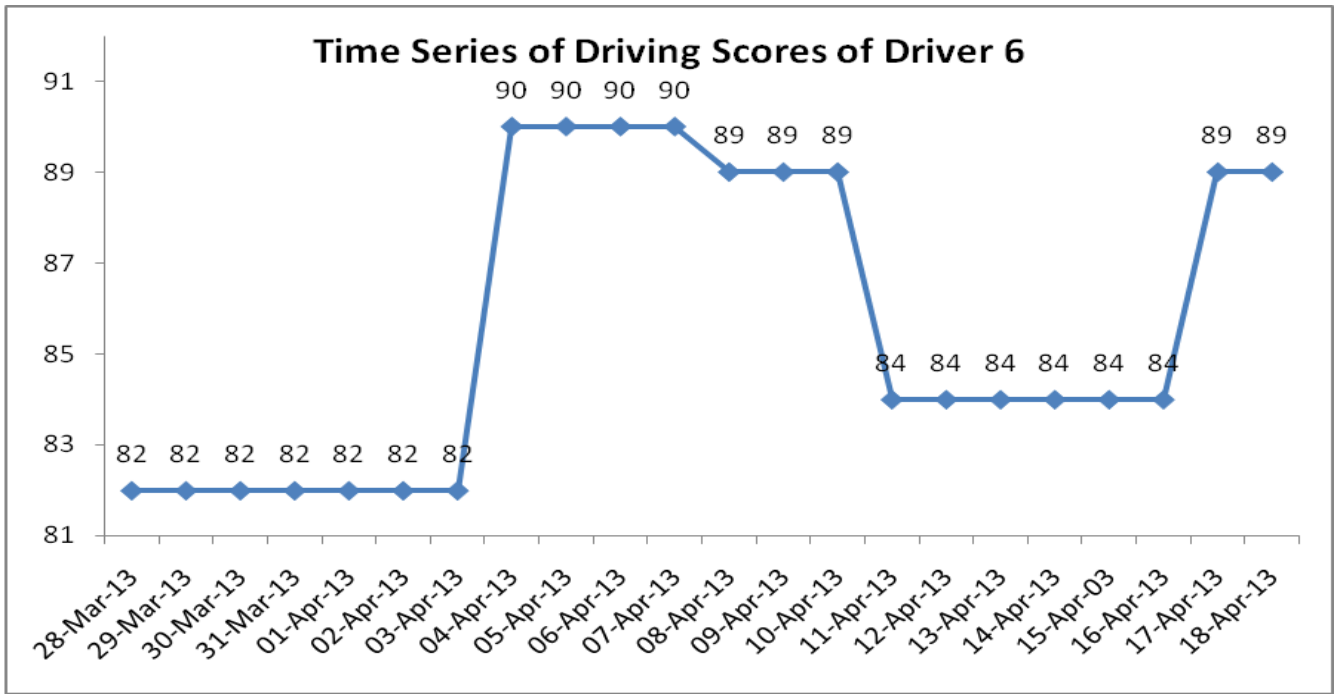


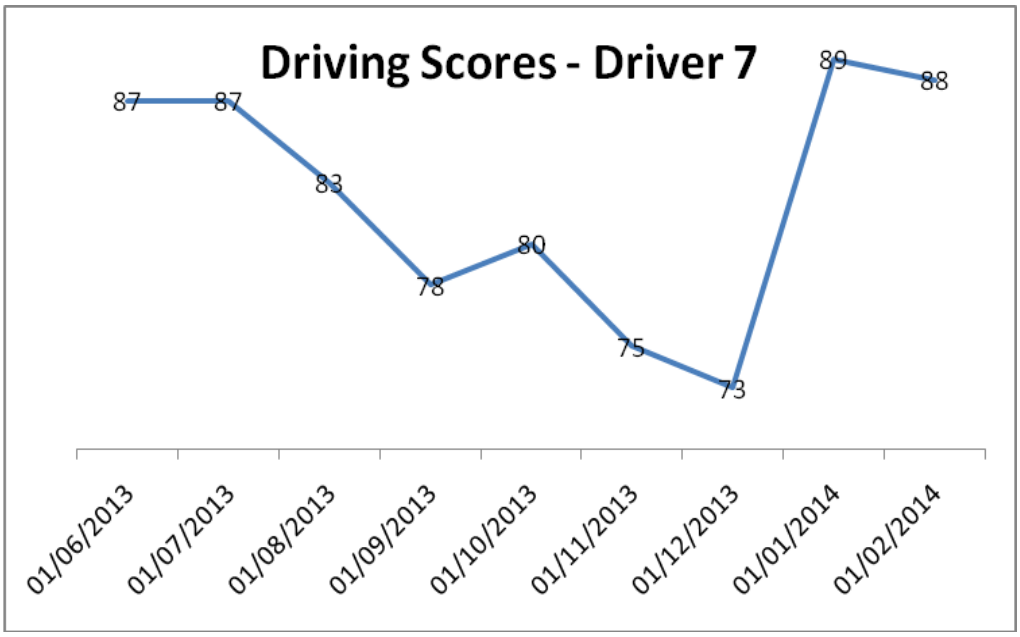

Driving Scores - Driver 4
46
40
45
48
50
67
64
81
80
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014

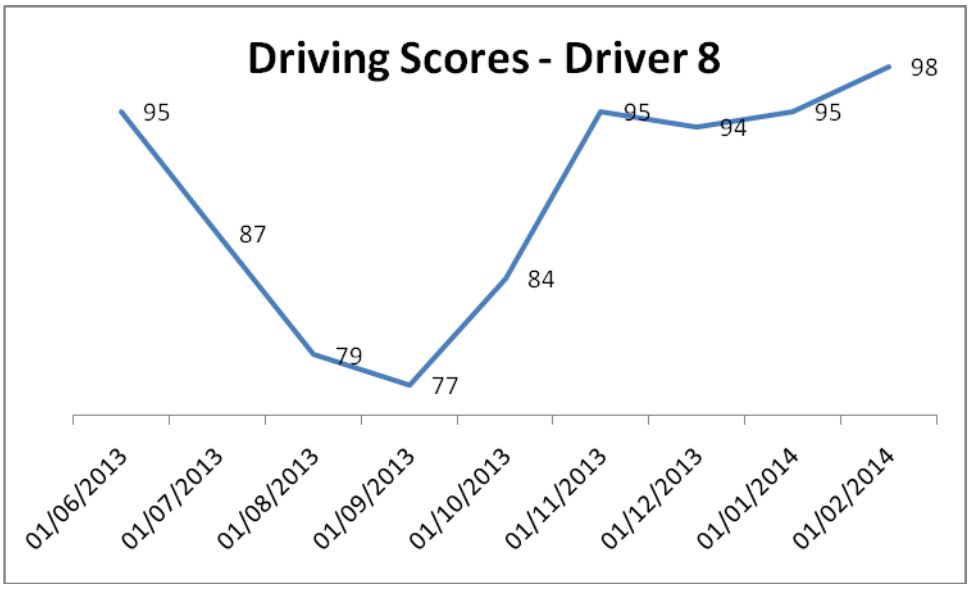

Driving Scores - Driver 5
78
85
85
85
88
88
87
88
84
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014

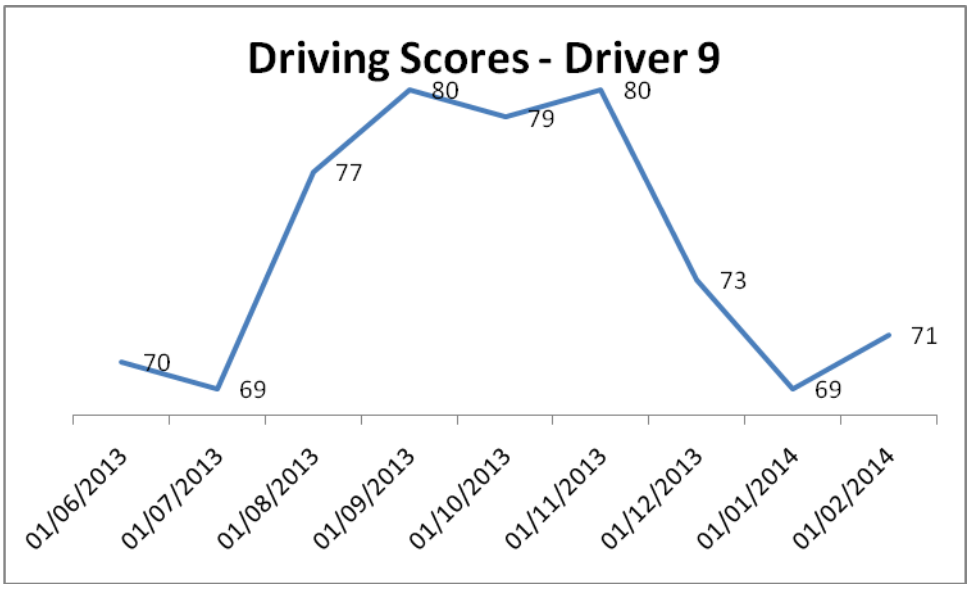

Driving Scores - Driver 6
84
84
84
84
84
84
84
84
84
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014

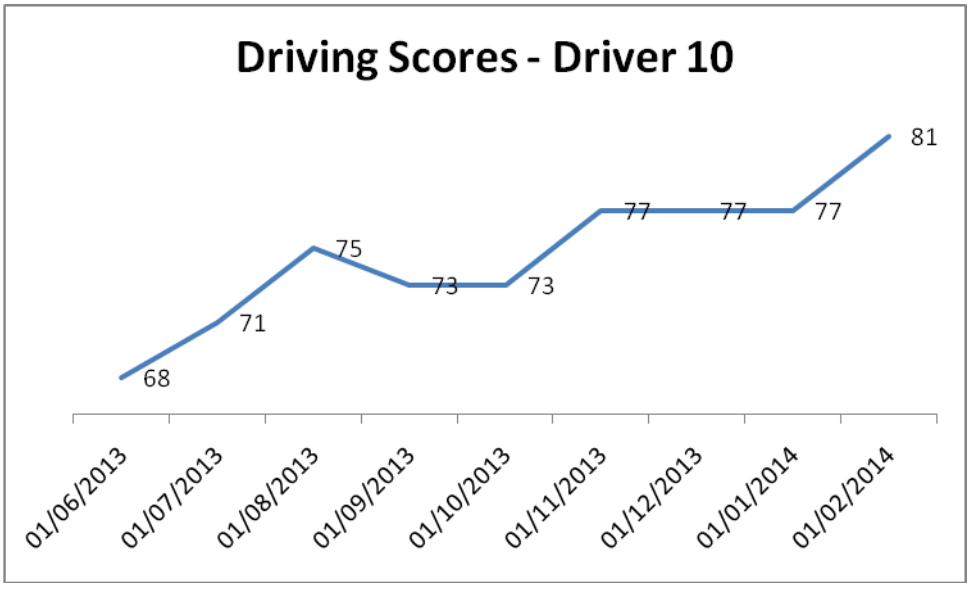
When viewed as a monthly snapshot, the driving scores for driver 6 appear not to vary at all. However, when viewed on a daily basis, there are clear variations, as shown in the graph below:

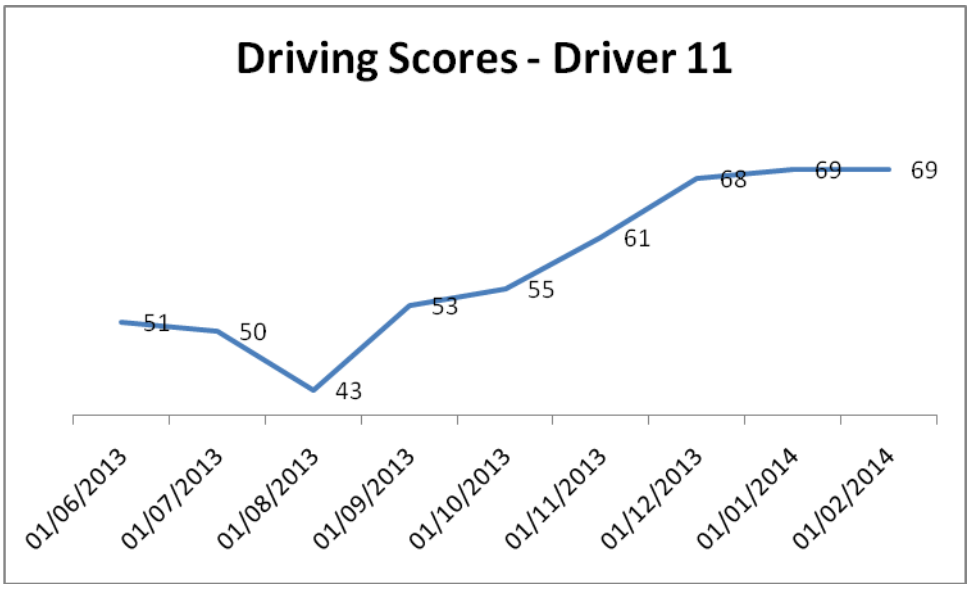


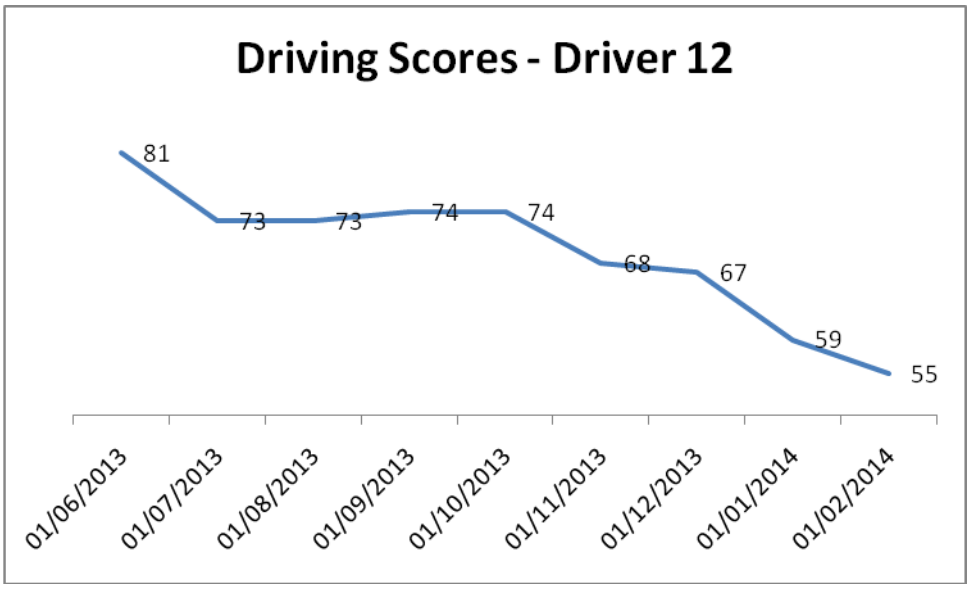


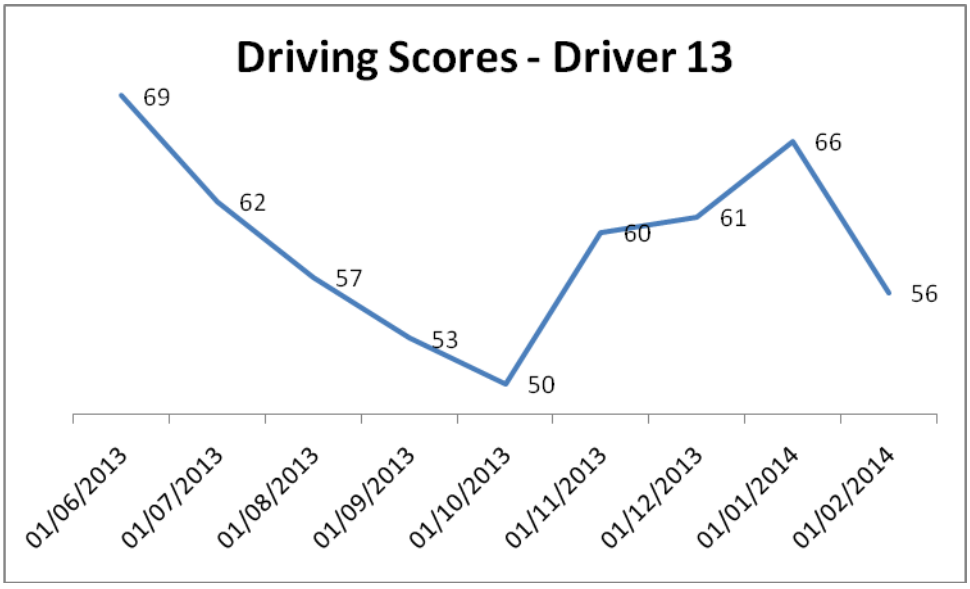

Driving Scores - Driver 8
95
87
79
77
84
95
94
95
98
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014

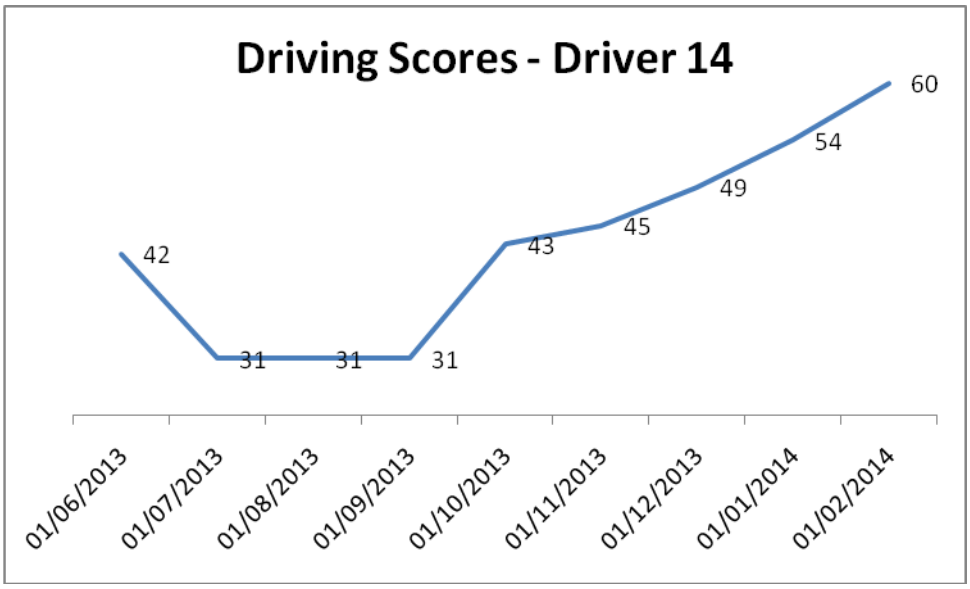

Driving Scores - Driver 9
70
69
77
80
79
80
73
69
71
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014

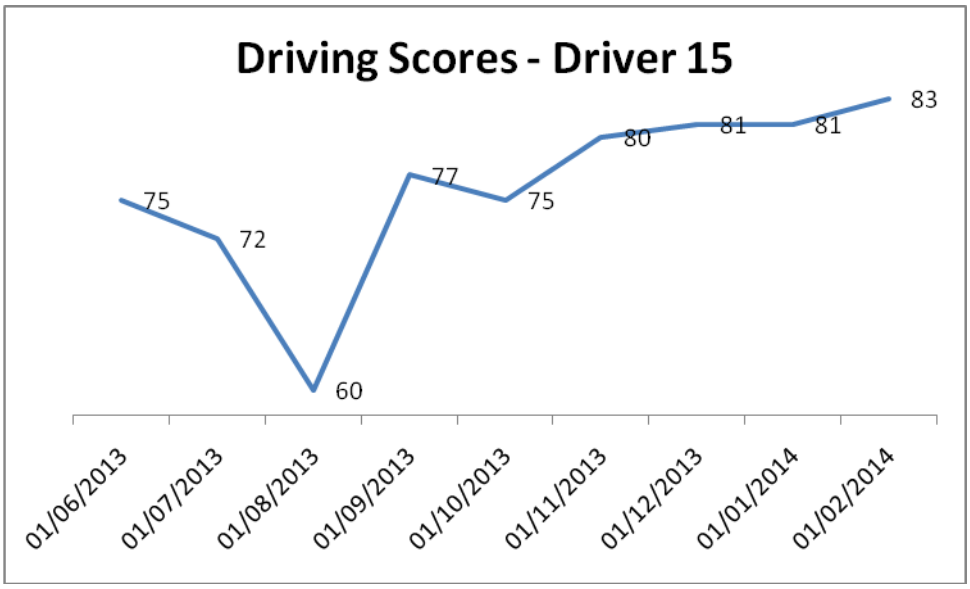

Driving Scores - Driver 10
68
71
75
73
73
77
77
77
81
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014

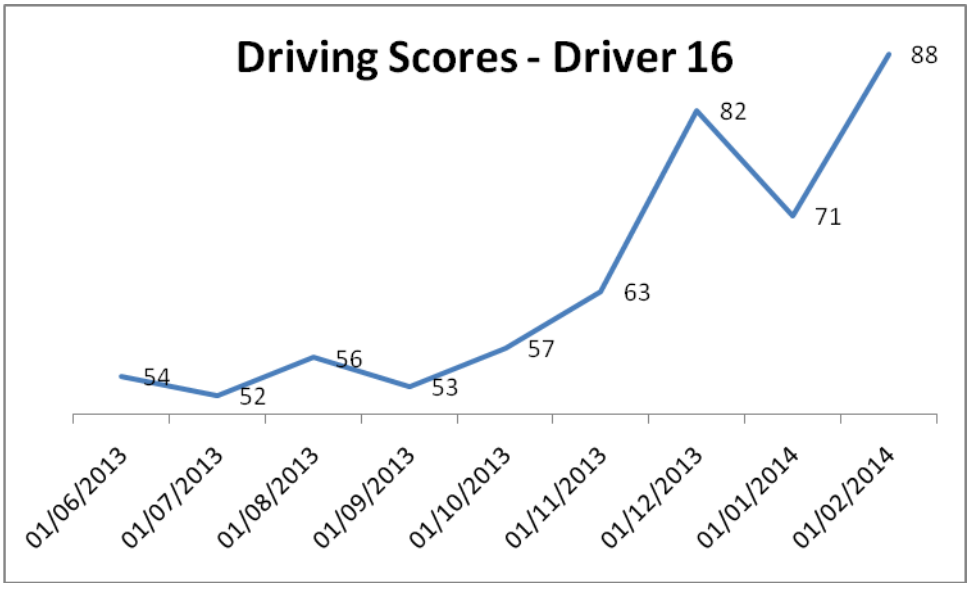

Driving Scores - Driver 11
51
50
43
53
55
61
68
69
69
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014

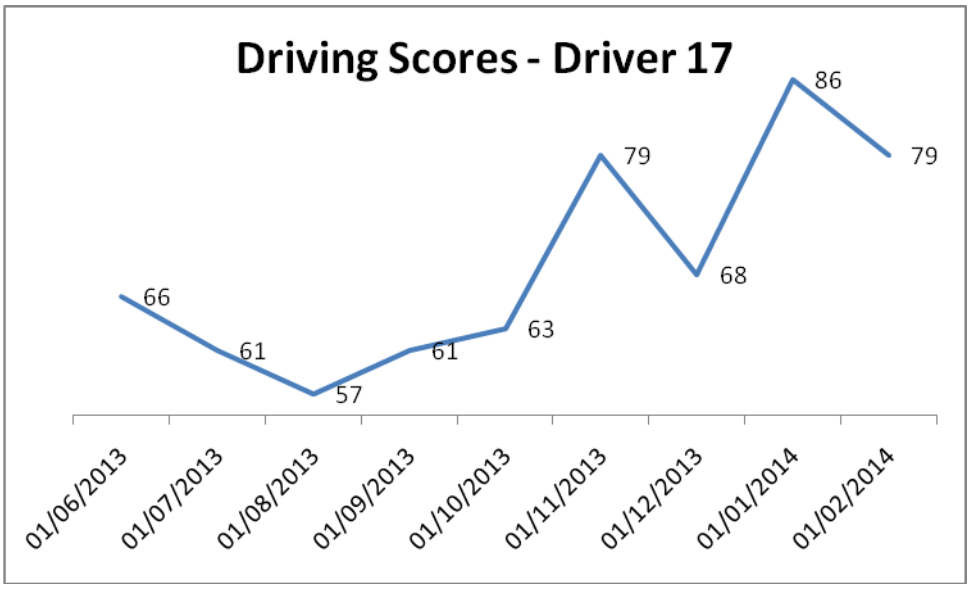

Driving Scores - Driver 12
81
73
73
74
74
68
67
59
55
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014


Driving Scores - Driver 13
69
62
57
53
50
60
61
66
56
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014


Driving Scores - Driver 14
42
31
31
31
43
45
49
54
60
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014


Driving Scores - Driver 15
75
72
60
77
75
80
81
81
83
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014

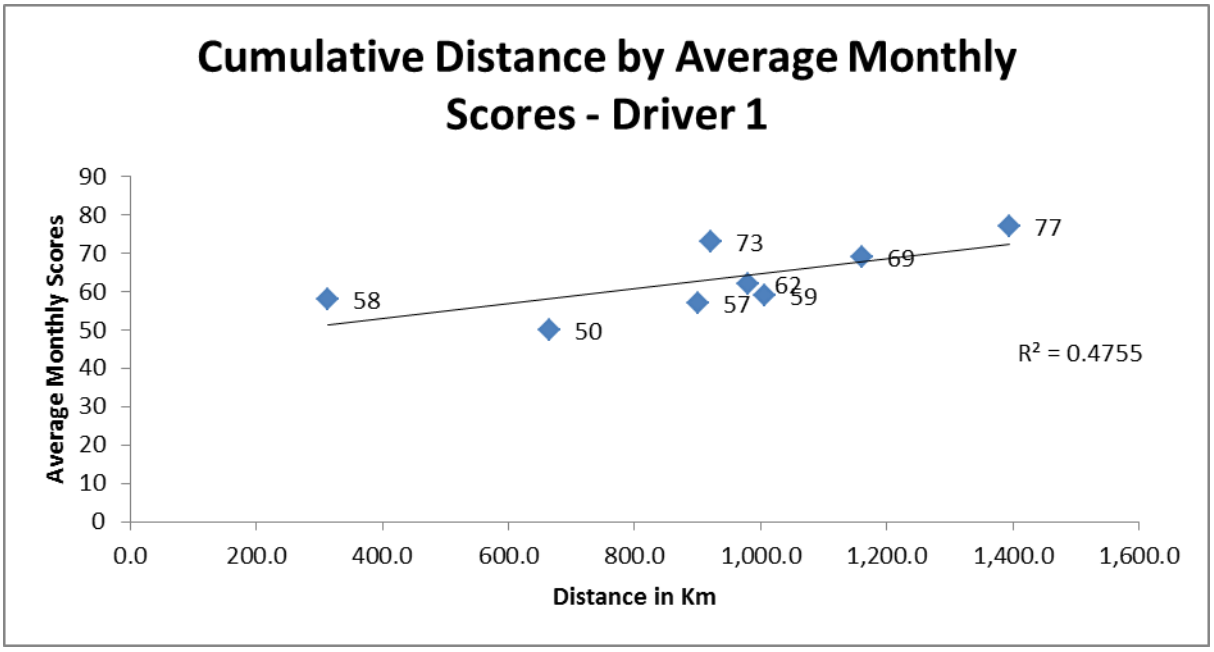

Driving Scores - Driver 16
54
52
56
53
57
63
82
71
88
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014


Driving Scores - Driver 17
66
61
57
61
63
79
68
86
79
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014

APPENDIX 6: ASSOCIATION BETWEEN CUMULATIVE DISTANCE AND AVERAGE MONTHLY SCORE FOR INDIVIDUAL DRIVERS.

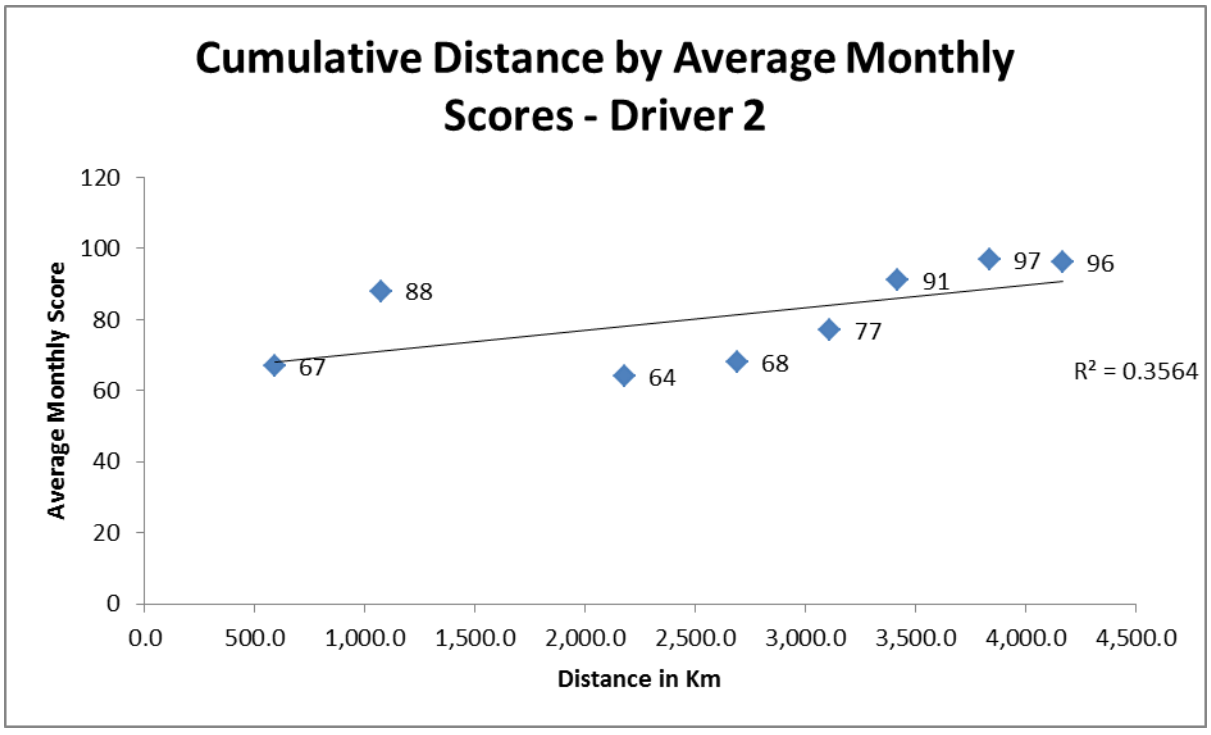
Driver 1

	Driver 1 Distances Km	Driver 1 Cumulative Km	Average Monthly Scores Driver 1
Total Km June 2013	313.2	313.2	58
Total Km July 2013	351.9	665.1	50
Total Km September 2013	112.8	900.7	57
Total Km October 2013	20.5	921.3	73
Total Km November 2013	59.6	980.9	62
Total Km December 2013	25.8	1,006.6	59
Total Km January 2014	153.4	1,160.1	69
Total Km February 2014	233.8	1,393.8	77
Total Km March 2014	156.9	1,550.7	
Total Km April 2014	184.5	1,735.2	
Total Km	1,735.2		
Correlation Coefficient		**0.70**	



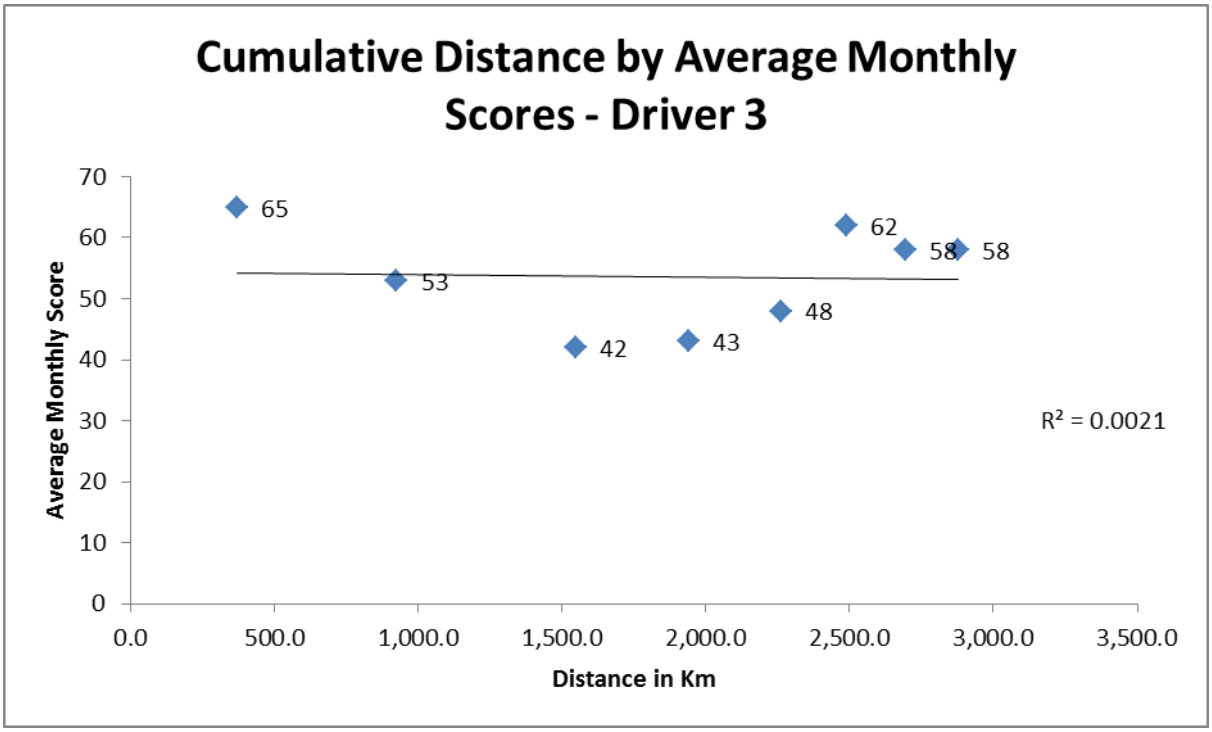
Driver 2

	Driver 2 Distances Km	Driver 2 Cumulative Km	Average Monthly Scores Driver 2
Total Km June 2013	588.8	588.8	67
Total Km July 2013	484.9	1,073.7	88
Total Km September 2013	511.9	2,176.6	64
Total Km October 2013	513.6	2,690.2	68
Total Km November 2013	419.6	3,109.8	77
Total Km December 2013	307.4	3,417.2	91
Total Km January 2014	417.0	3,834.2	97
Total Km February 2014	330.2	4,164.3	96
Total Km March 2014	307.3	4,471.6	
Total Km April 2014	328.5	4,800.2	
Total Km	4,800.2		
Correlation Coefficient		**0.63**	



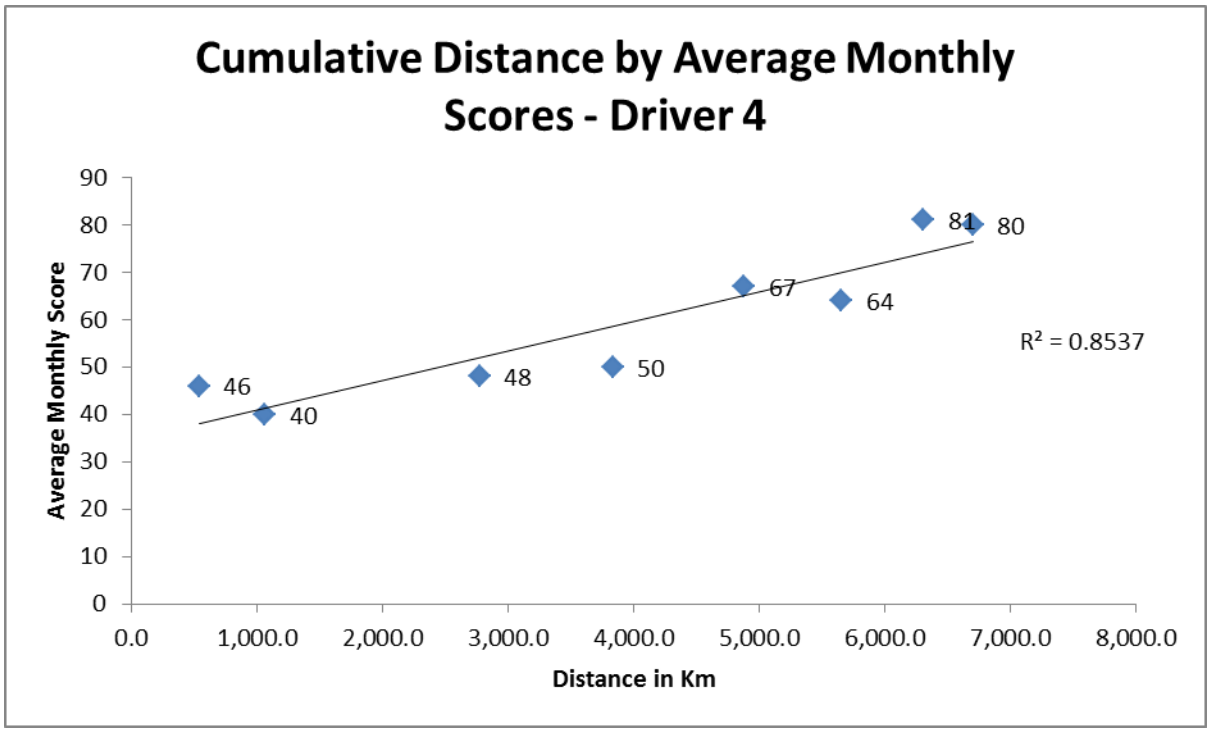
Driver 3

	Driver 3 Distances Km	Driver 3 Cumulative Km	Average Monthly Scores Driver 3
Total Km June 2013	371.6	371.6	65
Total Km July 2013	553.5	925.1	53
Total Km September 2013	226.4	1,547.0	42
Total Km October 2013	394.3	1,941.3	43
Total Km November 2013	320.5	2,261.8	48
Total Km December 2013	228.3	2,490.1	62
Total Km January 2014	204.0	2,694.1	58
Total Km February 2014	182.3	2,876.4	58
Total Km March 2014	109.4	2,985.8	
Total Km April 2014	106.0	3,091.9	
Total Km	3,091.9		
Correlation Coefficient		**-0.05**	



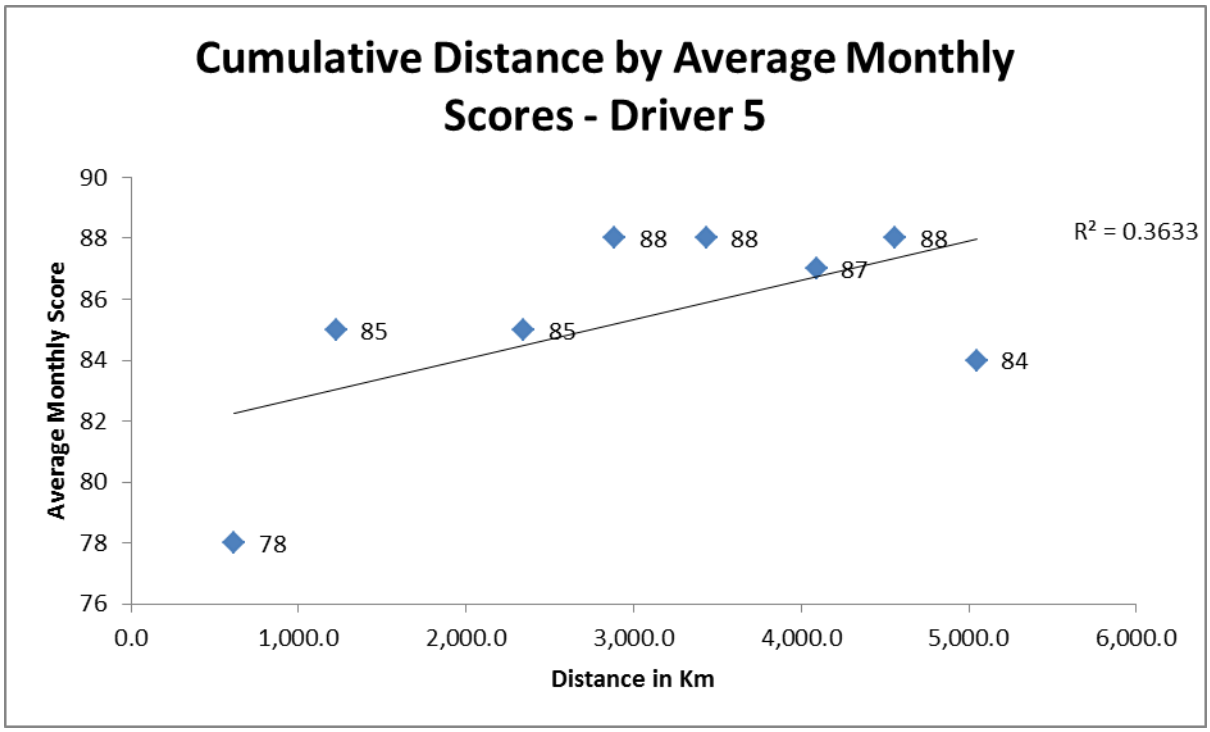
Driver 4

	Driver 4 Distances Km	Driver 4 Cumulative Km	Average Monthly Scores Driver 4
Total Km June 2013	538.9	538.9	46
Total Km July 2013	528.0	1,066.8	40
Total Km September 2013	892.3	2,772.4	48
Total Km October 2013	1,064.3	3,836.7	50
Total Km November 2013	1,042.4	4,879.1	67
Total Km December 2013	776.8	5,655.8	64
Total Km January 2014	651.4	6,307.2	81
Total Km February 2014	393.6	6,700.8	80
Total Km March 2014	225.7	6,926.5	
Total Km April 2014	135.5	7,062.1	
Total Km	7,062.1		
Correlation Coefficient		**0.93**	



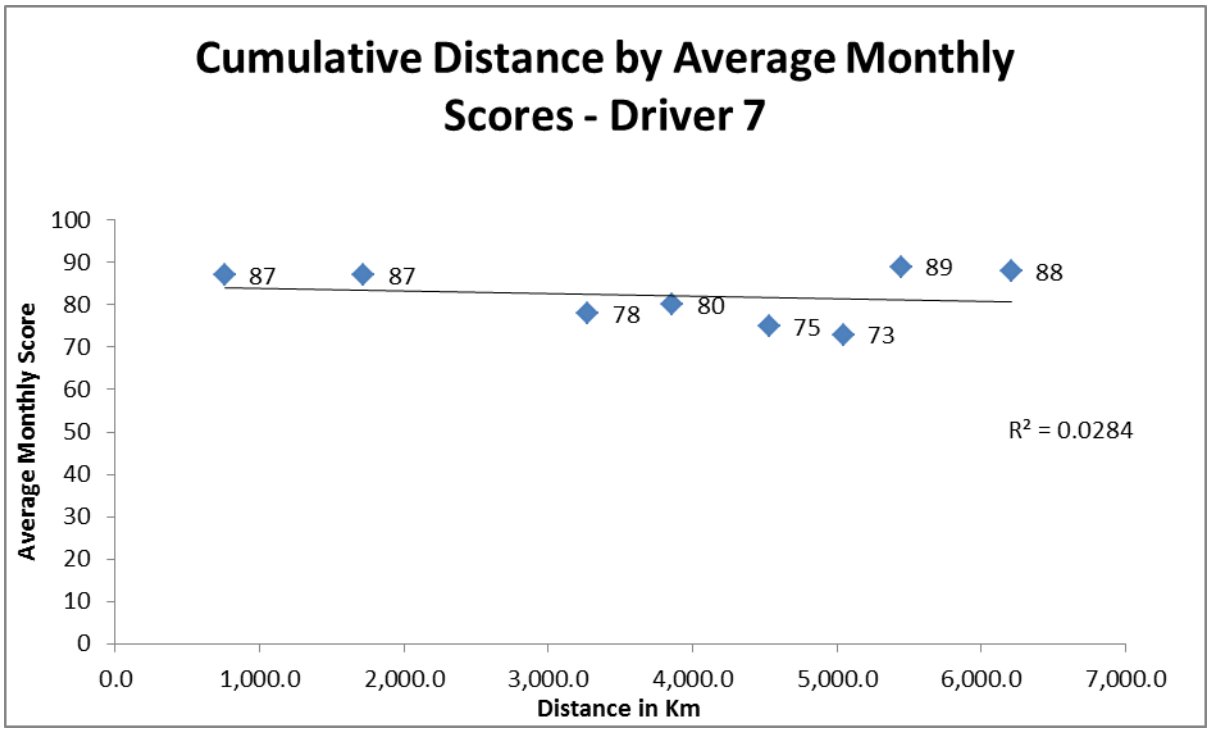
Driver 5

	Driver 5 Distances Km	Driver 5 Cumulative Km	Average Monthly Scores Driver 5
Total Km June 2013	616.2	616.2	78
Total Km July 2013	608.7	1,225.0	85
Total Km September 2013	569.9	2,343.5	85
Total Km October 2013	545.2	2,888.7	88
Total Km November 2013	543.7	3,432.4	88
Total Km December 2013	658.2	4,090.6	87
Total Km January 2014	471.0	4,561.6	88
Total Km February 2014	486.0	5,047.7	84
Total Km March 2014	623.9	5,671.6	
Total Km April 2014	433.9	6,105.4	
Total Km	6,105.4		
Correlation Coefficient		**0.59**	



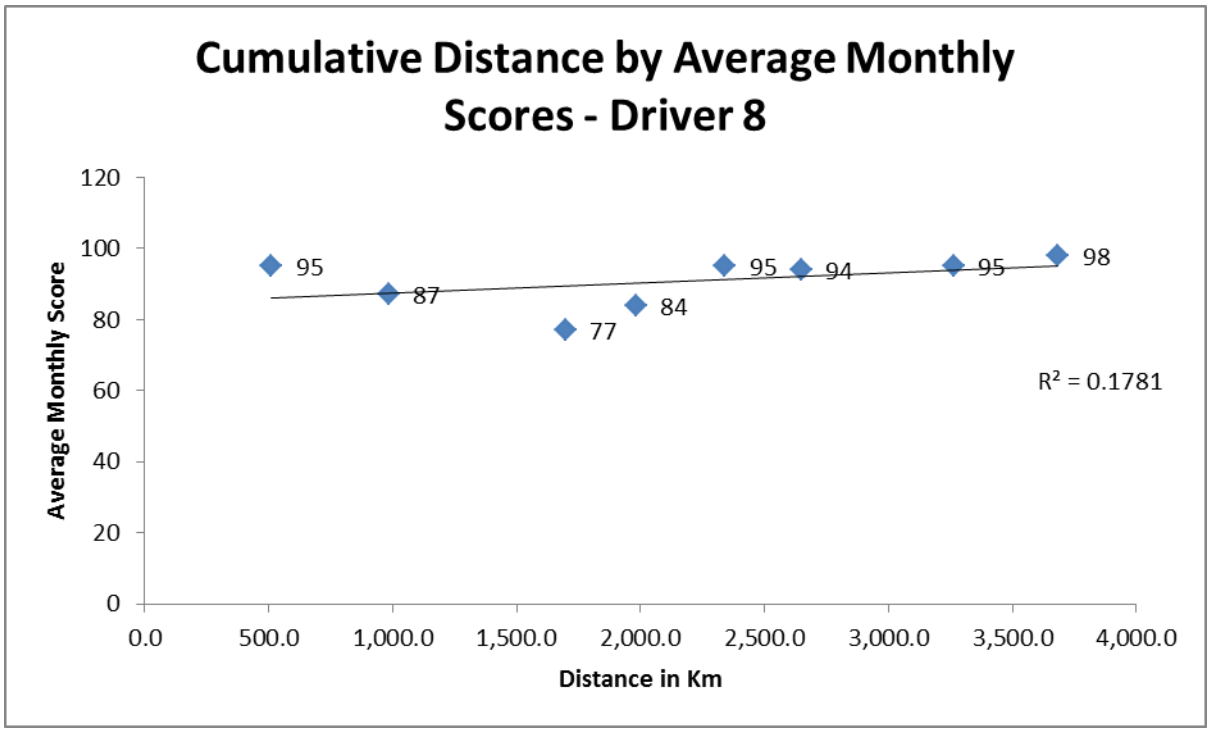
Driver 7

	Driver 7 Distances Km	Driver 7 Cumulative Km	Average Monthly Scores Driver 7
Total Km June 2013	755.8	755.8	87
Total Km July 2013	964.1	1,720.0	87
Total Km September 2013	647.2	3,272.9	78
Total Km October 2013	586.6	3,859.5	80
Total Km November 2013	673.0	4,532.5	75
Total Km December 2013	512.3	5,044.8	73
Total Km January 2014	399.7	5,444.4	89
Total Km February 2014	763.3	6,207.8	88
Total Km March 2014	923.8	7,131.5	
Total Km April 2014	270.1	7,401.7	
Total Km	7,401.7		
Total km	7,401.7		
Correlation Coefficient		**-0.17**	



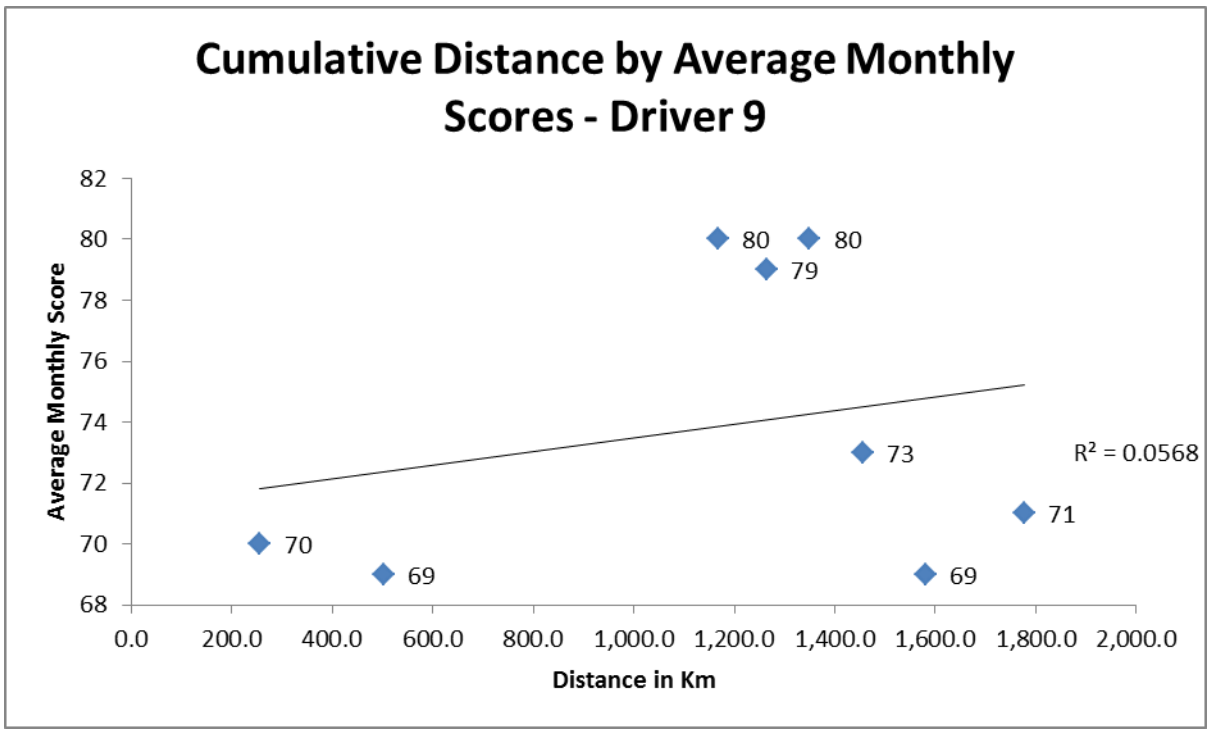
Driver 8

	Driver 8 Distances Km	Driver 8 Cumulative Km	Average Monthly Scores Driver 8
Total Km June 2013	512.0	512.0	95
Total Km July 2013	471.8	983.7	87
Total Km September 2013	364.5	1,696.8	77
Total Km October 2013	284.3	1,981.1	84
Total Km November 2013	359.0	2,340.1	95
Total Km December 2013	307.7	2,647.9	94
Total Km January 2014	615.8	3,263.6	95
Total Km February 2014	420.5	3,684.1	98
Total Km March 2014	240.7	3,924.8	
Total Km April 2014	809.5	4,734.3	
Total Km	4,734.3		
Correlation Coefficient		**0.48**	



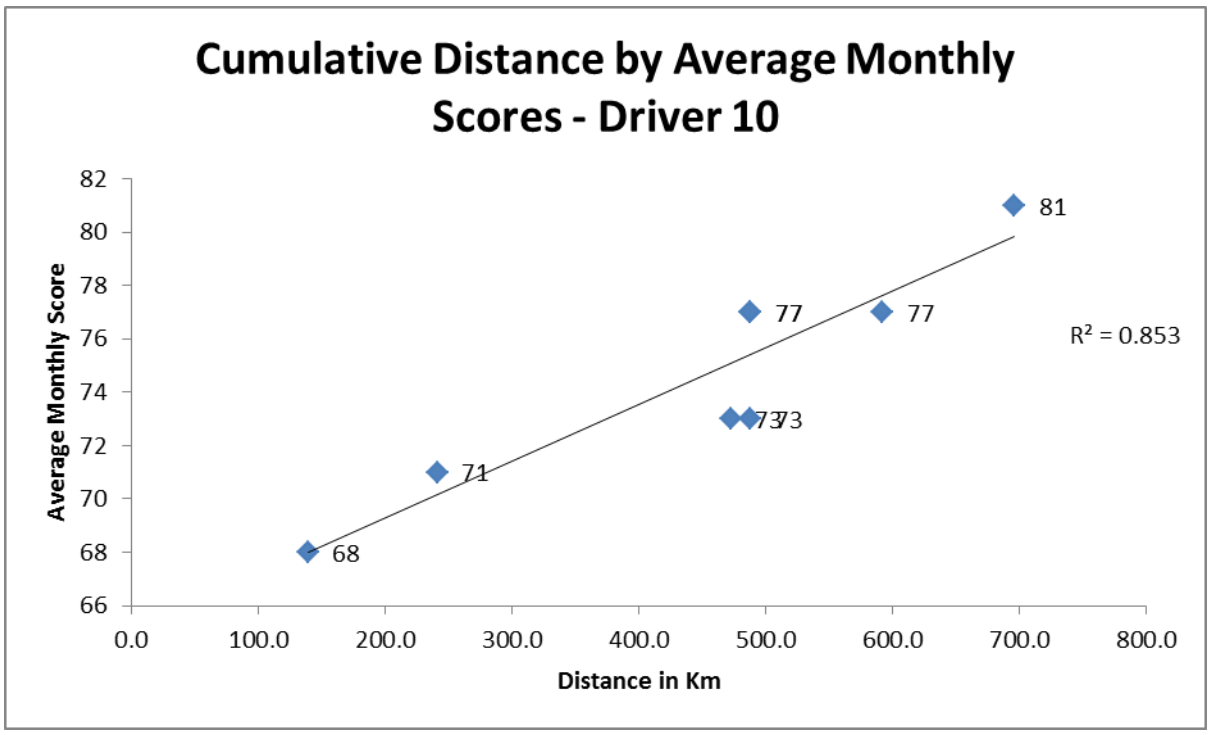
Driver 9

	Driver 9 Distances Km	Driver 9 Cumulative Km	Average Monthly Scores Driver 9
Total Km June 2013	256.5	256.5	70
Total Km July 2013	246.5	503.0	69
Total Km September 2013	509.0	1,167.0	80
Total Km October 2013	98.2	1,265.2	79
Total Km November 2013	84.7	1,349.8	80
Total Km December 2013	105.5	1,455.4	73
Total Km January 2014	125.5	1,580.8	69
Total Km February 2014	196.5	1,777.3	71
Total Km March 2014	180.0	1,957.3	
Total Km April 2014	183.8	2,141.1	
Total Km	2,141.1		
Total km	2,141.1		
Correlation Coefficient		**0.15**	



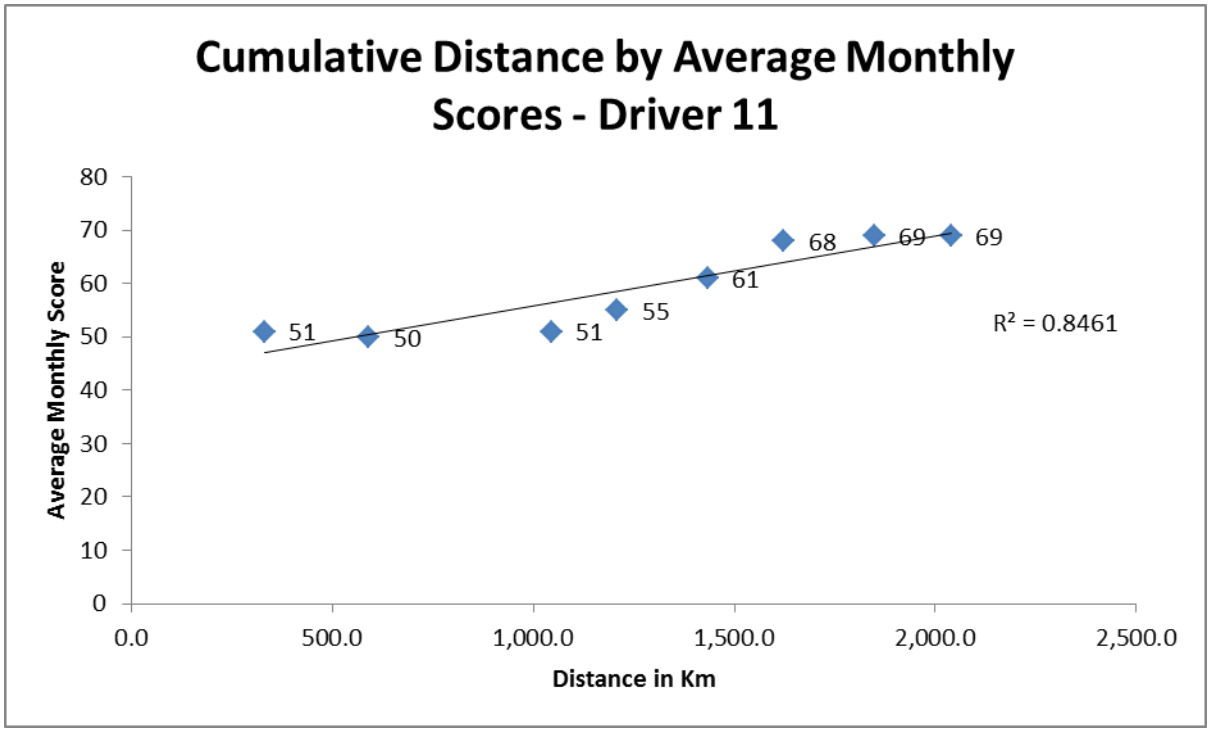
Driver 10

	Driver 10 Distances Km	Driver 10 Cumulative Km	Average Monthly Scores Driver 10
Total Km June 2013	139.5	139.5	68
Total Km July 2013	102.2	241.6	71
Total Km September 2013	117.8	472.6	73
Total Km October 2013	15.5	488.1	73
Total Km November 2013	0.0	488.1	77
Total Km December 2013	0.0	488.1	77
Total Km January 2014	103.9	592.0	77
Total Km February 2014	104.2	696.2	81
Total Km March 2014	122.6	818.8	
Total Km April 2014	86.8	905.5	
Total Km	905.5		
Correlation Coefficient		**0.92**	



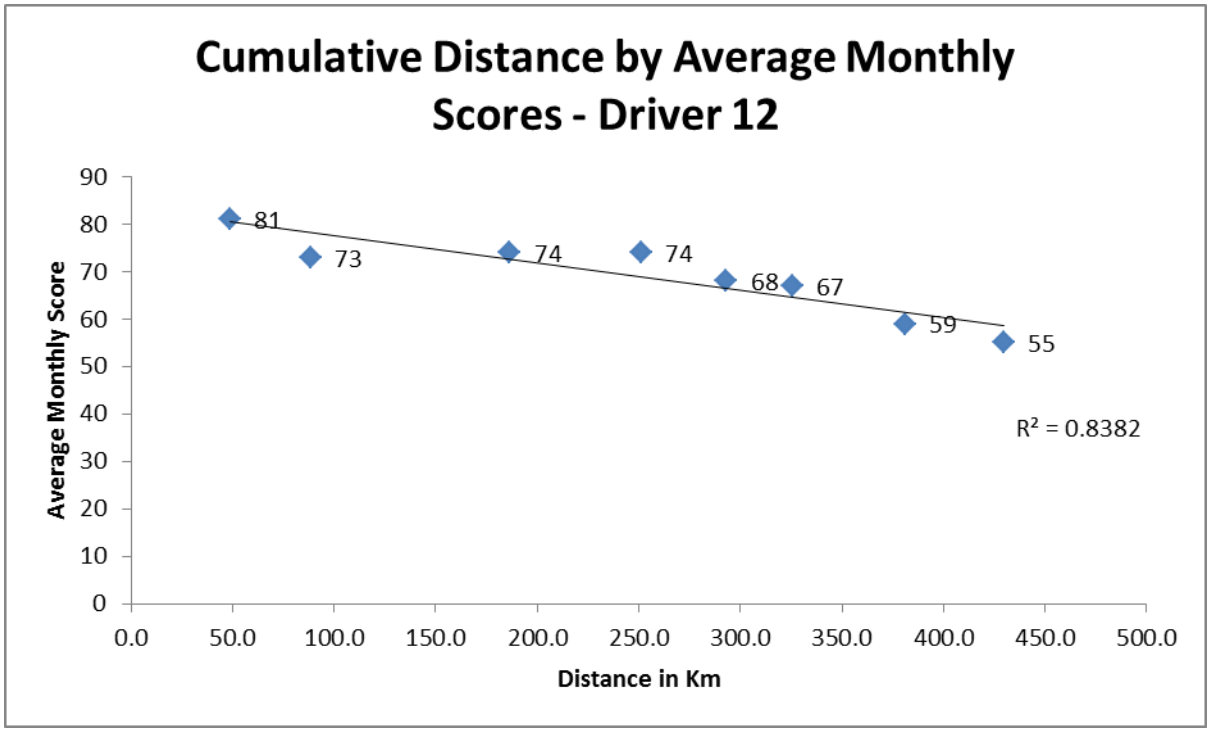
Driver 11

	Driver 11 Distances Km	Driver 11 Cumulative Km	Average Monthly Scores Driver 11
Total Km June 2013	332.5	332.5	51
Total Km July 2013	258.8	591.4	50
Total Km September 2013	221.6	1,045.2	51
Total Km October 2013	164.8	1,210.0	55
Total Km November 2013	223.2	1,433.1	61
Total Km December 2013	190.5	1,623.6	68
Total Km January 2014	223.9	1,847.5	69
Total Km February 2014	190.7	2,038.3	69
Total Km March 2014	13.8	2,052.1	
Total Km April 2014	0.0	2,052.1	
Total Km	2,052.1		
Correlation Coefficient		**0.92**	



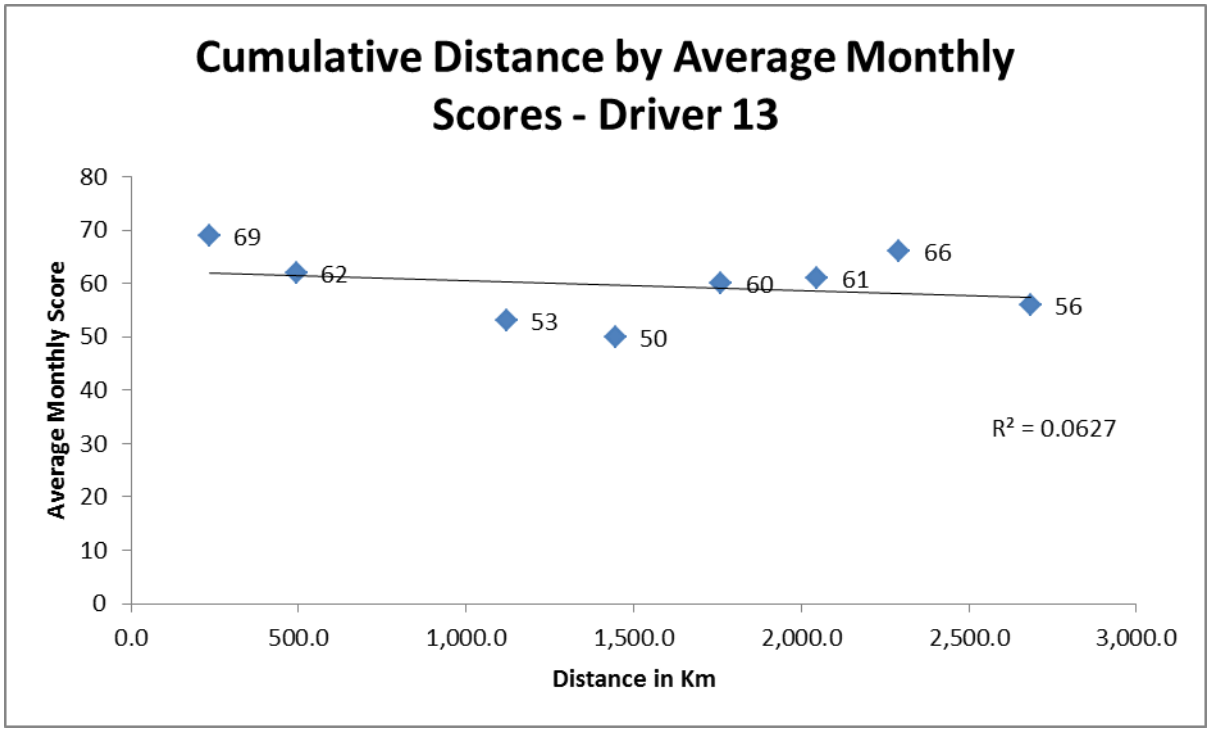
Driver 12

	Driver 12 Distances Km	Driver 12 Cumulative Km	Average Monthly Scores Driver 12
Total Km June 2013	48.5	48.5	81
Total Km July 2013	39.9	88.5	73
Total Km September 2013	50.9	186.4	74
Total Km October 2013	64.6	251.0	74
Total Km November 2013	42.1	293.1	68
Total Km December 2013	32.7	325.8	67
Total Km January 2014	55.5	381.2	59
Total Km February 2014	48.4	429.6	55
Total Km March 2014	42.8	472.4	
Total Km April 2014	40.2	512.6	
Total Km	512.6		
Correlation Coefficient		**-0.92**	



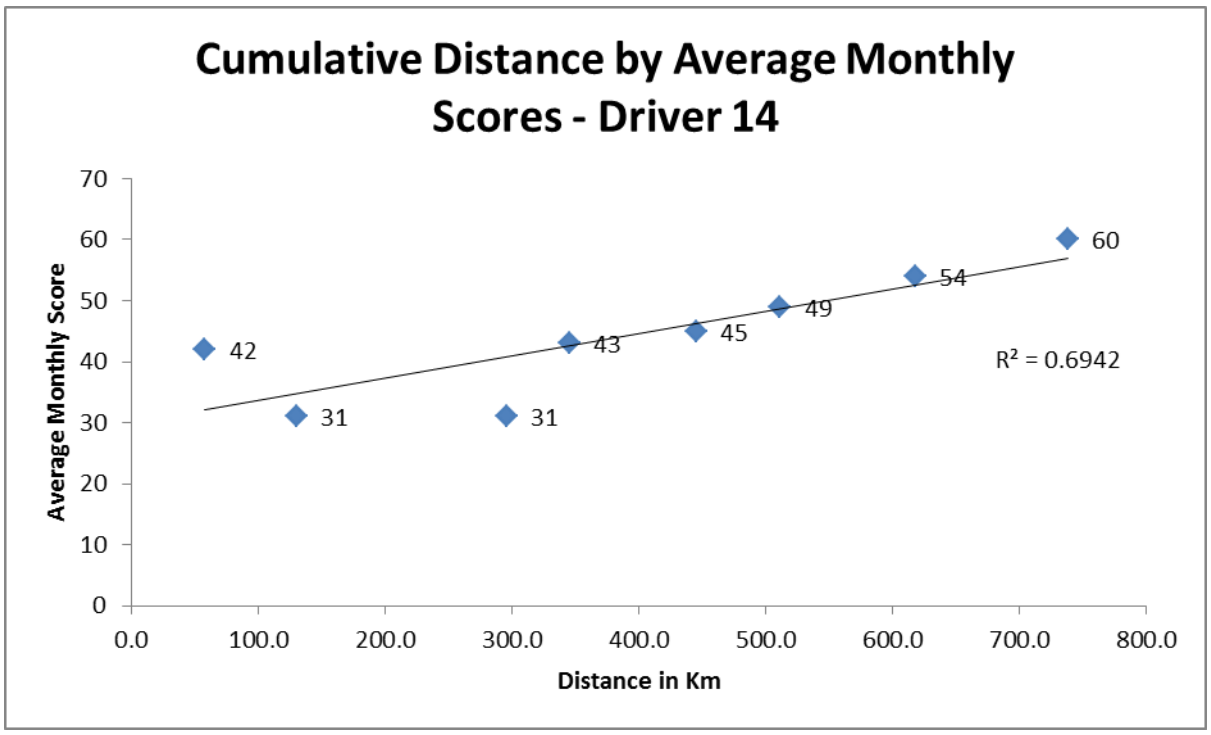
Driver 13

	Driver 13 Distances Km	Driver 13 Cumulative Km	Average Monthly Scores Driver 13
Total Km June 2013	233.4	233.4	69
Total Km July 2013	260.4	493.8	62
Total Km September 2013	278.8	1,121.6	53
Total Km October 2013	323.5	1,445.1	50
Total Km November 2013	315.5	1,760.6	60
Total Km December 2013	287.3	2,047.9	61
Total Km January 2014	244.6	2,292.5	66
Total Km February 2014	391.5	2,684.0	56
Total Km March 2014	281.5	2,965.5	
Total Km April 2014	324.3	3,289.8	
Total Km	3,289.8		
Correlation Coefficient		**-0.25**	



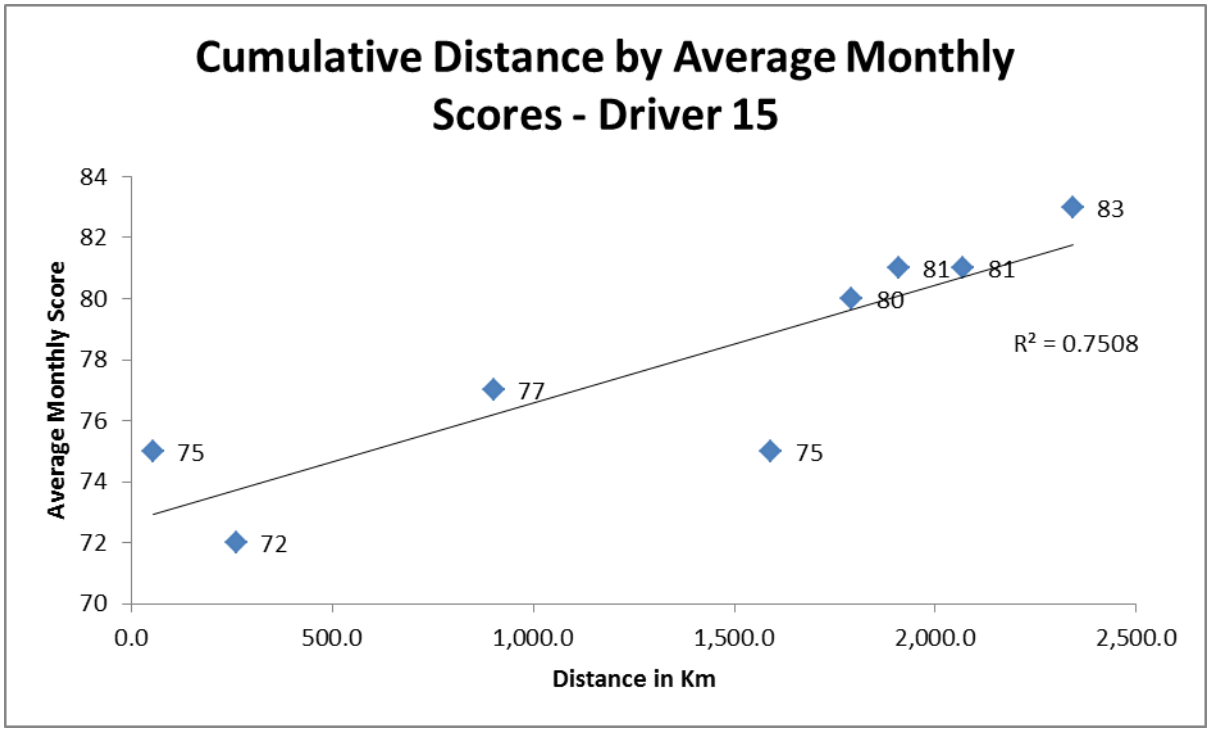
Driver 14

	Driver 14 Distances Km	Driver 14 Cumulative Km	Average Monthly Scores Driver 14
Total Km June 2013	58.0	58.0	42
Total Km July 2013	72.6	130.6	31
Total Km September 2013	88.3	296.1	31
Total Km October 2013	49.1	345.2	43
Total Km November 2013	99.8	445.0	45
Total Km December 2013	66.5	511.5	49
Total Km January 2014	106.5	618.0	54
Total Km February 2014	119.9	738.0	60
Total Km March 2014	89.5	827.4	
Total Km April 2014	115.0	942.5	
Total Km	942.5		
Correlation Coefficient		**0.83**	



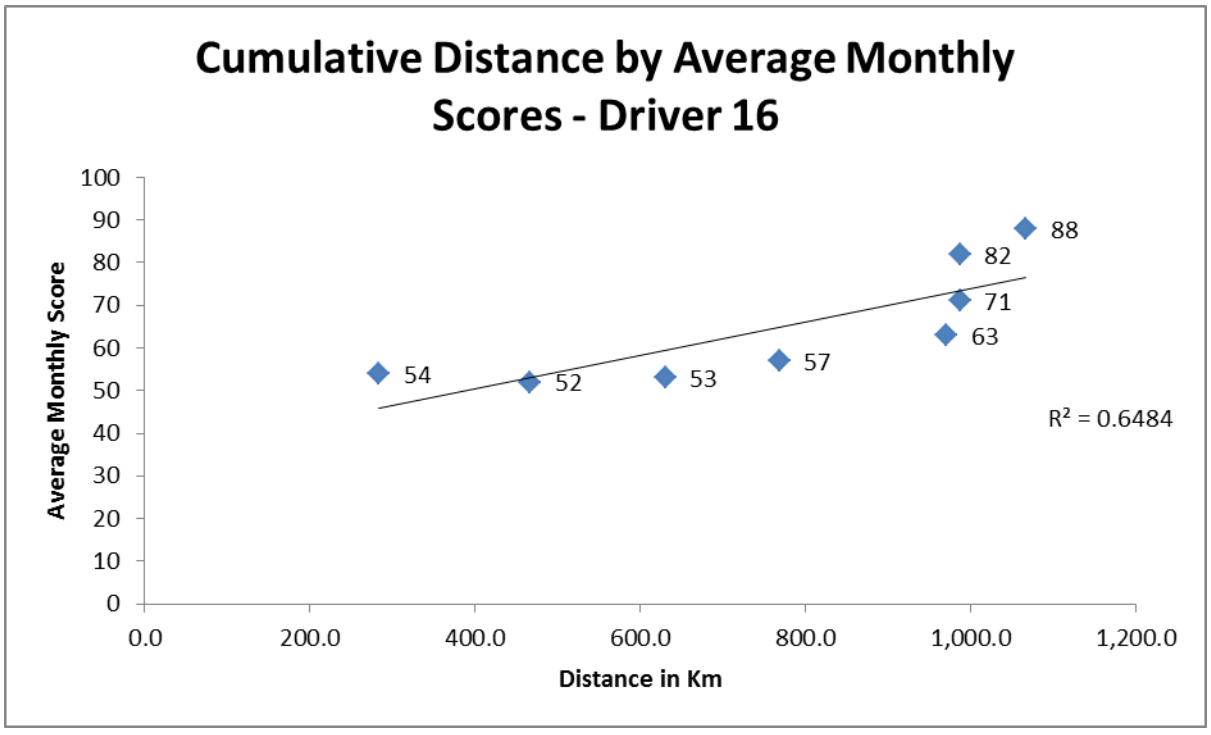
Driver 15

	Driver 15 Distances Km	Driver 15 Cumulative Km	Average Monthly Scores Driver 15
Total Km June 2013	55.1	55.1	75
Total Km July 2013	206.7	261.8	72
Total Km September 2013	337.9	902.9	77
Total Km October 2013	688.6	1,591.5	75
Total Km November 2013	201.0	1,792.5	80
Total Km December 2013	116.2	1,908.7	81
Total Km January 2014	160.9	2,069.5	81
Total Km February 2014	271.9	2,341.5	83
Total Km March 2014	270.2	2,611.7	
Total Km April 2014	205.1	2,816.7	
Total Km	2,816.7		
Correlation Coefficient		**0.87**	



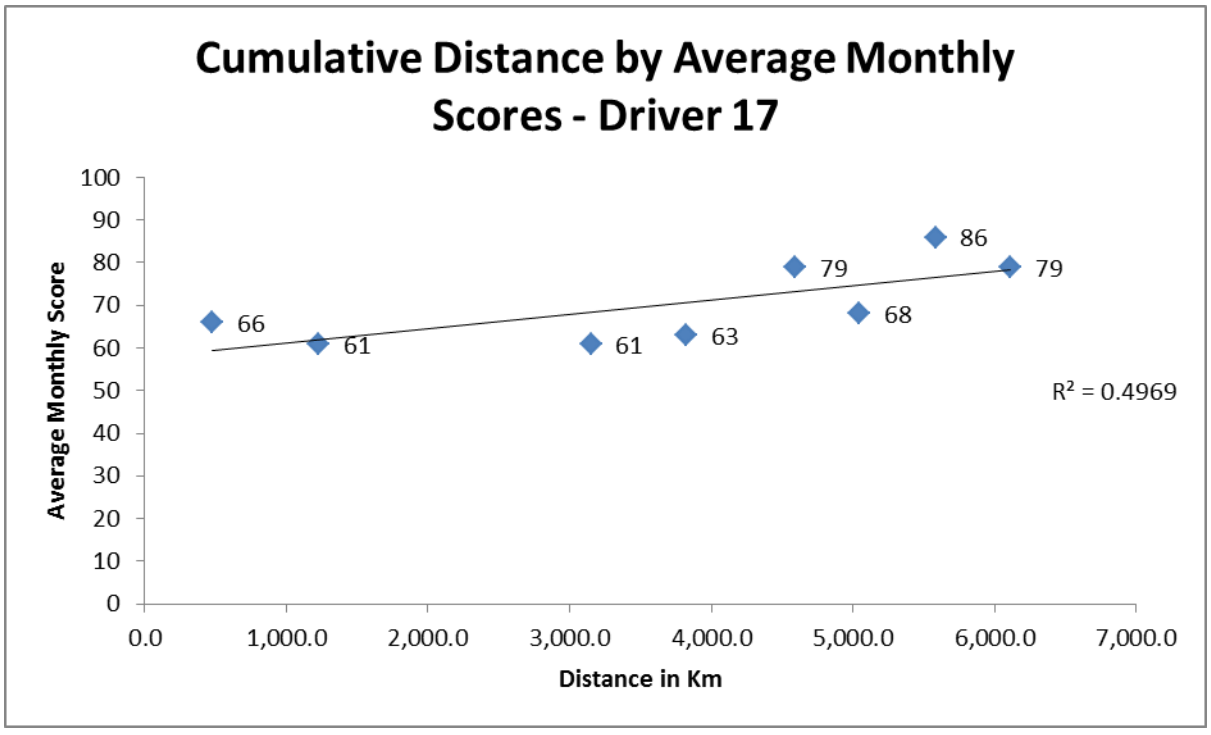
Driver 16

	Driver 16 Distances Km	Driver 16 Cumulative Km	Average Monthly Scores Driver 16
Total Km June 2013	284.0	284.0	54
Total Km July 2013	182.5	466.5	52
Total Km September 2013	90.5	630.0	53
Total Km October 2013	138.5	768.5	57
Total Km November 2013	201.9	970.4	63
Total Km December 2013	16.0	986.3	82
Total Km January 2014	0.0	986.3	71
Total Km February 2014	80.2	1,066.5	88
Total Km March 2014	495.5	1,562.0	
Total Km April 2014	377.6	1,939.6	
Total Km	1,939.6		
Correlation Coefficient		**0.81**	

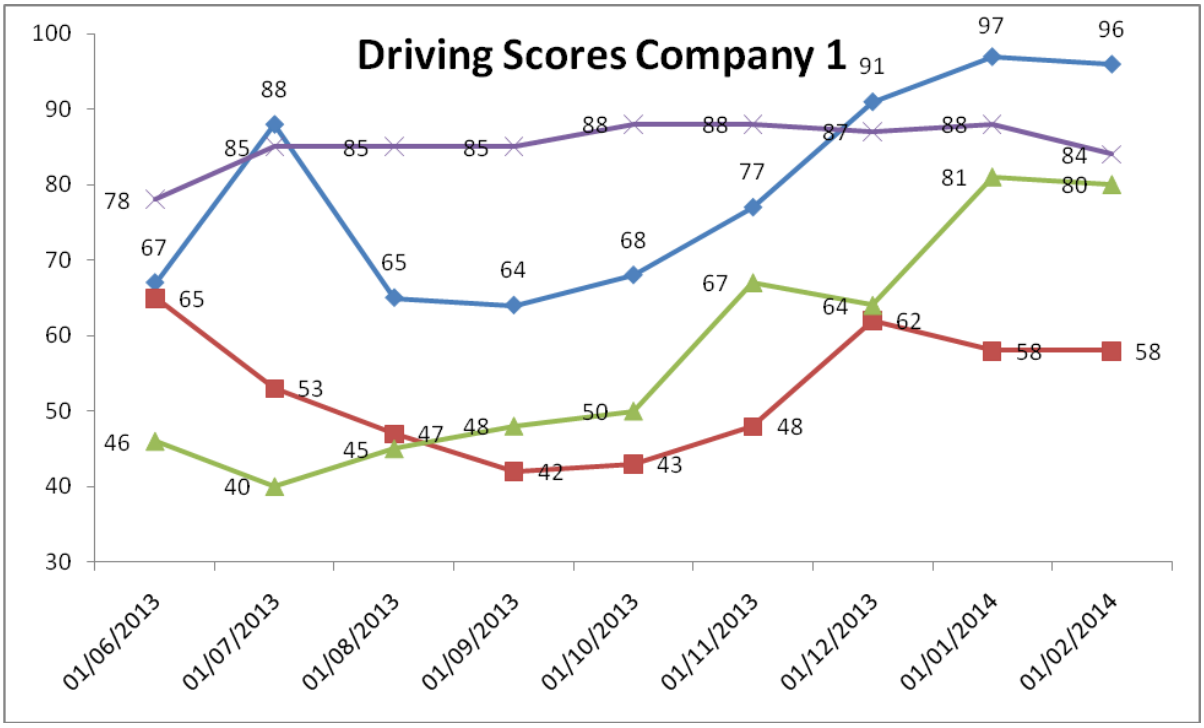


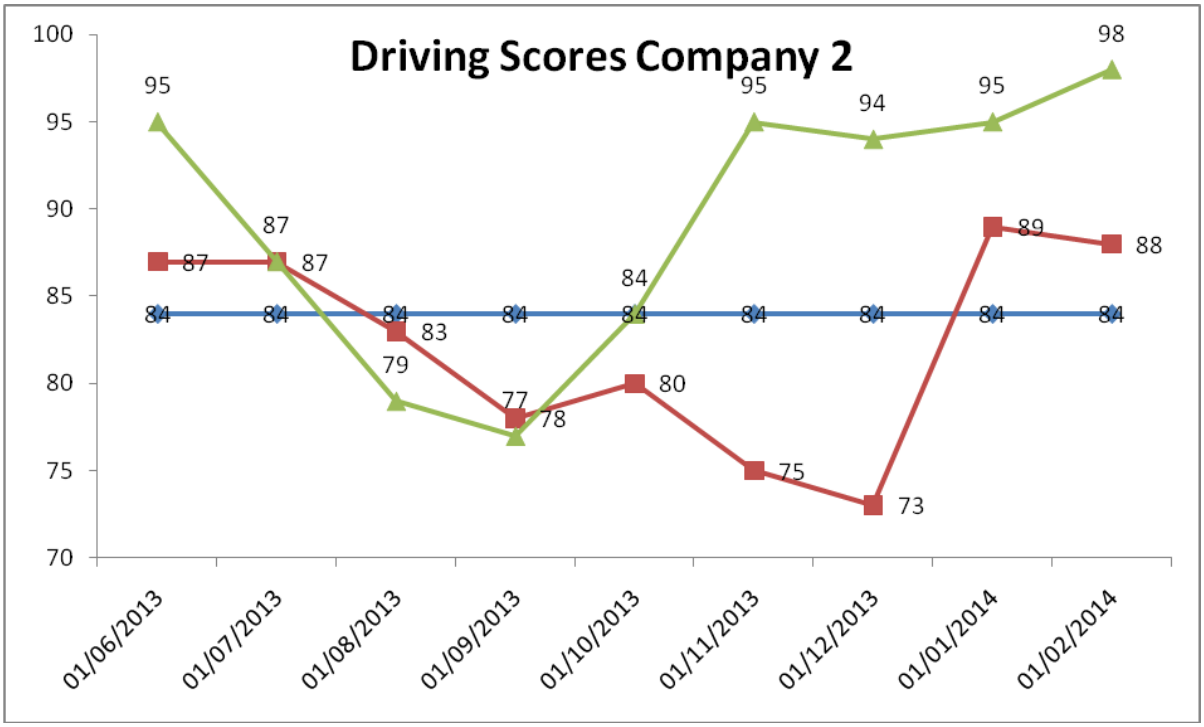
Driver 17

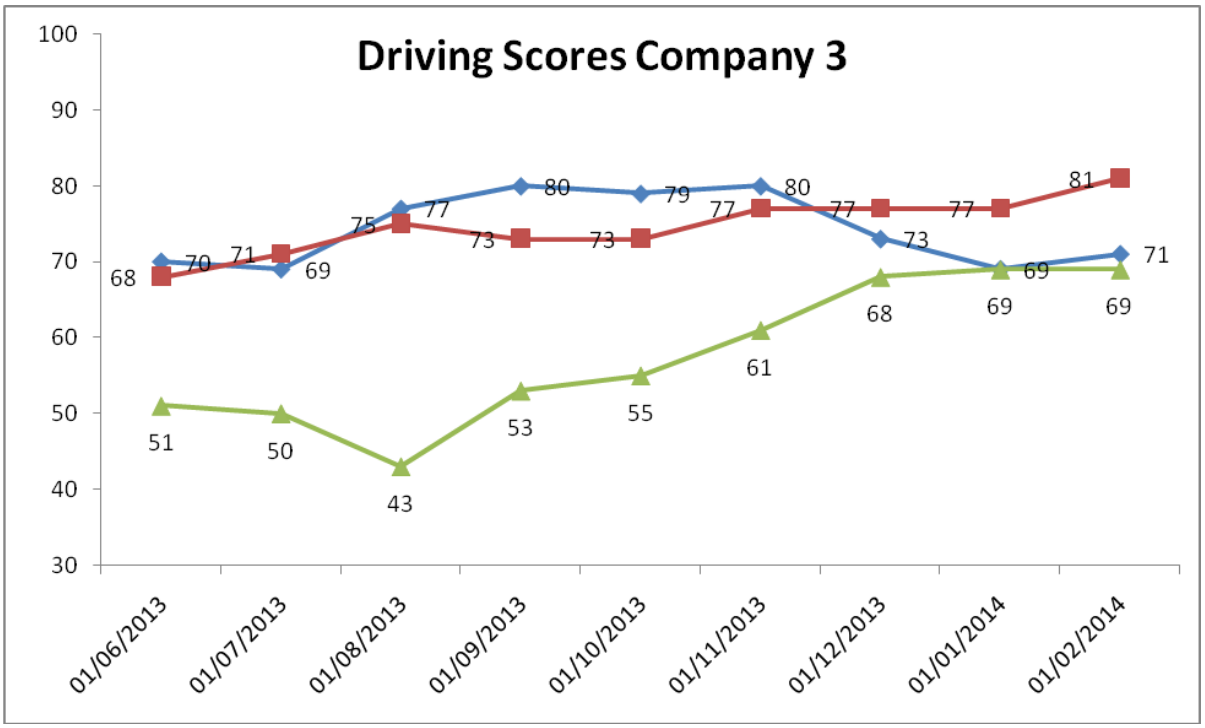
	Driver 17 Distances Km	Driver 17 Cumulative Km	Average Monthly Scores Driver 17
Total Km June 2013	481.4	481.4	66
Total Km July 2013	750.3	1,231.7	61
Total Km September 2013	1,009.4	3,151.5	61
Total Km October 2013	674.1	3,825.6	63
Total Km November 2013	766.5	4,592.1	79
Total Km December 2013	453.4	5,045.5	68
Total Km January 2014	536.5	5,582.0	86
Total Km February 2014	529.8	6,111.8	79
Total Km March 2014	521.4	6,633.2	
Total Km April 2014	280.0	6,913.2	
Total Km	6,913.2		
Correlation Coefficient		**0.70**	

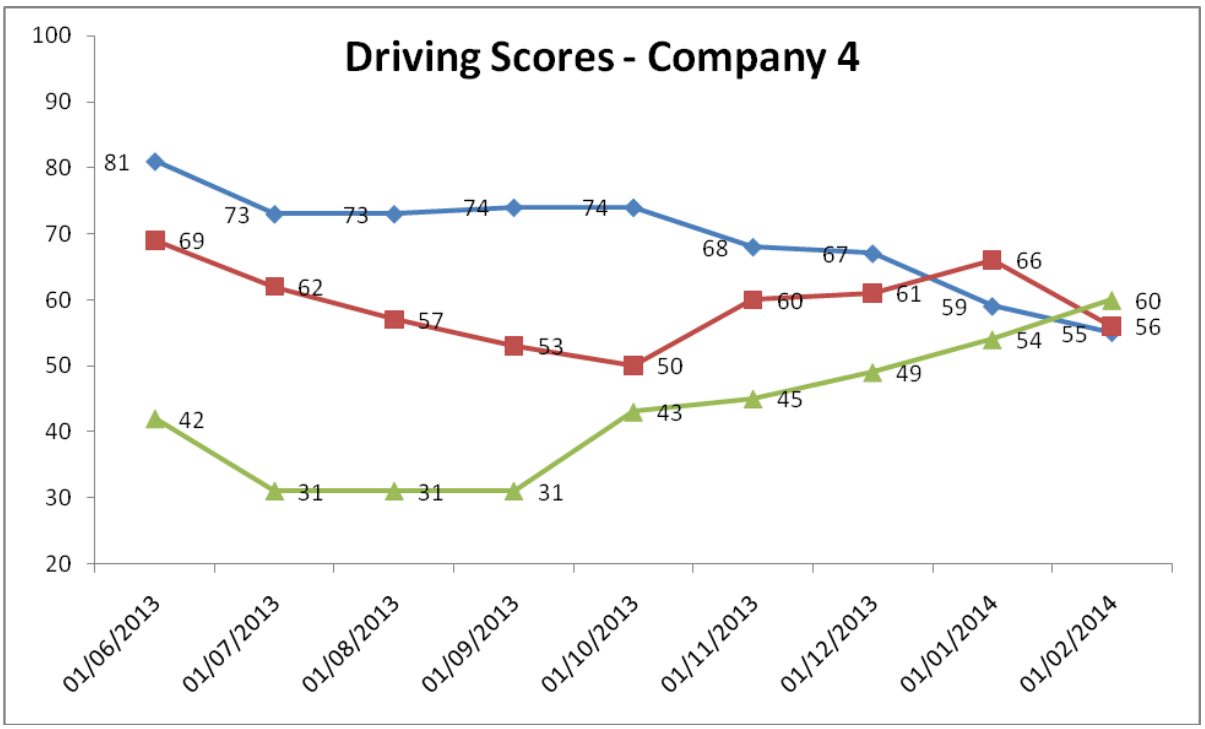


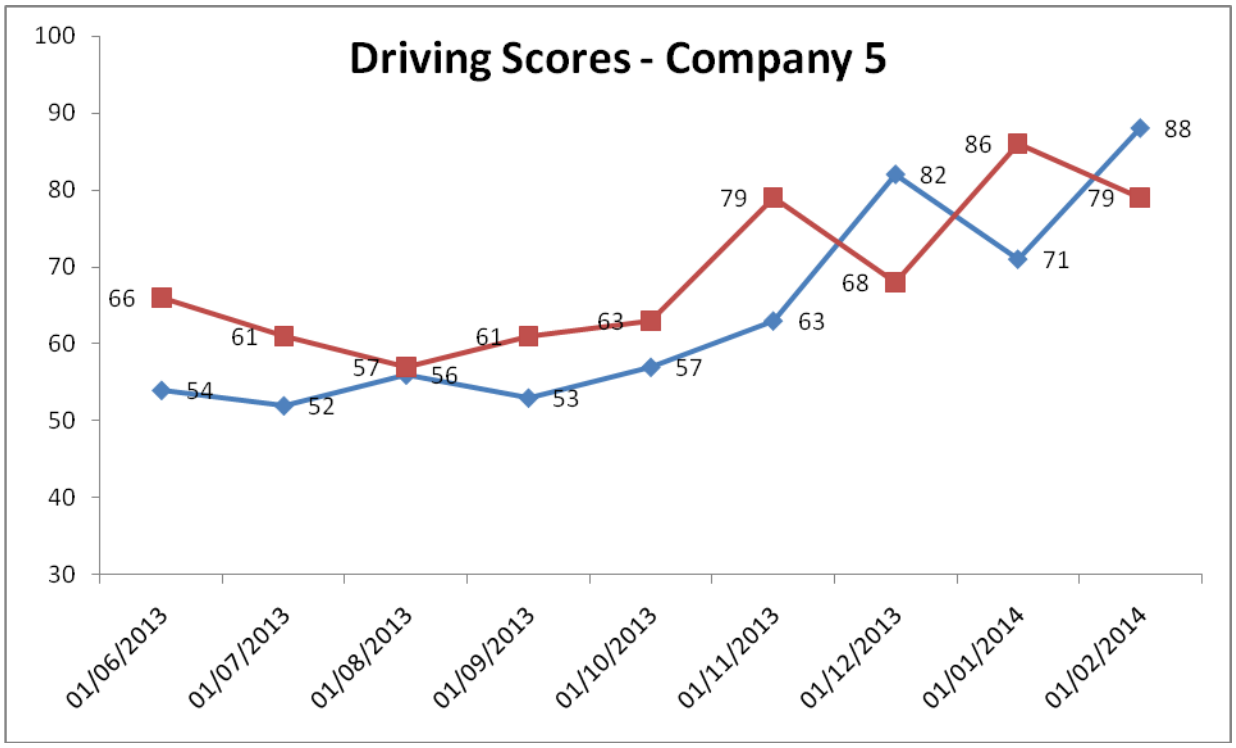
APPENDIX 7: SAMPLE OF DRIVING SCORES BY COMPANY






Driving Scores Company 3
100
90
80
70
60
50
40
30
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014
68 70 71 69 75 77 80 79 80 77 73 69 71
68 73 77 73 73 77 77 77 81 69 69
51 50 43 53 55 61 68 69 69


Driving Scores - Company 4
100
90
80
70
60
50
40
30
20
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014
81 73 73 74 74 68 67 59 55
69 62 57 53 50 60 61 66 56
42 31 31 31 43 45 49 54 60


Driving Scores - Company 5
100
90
80
70
60
50
40
30
66
61
57
61
63
79
68
86
79
54
52
56
53
57
63
82
71
88
01/06/2013
01/07/2013
01/08/2013
01/09/2013
01/10/2013
01/11/2013
01/12/2013
01/01/2014
01/02/2014

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