Optimizing driver performance monitoring and feedback: An innovative approach utilizing a global mobile interactive e-platform

This is a pilot study of a new concept in real time driver behavior monitoring and feedback It uses a smartphone e-platform configured to enhance Intelligent Speed Adaptation (ISA), capture real time two way vehicle operations data and to simultaneously remove driver distraction from mobile phone calls and texting.

The smartphone is configured with a downloadable software application (app) with telematics, Global Green Drive (GGD), and operates via an e-platform integrated with GPS and GPRS, and capable of immediate auditory driver feedback with analysed driver performance data for fleet management oversight. The smartphone is capable of detecting vehicle motion via both the accelerometer and changes in GPS and GPRS location. It also has the capacity to identify harsh braking. Software configuration can also disable the use of texting and non-emergency calls whilst the vehicle is in motion.

The smartphone devices and e-platform were implemented initially in small fleet settings in 5 countries, UK, USA, Ireland, Switzerland and Australia. Preliminary evaluation data captured as quality assurance (QA) data for a 6 week period identified rectifiable operational and implementation issues - and demonstrated user functionality, device stability and performance on a range of diverse mobile phone handsets and environments.

The enduser smartphone operational screens are depicted below. All data entry is completed either before embarking on a trip, or once the trip is completed and was not done whilst the vehicle is in motion.

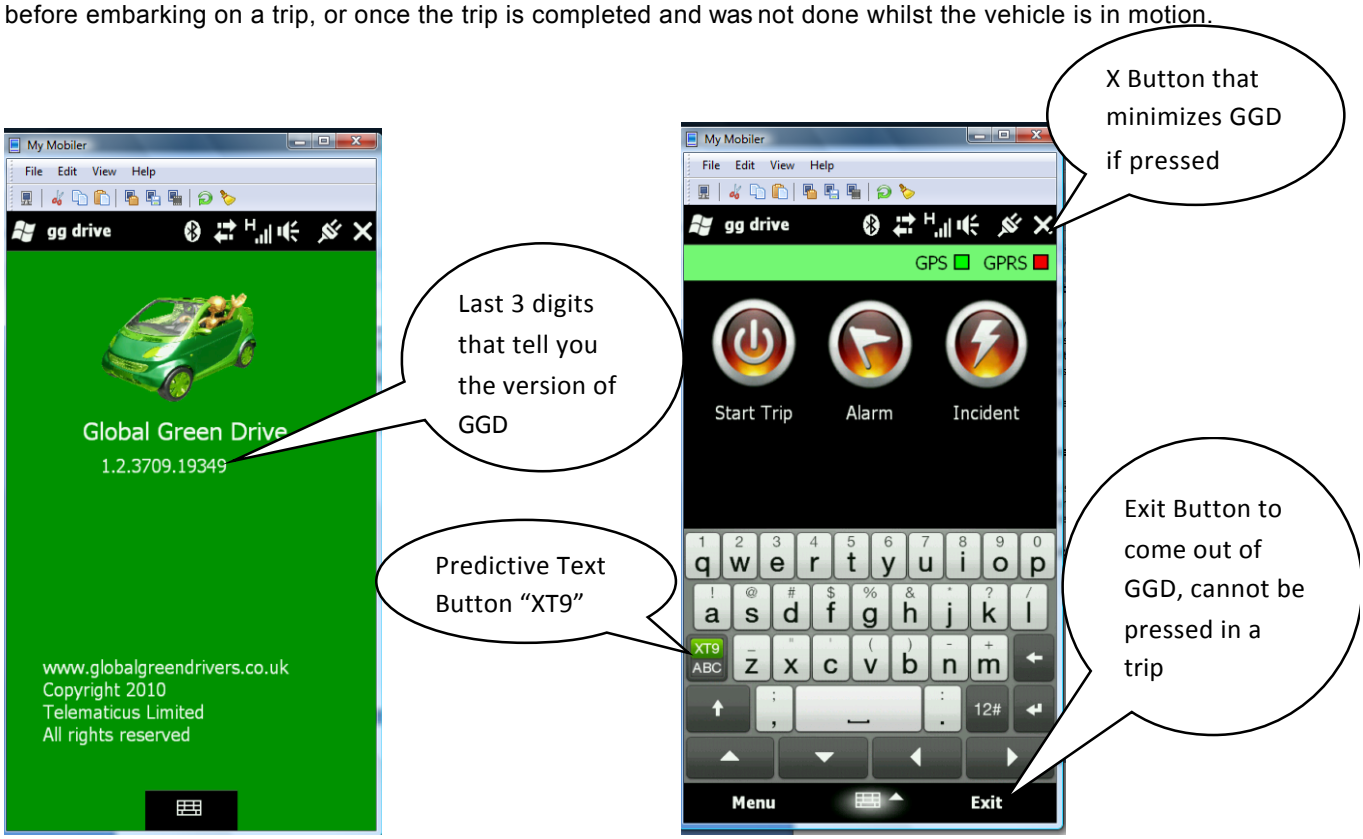


Figure 1. The enduser smartphone operational screens

Below are sample traces of driver mapping onto Google maps – trace 2a is of a USA New York City driver, This demonstrates the resolution of driver location capture. Fig. 2b is Pisa Airport Italy and also depict driver speed. The e-platform monitoring was being conducted from the UK London site.

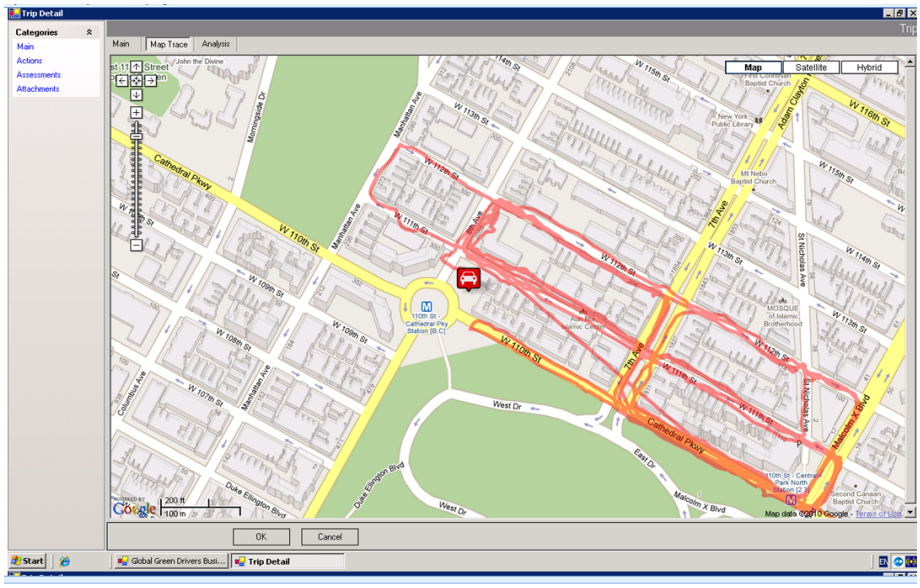


Figure 2a. Sample trace map of a monitored driver in New York USA

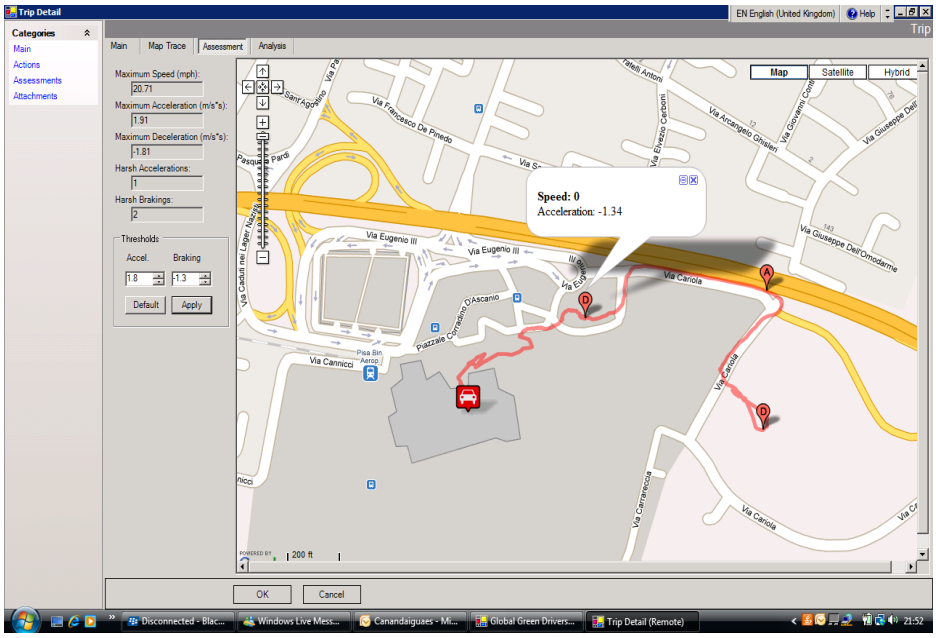
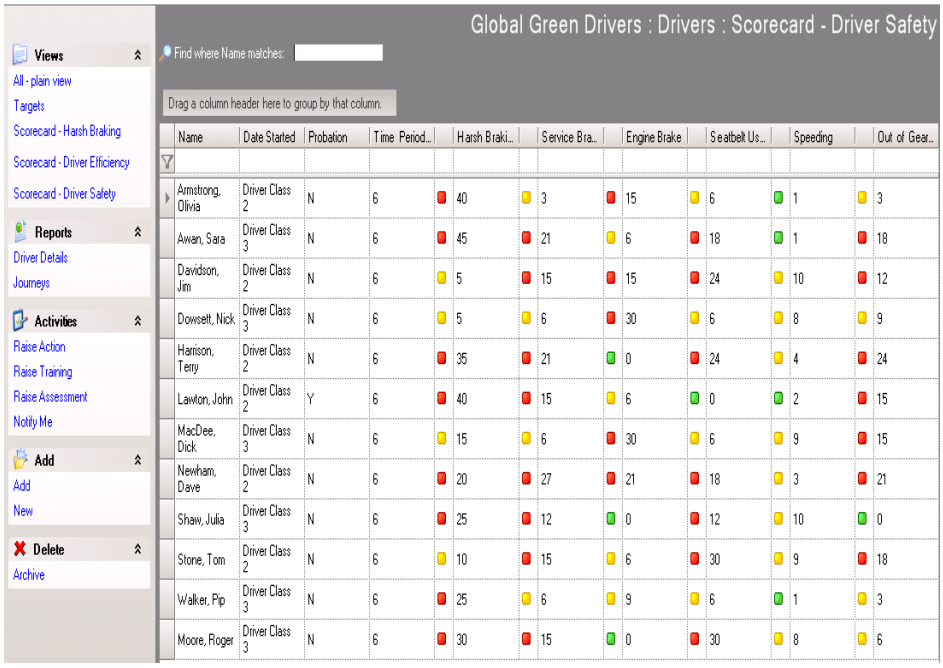


Figure 2b. Sample map assessment mode of a monitored driver, with speed travelled depicted, Pisa Italy

The scorecard is created using telematics data from dedicated on-board telematics device and is presented in traffic light format against benchmark and set targets See Fig 3 below



Global Green Drivers : Drivers : Scorecard - Driver Safety

Views
All - plain view
Targets
Scorecard - Harsh Braking
Scorecard - Driver Efficiency
Scorecard - Driver Safety

Reports
Driver Details
Journeys

Activities
Raise Action
Raise Training
Raise Assessment
Notify Me

Add
Add
New

Delete
Archive

Find where Name matches:

Drag a column header here to group by that column.

Name	Date Started	Probation	Time Period...	Harsh Braki...	Service Bra...	Engine Brake	Seatbelt Us...	Speeding	Out of Gear...
Armstrong, Olivia	Driver Class 2	N	6	40	3	15	6	1	3
Awan, Sara	Driver Class 3	N	6	45	21	6	18	1	18
Davidson, Jim	Driver Class 2	N	6	5	15	15	24	10	12
Dowsett, Nick	Driver Class 3	N	6	5	6	30	6	8	9
Harrison, Terry	Driver Class 2	N	6	35	21	0	24	4	24
Lawton, John	Driver Class 2	Y	6	40	15	6	0	2	15
MacDee, Dick	Driver Class 3	N	6	15	6	30	6	9	15
Newham, Dave	Driver Class 2	N	6	20	27	21	18	3	21
Shaw, Julia	Driver Class 3	N	6	25	12	0	12	10	0
Stone, Tom	Driver Class 2	N	6	10	15	6	30	9	18
Walker, Pip	Driver Class 3	N	6	25	6	9	6	1	3
Moore, Roger	Driver Class 3	N	6	30	15	0	30	8	6

Figure 3. Example scorecard of comparative driver performance from the ggdrive business applicationTM.

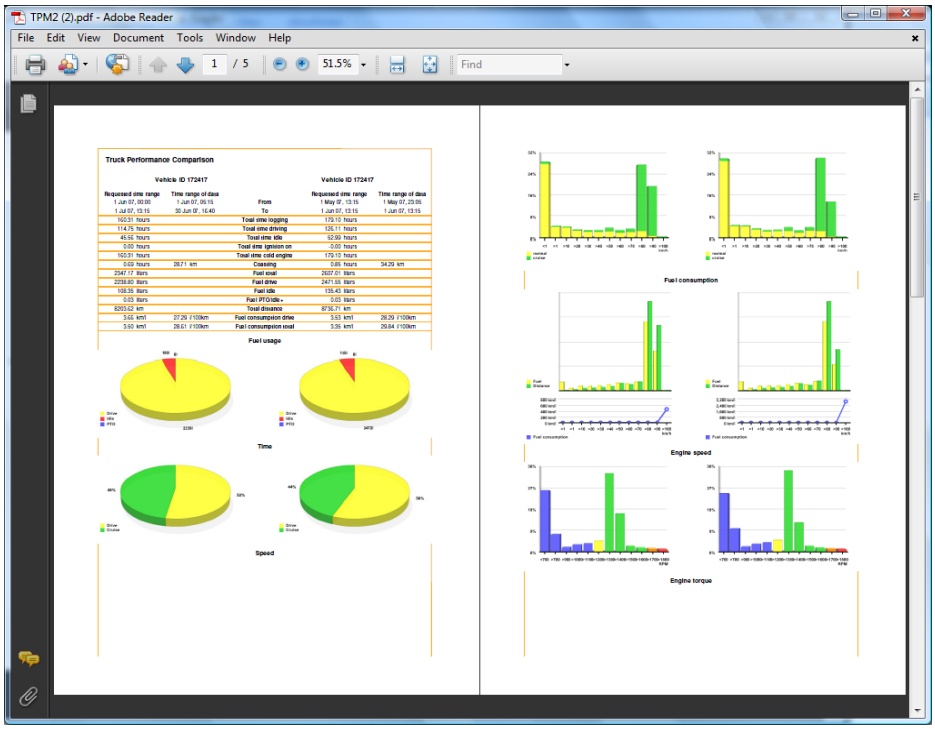


Figure 4. PDF report of comparative vehicle performance from the ggdrive business applicationTM.

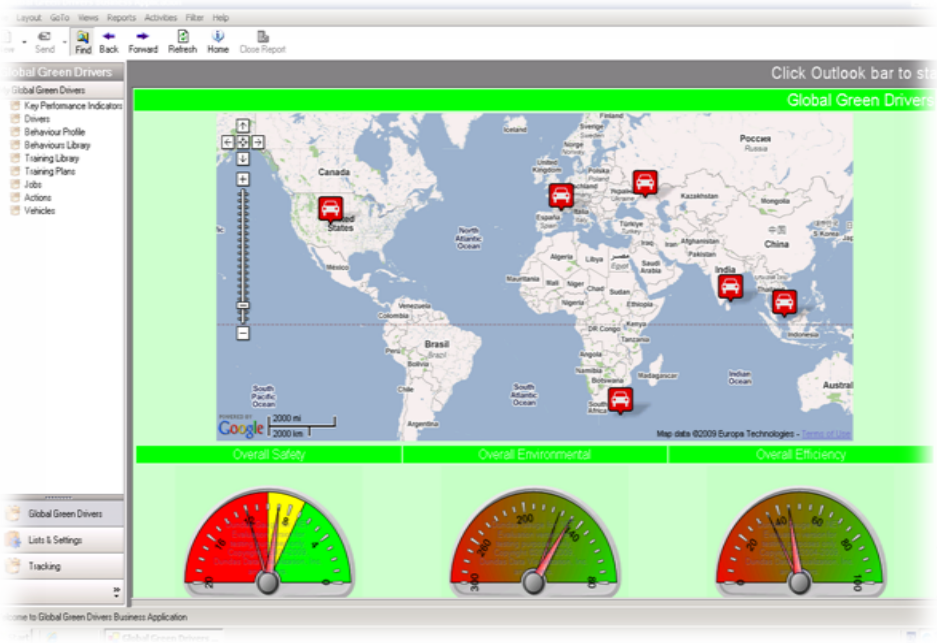


Figure 5. Web based performance oversight. Gauges for safety, environment and efficiency.

These online and .pdf reports are automatically created using telematics data from dedicated on-board smartphone telematics device. The .pdfs can be scheduled for production and email distribution.

This initial in depth part of the study involves the pilot based in the UK. The QA pilot site was a group of primarily older female drivers, employees of an outreach program for pediatric hospice care who were not prior 'technology users'. A number of rounds of inservice were required to ensure comprehensive familiarity with the software platform and device usage.

These data are part of a 3 phase cohort study, which consists of Phase I – capturing vehicle distance travelled and speeds in excess of limits without real time driver feedback, Phase II – Disabling texting, non-emergency features whilst the vehicle is in motion, Phase III - implementation of auditory driver feedback alerts and messages. Outcomes for any reductions in speed violations, harsh breaking and other incidents for Phase I is currently being analyzed and preliminary data for those drivers from Phase I are presented in this study. Phase II and III are being implemented. The preliminary implementation evaluation described below preceded Phase I data capture.

The Phase I measure was the number of trips fully completed in the system, the number of open trips has consistently been reducing month of month - over 1400 trips have been made by a pool of 23 people of whom 5 have not been active (we are currently investigating why they are not using the system). 21 of these people are female and 2 male, across the UK approximately 50% in the North and 50% in the South.

Preliminary Implementation Evaluation – 'Learn' Stage:

The pure data gathering was conducted in February, March & April 2010, and two additional versions of the Application were released with improved Data Caching functionality as well as the ability to change drivers direct from the phone.

Time was spent enabling the people taking part of get used to the new phone and app, some bad habits closing down the app were spotted and some concerns about text and voice use interfering with the phone were reported. The security alarm was triggered as part of a trial at the start of the pilot - since then it has not been raised.

At the same time we have been looking to deliver the operational benefits of automatic expense collection which the system was designed to deliver in the “learn” stage. These expense reports are currently being matched against the manually submitted returns and the results are that the correlation is very good.

The preliminary implementation evaluation identified the following end-user operations issues and solutions for smartphone use:

- Constant power source. Phone needs to be plugged in (via cigarette lighter outlet) all of the time
- Getting a connection - particularly at the start of a trip - app modified to cache data at the start of a trip and send the data next time it gets a signal
- Time it takes to get into the app when starting the phone up - cannot change the time it takes to start a phone but have modified the app for "quick start"
- Using a cradle to hold the phone - probably less than 50% of users use a cradle to hold the phone whilst in trip

Phase I Data Capture – ‘Guide’ Stage

In Mid April the Phase I guide stage of the project was commenced, this provided members of the pilot project with a visible view of the speed that they were driving at, so that they had immediate vehicle speed information on the phone.

No speed limits were set up in the system of notification for excess speeding (as this is Phase I of the study) - this is simply additional information for the driver. Once the analysis of Phase I data is completed then Phase II real time feedback, with the messaging based on an operational basis as well as safety based on thresholds set in the system.

The performance dial displays on the phone application (as those depicted in Fig 5.) were turned on, though not configured to work but participants were already looking at them. One driver informed the researchers that she was convinced the needle had moved on the dial!!

Name	Total distance (Miles)	Total number of trips	Distance per Trip	Harsh breaking < 0.0	Harsh breaking < -4.0	Harsh breaking 4.6	Mile/Break	Mile/HB <-4.0	Break/Trip	Trip/HB <-4.0
Driver 9	11,972	194	62	16,066	25	16	0.75	479	83	7.76
Driver 2	12912	394	33	5,217	19	7	2.47	680	13	20.74
Driver 11	7,433	136	55	5,164	7	5	1.44	1062	38	19.43
Driver 10	5,733	96	60	2,169	5	1	2.64	1147	23	19.20
Driver 6	6939	261	27	9,254	6	3	0.75	1157	35	43.50
Driver 8	2365	47	50	768	2	1	3.08	1183	16	23.50
Driver 1	9179	144	64	9,972	7	3	0.92	1311	69	20.57
Driver 13	7,337	321	23	2,000	5	4	3.67	1467	6	64.20
Driver 4	7556	164	46	1,463	4	1	5.16	1889	9	41.00
Driver 3	9479	231	41	2,394	5	2	3.96	1896	10	46.20
Driver 12	5497	63	87	1,516	1	1	3.63	5497	24	63.00
Driver 7	5513	107	52	1,528	0	0	3.61		14	
Driver 5	197	17	12							

Table 1. Harsh acceleration data

The default setting for both Harsh Braking and Harsh Acceleration threshold is 4.4 m/s*s. 4.4m/s2 is considered to be the level that abs starts to kick in. Harsh breaking data was captured based on this threshold. Automated messaging and performance feedback for Phase II will be based on these criteria.

Summary:

There has been acceptance of the technology and the pilot project by the vast majority of the participants. The preliminary program has demonstrated that it is possible to monitor fleet safety performance with a software application on a standard smartphone device and that this platform also provides scope for ISA driver feedback and to simultaneously remove driver distraction from mobile phone hazards.