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Research on Driver Behavior

An Innovative Approach to Enhancing Driver Performance, Monitoring and Feedback with Cellular and Cloud Based Technologies

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EMSSafety FOUNDATION Telematicus

Convergence of Technologies

Integrated Business Solution

Combining innovative smartphone technology to drive safety behaviour change

Innovative and cost effective solutions for driver and vehicle efficiency, safety, and minimal environmental impact across the automotive vehicle spectrum.

Background:

- Two high priority goals for fleet safety management are:
  - Effective real time driver performance data
  - Isolating the driver from the use of talk and text on cell phones
- This presentation outlines an innovative approach to addressing both priorities in an applied business model – addressing safety, efficiency and environmental impact.

OK, so this is in total contrast to current ethos of the relationship btw cell phones and vehicle safety

Can we harness the foe??

- Smartphones are becoming ubiquitous
- The dangers of talking/texting and driving are clear and serious
- Education and policing have limitations
- Can we harness the enemy to advance and enhance road safety???

Lean performance data capture – what matters?

- Whilst there are numerous fleet telematics platforms that capture extensively detailed information – a goal of this project was <u>to identify lean data capture and basic driver performance profiles in a cost effective and technology efficient manner</u>

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Introduction

- Pilot study of preliminary implementation of a real time driver behavior monitoring & feedback
- Uses a smartphone integrated e-platform with scope to be configured to:
  - Capture real time two way vehicle operations data
  - Enhance Intelligent Speed Adaptation (ISA),
  - Also simultaneously remove driver distraction from routine mobile phone calls and texting

Data terminal features

- The smartphone is capable of detecting:
  - Vehicle motion and speed via both the accelerometer and changes in GPS and GPRS location
  - 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.

Two way system

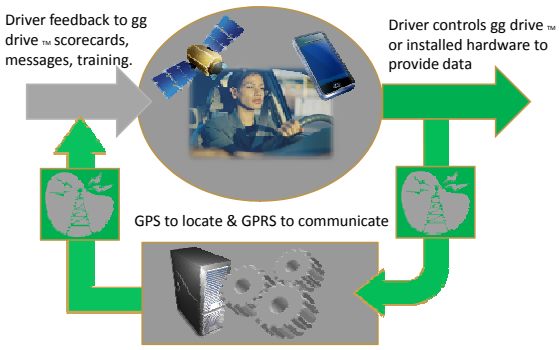
- End User terminal - smartphone is configured with a downloadable software application (app) with telematics Global Green Drive (GGD),
- GGD operates via an e-platform integrated with GPS and GPRS, and capable of immediate auditory driver feedback
- Fleet analyzed for real time driver performance data for fleet management oversight.

Data Entry Key Issues

Data entry

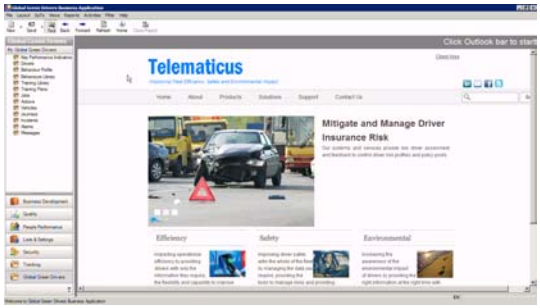
- To be completed ONLY before trip commences and after end of trip
- ONLY whilst vehicle is stationary

Closed loop system



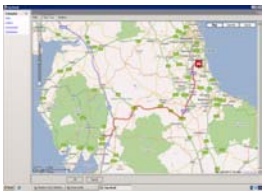
gg drive business application ™ records , analyses & actions data in real time

Management System



Example scorecard of comparative driver performance from the ggdrive business application™.

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.



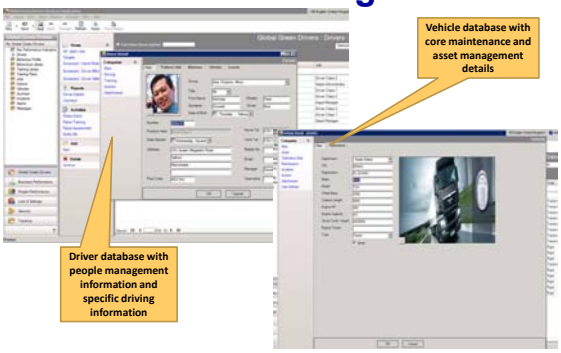
Example trip trace from the ggdrive business application™.

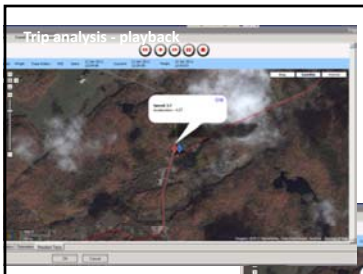
This trace is automatically created using GPS data send from gg drive and can be used to analyse speed, distance, acceleration (deceleration), and time during the trip..

- HTC
  - Windows/Android based touch screen device
  - GGD application installed
  - Co Pilot Sat Nav installed
- Installation
  - Drivers provided with standard goose neck holder
  - Power lead provided.
- Challenges
  - Getting used to a touch screen phone (mini computer)
  - Making sure the power lead is plugged in
  - Getting a GPRS signal to connected to the system.
  - What is an application, what can the device do

Front end Driver smartphone interface

Integration of driver and vehicle and asset management

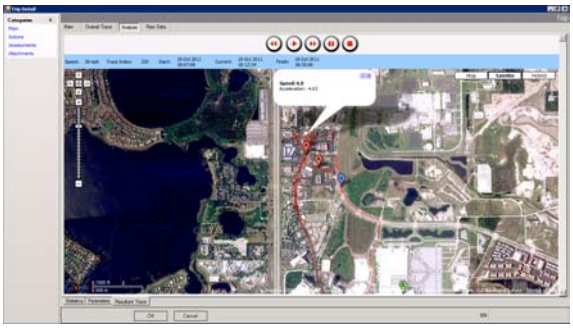




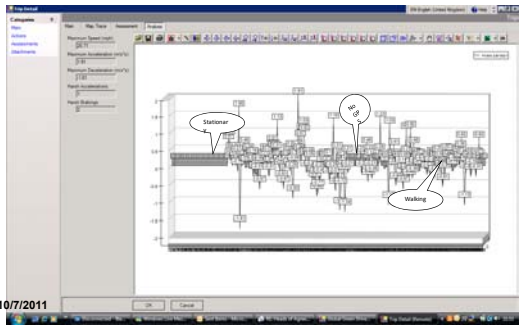
- Harsh Acceleration & Harsh Braking
  - Where (shown on map)
  - Change parameters

- Speed
  - Actual speed displayed
  - Link to parameters

Last nights shuttle ride



The analyzed system data that sits behind each Trace Assessment



GGD Data Capture

- **Real time**
- **Key details**
- **Photographs**
- **Details on application**

Business System

- **Individual records linked to drivers and vehicles**
- **Action planning and assignment**
- **Attachments e.g. photos**

Reports

- **Launch accident reporting process**
- **Export to Excel for manipulation**
- **Scorecard or crystal reporting**

GGD Smartphone views

Driver's Individual performance against company set performance targets in the system

- **Needle points to individual driver performance against targets**
- **Green area represents the difference between standard and stretch targets**
- **Goals can be varied by region, market, team as required**
- **Performance is updated and presented in real time.**

2010 UK pilot

The Phase I pre-implementation data – Rainbow Trust (Child Hospice care outreach)

- Total number of trips fully completed in the system >2000 trips
- Drivers a pool of 23 people
- 21 of these people are female and 2 male, across the UK approximately 50% in the North and 50% in the South
- Data captured over a 5 month period

Driver profile

The driver cohort were:

- All were health care providers
- Non professional drivers
- Predominantly Older
- Predominantly Female
- Technophobes/Technologically inexperienced

Outline

- Preliminary pre-implementation evaluation data captured as quality assurance (QA) data for a 6 week period
- To identify rectifiable operational and implementation issues
- Demonstrate user functionality for non-professional drivers, device stability and performance on a range of diverse mobile phone handsets and environments.

3 Phase Study

These data are initial data part of a 3 phase cohort study:

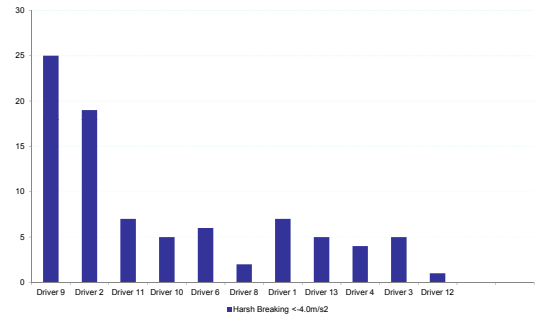
- Phase I – capturing vehicle distance travelled and speeds in excess of limits without real time driver feedback and harsh braking
- Phase II – Disabling texting, non-emergency features whilst the vehicle is in motion
- Phase III - Implementation of auditory driver feedback alerts and messages.

- Outcomes for harsh braking and other incidents for Phase I has been analyzed and pre-implementation and preliminary data for those drivers from Phase I are presented in this study.
- Outcomes for any reductions in speed violations is currently being analyzed
- Phase II and III are to be implemented

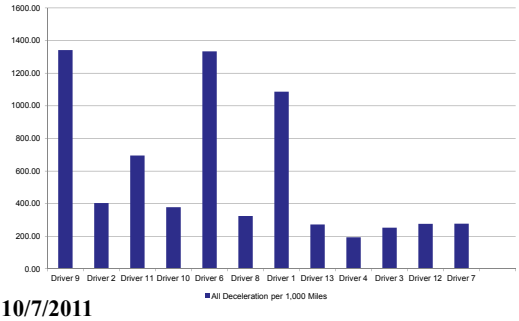
Harsh Braking thresholds

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

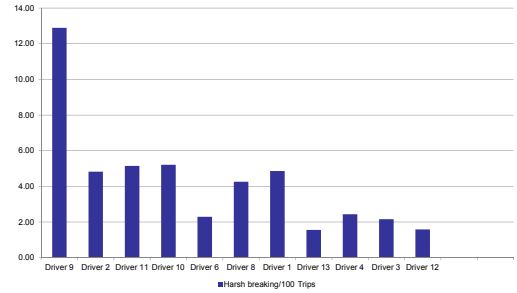
Episodes of Harsh Braking



All decelerations per 1,000 miles



Harsh Braking per 100 trips



Phase I Data

Name	Total distance (Miles)	Total number of trips	Distance per Trip	All Breaking < 0.0	Harsh breaking < -4.0	Severe Harsh breaking < -4.6	Breaking/ 1,000 Mile	Harsh breaking/ 1,000 Mile	Severe HB/1,000 Mile	Break/Trip	Harsh breaking/ 100 Trips
Driver 9	11,972	194	62	16,066	25	16	1341.96	2.09	1.34	83	12.89
Driver 2	12912	394	33	5,217	19	7	404.04	1.47	0.54	13	4.82
Driver 11	7,433	136	55	5,164	7	5	694.74	0.94	0.67	38	5.15
Driver 10	5,733	96	60	2,169	5	1	378.34	0.87	0.17	23	5.21
Driver 6	6939	261	27	9,254	6	3	1333.62	0.86	0.43	35	2.30
Driver 8	2,365	47	50	768	2	1	324.74	0.85	0.42	16	4.26
Driver 1	9179	144	64	9,972	7	3	1086.39	0.76	0.33	69	4.86
Driver 13	7,337	321	23	2,000	5	4	272.59	0.68	0.55	6	1.56
Driver 4	7,556	164	46	1,463	4	1	193.62	0.53	0.13	9	2.44
Driver 3	9,479	231	41	2,394	5	2	252.56	0.53	0.21	10	2.16
Driver 12	5,497	63	87	1,516	1	1	275.79	0.18	0.18	24	1.59

Limitations

- Small pilot
- Not professional drivers
- Preliminary implementation
- Phase II and III - Routine cell phone use disable feature, and Real time ISA yet to be implemented

Discussion

- Lean platform – app driven, minimal Infrastructure required
- Cost effective requiring no vehicle retrofit or hardware
- Rapidly and easily updated not fixed to the vehicle
- Conceptual obstacles to the consideration of use of a smart phone AS a safety tool
- Phase II and III has scope to assist in addressing a key and crucial road and fleet safety hazard

Discussion

- Fleet performance data capture can be achieved by use of a smartphone terminal
- Technologically unskilled and non professional drivers can effectively manage the invehicle data smartphone terminal
- Driver performance can be stratified on harsh braking rates alone

Summary

- The preliminary data has demonstrated that it is possible to monitor fleet safety performance with a software application on a standard smartphone as a data terminal device
- Harsh braking data alone maybe a valuable near miss safety tool
- Scope for Phase II and III ISA driver feedback implementation and to simultaneously remove driver distraction from mobile phone hazards

Thank you!
Any Questions??

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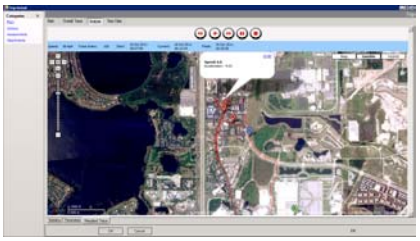
www.objectivesafety.net



- Integrated approach
- Data management
- Technology convergence
- ROI

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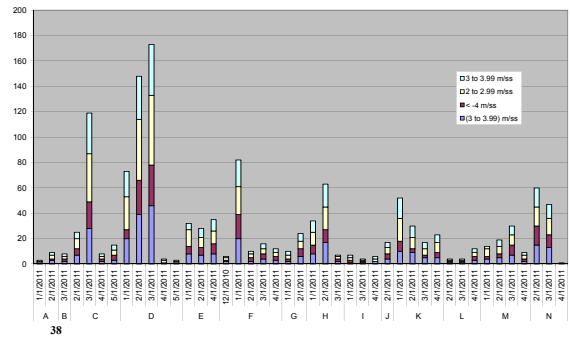
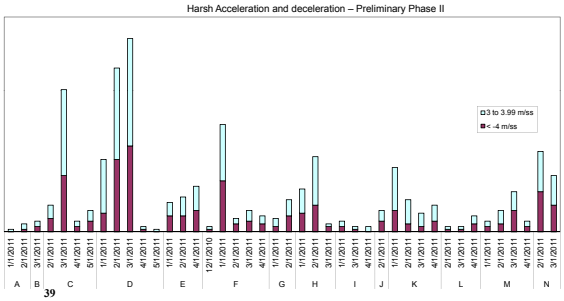
Preliminary Phase II Data Spectrum of decelerations

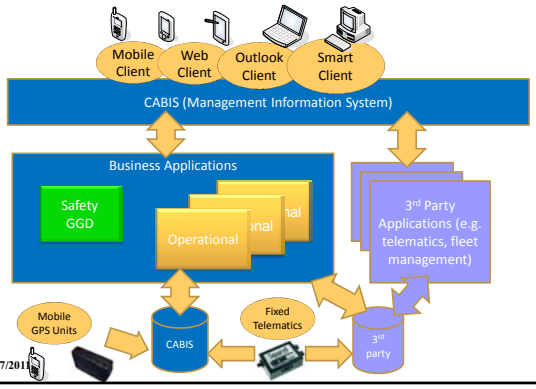


Harsh acceleration was closely correlated to harsh deceleration



Preliminary end-user operations issues and solutions

- Constant power source
  - Phone needs to be plugged in (via cigarette lighter outlet) all of the time
- Getting a connection
  - 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 from phone start up
  - Modified the app for "quick start"
- Less than 50% of users used a cradle to hold the phone whilst in trip
  - Using a cradle to hold the phone at all times whilst the vehicle is in motion



Realtime mapping from London for 2.5hr of a trip of attempting to park in NYC after a snow storm and whilst 'Law and Order' filming was underway