	Health and Safety Management System	Document Reference	
	Road Transport Safety iVMS and Driver Performance Monitoring Guidelines	Issue Date:	June 2017
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		Approved by:	HSLT - Logistics

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1. Requirements for iVMS[1] functionality

1.1. Minimum required iVMS features:

- Deceleration and acceleration:
  - Decelerating too fast (harsh braking) indicates poor anticipation and not sufficient distance between vehicles. It is the most important required criteria to monitor driver skills.
  - Accelerating too fast (harsh acceleration) indicates poor anticipation.
  - Harsh braking and harsh acceleration increase fuel consumption and vehicle repair costs.
- Speed and iVMS digital mapping:
  - Required to monitor speed against allowable speed limits.
- Driving Hours[2]:
  - Monitors compliance with driving hours requirements to avoid fatigue.
- Ability to perform geo-fencing[3].
- Web based data transfer via cellular or satellite networks.
- Data transmission:
  - Data of all monitored variables to be sent at least once every minute,
  - In case of an infraction to harsh braking, speeding or harsh acceleration, second-by-second data is stored and transmitted for 30 seconds before and 30 seconds after the incident,
  - Device will continue to record data and store when out of network coverage.[4]
- IVMS device must be able to upload to different web services:
  - IVMS contract must allow upload of data to different web services,
  - IVMS device hardware must be compatible with different web services software.

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[1] In-vehicle monitoring system.
[2] Either integrated into the IVMS package or measured with a separate device that captures the data electronically and acts as an additional OER (on-board event recording).
[3] A geo-fence is an electronic geographic boundary (longitude and latitude) that can be created to set specific rules around speed limits and allowed/prohibited driving zones.
[4] This feature is critical in areas with limited cellular/satellite coverage.

1.2. Recommended iVMS features:

- Information storage:
  - o iVMS stores five minutes of second-by-second data in case of an incident.
- Event alert notification (alarm):
  - o To alert driver in the event of an infraction,
  - o For events such as harsh braking, over-speeding, route deviation/entry in no-go areas, exceeding driving hours.
- Driver identification:
  - o Ensure that iVMS data is linked to the specific driver of the vehicle[5].
- Tamper resistant device.
- Hard cornering:
  - o Driving at a speed too high when turning. It is also known as swerving,
- Monitoring vehicle movement while in neutral:
  - o Known as "freewheeling", it is when the vehicle is put in neutral and allowed to coast, It is often done in order to save fuel, and is a very dangerous practice especially on downhill slopes.

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[5] Some possible technologies include radio frequency identification (RFID), identification key (vehicle key linked to specific driver and biometrics.

2. IVMS Settings

IVMS Settings[6]

Harsh Braking	Initial 2017 settings • Light vehicles: 3.3m/s2 • Heavy vehicles: 2.8m/s2	Future settings[7] • Light vehicles: 2.8m/s2 • Heavy vehicles: 2.2m/s2
Speeding[8]	• Light vehicles: tolerance of 5%[9] above posted speed limit • Heavy vehicles: vs. posted speed limit	
Harsh Acceleration	• Light vehicles: 2.8m/s2 • Heavy vehicles: 2.2m/s2	
Exceeding Driving Hours (measured in minutes)	• Time above maximum driving hours • Time below minimum resting period	

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[6] For countries who wish to use more advanced monitoring systems that provide more stringent iVMS settings (i.e. driver camera technology – distance between vehicles) approval and validation by regional head of H&S and global head of road transport safety is required.

[7] IVMS settings will be reviewed at end of 2017. Target date is to have future harsh brake settings in place in 2018.

[8] Allowed speed may be less than the posted speed limit.

[9] For light vehicles, cumulative speeding time is recorded when the vehicle is travelling 5% higher than the posted speed limit, for example, speeding is detected at 63 km/h when the posted limit is 60km/h. There is no such tolerance for heavy vehicles as posted speed limits are set for light vehicles and heavy vehicles should always be travelling below the speed limit.

3.   Driver Evaluation with iVMS

3.1. Driver Score Card:

- Points system that ranks driver's performance based on the number of infractions and distance driven.
- Each driver will have a score card for each calendar month[10]. A driver receives 1 point for each of the following infractions based on the iVMS settings in the table above:
    - Harsh braking,
    - Speeding: 1 point for every 60 seconds of cumulative time[11] above the allowed speed,
    - Harsh acceleration,
    - Exceeding driving hours[12]:
        - 10 minutes more than allowed driving time,
        - 10 minutes less than required resting time.
- Driver scores are based on 100 kilometers driven.
- Drivers are ranked in 3 categories:
    - Green, yellow and red driver ratings[13] based on points per 100 kilometers,
    - Best in class targets:
        - Green : 2 points or below per 100 kilometers,
        - Yellow: between 2 and 5 points per 100 kilometers,
    - Red   : above 5 points per 100 kilometers
    - Minimum allowable targets countries could start with:
        - Green : 20 points or below per 100 kilometers,
        - Yellow: between 20 and 50 points per 100 kilometers,
        - Red   : above 50 points per 100 kilometers
- Details of the driver score card and a sample calculation are found in Appendix 1.

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[10] Weekly driver scorecards and daily post-trip feedback to drivers are good practices that should be implemented when possible.

[11] For speeding, time is cumulative and starts to be counted immediately once the allowable speed is exceeded and ends once under the allowed speed. Total time speeding is calculated by adding the duration of each infraction together.

[12] This is a measure of violation against the fatigue management rules of each country. The minimum required fatigue management rules are defined in "Phase 1 Global Requirements Road Transport Safety".

[13] Each country will determine their initial green-yellow-red scoring system which could be higher than best in class and tighten the points to reach best in class driver score cards target by end of 2018.

3.2. Ranking, Recognition and Consequence Management:

- Recognition policy linked to high standard of driver performance – Green drivers.
- Clear consequence policy for drivers with yellow or red rankings:
  - Yellow[14] drivers to be retrained
  - Red drivers to be suspended/blacklisted.
- Drivers are ranked monthly based on their driver scores.
- Monthly rankings of contracted transporter companies:
  - Based on driver score cards,
  - Used for transporter company selection/usage.

Policy based on Driver Score Card[15]

Driver Recognition & Consequence Policy	First Time	Second Time[16]
GREEN	Reward[17]	
YELLOW	Driver retraining	Driver pass/fail assessment
RED	suspension	black listed

4.   Legal Assessment

- Each country must consult with their country's legal department in order to ensure that iVMS & driver monitoring are fully compliant with local legislation.
- All legal areas must be verified for compliance including:
  - Data privacy
  - Labor law (including risk of requalification)
  - Competition / anti-trust law
  - Other country specific legislation (i.e. restrictions on data storage location)

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[14] A driver becomes red if he has a third yellow driver score card rating.
[15] Each country must have a clear policy based on driver score card.
[16] If the driver is yellow or red twice within a 12 month period.
[17] Possible rewards would include; 1) bronze badge for 3 months as green driver, silver badge for 6 months as green driver and gold badge for 12 month as green driver with reward ceremony. 2) Bonus linked to green driver (5% or 10% of salary).

Appendix 1: Driver Score Card

Required Data Input	Rules for Scoring
# of harsh braking incidents	1 point for every incident
Speeding duration • Measured in cumulative time above allowed speed	1 point for every 60 seconds of cumulative time in violation of the allowed speed
# of harsh acceleration incidents	1 point for every incident
Exceeding driving hours • time measured when driving more hours or resting for less time than allowed	1 point for every 10 minutes in violation of fatigue management rules
Driving Distance • in kilometers	Driver Score is based on 100 kilometers driven[18]

Driver Ratings

GREEN = Driver Score 2 or below
YELLOW = Driver Score above 2 & below 5
RED = Driver Score above 5

Example of Driver Score Card

Driver Name	Driver A	
Distance Driven	**1200km**	
# of Harsh braking	5	0.42
Time above allowable speed	500 seconds	0.69
# of Harsh Acceleration	2	0.17
Time in violation of fatigue management rules	30 minutes	0.25
	Driver Score	**1.53**

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[18] Driver Score is total of points, multiplied by 100 and divided by the number of kilometers.