THE FUTURE OF TRANSPORT

eCall, TRL's involvement and PTI

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Workshop: Study on the inclusion of eCall in the periodic roadworthiness testing of motor vehicles

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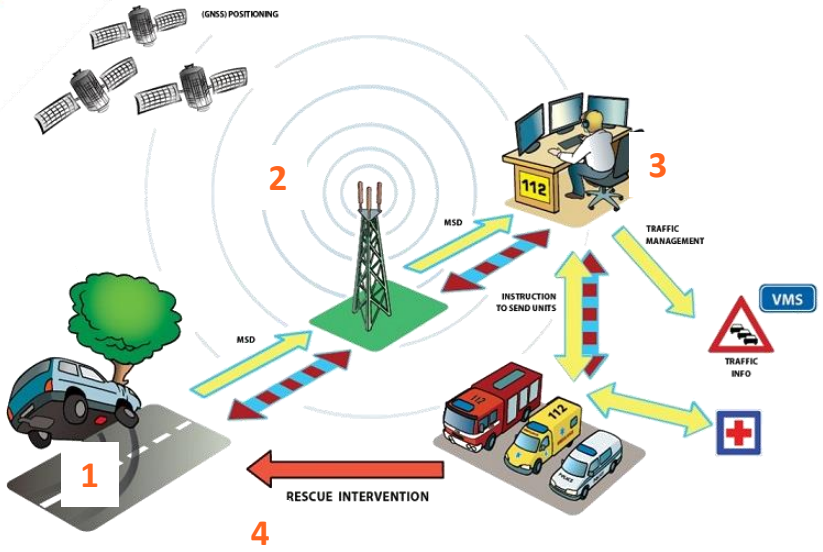
eCall – how it works

1) eCall automatically triggered in event of accident
   - Automatically calls 112
   - Manual call can be made by pushing button
2) Minimum Set of Data (MSD) generated and transmitted via mobile network to Public Answering Point (PSAP)
   - Vehicle's position, direction of trav… …e, etc (EN 15722)
3) (PSAP) Emergency call centre
   - Trained operators evalua…
   - If possible, two way v… …ommunication established
   - Dispatch emerg… , possibly inform traffic control centr…
4) Quicker help
   - Appropriate emergency services arrive much quicker

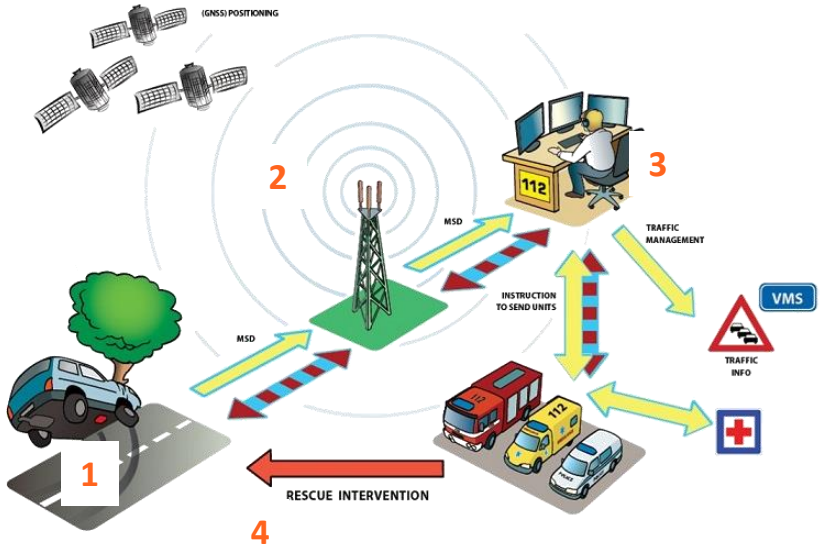
Cannot be used to monitor motorist's moves (SIM normally dormant)



eCall – benefits

- Speed up emergency response times
  - 40% in urban areas
  - 50% in countryside
- Reduce congestion & secondary accidents
- EC impact assessment (2011)
  - Reduce fatalities by between 1% and 10% depending on country – all vehicles eCall equipped
    - At least 4% (on average)
  - Reduce severe injuries by between 2% and 15%
    - 6%
  - Congestion reduction
  - Benefit to Cost Ratio (BCR): light vehicles 1.74
    - < € 100

http://ec.europa.eu/information_society/newsroom/cf/dae/document.cfm?doc_id=2252



eCall – regulation (history)

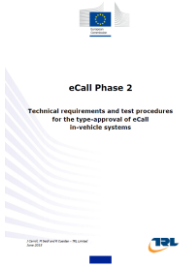
- 2011: Impact assessment – regulatory approach
- 2011 – 2013: Harmonised eCall European pilot (HeERO)
- Public Safety Answering Points & telecommunications network
  - Proposal for decision on deployment of interoperable EU-wide eCall service (2013/0166 (COD))
    - Decision 585/2014/EU
    - PSAP / emergency service organisation (EU 305/2013)
- In-vehicle System
  - Proposal for regulation of the deployment of eCall IVS (2013/0165 (COD))
  - Fitment of IVS to M1 and N1 (EU 2015/758)
    - Privacy and data protection (EU 2017/78)
    - Technical requirements and test procedures (EU 2017/79) -1st March 2018

eCall – TRL's involvement

- Provided support to EC to develop type approval regulation for **eCall in-vehicle systems** (EU 2017/79)

- Identified aspects that needed to be considered for type approval of eCall IVS

http://ec.europa.eu/DocsRoom/documents/5601/attachments/1/translations/en/renditions/native



- Developed test procedures for TA of eCall IVS
  - Resistance to severe crashes
  - Full-scale test assessments
  - Crash resistance of audio equipment
  - Co-existence of third-party services
  - Automatic triggering mechanism
  - **In-vehicle self-test**

http://publications.europa.eu/resource/cellar/6ade51b5-82be-11e5-b8b7-01aa75ed71a1.0001.02/DOC_1

Automatically dials 112 in the event of serious accident, opens telephone link (PSAP) and communicates vehicle's location (MSD) to emergency services

eCall – IVS self-test and PTI

Regulation (EU) 2015/758, Recital 18

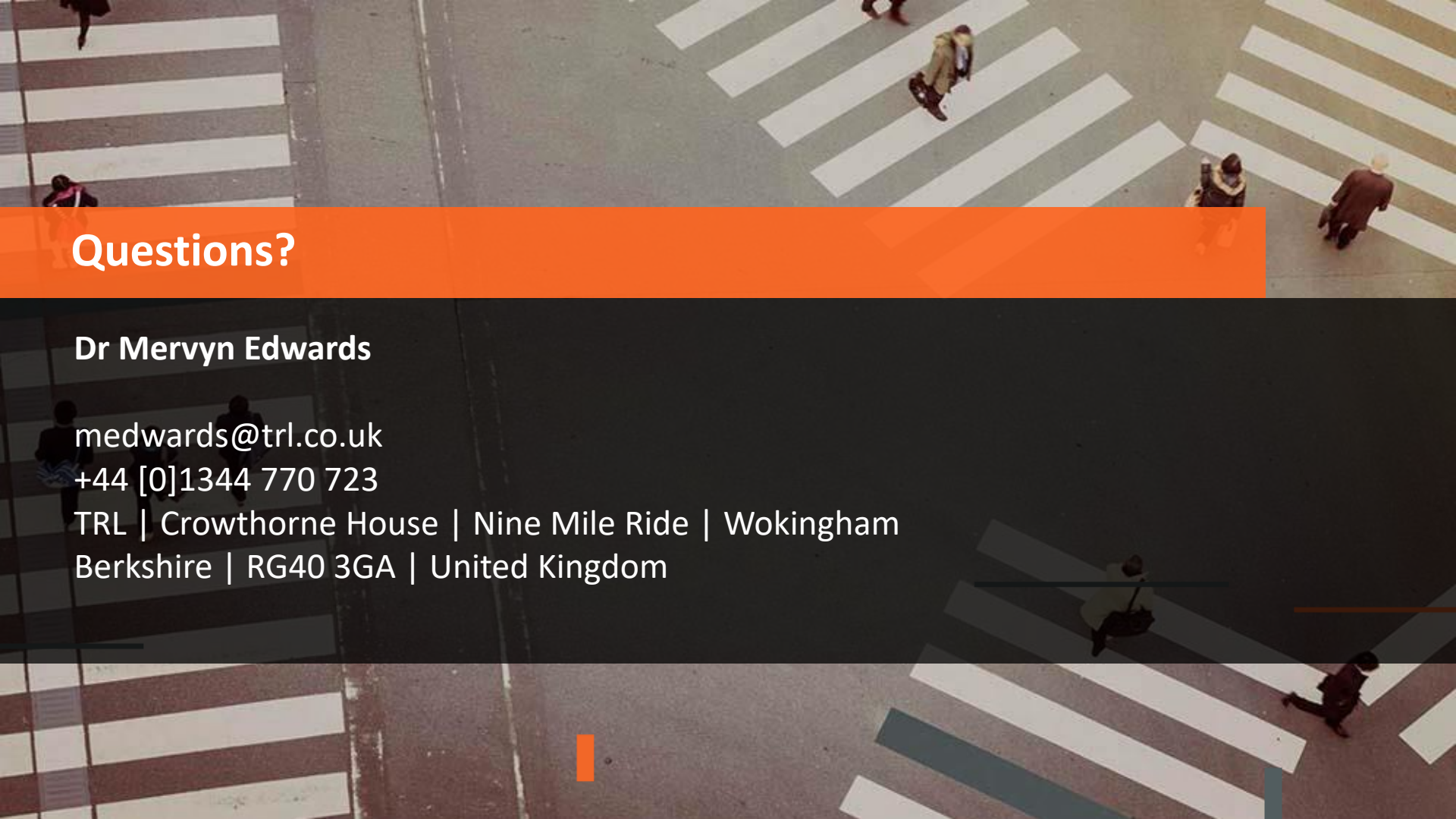
(18) The 112-based eCall in-vehicle system, as an emergency system, requires the highest possible level of reliability. The accuracy of the minimum set of data and of the voice transmission, and quality, should be ensured, and a uniform testing regime should be developed to ensure the longevity and durability of the 112-based eCall in-vehicle system. Periodic roadworthiness tests should therefore be carried out regularly in accordance with Directive 2014/45/EU of the European Parliament and of the Council ([2]).

Regulation (EU) 2017/79

- Self-test at power-up
- Mandatory items
  - ECU - working order
  - External mobile network antenna – connected
  - Communication device – working order
  - GNSS antenna – connected
  - GNSS receiver – working order
  - Crash control unit – connected
  - Communication (bus connection) failures – none
  - SIM - present
  - Power – connected, sufficient charge
- Warning – visual tell-tale or message
  - Note: Accident Emergency Call System tell-tale in UNECE Regulation 121 – July 2018

Table 4: Potential failure modes and mechanisms of eCall IVS parts; colour-coding indicates feasibility to check via IVS self-test (green: generally feasible; yellow: feasible in some instances; red: generally not feasible)

Part	Failure mode/mechanism	Comment
eCall control unit, network access device, GNSS receiver	Power supply failure (connection failure, short circuit, voltage high/low)	
	Communication failure (bus connection failure)	
	Internal hardware failure	e.g. via monitoring signal from NAD and GNSS receiver
	Software error	e.g. software image integrity via checksum
	SIM failure/not present	
	SIM invalid	Not feasible to test without network communication (dormant mode SIM)
Dedicated battery	Connection failure, short circuit	e.g. via voltage monitoring
	Output voltage high/low	Generally feasible; challenging in high/low temperature conditions
	Reduced state of capacity	Generally feasible for rechargeable batteries; challenging for primary batteries to be performed at every vehicle start (gradually discharging battery)
	Reduced state of charge	When applicable to rechargeable batteries only
Mobile network antenna (GSM/UMTS)	Connection failure, short circuit	
	Reduced performance/failure due to unintended manipulation (e.g. non-approved replacement part, installation faults) or mechanical degradation (e.g. corrosion of contacts)	Not feasible to test because similar to weak signal situation and dormant mode SIM
	Failure due to deliberate manipulation (shielding of antenna or jamming of signals), e.g. based on concerns the vehicle could be tracked	Not feasible to test because identical to no-signal situation and dormant mode SIM
GNSS antenna	Connection failure, short circuit	
	Reduced performance/failure due to unintended manipulation (e.g. non-approved replacement part, installation faults) or mechanical degradation (e.g. corrosion of contacts)	Not feasible to test because similar to weak signal situation
	Failure due to deliberate manipulation (shielding of antenna or jamming of signals), e.g. based on concerns the vehicle could be tracked	Not feasible to test because identical to no-signal situation
Microphone(s)	Connection failure, short circuit	
	Reduced performance/failure due to degradation (e.g. soiling, ageing, mechanical defects)	Would require playback and recording of audio signal at vehicle start (unreliable in noisy conditions, nuisance for occupants)
	Reduced performance/failure due to manipulation (e.g. non-approved replacement part, installation faults, covered by retrofit elements)	Would require playback and recording of audio signal at vehicle start (unreliable in noisy conditions, nuisance for occupants)
Loudspeaker(s)	Connection failure, short circuit	
	Reduced performance/failure due to degradation (e.g. soiling, ageing, mechanical defects)	Would require playback and recording of audio signal at vehicle start, (unreliable in noisy conditions, nuisance for occupants)
	Reduced performance/failure due to manipulation (e.g. non-approved replacement part, installation faults, covered by retrofit elements)	Would require playback and recording of audio signal at vehicle start, (unreliable in noisy conditions, nuisance for occupants)



Questions?

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About TRL

Vision

World leader in creating the future of transport and mobility, using evidence-based solutions and innovative thinking

300

engineers, scientists, psychologists, IT experts and statisticians

Providing world-leading research, technology and software solutions for surface transport modes and the related markets of automotive, motorsport, insurance and energy

Mission

Challenge and influence our chosen markets, driving sustained reductions (ultimately to zero) in:

- Fatalities and serious injuries
- Harmful emissions
- Barriers to inclusive mobility
- Unforeseen delays
- Cost inefficiencies

1000 clients in

145 countries

Whereas PTI *per se* is beyond the scope of this study, the self-test requirements could facilitate future PTI testing because performing a test call during PTI tests might not be feasible. Efficient PTI testing can be supported by ensuring that a universal scan tool can access relevant diagnostic information via the standard OBD connector and that the necessary information to do so is made available by the manufacturer. The following prescriptions could be included in the type-approval acts for this purpose:

1. Provisions for the periodic technical inspection

1.1. It shall be possible to verify the integrity of the eCall in-vehicle system via the serial interface of the standard on-board diagnostic connector (OBD). According to this it shall at least be possible to test the accuracy of the Minimum Set of Data, the availability of Public Land Mobile Network(s) and the functionality of the voice communication by audible means (e. g. short echo test).

1.2. All necessary information for the proper conduct of the test shall be made freely available.

Note that concerns were raised by ACEA regarding this item at the current stage, stressing that it might have a strong influence on eCall system design and would require considerable further legislative work: For example, the current OBD2 message set did not include the relevant messages for these prescriptions, which is why further work would be needed on the relevant specifications to enable these prescriptions.