



Recommendations from the eSafety-HMI Working Group

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1. Introduction

Following the publication of the European Statement of Principles (ESoP), for in-vehicle information and communication systems, responses from the Member States concerning application of the Principles have been studied by the eSafety Working Group (WG) on HMI (Human Machine Interaction).

The WG has also compared this approach with similar ongoing initiatives in the USA and Japan and the main issues involving HMI relevant to development of eSafety have been elaborated. The multiple actors involved in delivering information services have been noted and the implications for the driver assessed. The increasing availability of “nomad devices” and, to a lesser extent after-market systems, give particular cause for concern as their lack of integration within the vehicle may cause additional driver workload. Although the ESoP is valuable in clarifying issues under the responsibility of manufacturers, it is recognised that other Stakeholders including system users, have their part to play in ensuring that the benefits of eSafety systems can be safely delivered to drivers. The EC will be writing a Communication to the Parliament and Council at the end of 2004 and the opportunity exists to make a substantial contribution.

This paper describes the development of an HMI “Solutions Matrix” developed by the eSafety WG-HMI to analyse and focus on problems and solutions. Some approaches to addressing the identified problems have now been formulated and need to be validated.

Specific recommendations are provided in four areas:

- Nomadic devices
- Service Providers
- Fleet Operators and Employers
- Authorities

The aim of this consultation is to identify where there is a consensus over the approach to a solution. Where this can be established, the WG-HMI will work with other Stakeholders to develop a workplan for resolving outstanding issues and solving problems.

2. Development of analysis tool

The WG-HMI have analysed the member states' reports on the European Statement of Principles and other relevant documents and, coupled with their own experience, have developed a number of "Problem Statements".

Based on these problem statements possible solutions were drafted using a three-dimensional matrix (figure 1). The **first dimension** is given by the system type ("systems"), because different problems were identified for nomadic systems, aftermarket systems, OEM installed systems and fully integrated systems.

The **second dimension** is given by the HMI aspect, since i.e. the responsibilities for installation, information presentation, design of interaction and use vary depending on the type of the system.

Finally the stakeholders are seen as the **third dimension** because their responsibility and contribution again depends on system type as well as on the specific HMI Aspect.

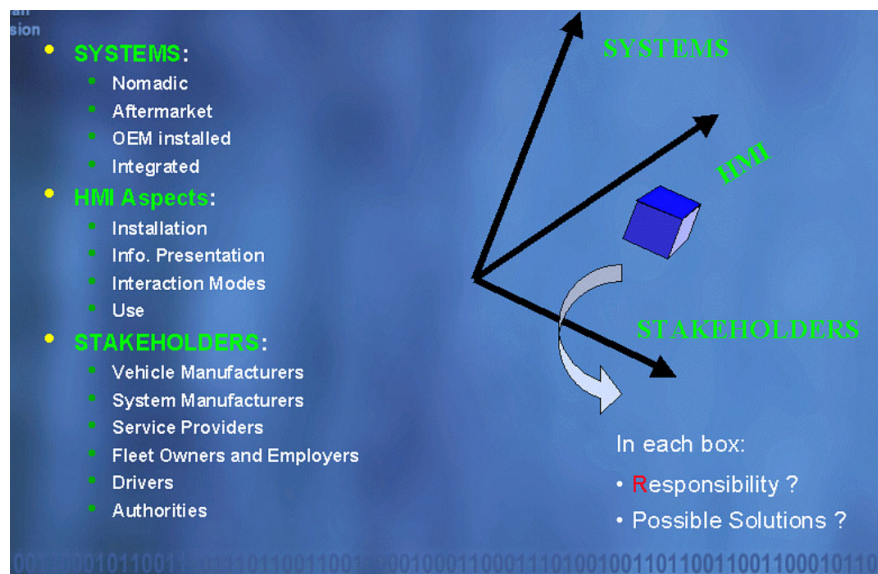


figure 1: Idea of the 3D- Matrix on HMI as basis for identifying solutions

On the basis of this 3D-Matrix the distribution of responsibility and of potential contribution to the solution of problems can be discussed box by box.

Example: the box "nomadic system x installation x system manufacturer" addresses the responsibility that the system manufacturer has for the correct installation of his nomadic device in a vehicle and what his contribution to the problem solution could be.

The 3D-Matrix offers the advantage that to a given question a comprehensive description of influencing factors and possible solutions can be easily obtained by "cutting out" the respective "slice" or sector of the 3D Matrix. If the question is "what can be done about the problem of nomadic devices" the sector with the two dimensions "HMI Aspects" and "Stakeholders" needs to be analysed.

3. Analysis according to HMI-principles

3.1 Installation

INSTALLATION	Vehicle Manufacturer	System Manufacturer	Service Provider	Fleet Owners, Employers	Drivers	Authorities
Integrated Systems	R ¹ Apply ESoP in-house	\	\	specifications according to ESoP ²	-	Ensure ESoP is known and used
OEM (factory) Installed system	R Apply ESoP in-house	\	\	specifications according to ESoP	no tampering	Ensure ESoP is known and used
After-Market System	may provide information on installation or installation kit according to ESoP	R Supply fitting kit according to ESoP while taking into account passive safety (i.e. ECE21) Consumer information on installation	\	R installation according to ESoP	R Install systems according to installation instruction given by system manufacturer	Ensure ESoP is known and used by designers, manufacturers and fleet owners
Nomadic Device	may provide information on installation or installation kit according to ESoP	R If a system is intended by its manufacturer to be used in a vehicle, supply fitting kit according to ESoP taking into account passive safety Consumer information	\	R installation according to ESoP	R Install systems according to installation instruction given by system manufacturer while driving, no use of not securely fixed devices	Enforce secure fixing (regular inspection of vehicles) ECE21 should apply ESoP should link to ECE21 Information to drivers

Comments

- Installation of Nomadic Devices is one focus of the eSafety WG HMI (marked yellow)
- ECE21 is the formal approval required for Original Equipment
- System manufacturers should also take into account the risk of theft when designing a fitting kit

¹ the red 'R' means 'responsible'

² most recent version of the European Statement of Principles

3.2 Design of Information Presentation

Design of INFORMATION PRESENTATION	Vehicle Manufacturer	System Manufacturer	Service Provider	Fleet Owners and Employers	Drivers	Authorities
Integrated Systems	R Apply ESoP in-house and through sub-contracts	Apply ESoP	R, if also providing presentation Apply ESoP, e.g. running text, Internet portal; could mark pages suitable for driving	R Apply ESoP on customized software;	R no tampering (e.g. of TV access)	Seek self-certification of ESoP compliance Driver information
OEM (factory) Installed system	R Assure ESoP compliance by contracts	Apply ESoP	R, if also providing presentation Apply ESoP, e.g. running text, Internet portal; could mark pages suitable for driving	R Apply ESoP on customized software;	R no tampering (e.g. of TV access)	Seek self-certification of ESoP compliance Driver information
After-Market System	may supply "vehicle moving" signal or a "mute request"	R Apply ESoP switch off functions not designed for use while driving e.g. no unlimited access to Internet	R, if also providing presentation Apply ESoP, e.g. running text, Internet portal; could mark pages suitable for driving	R Specification of custom systems Information/Rules for drivers	R no tampering (e.g. of TV access)	Identify/implement specific actions on enforcement Promote ESoP Driver information
Nomadic Device	may supply "vehicle moving" signal or a "mute request"	R Apply ESoP switch off functions not designed for use while driving e.g. no unlimited access to Internet	R, if also providing presentation Apply ESoP, e.g. running text, Internet portal; could mark pages suitable for driving	R Specification of custom systems Information/Rules for drivers	R no tampering (e.g. of TV access, DVD)	Identify/implement specific actions on enforcement Promote ESoP Driver education to make drivers aware about their responsibility and the possible consequences if they use and watch DVD/TV while driving

Comments

- current Version of ESoP already addresses TV and DVD use while driving: System behaviour principles: *Visual information not related to driving that is likely to distract the driver significantly (e.g. TV, video and automatically scrolling images and text) should be disabled or should only be presented in such a way that the driver cannot see it while the vehicle is in motion).*
Yet the driver is ultimately responsible; Suggestion by HMI WG: involve insurance company, more enforcement by member states;
- Second focus of WG HMI is the information presentation by service providers
- Interviews with fleet owners showed that manufacturers of specific systems (i.e. medical vehicle systems, express delivery systems) are not aware about ESoP.
- input for WG roadmaps: Information outside vehicle is also very complex and may cause distraction (i.e. by dynamic advertisement or complex road signs)

3.3 Design of Interaction

Design of INTERACTION	Vehicle Manufacturer	System Manufacturer	Service Provider	Fleet Owners and Employers	Drivers	Authorities
Integrated Systems	R Apply ESoP in-house and through sub-contracts driver information disable function or driver warning for functions not intended for use while driving ³	apply ESoP			(see "use")	Seek self-certification of ESoP compliance
OEM (factory) Installed system	R Apply ESoP in-house and through sub-contracts	R Apply ESoP disable function or driver warning for functions not intended for use while driving	\	\	(see "use")	Seek self-certification of ESoP compliance
After-Market System	may supply "vehicle moving" signal and/or accept a "radio mute" signal	R Apply ESoP disable function or driver warning for functions not intended for use while driving	R if providing the information presentation and interaction Apply ESoP	R for custom system Specification of custom systems	(see "use")	Identify/implement specific actions on enforcement Promote ESoP driver information monitoring
Nomadic Device	may supply "vehicle moving" signal and/or accept a "radio mute" signal	R Apply ESoP TV, DVD: provide an easy means to prevent misuse (providing a switch off) disable function or driver warning for functions not intended for use while driving	R if providing the information presentation and interaction Apply ESoP	R for custom system Specification of custom systems	(see "use")	Identify/implement specific actions on enforcement Promote ESoP driver information monitoring prosecute "misuse providers" ⁴

Comments

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³ because of system use by passenger

⁴ misuse provider is somebody who facilitates misuse of a system i.e. by providing information via the internet, how to disable the automatic TV-lock installed by OEM

3.4 Use of Systems

USE	Vehicle Manufacturer	System Manufacturer	Service Provider	Fleet Owners and Employers	Drivers	Authorities
Integrated Systems	Inform provide warning or switch off functions not suitable for use while driving	\	-	R Information/Rules for drivers Training	R Only interact with system, if situation permits use system according to instructions no tampering	evaluation of use
OEM (factory) Installed system	Inform	inform provide warning or switch off functions not suitable for use while driving	-	R Information/Rules for drivers Training	R Only interact with system, if situation permits use system according to instructions no tampering	evaluation of use
After-Market System	-	Instructions for safe use provide warning or switch off functions not suitable for use while driving	\	R Information/Rules for drivers Training	R Only interact with system, if situation permits use system according to instructions no tampering	evaluation of use consumer information ⁵ Enforce non-use of e.g. TV by driver while driving
Nomadic Device	-	Instructions for safe use if device is meant to be used in a vehicle, provide warning or switch off functions not suitable for use while driving	Information concerning safe use	R Information/Rules for drivers Training	R Only interact with system, if situation permits use system according to instructions no tampering	R evaluation of use consumer information Define rules (e.g. mobile phone) Enforce non-use of e.g. TV by driver while driving

Comments

- Fleet owners are the third area of focus of the WG-HMI

⁵ consumer information: apart from consumer information by authorities there are also private organisations like EuroNCAP, Stiftung Warentest etc. who evaluate and inform about products.

4. Areas of specific focus and Recommendations

4.1 Nomadic Devices

Nomadic Device	Vehicle Manufacturer	System Manufacturer	Service Provider	Fleet Owners and Employers	Drivers	Authorities
Installation	may provide information on installation or installation kit according to ESoP	R If a system is intended by its manufacturer to be used in a vehicle, supply fitting kit according to ESoP taking into account passive safety Consumer information	\	R installation according to ESoP	R Install systems according to installation instruction given by system manufacturer while driving, no use of not securely fixed devices	Enforce secure fixing (regular inspection of vehicles) ECE21 should apply ESoP should link to ECE21 Information to drivers
Information Presentation	may supply "vehicle moving" signal or a "mute request"	R Apply ESoP switch off functions not designed for use while driving e.g. no unlimited access to Internet	R, if also providing presentation Apply ESoP, e.g. running text, Internet portal; could mark pages suitable for driving	R Specification of custom systems Information/Rules for drivers	R no tampering (e.g. of TV access, DVD)	Identify/implement specific actions on enforcement Promote ESoP Driver education to make drivers aware about their responsibility and the possible consequences if they use and watch DVD/TV while driving
Design of Interaction	may supply "vehicle moving" signal and/or accept a "radio mute" signal	R Apply ESoP TV, DVD: provide an easy means to prevent misuse (providing a switch off) disable function or driver warning for functions not intended for use while driving	R if providing the information presentation and interaction Apply ESoP	R for custom system Specification of custom systems	(see "use")	Identify/implement specific actions on enforcement Promote ESoP driver information monitoring prosecute "misuse providers" ⁶
USE	-	Instructions for safe use if device is meant to be used in a vehicle, provide warning or switch off functions not suitable for use while driving	Information concerning safe use	R Information/Rules for drivers Training	R Only interact with system, if situation permits use system according to instructions no tampering	R evaluation of use consumer information Define rules (e.g. mobile phone) Enforce non-use of e.g. TV by driver while driving

[Nomadic Paper text to be inserted here, finishing with clear recommendations]

⁶ misuse provider is somebody who facilitates misuse of a system i.e. by providing information via the internet, how to disable the automatic TV-lock installed by OEM

4.2 Service Providers

Service Providers	Installation	Design of Information Presentation	Design of Interaction	Use
Integrated Systems	\	<p>R, if also providing presentation Apply ESoP, e.g. running text, Internet portal; could mark pages suitable for driving</p>		-
OEM (factory) Installed system	\	<p>R, if also providing presentation Apply ESoP, e.g. running text, Internet portal; could mark pages suitable for driving</p>	\	-
After-Market System	\	<p>R, if also providing presentation Apply ESoP, e.g. running text, Internet portal; could mark pages suitable for driving</p>	<p>R if providing the information presentation and interaction Apply ESoP</p>	\
Nomadic Device	\	<p>R, if also providing presentation Apply ESoP, e.g. running text, Internet portal; could mark pages suitable for driving</p>	<p>R if providing the information presentation and interaction Apply ESoP</p>	Information concerning safe use

[Service Providers Paper text to be inserted here, finishing with clear recommendations]

4.3 Fleet Owners and Employers

Fleet Owners and Employers	Installation	Design of Information Presentation	Design of Interaction	USE
Integrated Systems	specifications according to ESoP ⁷	R Apply ESoP on customized software;		R Information/Rules for drivers Training
OEM (factory) Installed system	specifications according to ESoP	R Apply ESoP on customized software;		R Information/Rules for drivers Training
After-Market System	R installation according to ESoP	R Specification of custom systems Information/Rules for drivers	R for custom system Specification of custom systems	R Information/Rules for drivers Training
Nomadic Device	R installation according to ESoP	R Specification of custom systems Information/Rules for drivers	R for custom system Specification of custom systems	R Information/Rules for drivers Training

[Fleet Owners Paper text to be inserted here, finishing with clear recommendations]

⁷ most recent version of the European Statement of Principles

3.4 Authorities

Fleet Owners and Employers	Installation	Design of Information Presentation	Design of Interaction	USE
Integrated Systems	Ensure ESoP is known and used	Seek self-certification of ESoP compliance Driver information	Seek self-certification of ESoP compliance	evaluation of use
OEM (factory) Installed system	Ensure ESoP is known and used	Seek self-certification of ESoP compliance Driver information	Seek self-certification of ESoP compliance	evaluation of use
After-Market System	Ensure ESoP is known and used by designers, manufacturers and fleet owners	Identify/implement specific actions on enforcement Promote ESoP Driver information	Identify/implement specific actions on enforcement Promote ESoP driver information monitoring	evaluation of use consumer information ⁸ Enforce non-use of e.g. TV by driver while driving
Nomadic Device	Enforce secure fixing (regular inspection of vehicles) ECE21 should apply ESoP should link to ECE21 Information to drivers	Identify/implement specific actions on enforcement Promote ESoP Driver education to make drivers aware about their responsibility and the possible consequences if they use and watch DVD/TV while driving	Identify/implement specific actions on enforcement Promote ESoP driver information monitoring prosecute "misuse providers" ⁹	R evaluation of use consumer information Define rules (e.g. mobile phone) Enforce non-use of e.g. TV by driver while driving

[Authorities Paper text to be inserted here, finishing with clear recommendations]

⁸ consumer information: apart from consumer information by authorities there are also private organisations like EuroNCAP, Stiftung Warentest etc. who evaluate and inform about products.

⁹ misuse provider is somebody who facilitates misuse of a system i.e. by providing information via the internet, how to disable the automatic TV-lock installed by OEM

APPENDIX 1 Definitions

nomadic system: are often not specifically designed for in-vehicle use and brought into the vehicle by the driver, i.e. hand-held telephone, PDA, MP3-Player ...

aftermarket system: system specifically designed for in-vehicle use but not sold by the vehicle manufacturer;

OEM installed system: system which can be ordered with the vehicle from its manufacturer and is factory installed but can be found in different vehicle brands.

Integrated system: physically fully integrated, brand specific system which often comprises many applications like audio, telephone, navigation, i.e. Mercedes-Benz COMAND, BMW i-Drive, Audi MMI

Service Provider: Service Provider is a person or organisation supplying information e.g. geographical or congestion information but may also provide the information presentation (running text, web portals) ... t.b.d.

Fleet Owners and Employers: including Car rental Companies, Taxi Companies