

# **The European statement of principles on human machine interaction 2005**

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## **ABSTRACT**

One of the key recommendations from the European eSafety Working Group on Human Machine Interaction (HMI) involved development of the European Statement of Principles (ESoP) on HMI. The principles, originally published in 1999, are concerned with all information and communication systems intended to be used by drivers, and cover system installation, information presentation, interaction with displays and controls, system behaviour and information about the system. Following a comparison with US and Japanese approaches, and taking account of opinions from European Member States, the principles have been revised and extended. This paper discusses the recommendations of the eSafety HMI Working Group, and reports progress with ESoP development during 2005.

## **KEYWORDS**

Human factors, HMI, design principles, in-vehicle

## **THE EUROPEAN STATEMENT OF PRINCIPLES (1999)**

The importance of a safe human machine interface (HMI) for in-vehicle information and communication systems has been stressed many times. In December 1999, the EC adopted a Recommendation [1] incorporating the “European Statement of Principles”. In addition, the EC published an expansion of the principles by its expert group in 2001 [2]. The documents contain three overall design principles on human machine interaction and 32 principles covering the topics of system installation, information presentation, interaction with displays and controls, system behaviour and information about the system. The purpose of the EC recommendation was to widely disseminate the principles, through the Member States (MS), to the main actors in the field. A voluntary agreement from European car manufacturers to fully respect the ESoP was issued in 2001 by ACEA (the European Automobile Manufacturers’ Association).

## **DEVELOPMENT UNDER ESAFETY**

### **eSafety working group on HMI**

The eSafety Forum [3] was established by the European Commission (EC) in close collaboration with the industry, industrial associations and public sector stakeholders to address both safety and market issues in the implementation of driver information and assistance systems as a contribution to European road safety improvement targets. The eSafety Steering Group established a Working Group on Human Machine Interaction (HMI) to tackle the important issue of driver interaction with on-board devices, such that HMI does not become a barrier to deployment.

The HMI Working Group was extremely active during 2004 analysing issues and discussing approaches to promoting safe deployment. Following a workshop in mid-2004 specific recommendations were developed [4] and discussed with Member State officials and industry representatives. One of the key recommendations concerned development of the European Statement of Principles (ESoP) on HMI.

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### **Comparison with US and Japanese approaches**

The WG-HMI compared European, Japanese and US approaches to HMI guidelines. In the USA within an initiative by the Alliance of Automobile Manufacturers (AAM), there are some small and some more substantial differences emerging.

Introducing pass/fail criteria, as the AAM guidelines do, was regarded by the WG as problematic: criteria that are too simplistic may be spurious i.e. they may exclude good HMI solutions and may not exclude bad HMI solutions. Simplistic criteria also tend to exclude certain tasks in general and this eliminates the challenge for researchers and industry to strive for a HMI solution which permits the performance of these tasks while the vehicle is in motion. Simplistic criteria for HMI may also imply that it is safe to undertake tasks while driving whereas, no matter how restrictive, there will always be traffic situations in which the operation of these tasks may cause critical situations.

On the other hand the AAM guidelines contain some helpful additions and clarifications which have contributed to the revised ESoP. For example, the new ESoP benefits from a clear allocation of relevant standards, rules and directives to the individual principles and it is helpful to link available, scientifically well-founded and accepted assessment methods to specific principles.

### **Recommendations of the eSafety working group on HMI**

The application of the 1999 ESoP by car manufacturers and suppliers of original equipment was judged positive, but the impact of the ESoP could be improved for other stakeholders, e.g. “nomadic” device manufacturers and service providers. Information from the EC Member States concerning impact of the ESoP was also studied. Based on these responses and further reflection, the Working Group made a number of recommendations concerning ESoP development, the full text of which can be found in the Working Group report [4]:

- Explicitly address information presentation by service providers (e.g. running text on displays).
- Explicitly address manufacturers of specific systems (e.g. medical vehicle systems, express delivery systems)
- Enhance the ESoP with additional principles that apply to Fleet Managers and Employers who have responsibilities in design, installation and use of systems by their employees
- Clarify and adequately incorporate the distribution of responsibilities
  
- Enhance the ESoP by precise criteria, where possible, on the combination of several systems during retrofit and for context specific applications

Presentation of the WG report and discussion with MS representatives was undertaken during February 2005. The MS were, in general, positive towards the ESoP and agreed with the recommendations of the eSafety Working Group on HMI concerning its development.

## **DEVELOPMENT DURING 2005**

### **ESoP development group**

The eSafety HMI Working Group finalised its report to the European Commission in early 2005. The Commission accepted the report and responded quickly by announcing that a new version of the ESoP will be produced during 2005 and become part of an EC Communication on HMI issues towards the end of the year. The Commission made some funding available through existing HMI-related projects HUMANIST and AIDE and invited a small group of HMI specialists to implement the WG-HMI recommendations concerning the ESoP.

The ESoP (2005) development group comprised:

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The group facilitators were Val rie Moutal and Wolfgang Hoefs from the Commission (DG INFSO). The Development Group worked intensively from April to July including an information workshop at the end of June to solicit feedback.

### **ESoP (2005) Scope**

The principles apply to in-vehicle information and communication systems intended for use by the driver while the vehicle is in motion, for example, navigation systems, telephones and traffic information. They are not specifically intended to apply to systems providing vehicle stabilization (such as ABS and ESP) or to Advanced Driver Assistance Systems (ADAS) such as adaptive cruise control and collision mitigation systems. ADAS are fundamentally different and require additional considerations in terms of HMI.

The principles apply to all components and aspects of a system that the manufacturer intends that the driver will interact with while driving and also to certain other components and aspects that should not be used while driving. So, "the system" refers to the functions and parts, such as displays and controls, which constitute the interface and interaction between the system and the driver. In the current version the scope excludes aspects unrelated to HMI such as electrical characteristics, material properties, system performance and legal considerations.

The principles apply specifically to vehicles of class M and N [5] (including passenger cars, trucks and buses) although some aspects may also be valid for other vehicle classes. The principles apply to both portable and permanently installed systems. They apply to OEM systems and to after market and nomadic devices. The principles apply to HMI functionality independent of the degree of integration between systems.

### **Stakeholders**

As described in the scope, the principles are intended to apply to OEM systems and to after-market and nomadic devices. In general, a number of organisations are involved designing, producing and providing elements of such systems and devices, including, for example:

- Vehicle manufacturer offering information and communication functionality
- After-market system producers
- Providers of nomadic device functionality intended to be use by a driver while driving
- Manufacturer of parts enabling the use of nomadic devices by the driver while driving (e.g. cradle, interface connectors)
- Providers, broadcasters of information meant to be used by the driver while driving, e.g. RDS information, radio programme information as running text

Where systems are provided by a vehicle manufacturer (OEM) it is clear that the manufacturer is responsible for the overall design. In other cases, the “Product-Responsible Organisation” is expected to be the organisation introducing a product into the market, part or all of which may have been designed and produced by different parties. For simplicity, the term “manufacturer” is used in the ESoP but this should be understood to refer to the Product-Responsible Organisation (PRO).

In addition to making individual system design as good as possible, the driver can be supported in the safe operation of in-vehicle systems while driving by making other aspects of the context of use as benign as possible. These non-system design aspects of the context of use can be called the “Human Machine Environment”.

In the same way that the design principles are formulated to inform and influence those organisations responsible for (or contributing to) system design and construction, the principles concerning use are formulated to inform and influence those organisations that are responsible for (or contribute to) the human-machine environment of system use. This environment includes:

- The combined use of systems to complete a task
- The knowledge and skill of the driver (in terms of the systems and tasks)
- The driving task/situation
- The social environment (including time pressure)

For a professional driver, this environment also includes:

- Tasks that are required as part of the job (in addition to the driving task)
- Company instructions and practices

## **ESoP Contents**

The revised ESoP is available on the eSafety website [3]. Following a number of overall design goals, the main part concerns system design and construction and includes overall design, installation, information presentation, interaction with displays and controls, system behaviour and information about the system. It is supplemented by a document on system use which includes recommendations on context/definition, driver training, use by drivers, and assessment of use.

The principles are short statements summarising specific and distinct HMI issues. Following each statement is an explanation of the rationale and meaning of the principle including examples. Where possible a practical means of verifying that the principle has been followed is provided. The ESoP Development Group does not believe that the current state of scientific development is sufficient to robustly link compliance criteria with safety for all the principles.

## **CONCLUDING REMARKS**

Where the manufacturer's intention has been clearly stated (such that the driver can reasonably be expected to be aware of it) and the driver subsequently uses the system in a way which is not intended by the manufacturer, this can be considered as misuse.

The ESoP Development Group is of the opinion that systems designed in accordance with the principles are generally expected to be safer than those that do not take account of them. However, it may be possible to meet the overall design goals even if one or more principles are violated.

The principles are not a substitute for regulations and standards and these should always be taken note of and used.

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