

WG-HMI Report October 2009

Executive summary

The ITS Action plan adopted in December 2008 has amongst its 24 proposed actions *“Development of a regulatory framework on a safe on-board human-machine-interface and the integration of nomadic devices, building on the European Statement of Principles ...”*

In response to requests from Member States, the eSafety Steering Group re-established its Working Group on Human Machine Interaction (HMI) to discuss this issue and to conclude *whether an update of the ESoP 2008 can be recommended or not.*

The working group held four well-attended meetings in Brussels during 2009 to develop this report. As a result of discussions during the first meeting, a series of Expert Teams were established, grouped around some key thematic areas. Of course, there were also wider discussions concerning the purpose of the ESoP, its stakeholders and its application.

The overall conclusion is that the ESoP is essentially adequate but that a substantive update could now be undertaken (which could also include a number of identified editorial issues). There is also a need to monitor ongoing developments such that the ESoP can be re-visited periodically (at least every three years) providing a balance between current relevance and stability.

During discussions it was appreciated that the Personal Navigation Devices (PND) industry is maturing and leading manufacturers appreciate the importance of good HMI. A larger concern surrounds other Nomadic Devices (NDs), particularly Smart Phones and Personal Digital Assistants (PDAs), where the hardware is multi-purpose and not specifically designed for in-vehicle use but is rendered useful while driving as a result of application software.

In discussions it became clear that verification criteria for the ESoP as a whole was not considered achievable, but in some cases might be desirable. This points to the need for further intensified research on the one hand; on the other hand this raises the issue of how the ESoP might be used beyond its initial objective of general design advice. It should be stressed that the working group recommends that solutions on the level of individual Member States or regions should be avoided.

Separately from any ESoP development, the PND industry might develop certification procedures for NDs. However, how any verification procedures and criteria are used (e.g. self-certification, external certification) is a matter of implementation for individual stakeholders.

In this consensus report, seven detailed recommendations are made concerning short-term ESoP development, eight recommendations are made concerning investigations and longer term ESoP development and five recommendations are made concerning development and application of verification criteria.

1. Introduction and Background

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 incorporating the “European Statement of Principles”. In addition, the EC published an expansion of the principles by its expert group in 2001. These 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 this 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).

Following the recommendation of the eSafety Working Group on Road Safety (see Final Report November 2002) the eSafety Forum was established by the European Commission (EC) in close collaboration with the industry, industrial associations and public sector stakeholders. Its aim is 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 (SG) 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 active during 2003 - 2004 analysing issues and discussing approaches to promoting safe deployment. Following a workshop in mid-2004 specific recommendations were developed and discussed with MS officials and industry representatives. 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 MS 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 presentation of the WG final report and discussion with MS representatives was undertaken at a meeting in Paris on 28 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. The Commission accepted the report and responded quickly by announcing that a new version of the ESoP would be produced during 2005 and become part of an EC Communication on HMI issues towards the end of this year. The Commission made some funding available through existing HMI-related projects HUMANIST and AIDE and invited a small group of HMI specialists – the ESoP Development Group - to implement the WG-HMI recommendations concerning the ESoP.

The revised ESoP was finally adopted on 26 May 2008 following some minor changes made by EC in a footnote. Starting with 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 has been

provided. The ESoP Development Group did not believe that the current state of scientific development is sufficient to robustly link compliance criteria with safety for all the principles.

On September 30, 2008 a MS meeting took place in Brussels. It was the purpose of this meeting to report on dissemination activities, application of the ESoP and impacts achieved. Moreover, future perspectives of the ESoP were discussed. As a result some recommendations were issued. In particular it was recommended to the eSafety SG to re-establish the Working Group on HMI. This recommendation formed the starting point for the work summarised in the present report.

The ITS Action plan adopted in December 2008 has amongst its 24 proposed actions “Development of a regulatory framework on a safe on-board human-machine-interface and the integration of nomadic devices, building on the European Statement of Principles ...”

3.3	Development of a regulatory framework on a safe on-board Human-Machine-Interface and the integration of nomadic devices, building on the European Statement of Principle ²⁹ on safe and efficient in-vehicle information and communication systems	2010
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Figure 1. Extract from the ITS Action plan

It is understood that a regulatory framework can include three “levels”: a Recommendation (the current ESoP status), a Directive to be transposed into national laws and/or a Regulation which would apply immediately, after entering into force. Importantly, for a law or Regulation, criteria would need to be established to indicate whether the law or Regulation had been adhered to.

2. Method of working

The terms of reference of the group were agreed (Annex 1). The objectives were to:

- Review the state-of-the-art and the technological progress made since the recent adoption of the ESoP to verify whether the ESoP’s scope is still suitable or needs enlargement
- Scrutinise the ESoP with respect to sufficient coverage of the different requirements induced by the variety of vehicle users
- Look in depth into aftermarket issues, specifically related to nomadic devices, and for this to work closely with the Nomadic Devices WG of the eSafety Forum
- Discuss protection against misuse and manipulation in co-operation with the eSecurity WG of the eSafety Forum
- Agree on the desirability and practicality of including specific verification methods and criteria
- Identify any outstanding liability issues related to HMI
- Consider the role of driver training
- Discuss the need for international harmonisation, recognising the global nature of vehicle markets (e.g. UNECE activities) and include discussion of Certification issues

Based on the consensus, the WG-HMI was tasked with concluding whether an update of the ESoP 2008 can be recommended or not.

The working group held a number of meetings in Brussels as follows:

- 28 January 2009
- 16 April 2009
- 30 June 2009
- 08 September 2009

As a result of discussions during the first meeting, a series of Expert Teams were established, grouped around some thematic key areas (blue boxes in the figure below) and each with a Champion. The main task of the Champions was coordinate discussion and flow of information within the Expert Team and to briefly present at the WG meetings. Of course, there were also wider discussions concerning the purpose of the ESoP, its stakeholders and its context.

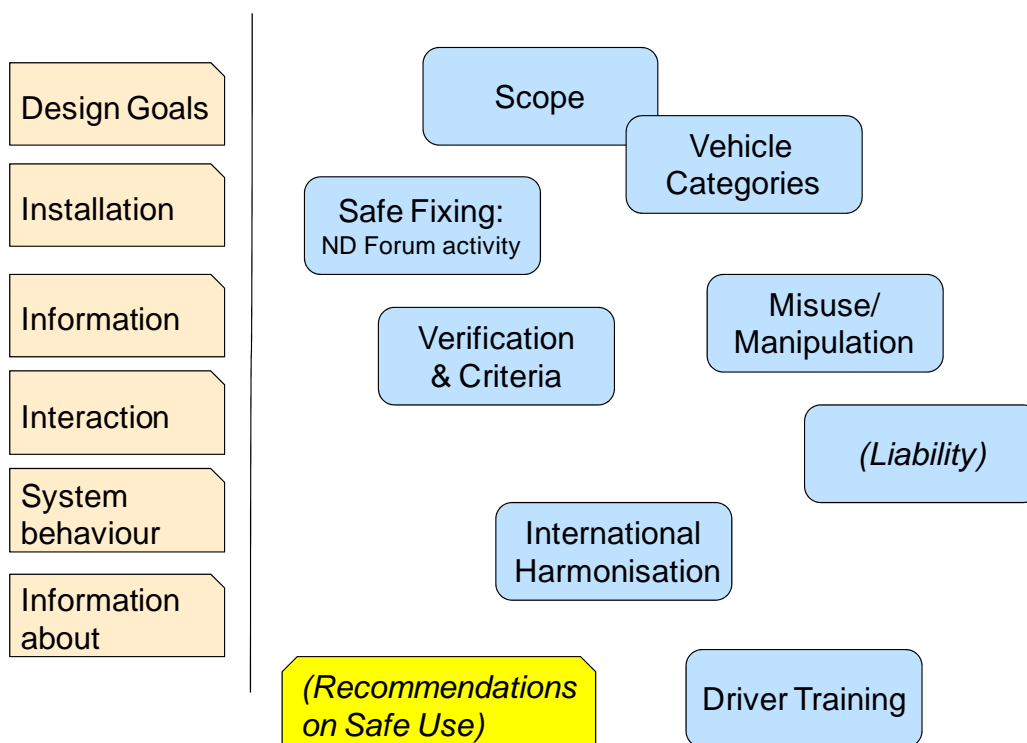


Figure 2. WG-HMI Expert Teams

3. Findings from Key Topics

3.1 Broad discussion issues

The ESoP is intended to inform designers of in-vehicle information and communication systems, one motivation being to ensure that drivers are not overly-distracted. Thus it focuses on (so

called, but difficult to define) “secondary tasks” and not the whole vehicle HMI. The emphasis is on design and is not intended to evaluate HMI as a whole which typically involves usability, effectiveness, acceptance and controllability issues.

Some initial discussion concerned the criteria through which development of the ESoP should be guided. One proposal was the proven existence of a safety issue; i.e. that development should take place only when a safety issue is unambiguously identified. This was generally accepted although some thought that development should be considered if safety problems are reasonably expected and, anyway, the identification of a safety problem was a difficult issue. As a second criterion it was proposed that there should be sufficient development of the state-of-the-art, i.e. that there is a sound scientific basis available. The parallel was drawn with standards activity which needs a good scientific basis for development.

The WG noted the potential safety risks associated with portable devices such as smart phones and PDAs that incorporate software applications that transform them into in-vehicle information systems. The main issue is that the original hardware platform manufacturer seems not to take account of the potential in-vehicle context of use later assumed by application providers and drivers.

It was noted that the ESoP, and its context of implementation, should be developed such that taking account of the ESoP provides a market advantage (or, at least, no disadvantage) compared with systems that do not.

Several participants of this HMI Working Group were also active in the Nomadic Devices eSafety Working Group (NDWG) where safe and secure fixing was a topic of study. The group was also working towards voluntary agreements to respect the ESoP so some stability in the ESoP was requested even if periodic updates are necessary. Notably, the NDWG did not conclude a voluntary agreement concerning the ESoP and this issue is still open.

3.2 Scope of systems and functions

3.2.1 Issues addressed

Some new technologies, such as head-up displays (HUDs) and voice activated controls as well as ADAS (Advanced Driver Assistance Systems) are currently specifically excluded from the ESoP.

The goal of this topic group was to consider the range of technology currently covered by the ESoP and to analyse possible extensions of the scope, bearing in mind the state of knowledge.

3.2.2 Discussion

The point was made that the scope should be related to functionality and driver tasks more than to (hardware) systems; the current ESoP is a little bit inconsistent in this regard and it was agreed that the scope needs to be made clearer in order to avoid possible misunderstandings and ambiguities.

It was generally accepted that driver assistance functionality and warnings that require immediate driver action require different HMI considerations than information systems (e.g.

demanding attention rather than not being distracting) and that the “RESPONSE Code of Practice for the Design and Evaluation of ADAS”, could be a reference to cover such issues. However, the point was also made that, increasingly, IVIS and ADAS will share common HMI, and there could be challenges ahead in this regard. This might also be addressed during a further update of the current version of the ESoP.

It was agreed that including new functionality or systems without sufficient state-of-the-art knowledge could impede innovation. Clearly, some knowledge exists as there are systems already on the market but the volume is rather low and practical experience is still limited. It was concluded that it was probably too early to be design-specific about HUD, night vision, voice input and haptic systems based on proven research and scientific results. Also, no safety issues have been raised. So, if a functional approach is adopted in the scope, it needs to be made clear that the ESoP may not wholly apply to HUD, voice-activated controls and haptic elements, where it is likely to be necessary and applicable. Nevertheless, it needs to be mentioned that there were also the view expressed that such new functionality should be explicitly excluded from the scope at the present stage.

It was noted that co-operative systems that provide information are probably already included (as it is the HMI rather than the source of the information that is important in the ESoP). For eco-driving systems, the issue of inclusion depends on the function: information being already included but warning and assistance being excluded.

According to the ACEA position expressed in a letter from May 29th 2009 to the EC, ACEA is looking for continuity and consistency due to long industry lead times and does not support a complete revision of the Principles or radical extension of the scope so soon after official publication of the last version.

Concerning the suggested timescale for periodically re-visiting the ESoP, it was pointed out that the vehicle industry model timescale is around 5 years but that Nomadic Device (ND) manufacturers operated at less than one year. The formula “at least every three years” was thus considered a reasonable solution.

3.2.3 Recommendations

- The scope of the ESoP is a little bit inconsistent and should be reformulated in terms of functionalities rather than systems. This also includes some editorial issues and the correction of the footnote under 4.3.2.4.
- Driver assistance functionality and warnings that require immediate driver action should be kept outside the scope of the ESoP.
- With regard to warning functions, there is still a need for more precise terminology in order to decide on their inclusion in the scope.
- Newer technology such as voice-controlled systems, HUDs, night vision and haptic elements will, formally, be included by a functional approach to scope. However, it

should be noted in the scope that their implementation is relatively immature and that the ESoP may currently not be wholly applicable to them.

- Ongoing activity should be initiated to monitor technological developments and implementations of in-vehicle HMI and to identify their safety impacts.
- The ESoP scope should be re-examined at least every three years based on state-of-the-art knowledge and experiences with new in-vehicle functions.

3.3 Vehicle categories

3.3.1 Issues addressed

The ESoP is concerned with vehicles of type M and N and explicitly excludes motorcycles. This section will re-consider that and also re-visit the ESoP's provision on trucks and buses to check for consistency and completeness.

3.3.2 Discussion

The perspective of the ESoP is that from a vehicle that has a passenger compartment. As motorcycles do not have a dashboard/windscreen and the field of view is very different from that of a 4-wheeled vehicle, secure fitting is a completely different concept.

From the perspective of the motorcyclist and other vulnerable road user, the ESoP could be strengthened, perhaps by additional examples, to emphasise the characteristics of other road users and their interaction with the drivers.

Whether the scope of the ESoP should be extended to include powered two-wheelers (PTWs), or a separate ESoP constructed to deal with motorcyclists was an issue for discussion. As noted above, many of the basic concepts are different. The SAFERIDER project is currently investigating the use of IVIS and ADAS functions on two-wheeled vehicles and will be developing guidelines for HMI design towards the end of 2010. This question should be raised again when results from the SAFERIDER project (and other relevant projects such as 2BESAFE) are available.

Buses and trucks are currently included in the ESoP. Concerning trucks, the ESoP was seen as suitable in its present form. New services for professional drivers could shed light on further detailed requirements in the bus area towards the end of 2011 based on the results of the European Bus System of the Future (EBSF) project.

3.3.3 Recommendations

- The ESoP should continue to exclude motorcycles. This issue should be re-examined when results and recommendations from the SAFERIDER project are available. At that point the option of developing an ESoP specifically dedicated to the PTW domain could be considered as well.

- The ESoP should continue to include buses and trucks. Detailed requirements in the bus area should be reviewed when results and recommendations from the EBSF project are available.

3.4 Verification and criteria

3.4.1 Issues addressed

The ESoP contains relatively high-level design goals but deliberately avoids simplistic pass/fail criteria. Therefore, although the ESoP assists designers, it is not currently possible to decide objectively if a specific device is in accord with the ESoP. A key question is whether such an objective process is desirable, necessary or practicable.

This section considers the desirability, implications and practicality of developing more specific pass/fail criteria for the ESoP and ways to assist designers and others to identify whether or not a specific system is in accord with the ESoP.

3.4.2 Discussion

It was agreed that for an EC Recommendation (the current ESoP status) strict verification criteria are not necessary but for a Directive or a Regulation they would be required. It was noted that the AAM Guidelines and the JAMA guidelines do have some specific criteria; however, the philosophy and focus of those documents are somewhat different from that of the ESoP. Whereas it is the primary goal of the ESoP to facilitate good design the focus of the AAM Guidelines and the JAMA Guidelines is on the limitation of distraction. The clear point was made that any criteria should be scientifically sound, based on consensus and should not constrain innovation. Further research activities should therefore be initiated to establish more scientific knowledge for some key questions.

It was agreed that there would be a significant difference between the ESoP, which provides assistance in design, and a document whose objective was to facilitate verification and certification. If such a document was required then one possibility suggested was to exploit the recognition of ESoP with a separate “ESoP-Select” document containing those aspects of the ESoP (such as safe fixing) where verification was more tractable, although possibly elements not in the ESoP would also be required for an overall HMI assessment. This would be a new document (of, as yet, undefined status) that could provide the technical basis for an assessment mechanism to provide certification and/or consumer information.

Since 2005, there has been considerable development in HMI issues and these contributions could assist. Some more exploration of national and international standards could be worthwhile. As an example the standard on User-Centered Design and the standard definition of Usability (analyzing ISO 13407 against ISO 9241-11) could be considered. Any new developments should intrinsically respect standards and may need to extend them in an appropriate way.

Also, in the research domain, the project “SafeTE” (by Engström and Mårdh), for example, developed a comprehensive methodology using a checklist followed by quantitative testing that is intended to evaluate HMI quality. This could be an applicable approach but may also be considered too complex. It was also noted that a current German national project, CAR-USE, is investigating an HMI rating system.

It appeared that different stakeholders presented different opinions:

- The ACEA position was that any formal need for verification or certification by the OEMs would involve additional cost and would therefore not be welcomed.
- The PND (Personal Navigation Device) industry recognised that some form of certification or consumer information, perhaps based on selected ESoP elements, could have some advantage in marketing the “better” personal navigation devices. Also, some manufacturers/suppliers of information systems had been asked by their industry customers to be “ESoP-compliant” so would welcome agreed valid procedures.
- As well as the OEM and PND industries, a third Stakeholder is Traffic Safety Authorities, *some* of which would appreciate a “tool” such as certification/consumer rating system to give a concrete way of implementing the ESoP.

If some sort of evaluation by criteria were to be envisaged, perhaps just for NDs, what development would be involved and what could it look like?

- Firstly, there would be issues of scope. Would the verification cover only PND? All Nomadic Devices? Also, which elements of the ESoP would be amenable to quantitative testing?
- Secondly, it would be necessary to identify and develop the required measurement procedure and to identify the appropriate criteria. There would need to be clear guidelines on the way devices should be tested in order to comply with the selected ESoP requirements and such procedures could be incorporated into recognised standards.
- Thirdly, there would be issues of style of presentation of the verification and criteria (Would they be an extension to contemporary documents? Would they be presented in a similar way to contemporary documents?).
- Then there would be organisational issues – would the verification be a form of self-certification or would an external agency need to be involved?

It was proposed that attempting to achieve specific verification criteria (certification) should not result in rigid products that comply with rules but have no appeal to the end users. Frustrating products are, by definition, unsafe. Product makers should make safe products. However, it is important that they are innovative in order to reach that goal and not simply satisfying rules.

One key target is to make HMI safe and, in a positive way, accepted by the consumer. Although rigid certification processes are somewhat distant, there was, nevertheless, a request from some contributors to aim for a more precise definition what is good and what is to be avoided.

Clearly, much work would be required and consensus looks to be difficult to achieve. Some contributors argued that the ESoP was never intended to contain hard criteria to which to comply when putting an IVIS on the market; ESoP works well in its current form by guiding the designers in the process of decision making. In this process, trade offs are made for the importance of the separate statements. If one cannot be met it can be compensated for with extra attention for another statement. This process, in which every manufacturer makes its own choices, can never be appreciated in standardized pass/fail criteria.

Whilst an overall consensus cannot be achieved it may be that some stakeholders will pursue verification criteria building on some elements of the ESoP. How such verification procedures and criteria are used (e.g. self-certification, external certification, consumer rating scheme) is a matter for further discussion and implementation by the stakeholders.

Much discussion concerned possible actions by Member States (MS), and the working group formed the clear consensus that national interpretations/criteria should be discouraged in favour of European solutions.

How any verification procedure and criteria are used (e.g. self-certification, external certification, consumer rating scheme) is a matter of implementation for individual stakeholders.

3.4.3 Recommendations

- Verification of the whole in-vehicle HMI is a complex issue and was never intended to be addressed through the ESoP. Verification criteria for the ESoP as a whole is not considered achievable.
- There would be merit in developing clearer definitions and verification criteria for selected elements of the ESoP (e.g. secure fixing, contrast) and specifically for Nomadic Navigation Devices.
- The Nomadic Devices industry is strongly interested in verification criteria and should therefore be free to develop procedures based on parts of the ESoP (“ESoP-Select”). Contributions from other interested stakeholders should be invited.
- Member States are invited to contribute to the development of harmonised verification and certification procedures under the umbrella of a European working group. Thereby it has to be stressed that solutions on the level of individual Member States or regions should be avoided.

3.5 Safe fixing

3.5.1 Issues addressed

The ESoP contains reference to safe fixing and this section describes work, originally undertaken in the Nomadic Devices eSafety Working Group, to consider the issues of fixing including a possible roadmap for future development of in-vehicle fixings and communication to other on-board functions.

3.5.2 Discussion

It was noted that the ESoP refers to dashboard fixing whereas many devices are now fixed to the windscreen.

A round-table review of approaches and legislation concerning fixing of Nomadic Devices in MS revealed a diversity of approaches but there was consensus that a European approach should be sought. The EC has launched a study to report on MS legislation concerning Nomadic Devices which will report in 2010.

It was suggested that there should be consensus that the obstruction of drivers' field of view cannot be accepted and, indeed, this appeared to be agreed by the group. It was also noted that there is cross-linkage between fixing position and other issues such as text size/readability.

The Nomadic Devices eSafety Working Group identified a number of future possibilities for Personal Navigation Devices (PND) including:

1. Mounting instructions in the **user manual** of the **PND**
2. Mounting positions in the **user manual** of the **car**
3. Look-up **database** with car model specific mounting instructions for the users
4. Proprietary **OEM mounting facilities** for PND
5. Standardized electro-mechanical interface referred to as "**NaviFix**"

These five options differ from each other in terms of feasibility in particular with regard to organizational efforts concerning information exchange between OEMs and PND manufacturers. So, although NaviFix is considered the best solution its timescale is long and its achievability is challenging.

The group also foresaw the need for some verification/certification of fixing solutions. In discussion, it became clear that the OEMs did not see the need for certification of safe fixing since they were responsible for the HMI in-vehicle design as a whole. However, they accepted that ND manufacturers may want to pursue certification themselves and/or in discussion with the EC, but that this was a separate issue from ESoP development.

3.5.3 Recommendations

- The ESoP should be developed to include windscreen as well as dashboard fixing of NDs.
- Member State legislation concerning NDs should be investigated with a view to better appreciating the European legal situation.

- Safe fixing determination should be part of any future verification criteria for Nomadic Devices.
- The five solutions to support safe fixing proposed by the Nomadic Devices eSafety Working Group should be developed and pursued.

3.6 Manipulation and misuse

3.6.1 Issues addressed

Misuse and manipulation by drivers is raised in the ESoP by statements such as “should be made impossible to interact with by driving” and covers functions such as TV/DVD/gaming/internet access. There are also links to driver training and the Recommendations on Safe Use. This section discusses if the ESoP sufficiently addresses the issues.

3.6.2 Discussion

It was noted that the eSafety working group on eSecurity is also discussing manipulation and misuse. By considering extracts from the ESoP/RSU and discussing the use cases being considered by the eSecurity group, it was concluded that the ESoP’s intention and clarity concerning misuse and manipulation was perfectly clear and sufficient as far as IVIS functions are concerned. It was, however, noted that if the scope were to be expanded then these issues may need to be examined again because the concrete shape misuse takes is highly specific to functions.

In discussion it was clarified that internet access per se was not a problem (e.g. to update mapping information) but it was distraction caused by unrestricted access to the internet while driving that was one focus of safety concern.

3.6.3 Recommendations

- The intention and clarity of the ESoP concerning misuse and manipulation of IVIS functions is perfectly clear and sufficient and no development is required as long as the scope remains unchanged.
- Manipulation and misuse continues to be a serious issue and further work should be (and is being) undertaken by the eSecurity Working Group. Results from this WG might be considered in future ESoP developments.

3.7 International harmonisation

3.7.1 Issues addressed

The scope of the work on International Harmonisation concerned discussing the need for international/ intercontinental harmonisation of HMI guidelines like ESoP, recognizing the global nature of vehicle markets (e.g. UN ECE activities).

3.7.2 Discussion

As previously noted, other regions have developed guidelines documents with a somewhat different philosophy and purpose compared with the ESoP. Nevertheless, there may be aspects of international work Europe could benefit from.

In discussion, all stakeholders appreciated the general and strategic benefit in international harmonisation. Possible mechanisms discussed included the UNECE WP29 informal ITS group and the eSafety Intercontinental Working Group, but the route of engagement with all the required stakeholders was rather unclear. Certainly, there would need to be an appropriate international mechanism, and there might need to be some funding also for the participants.

It was noted that technological progresses in HMI-related devices is very fast and any international approach should not constrain development. It was appreciated that the process of international harmonisation (with involvement of different regions) would involve more time for adoptions/revisions compared with what can be achieved on the basis of the current ESoP.

Therefore based on practicality and flexibility, no urgent need for international harmonisation was seen.

3.7.3 Recommendations

- The relevance of, and benefit to the EU from, approaches adopted in other regions should continue to be monitored.
- International/ intercontinental harmonisation is not a current priority for the ESoP.

3.8 Driver Training

Further driver training to resist secondary task distractions and concentrate better on safety-related driving tasks was identified as a potential future research area.

No specific recommendations concerning the need to update the current ESoP with regard to driver training were identified. However, it was stressed that the integration of training related to HMI issues is important for the development of future driver training curricula and should be taken seriously.

4. Overall Conclusions and Recommendations

1. The overall conclusion is that the ESoP is essentially adequate but that a substantive update could now be undertaken (which could also include a number of identified editorial issues, in particular a correction of the footnote related to 30⁰ rule.).
2. There is also a need to monitor ongoing developments such that the ESoP can be re-visited periodically (at least every three years) providing a balance between current relevance and stability.
3. The PND industry is maturing and leading manufacturers appreciate the importance of good HMI. A larger concern surrounds other Nomadic Devices, particularly Smart Phones and PDAs, where the hardware is multi-purpose and not specifically designed for in-vehicle use but is rendered useful while driving as a result of application software.
4. Legal issues surrounding mounting and use of ND are different in different MS and some further study would be useful.
5. Separately from any ESoP development, the PND industry might develop certification procedures for NDs.

The recommendations identified above are here re-structured in three groups:

- Developments of substance within the ESoP which are expected to be achievable within about one year (referred to as “short-term” development)
- Further investigations and ESoP developments on a longer than one year timescale
- Recommendations concerning verification and criteria

4.1 Recommendations concerning short-term ESoP development

1. The scope of the ESoP is a little bit inconsistent and should be reformulated in terms of functionalities rather than systems. This also includes some editorial issues and the correction of the footnote under 4.3.2.4.
2. Driver assistance functionality and warnings that require immediate driver action should be kept outside the scope of the ESoP.
3. With regard to warning functions, there is still a need for more precise terminology in order to decide on their inclusion in the scope.
4. Newer technology such as voice controlled systems, HUDs, night vision and haptic elements will, formally, be included by a functional approach to scope. However, it should be noted in the scope that their implementation is relatively immature and that the ESoP may currently not be wholly applicable to them.

5. The ESoP should be developed to include windscreen as well as dashboard fixing of NDs.
6. The intention and clarity of the ESoP concerning misuse and manipulation of IVIS functions is perfectly clear and sufficient and no development is required as long as the scope remains unchanged.
7. International/ intercontinental harmonisation is not a current priority for the ESoP.

4.2 Recommendations concerning further investigation and future ESoP development

1. Member State legislation concerning NDs should be investigated with a view to better appreciating the European legal situation
2. Manipulation and misuse continues to be a serious issue and further work should be (and is being) undertaken by the eSecurity Working Group. Results from this WG might be considered in future ESoP developments.
3. The relevance of, and benefit to the EU from, approaches adopted in other regions should continue to be monitored.
4. Ongoing activity should be initiated to monitor technological developments and implementations of in-vehicle HMI and to identify their safety impacts.
5. The five solutions to support safe fixing proposed by the Nomadic Devices eSafety Working Group should be developed and pursued.
6. The ESoP should continue to exclude motorcycles. This issue should be re-examined when results and recommendations from the SAFERIDER project are available. At that point the option of developing an ESoP specifically dedicated to the PTW domain could be considered as well.
7. The ESoP should continue to include buses and trucks. Detailed requirements in the bus area should be examined when results and recommendations from the EBSF project are available.
8. The ESoP scope should be re-examined at least every three years based on state-of-the-art knowledge and experiences with new in-vehicle functions.

4.3 Recommendations concerning verification and criteria

1. Verification of the whole in-vehicle HMI is a complex issue and was never intended to be addressed through the ESoP. Verification criteria for the ESoP as a whole is not considered achievable.
2. There would be merit in developing clearer definitions and verification criteria for selected elements of the ESoP (e.g. secure fixing, contrast) and specifically for Nomadic Navigation Devices.
3. Safe fixing determination should be part of any future verification criteria for Nomadic Devices.
4. The Nomadic Devices industry is strongly interested in verification criteria and should therefore be free to develop procedures based on parts of the ESoP ("ESoP-Select"). Contributions from other interested stakeholders should be invited.
5. Member States are invited to contribute to the development of harmonised verification and certification procedures under the umbrella of a European working group. Thereby it has to be stressed that solutions on the level of individual Member States or regions should be avoided.

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October 2009

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Verification and Criteria: Marika Hoedemaeker, TNO, The Netherlands, Petr Bouchner, CTU Prague, Czech Republic, and, Katia Pagle, ICCS, Greece

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