Information Society Technologies (IST) Programme

AIDE IST-1-507674-IP

Initial Exploitation plans

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Workpackage No.	**WP4.2**	Workpackage Title	**Exploitation and Dissemination**
Activity No.	**A4.2.3**	Activity Title	**Initial exploitation plan: Public part**
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List of Abbreviations

ACC	Adaptive Cruise Control
ADAS	Advanced Driving Assistance System
CAA	Cockpit Activity Assessment Driver State Degradation
CAN	Controller Area Network (bus)
CWS	Collision Warning System
DAE	Driver Availability Estimator
DALI	Driving Activity Load Index
DSD	Driver State Degradation
DVE	Driver, vehicle and environment
E-DVE	Elementary-DVE
ETS	eye-tracking-system
HMI	Human Machine Interface
ICA	Interaction and Communication Assistant
IP	Integrated Project
IVIS	In-Vehicle Information & Communication System
LCT	Lane Change Test
LDWS	Lane departure warning system
LED	Light Emitting Diode
NASA-TLX	NASA Task Load indeX
OEM	Original Equipment Manufacturer
SP	Subproject
TERA	Traffic and Environment Risk Assessment
VDM	Visual Demand Measurement

Table of contents

1. Executive summary

This initial expoitation plan gives an overview over the existing results in the integrated project "Adaptive integrated Driver Vehicle Interface (AIDE) and a perspective on expected final results. The document separates the results following the project structure into four sub-project sections. It is obvious that each subproject puts the focus to a different direction which represents the inherent structure of this IP. Whereby SP1 mainly discusses results that are made available to the basic research, the methodological focus of SP2 is on the adaptation of evaluation procedures and methodologies to the industrial context. SP3 discusses results that target the implementation of future HMI concepts and technical aspects due to requirements of adaptive systems and the need for more integration, whereby SP4 results are more related to dissemination, networking and standardization. Due to this heterogenity all results are discussed in a standardized format that describes the content and a contact person for further information.
The procedure to gather this information also followed the subproject structure of the IP. Results were collected and synchronized by SP-leaders and Workpackage leaders. Content and description was delivered by task leaders and partners.
Following the AIDE nomenclature confidential results are not listed in this deliverable but directly forwarded to the commission bypassing the review process.
It is important to note that AIDE reports a remarkable lists of 37 results that cover a broad spectrum and were in several cases made available to external parties (cf. Standardization bodies, evaluators). The content of this initial exploitation plan is due to the first project's phase and will therefore expand following the AIDE project plan. Nevertheless, further research and project work might alter the scope of some of the results or give more insight into a more detailed exploitation plan potential of these first ideas. This is – according to the project plan – the target of the following project phases and shall be documented within the final exploitation plan.

2. Introduction

The AIDE project started in March 2004 and has made remarkable progress meanwhile. As an IP it consists of 4 Subprojects that present a compilation oriented to the project structure of the available results within this deliverable. For good reason the title of this deliverable is "Initial Exploitation plans" as most of results will be further developed during the remaining project time towards a possible exploitation.
The AIDE consortium includes OEMs, suppliers and scientific research institutes. The general objective of the AIDE IP is to generate the knowledge and develop methodologies and human-machine interface technologies required for safe and efficient integration of ADAS, IVIS and nomad devices into the driving environment.
Specifically, the IP will design, develop and validate a generic Adaptive Integrated Driver-vehicle InterfacE (AIDE) that employs innovative concepts and technologies in order to: (1) maximise the efficiency, and hence the safety benefits, of advanced driver assistance systems, (2) minimise the level of workload and distraction imposed by in-vehicle information systems and nomad devices and (3) enable the potential benefits of new in-vehicle technologies and nomad devices in terms of mobility and comfort, without compromising safety.

The project's actual outcomes are listed below, per SP:

- Subproject 1
  Basic understanding and modelling of the driver-vehicle-environment (DVE) interaction and how it is affected by ADAS and IVIS.

- Subproject 2
  Development of a generic, cost efficient and industrially applicable methodology for evaluating integrated and adaptive solutions.

- Subproject 3
  Implementation and validation of the AIDE concept in three different test vehicles
  (city car, luxury car, heavy truck).

- Subproject 4
  Dissemination, contribution to guidelines and standards activities.

Broad dissemination and use intentions for the expected.

- Target Groups for IP-Results
  All subprojects target several interest groups with their different results:
  End users (private users, fleet owners), Automotive industry, Research community, Public administrations organisations and networks, National and international standardisation bodies and other related FP6 projects.

- Dissemination tools for IP-Results
  For the public results AIDE uses different instruments of dissemination and publication: Public forums, joint workshops, digital media, scientific publications, public presentations. The dissemination procedures ensure that AIDE results are recognized as those by being labelled with the AIDE project identifiers (acronym, logo, project description).

<u>Interaction between Subprojects within the IP</u>

For practical reasons the results will be listed by subprojects as the subprojects are the reporting structure with the integrated project.
But following the AIDE interaction plan all subprojects show that there is – beneath SP specific results - a strong linkage between interaction oriented results.
In general, all results, from an IP view, contribute to the general objective of generating the knowledge and develop methodologies and human-machine interface technologies required for safe and efficient integration of ADAS, IVIS and nomad devices into the driving environment. The IP benefit is to do so following synchronized definitions, scenarios and technological standards.

In example, this can be clearly shown for the following results (details on results given in the following text sections):

From	**Result**	**Interaction with**
SP1	Behavioural effects of driver assistance systems and road situations	SP2
SP2	Review of available HMI design guidelines and standards	SP3
	Definition UseCases for in-car use of Nomadic Devices while driving	SP3
	Definition of Scenario building blocks for HMI evaluation in driving simulation	SP3
SP3	Evaluation scenarios	SP2
	Driver Characteristics Module	SP1 SP2
	Traffic and Environment Risk Assessment (TERA S/W libraries)	SP1

3. Comment on European Interest

<u>Community added value and contribution to EU policies</u>

Road safety is identified as a major European health problem. Every year, about 45 000 people die and 1.5 millions people are injured in traffic accidents in Europe.

AIDE is oriented to the “White Paper on European Transport Policy for 2010”, in which the European Commission declares the ambitious objective to reduce by 50% the number of fatal accidents on European roads by 2010 (European Commission, 2001). The development of new Advanced Driver Assistance Systems (e.g. collision avoidance, lane-keeping aid and vision enhancement systems) offers great potential for further improving road safety. Additionally, in the Final Report of the eSafety working group (European Commission, 2002, human-machine interaction (HMI) is identified as one of the key building blocks for integrated safety.

<u>Contribution to developing S&T co-operation at international level. European added value</u>

AIDE addresses in its four subprojects HMI issues within a general European joint effort including research, suppliers, OEMs to address the main hurdles for integrated HMI solutions and identify the potential for adaptive solutions.
This cannot be accomplished by individual companies or member states alone, but requires large-scale European collaboration. Such collaboration will also strongly facilitate the industrial take-up of technologies, methodologies, HMI design guidelines and standards, which will increase the penetration rate of HMI RTD results and enable them to have a real impact on road safety. Especially the section on SP3 results show that the cooperation between OEMs, suppliers, nomadic device producers and research institutes leads to important results.

<u>Contribution to policy design or implementation</u>
AIDE as an IP is structured to contribute with latest scientific and experimental results to the work on the European Statement of principles (eSafety Working Group) and is linked to ISO WG8 SC13. The results in this area are described in the SP4 results section.

<u>Improving the quality of life in the Community:</u>

The increase of new information society technologies (nomad devices, phone, email) shows that the great potential for enhancing the mobility and quality of life is identified by the European citizen. An increasing amount of time is spent in vehicles and new telematics services and in-vehicle information applications are transforming the vehicle from merely a means for transportation to a place for work and leisure.
As information and mobility represent key values of the quality of life, it is necessary to address the well-known safety risks associated with the in-vehicle use of these systems and solve the potential conflict between information, mobility and road safety. Furthermore, an increase of in-car functionality will also take place in the field of active safety and driver assistance systems. AIDE is active on the field of integration of functionality for the user via the HMI (SP3) and develops further evaluation methodology that helps to ensure the quality of products throughout the development process (SP2).

4. List of Deliverables

The following list of deliverables divided by Subproject shall give an overview, which results shall be reached and documented. These deliverables are in a strong correlation to the exploitable results in the further reading of this deliverable.

Sub-project 1: Behavioural effects and Driver-vehicle-environment modelling						
Del. no.	Deliverable name	WP no.	Lead participant	Nature	Dissemination level	Delivery date (proj. month)
D1.1.1	D1.1.1a Synthesis of models for Joint Driver-Vehicle interaction design. D 1.1.1b Requirements for HMI design and driver modelling	1.1	CRF	R	D1.1.1a PU D1.1.1b CO + PU summary	8
D1.1.2	Preliminary model application to existing ADAS and IVIS and guidelines for implementation in design process	1.1	CRF	R	PP	11
D1.1.3	Parameters and indicators of behavioural adaptation to ADAS/IVIS for inclusion in DVE model for preliminary design of AIDE system	1.1	CRF	R	PP	18
D1.1.4	Results of preliminary model application to existing ADAS and IVIS	1.1	CRF	R	PP	26
D1.1.5	Final DVE model structure	1.1	CRF	R	PU	30
D1.2.1	Behavioural effects of driver assistance systems and road situations.	1.2	INRETS	R	PU	6
D1.2.2	General Experimental Plan for long term behavioural assessment	1.2	INRETS	R	PP + HUMANIST	12
D1.2.3	Learning and Appropriation phase test and results	1.2	INRETS	R	PU	18
D1.2.4	Long-term phase test and results	1.2	INRETS	R	PU	30
D1.3.1	DVE Simulation architecture and preliminary guidelines for model software implementation	1.3	KITE	R	CO + PU Summary	18
D1.3.2	Learning phase simulations: data preparation and data analysis	1.3	KITE	R	PP	35

Sub-project 1: Behavioural effects and Driver-vehicle-environment modelling						
Del. no.	Deliverable name	WP no.	Lead participant	Nature	Dissemination level	Delivery date (proj. month)
D1.3.3	Adapted Driver Model – final release	1.3	KITE	R	PP	40
D1.3.4	Final software and database with package installation and user manual	1.3	KITE	O	CO + PU summary	46
D1.3.5	DVE validation tests: data analysis and results	1.3	KITE	R	PU	48

Sub-project 2: Evaluation and assessment methodology						
Del. no.	Deliverable name	WP no.	Lead participant	Nature	Dissemination level	Delivery Date (proj.month)
D 2.1.1	Review of existing tools and methods	2.1	CRF	R	PU	6
D 2.1.2	Review and of IVIS/ADAS axonomy applications	2.1	CRF	R	PP	6
D 2.1.3	Scenario Descriptions	2.1	CRF	R	PP	18
D 2.2.1	Review of existing Techniques	2.2	VTEC	R	PU	8
D 2.3.1	Relations between behavioural parameters and risk	2.3	UNIVLEEDS	R	PU	18
D 2.3.2	Describing the trade-offs between behavior and workload	2.3	TNO	R	PU	18
D 2.1.4	Development of AIDE evaluation methodology	2.1	BMW	R	PP	36
D2.1.5	Final assessment of methods	2.1	BMW	R	PP	36
D2.2.2	Prototype version of VDM tool	2.2	VTEC	P	CO + PU summary	18
D2.2.3	Development of advanced secondary task methodology	2.2	UNIVLEEDS	R	PU	22
D2.2.5	Performance indicators as workload measurement tool	2.2	VTI	R	PU	22
D2.2.6	Subjective assessmnet methods for workload	2.2	PSA	R	PU	22
D2.2.7	Empirical comparison of methods for off-line workload measurement	2.2	DC	R	PP	24
D2.3.3	Combining workload and behavioral effects into overall risk reduction estimate	2.3	CERTH/HIT	R	PU	26
D2.4.1	Report on prototype evaluation	2.4	VTI	R	PP	44

Sub-project 3: Design and development of an Adaptive Integrated Driver-vehicle Interface						
Del. no.	Deliverable name	WP no.	Lead participant	Nature	Dissemination level	Delivery date (proj. month)
D3.1.1	Workshop on nomad devices minutes	3.1	ERTICO	R	PU	12
D3.1.2	AIDE scenarios and use cases definition	3.1	SEAT	R	PP	12
D3.2.1	Requirements and specifications for HMI and safety functions	3.2	BOSCH	R	PP	12
D3.2.2	System Architecture, data flow protocol definition and design	3.2	BOSCH	R	CO + PU summary	18
D3.3.1	DVE monitoring modules design and development	3.3	SV	P	CO + PU summary	18
D3.4.1	Plan for driver-vehicle interaction and communication management	3.4	CRF	R	CO + PU summary	18
3.2.3	AIDE System Architecture	3.2	BOSCH	S/W and R	CO + PU summary	24
3.4.2	HMI Components	3.4	CRF	Prototyp es	CO + PU summary	28
3.3.1	Final and verified DVE Monitoring Modules	3.3	ICCS	Prototyp e	CO + PU summary	30
3.4.3	Technical verified Adaptive HMI	3.4	CRF	Prototyp e and R	CO + PU summary	34
3.4.4	Guidelines for safe Integration of nomad devices within the vehicle environment	3.4	MOT	R	PU	36
3.5.1	Prototype vehicles	3.5	VTEC	Prototyp e	PU	40
3.5.2	Technical verification results and evaluation	3.5	VTEC	R	CO + PU summary	46
3.4.5	Final AIDE prototypes	3.4	CRF	Prototyp e	CO + PU summary	48

SP4 Horizontal activities						
Del. no.	Deliverable name	WP no.	Lead participant	Nature	Dissemination level	Delivery date (proj.month)
D4.1.1	Financial management plan	4.1	VTEC	Report	CO + PU summary	3
D4.1.2	Quality Management Plan	4.1	CERTH/HIT	Report	PU (annexes confidential)	3
D4.1.3	Gender Equality Plan	4.1	VTEC	Report	PU	3
D4.1.4	Annual Project Management and Technical Report	4.1	VTEC	Report	CO + PU summary	12, 24, 36
D4.1.6	Final Report	4.1	VTEC	Report	PU	48
D4.2.1	Report on results of First User Forum	4.2	ICCS	Report	PU	12
D4.2.2	Dissemination materials including web site	4.2	ICCS	Report plus other	PU	12
D4.2.3	Report on results of Second User Forum	4.2	VTEC	Report	PU	36
D4.2.3a	Initial exploitation plan: Public part	4.2	BMW	Report	PU	12
D4.2.3b	Initial exploitation plan: Confidential part	4.2	BMW	Report	CO + PU summary	12
D4.2.4a	Final Exploitation plan: Public part	4.2	BMW	Report	PU	45
D4.2.4b	Final Exploitation plan: Confidential part	4.2	BMW	Report	CO + PU summary	45
D4.3.1	Report on the review of the available guidelines and standards	4.3	BASt	Report	PU	6
D4.3.2	Report on design guidelines and standards recommendations	4.3	BASt	Report	PU	46
D4.4.1	Review and assessment report of AIDE as IP	4.4	ICCS	Report	CO + PU summary	18

5. Subproject 1

5.1 Introduction

In SP1, six exploitable results have been obtained in accordance with the plan of work.
The results may be grouped according to the three Work Packages in which Sub Project one is structured, namely: WP1, Modeling Driver-Vehicle and Environment (DVE); WP 2, Behavioral Effects of Driver Assistance systems; Running Simulation of DVE for predictive analysis.

Concerning WP1 (Driver-Vehicle-Environment modeling) the results obtained, match the production of three deliverables (D1.1.1/a; D1.1.1/b; D.1.1.3). The work was conducted with the aim of identifying and developing a theoretical modeling architecture for the three safety pillars, namely Driver-Vehicle and Environment. This architecture comprises a generic behavioral model and a more specific simplified model of driver behavior to be implemented in a simulation tool. Deliverable 1.1.1/a contains the generic modeling architecture, while all the rest Deliverables focus on the Elementary-DVE model. SP1 partners have been involved in the identification of parameters and measurable variables to be included in the E-DVE model that is under development in WP 3. The effort in this work was carried out in collaboration and interaction with SP3, in order to develop a common reference model within the global IP.

WP3 (Driver-Vehicle-Environment Simulation and Validation) main exploitable result consists in the implementation of the architecture on which the final simulation will run. The preliminary guidelines for the production of the software implementation are contained in D1.3.1.
Concerning WP2 (Behavioral Effects of Driver Assistance systems) the results are strongly linked to the experimental work that the partners involved have carried out during this working period. Two main results have been obtained: the first one relates to work performed in the short term behavioral adaptation tests and on the learning and appropriation phase. The second type of results is related to the most complex issue of the work package, i.e., the long term behavioral adaptation tests and results.

Even though the experiments on the short term studies covered several behavioral aspects, the most relevant exploitable results concern the interaction of the driver and the Adaptive Cruise Control. There are also other studies on longitudinal control ADAS (CWS) and lateral control ADAS (LDWS).These studies have been performed in a real environment focusing especially on the learning and appropriation phase that characterizes the interaction of a driver with an advanced support system, which is novel to the user. Some experiments have been carried out also in driving simulators.
The experimental studies carried out in WP2, both at short and long term level, have the following two main goals:

- Contribute to the overall knowledge about behavioral adaptation;
- Support the development of the DVE model and simulation by defining the parameters that affect models and algorithms developed in WP 1 and 3. And, more in general,
- Evaluate the impact on safety of adaptive ADAS

5.2 Results of Subproject 1

No.	Self-descriptive title of the result	Category A, B or C*	Partner(s) owning the result(s) (referring in particular to specific patents, copyrights, etc.) & involved in their further use
1	D1.1.1a Synthesis of models for Joint Driver-Vehicle interaction design.	A	All SP 1 partners
2	D1.1.1b Requirements for HMI design and driver modelling	A	All SP 1 partners
3	D 1.1.3 Parameters and indicators of behavioural adaptation to ADAS/IVIS for inclusion in DVE model for preliminary design of AIDE system	B	All SP 1 partners
4	D 1.3.1 DVE Simulation architecture and preliminary guidelines for model software implementation	B	All SP 1 partners
5	Learning and appropriation phase test results on the case study ACC	B	All SP 1 partners
6	Long-term phase test and results	B	All SP 1 partners

* A: results usable outside the consortium / B: results usable within the consortium / C: non usable results

The description of the results (one form per result) follows below:

No.	Self-descriptive title of the result
1	D1.1.1a Synthesis of models for Joint Driver-Vehicle interaction design.

SP	1

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Specific Result URL	

SUMMARY

This report describes the outcome of a review of a set models proposed as candidates for the joint driver-vehicle-environment (DVE) model to be used by AIDE. The review comprised 21 models from a number of fields, and spanning a period of almost 30 years.

The review was carried out using a structured questionnaire, which identified twelve essential model features, addressing both a scientific and a practical perspective.

A selection was made from the reviewed models using two primary criteria: first, that the models should be able to predict performance; second, that the models should be able to account for multiple, simultaneous activities.

Further criteria were that the models should be recursive and that they should be capable of describing one or more of the interactions between driver, vehicle and environment, or between all three. This reduced the 21 original models to a set of six, that all met the established criteria. Each of these was further analysed using available source materials. This analysis led to a further selection of models that were likely to meet the demands of AIDE.

The selection resulted in the recommendation of two models, where one is suitable for use as a G_DVE (Global DVE) model to support designers to predict the behaviour of the joint DVE system, and the other as an E_DVE (Embedded DVE) model to be part of an actual AIDE system.

No.	Self-descriptive title of the result
2	D1.1.1b Requirements for HMI design and driver modelling

SP	1

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SUMMARY

This report describes the set of equations and correlations that may enable to represent, in simple and fast running simulation, the dynamic interactions between driver-vehicle-environment.
The basic correlations and variables that are utilised for the simple model of **Driver behaviour** are directly correlated to much more complex and accurate studies and experimental plans on behavioural adaptation and modelling paradigms selected for designing interfaces of integrated ADAS and IVIS systems.
The variables that characterise the models of the **Vehicle** and **Environment** are derived from studies and literature reviews and are representative of the models of vehicle and environment applied for designing integrated ADAS and IVIS systems.
This model is called E-DVE, for Electronic or Embedded Driver-Vehicle-Environment Model, and is proposed as linkage between the basic research activity carried out in Subproject 1 ("Behavioural effects and Driver-vehicle-environment modelling") and the actual development of the AIDE system, carried out in Subproject 3 ("Design and development of an Adaptive Integrated Driver-vehicle

No.	Self-descriptive title of the result
3	D 1.1.3 Parameters and indicators of behavioural adaptation to ADAS/IVIS for inclusion in DVE model for preliminary design of AIDE system

SP	1

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SUMMARY

This report consists of a review of the driver behaviour variables and parameters aimed to be used for the Driver – Vehicle – Environment (DVE) model. It specifically addresses the issue of behavioural adaptation to the use of Advanced Driver Assistance Systems (ADAS) and In-Vehicle Information systems (IVIS), reflecting its most important indicators.

Therefore, this report is part of the modelling work within AIDE SP1, in particular WP1.1, task 1.1.2, titled Identification and validation of the Driver-Vehicle-Environment model. It can be also understood as an update of the previous Deliverable 1.1.2 'Preliminary model application to existing IVIS and ADAS and guidelines for implementation in design process', aiming to define and select the most relevant variables and parameters of DVE model.

No.	Self-descriptive title of the result
4	D 1.3.1 DVE Simulation architecture and preliminary guidelines for model software implementation.

SP	1

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SUMMARY

This document describes the conceptual structure of the DVE simulation software with particular attention to generic features that the core of the simulator should provide to the developers.

Starting from a simple walkthrough on simulation concepts and techniques, the deliverable describes the choices made for the conceptual tool, describes the technological aspects for usage and development from definition of the hardware and software running platform to the definition of the development languages, frameworks and related technologies for developers. A description **of a hypothetical simulation process** and some consideration over the various aspects of this process (setup, run and analysis), leads to the description of the first successful implementation of the simulator concepts. The **Concept Test Tool**, described with its provisory models, validates all the conceptual work from previous chapters.

No.	Self-descriptive title of the result
5	Learning and appropriation phase test results on the case study ACC

SP	1

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Specific Result URL	

SUMMARY

A test to study the learning phase of an ACC is performed: 8 drivers learn how to use an ACC over a period of 4 weeks when they drove 4 times with the system, for a total exposure time of 10 hours. In order to know how they understand the way the system functions and how it can be used, each driver is asked to teach to a new driver how to use the system (teaching method). Verbatim and answer to questionnaires (attitude towards the system, driving behaviour, driving style) constitute the data from which the learning phase will be described.
It is assumed that learning depends on the frequency and diversity of driving situations experienced using the system and on the ability to recognize many different conditions of use (environmental configurations). It also depends on the driver's ability to put the following into words: awareness of what to attend for and anticipate in dynamic decision-making environments, explanatory reasons of action, the priority-giving process and waiting to act at the right time
The test is already performed, the teaching method is described and the data processing is specified, even for verbatim.
Eight experienced male drivers (holding a driving license for more than 5 years and driving more than 10,000 km/year) with no previous use or familiarity with ACC will participate in the study. They will be in the same age bracket (from 23 to 41 years old).

This test protocol (with the teaching method) is intended to be used for other case studies by the cognitive ergonomics team of the Research and Innovation Direction, before thinking about its adaptation for a use in development phase.

No.	Self-descriptive title of the result
6	Long-term phase test and results

SP	1

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SUMMARY

A test (enquiry) to study the long term effect of the use of the Lane departure warning system (LDWS°) is performed: 60 French drivers and 40 German drivers, owners of a Citroen equipped with the LDWS, will be interviewed and observed.
The verbal reports will be processed to identify direct effects of the use of the system (i.e. effects on lateral control of the vehicle) and indirect effects (effects on any other component of the driving task).

This test protocol (with the teaching method) is intended to be used for other case studies by the cognitive ergonomics team of the Research and Innovation Direction, before thinking about its adaptation for a use in development phase.
The main objective of the PSA study is to understand how drivers learn to use an ADAS: How do their mental models of the system change over time? How do their rules and skills develop during learning? Are those mental models, rules and skills appropriate and useful for a proper use of the system?

6. Subproject 2

6.1 Introduction

The main goal of subproject 2 is to develop evaluation methodologies for future HMI concepts. This includes the further development and sophistication of existing techniques (cf. visual behaviour measurement and subjective methodologies) but also the specification of suitable scenarios and test protocols that enable the evaluation of adaptive HMI solutions in simulated environments. This includes the question how to evaluate integrated and adaptive solutions rather than stand alone functionalities.

For this reason, a set of evaluation scenarios was completed that can be used as a standardized set of for different laboratories within and after the AIDE project. Suitable methodologies that are time and cost efficient are the target of SP2 including an analysis to exploit the potential of simulation tools for risk estimation out of experimental data. Besides this off-line workload measurement tools were developed and compared against each other, and the results fed into the relevant scenarios for a preliminary specification of the final evaluation regime.

A second important final result will include the validation and correlation of different methodologies to describe their potential under the different aspects of an industrial evaluation process (reliability, validity, time, cost). Finally methods were proposed to get from evaluation results to estimates of real accident risk.

The list of preliminary results shows that remarkable progress was made within the first project phases in all of these fields. The remaining project phases will be used to tailor methodologies for the evaluation of the AIDE demonstrator and optimize a subset of methodologies for handover - including recommendations - to evaluators within and beyond the AIDE project.

6.2 Results of Subproject 2

No.	Self-descriptive title of the result	Category A, B or C*	Partner(s) owning the result(s) (referring in particular to specific patents, copyrights, etc.) & involved in their further use
1	LaneChangeTask (LCT) implemented in BMW driving simulator	A, B	BMW
2	VDM tool development for quick analysis of eye tracking data	A, B	SP2, task 2.2.2 partners
3	Definition of Usecases for in-car use of Nomadic Devices while driving		Public
4	Definition of Scenario building blocks for HMI evaluation in driving simulation	A, B	SP2
5	Review of existing tools and methods for HMI evaluation	A, B	Public
6	Test protocol for ADAS and IVIS learning experiments based on “subject teaching” procedure	A,B	SP2
7	Test protocol for ADAS and IVIS learning experiments based on “verbal reports” procedure	A,B	Public
8	PDT to evaluate HMI quality. Software and Hardware Specified and mocked up	A,B	VTEC, PSA, BMW
9	Further development of vehicle derived metrics based on earlier work in e.g. HASTE	A,B	Public
10	Adaptation of standard demand measurement tools to allow “subjective driving task demand evaluation”: PSA-TLX, DALI	A,B	PSA
11	Development of quantitative relationships to be used for estimating aggregate accident risk effects from behavioural evaluation studies	A,B	SP2
12	Deriving functional relations for quantifying the trade-offs between driver behavior and driver state with respect to their effects on accident risk	A,B	SP2

The description of the products follows below:

No.	Self-descriptive title of the result
1	LaneChangeTask (LCT) implemented in BMW driving simulator

SP	2

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SUMMARY

The LaneChangeTask (LCT) is a specific experimental setting for evaluating in-vehicle HMI. The task is currently under discussion as a new work item in ISOWG8. The LCT allows to measure performance degradation of a primary driving-like task (lane change) while simultaneously performing a secondary task under evaluation. The LCT that is currently available as a software for standard PCs has been integrated into BMW standard driving simulator software. This allows BMW to use the task with mock-ups and compare results from the LCT with results from standard driving simulator experiments. The basic research question within AIDE was to evaluate if the LCT was scaleable over different experimental set-ups. The results have been promising.

No.	Self-descriptive title of the result
2	VDM tool development for quick analysis of eye tracking data

SP	2

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SUMMARY

The aim of the Visual Demand Measurement (VDM) software is to speed up analysis of eye tracking data gathered during HMI evaluation experiments. Actually, the analysis of visual data is a very time and resource consuming step during HMI evaluation. Amongst other data ,visual behaviour gets one of the most important indicators for the evaluation of an HMI solution (IVIS as well as ADAS).

Currently BMW is implementing different filters that allows data from PSA's, VTEC's and BMW's e (ETS) to be automatically analysed using the VDM tool developed by VTEC.

This results in a software tool to estimate visual demand induced in a driving situation and by the use of HMI using visual information is developed. It is based on processing of eye tracker data. It delivers different indicators in addition to traditional eye tracker data (fixations time, fixations coordinates, etc.): focussing zone, distribution of fixations in visual field, eyes off the road time, etc.

No.	Self-descriptive title of the result
3	Definition of Usecases for in-car use of Nomadic Devices while driving

SP	2

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SUMMARY

The nomad device forums of AIDE offer a valuable platform for different interest groups to exchange and discuss questions on the integration of nomad device functionalities.
Different forums on Nomadic Devices have provided Use Cases and relevant functionalities considering the integration of nomad functionality into the car.
Input came from other OEMs, suppliers and nomad device industry:

- Evaluation scenarios.
- Necessary HMI features and functions.
- Future development of nomadic devices.

No.	Self-descriptive title of the result
4	Definition of Scenario building blocks for HMI evaluation in driving simulation

SP	2

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SUMMARY

A look-up table for scenario building blocks has been issued. The building blocks have been rated according to their usefulness in evaluating different IVIS/ADAS. The IVIS and ADAS have been categorized within AIDE and the look-up table is drawing on these categories.

No.	Self-descriptive title of the result
5	Review of existing tools and methods for HMI evaluation

SP	2

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SUMMARY

This deliverable provides a profound overview of different tools and methodologies for HMI evaluation. The tools and methods range from workload assessment methodologies to descriptions of driving simulator measures. Every method is evaluated with respect to its scope and usefulness. The overview is useful for the planning of future HMI evaluations and gives an overview to evaluation and development teams.

No.	Self-descriptive title of the result
6	Test protocol for ADAS and IVIS learning experiments based on “subject teaching subject” procedure

SP	2

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SUMMARY

This result provides a blueprint for usability experiments that are oriented to learning effects of ADAS and IVIS systems. An important aspect in this type of experiments is the procedure that has to be followed to teach the subjects.
It is an important standard for the use within AIDE but can also serve as an example for learning experiments beyond AIDE.

No.	Self-descriptive title of the result
7	Test protocol for ADAS and IVIS learning experiments based on “verbal reports” procedure

SP	2

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SUMMARY

This result provides a standardized procedure to gather data based on verbal reports of the subject. As there is a high source for variability and influences of the experimental setting, this procedure is of high value if – as in AIDE – verbal report data from different test sites shall be compared.

No.	Self-descriptive title of the result
8	PDT to evaluate HMI quality. Software and Hardware Specified and mocked up

SP	2

CONTACT PERSON FOR THIS RESULT

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SUMMARY

A method based on secondary task is proposed: drivers are asked to complete a detection task (simple reaction time task) while driving and even while using a driver assistance system or a driver information system. The reaction task consists in pressing a press-button fixed to on a finger as soon as a perceptible signal is detected (audo tone, LED lightening, vibration). Response time is the main variable used in complement to percentage of missed signal. The evaluation needs to choose a threshold to determine whether the driver is able to react to traffic and driving situation events in safe time.
A embedded device is available to implement this detection task in test-vehicle and test results on the use of vocal control for telematics functions.

No.	**Self-descriptive title of the result**
9	Further development of vehicle derived metrics based on earlier work in e.g. HASTE

SP	2

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SUMMARY

The HASTE project delivered a good basis to analyse driver performance data and behavioural data based on driver - vehicle interaction (e.g. SDLP, steering wheel behaviour, speed behaviour). These statistics will be further analyzed using data from AIDE experiments evaluated and further developed, regarding aspects of integrated/adaptive HMI solutions.

No.	Self-descriptive title of the result
10	Adaptation of standard demand measurement tools to allow "subjective driving task demand evaluation": PSA-TLX, DALI

SP	2

CONTACT PERSON FOR THIS RESULT

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SUMMARY

A specific method for driving task demand evaluation has been developed by PSA and is proposed to be evaluated by the project. The method is called PSA-TLX: a questionnaire asks the drivers to estimate the mental effort invested and the subjective level of performance reached for 7 driving sub-tasks, and to assess their current state. A data processing tool (software) is available helping to obtain the results very quickly.
Another method, developed by the INRETS, called the DALI, is also proposed to be evaluated in the project. It is mainly based on perceptive demand and global workload estimation.
Another method, proposed by the CRF (BMDMW i.e. behavioural markers of driver mental workload), is also evaluated.

No.	Self-descriptive title of the result
11	Development of quantitative relationships to be used for estimating aggregate accident risk effects from behavioural evaluation studies

SP	2

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SUMMARY

There is a need to have tools available for extrapolation from behavioural results to expected accident risk, like those usually collected in a simulator or an instrumented vehicle.
Functions have been defined that achieve this for a number of important parameters dealing with lateral (lane-keeping) and longitudinal (speed, speed variability) performance, as well as with car-following.

No.	Self-descriptive title of the result
12	Deriving functional relations for quantifying the trade-offs between driver behavior and driver state with respect to their effects on accident risk

SP	2

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SUMMARY

The relationships between behavioural parameters and the consequent accident risk may be modified by the condition the driver is in. This part of the SP 2 evaluation methodology deals with this trade-off, by proposing quantitative trade-off functions that incorporate driver alertness, as well as driver momentary workload, together with observable behavioural parameters.

7. Subproject 3

7.1 Introduction

In AIDE SP3, fifteen (15) discrete results will be released at the end of the project and are reported in this deliverable. The results represent components of the AIDE system or the AIDE system itself; most of them are in a pre-development phase and they should be treated as such, i.e. as technological prototypes. Others are more close to production (e.g. some I/O devices). The technological implementation plan will be revised and enriched at the end of the project.

In SP3, in a mid-term basis, all the expected results have been achieved in time as it was planned in the Technical Annex. The work in the reference period was focused on the development of the AIDE architecture, the AIDE Driver Vehicle Environment (DVE) components, based on the specification of the DVE internal architecture and the association with the other AIDE components, the specification of the nomad gateway, the specification and development of the Input/Output (I/O) devices, the logic and design of the Interaction and Communication Assistant (hereto ICA) module, and finally the initiation of the system integration towards the final system verification phase.

As it was already mentioned in SP3, intense development has been performed on a number of different frontiers. The AIDE system architecture work, which was essentially finalised, is reported in D3.2.2. The DVE monitoring modules which consist of the Traffic and Environment Risk Assessment module, the Cockpit Activity Assessment module, the Driver State Degradation module, the Driver Availability Estimator module and the DVE profile management module, consisting of the Driver Characteristics module, are under development. However, the first prototypes have already been released, and the corresponding deliverable D3.3.1 is completed. The design of the ICA logic and the associated Human Machine Interface (hereto HMI) strategies are finalised and they are reported in the relevant deliverable D3.4.1. These strategies will be further improved by the results of the user tests and expert evaluation and by the results of the test on the ICA virtual simulation. The software development of the ICA module has started and is expected to be finalised in time according to the implementation plan. The design and development of the nomad devices interface/gateway is ongoing and a first solution for the integration of Nomadic devices inside the vehicle interior has been presented, but this solution is still under consideration.

Concerning the speech I/O device, a first HMI specification of the speech dialogue system has been defined, where the dialogue design is largely independent from visual feedback on the screens. The speech dialogue system specification has been distributed to the partners involved in the demonstrator design and development. The haptic feedback of the barrel key is planned to be provided for virtual prototypes (VP), i.e. the luxury car VP and the truck VP and for the three demonstrator vehicles i.e. the luxury car, the city car and the truck, while a coin key will be provided only for the VP tests.

Finally the integration of the AIDE system (overall) in the luxury car, the passenger car and the truck has initiated. The first task is to address the hardware architecture starting from implementation issues, regarding the realisation of the ICA and DVE modules in the AIDE demonstrators.

7.2 Results of Subproject 3

No.	Self-descriptive title of the result	Category A, B or C*	Partner(s) owning the result(s) (referring in particular to specific patents, copyrights, etc.) & involved in their further use
1	AIDE system architecture (concept)		BOSCH + contributing partners
2	Traffic and Environment Risk Assessment (TERA S/W libraries)		ICCS
3	Cockpit Activity Assessment		VTEC, VTT
4	Driver State Degradation		SVDO
5	Driver Availability Estimator		INRETS
6	Driver Characteristics Module		HIT
7	ICA module		CRF + contributing partners
8	Nomad Gateway		MOTOROLA
9	Speech I/O device		NUANCE
10	Haptic Barrel Key		TELENOSTRA
11	Haptic Seat		USTUTT
12	AIDE system in a luxury car		CRF
13	AIDE system in a passenger car		SEAT
14	AIDE system in a truck		VTEC
15	Evaluation scenarios – Adaptation/Warning strategies		REGIENOV

* A: results usable outside the consortium / B: results usable within the consortium / C: non usable results

The description of the result(s) follows below:

No.	Self-descriptive title of the result
1	AIDE system architecture (concept)

SP	3

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SUMMARY

The AIDE architecture is a description of a logical structure realizing an adaptive integrated in-vehicle HMI. It contains the important components and their tasks and responsibilities and as well their dependencies. The architecture contains various architecture principles and design decisions. In addition to that, the AIDE architecture defines a prioritization mechanism in order to get a basis for the management and coordination of the input/output events.
It also defines the relevant interfaces specifying the semantic content and the communication flow.

The AIDE architecture can be mapped to a nearly arbitrary hardware and middleware implementations and aims to be the fundamental for future open platform standardization activities.
It guarantees scalability in terms of the system extend of I/O devices and applications and offers high flexibility with respect to different HMI strategies, which are an important competitive factor for the car manufacturers.
The AIDE architecture is developed in close collaboration to other integrated projects like EASIS, PREVENT and GST. The goal is to harmonise the overall logical architecture in order to gurantee a smooth collaboration between the different software systems developed in each project. The AIDE Architecture Forum is used as a platform to discuss architectural issues between AIDE, EASIS, PREVENT and GST. In addition to that EASIS validates the AIDE architecture and a high level committee were all these projects are represented develop a common scenario and logical architecture.

No.	Self-descriptive title of the result
2	Traffic and Environment Risk Assessment S/W prototype

SP	3

CONTACT PERSON FOR THIS RESULT

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SUMMARY

Traffic and Environment Risk Assessment (so-called here after TERA) is a software library tailored for adaptive HMI solutions. TERA library consist of the following components:

- a risk estimator component: calculation of the level of risk that is related to traffic and environmental conditions (Risk of Collision, Risk of Road Exit, Risk of Lane Exit, Environment Risk, etc.). The risk is based on the vehicle dynamics, the environment conditions, the road ahead and the other road users (e.g. moving objects), but not the current activity of the driver;
- an intention predictor: a decision component that predicts the intention of the “AIDE-vehicle” driver related to the possible maneuvering (e.g. straight motion, drifting, lane change to the left, lane change to the right, etc.). The output is accompanied with a level of confidence for the decision.

The library assumes input from the vehicle communication bus and surrounds sensors’ output.

The library is a technological prototype and is under development and evaluation. At this time – mid term - no additional information can be given.

No.	Self-descriptive title of the result
3	Cockpit Activity Assessment design and software prototype

SP	3

CONTACT PERSON FOR THIS RESULT

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SUMMARY

The Cockpit Activity Assessment (CAA) module is implemented with Simulink/MATLAB and can be utilized to simulate the driver's secondary task activity detection algorithm. Furthermore, a Microsoft Windows application will be available for rapid classifier adaptation to various vehicle types and models. On the other hand, the laboratory program is like an example for using the detection algorithm library, which includes support vector machine classifier for detecting cognitive workload and the algorithm for mapping the gaze/head position/orientation data to attention targets (e.g. exterior mirror, windscreen, radio, etc.). The algorithm can be used as well via the Simulink interface since the blocks are compiled to a Simulink model. The minimum input of the software library is 3D data from the driver's head tracking system. However, the confidence of cognitive distraction detection can be improved with using vehicle control measures (e.g. lane position, steering wheel reversal rate, etc.)

The alternative outputs of the library are:
- Driver is not looking at the road ahead {YES, NO, UNKNOWN}.
- Driver is engaged in a visual time sharing activity {YES, NO, UNKNOWN}.
- Driver is cognitively distracted {YES, NO, UNKNOWN}.
- Lateral manoeuvring intent {YES, NO, UNKNOWN}.

At the moment, the library is under development work and additional information is not available.

No.	Self-descriptive title of the result
4	Driver State Degradation

SP	3

CONTACT PERSON FOR THIS RESULT

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SUMMARY

The DSD module intends to detect and to diagnose, in real-time the driver hypo-vigilance state due to drowsiness and sleepiness situations. It gives an indication about the driver ability to execute the driving task. Various information are processed from on-board driver monitoring sensors such as eyelid sensors, lane tracking sensor and steering position sensors to achieve 2 complementary diagnostics that are then fused with additional in-vehicle information. The output of the module is the driver state degradation information that includes four levels, representing the current driver state (i.e. Normal, Pretty poor, Critical, And Dangerous).

No.	Self-descriptive title of the result
5	Driver Availability Estimator S/W prototype

SP	3

CONTACT PERSON FOR THIS RESULT

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Summary

The Driver Availability Estimator (DAE) module aims to assess the driver's "level of Availability / Unavailability" to receive and process information, according to the requirements of the primary driving task (depending on the nature of the road infrastructure, the goal followed at this time, the current driving actions carried out, the event occurrences, and so on). *Availability* is a user centred concept defined to "translate" the Driving Demand problem in specific terms of "on-board information management" question. Synthetically, if the driving demand is high, driver's attention must be focused on the driving task and – consequently – he/she is unavailable to perform another task. On the contrary, the driver can be considered as potentially available, when the driving demand is low. From a practical point of view, the DAE diagnosis is more particularly efficient to determine an 'Unavailability State' of the driver (i.e. when the driving activity requires all driver's attention), than to identify the availability itself (which indeed corresponds to a "default value" in our algorithms).

Once developed, DAE prototype will be at AIDE partners' disposal, for the whole duration of the project, for implementation on AIDE Demonstrators and end users test in real driving conditions.

No.	Self-descriptive title of the result
6	Driver Characteristics Module

SP	3

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SUMMARY

The Driver Characteristics module includes the definition of a driver set of typical profiles through the development of a driver identification application through smart card. The main application is based on Agent Technology. Initially, a *User's Profile Configuration Agent* supports different "types of users". The users themselves choose their type, residual abilities and preferences on posture, interface elements, etc. Then, a *Customisation Agent* monitors the user's driving behaviour and preferences / actions, by keeping and processing the user's driving record, i.e. average position in the lane, average reaction time, average time-to-collision, reliance on services, like navigation, requested often, etc. This Agent helps to predict user needs that are not explicitly mentioned (i.e. long reaction times) and, evolves with the user. Finally, a third agent, namely interface agent, is responsible for the final module's output correlating the profiles produced by the two former agents.

No.	Self-descriptive title of the result
7	ICA Module

SP	3

CONTACT PERSON FOR THIS RESULT

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SUMMARY

The intelligent management of the communication flow is defined by the ICA module which on the basis of the different conditions manages the provision of all type of information coming from the different applications. The Interaction and Communication Assistant (ICA) is the system responsible for the centralised management of information and adaptive interface functions, able to manage the information data flowing on the basis of the traffic and environment assessment, as well as of the level of activity of the driver in the primary and secondary tasks.

The responsible partner for the logic of the ICA is CRF.

The implementation of the different SW prototype versions (for the 3 different demonstrators) are performed as follows:
For the Fiat prototype: CRF and DIBE.
For the SEAT prototype: SEAT.
For the Volvo prototype: ICCS and VTEC.

No.	Self-descriptive title of the result
9	Speech I/O Device

SP	3

CONTACT PERSON FOR THIS RESULT

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SUMMARY

The Speech I/O device designed and implemented by Nuance will allow speech control of various in-car systems (cell phone including SMS handling, Media Player, Fleet Management system, etc). It will rely on state-of-the-art speech recognition and speech synthesis for input and output. Speech recognition and speech synthesis are combined in I/O dialogs by the Speech I/O device.

The Speech I/O device is developed in English and Italian within AIDE, but the technology and methodology is generic and can apply directly to other European languages.

The Speech I/O device takes the form of portable software code, readily applicable to current automotive embedded platforms. As such, it can be integrated in industrial automotive product developments immediately.

No.	**Self-descriptive title of the result**
11	Haptic Seat

SP	3

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SUMMARY

A haptic seat with multiple vibration elements has been designed and evaluated at USTUTT. The seat features 8 vibration motors that can be individually controlled by any driver assistance system. Most promising applications are to give intuitive warnings for lane departure, blind spot detection or frontal collision warning. It will be used as part of the multimodal HMI layout of the AIDE demonstrators.

No.	Self-descriptive title of the result
13	AIDE system in a passenger car

SP	3

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SUMMARY

Aide system in city car provides to the driver help in a critic situation, without he/she notices its intervention. The components of the Aide System are described below:

- ICA and DVE: Driver, vehicle and environment data provides to the ICA module all the information needed for reaching a conclusion about how risky is the situation. The task in SEAT is to provide the sensors information to the DVE modules and define the criteria used by the ICA to manage the HMI.
- INTERFACES: SEAT has to develop HMI adapter, CAN AIDE and LAN AIDE in order to communicate the City-Car systems and the AIDE systems.
- HMI: The specific HMI of the city car prototype is designed for this project; the main difference comparing to other HMI designs is the adaptation. It has to be prepared to give the information in different ways, for example an icon could be showed bigger than usual if the driver has problems of attention, or a buzzer sounds louder if the user has hearing problems. This kind of solution has to be contemplated in the design process.
- VIRTUAL PROTOTYPE: The aim of the virtual prototype is to validate the graphical user interface, the usability of the systems, as well as, the ICA logic. SEAT will develop a complete virtual prototype simulating the infotainment systems.

No.	Self-descriptive title of the result
15	Evaluation scenarios – Adaptation/Warning strategies

SP	3

CONTACT PERSON FOR THIS RESULT

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SUMMARY

Within SP3, Renault is involved on ICA logic and HMI strategies assessment from a Human Factors point of view. To achieve this:

- An approach has been developed for the design of scenarios in order to evaluate adaptive HMI strategies in terms of security, usability and acceptability by the drivers. This approach will exploit SP2 results in terms of evaluation tools and methods.
- Several specific scenarios – for which an important positive impact on safety is expected – have been identified and will be defined in detail and especially scenarios in which a lack of attention of the driver is detected and handled by the system.
- A simulation platform with multi-modal capabilities will be developed in order to evaluate the proposed adaptations.
- Adaptive HMI assessment and guidelines will be produced as a contribution to the AIDE system development and internally for Renault.

7.3 Confidential Results of Subproject 3

The confidential results of Subproject 3 are summarized in a separate document, namely 'AIDE-D-WP4_2-V01-InitialExploitationConfidential.DOC' which is not going to be reviewed within the project, but it will be directly forwarded by the Coordinator to the commission.

8. Subproject 4

8.1 Introduction

The main aspect of Subproject 4 is to organize, manage and communicate the AIDE IP structure. Moreover, SP4 covers the interface to relevant standardization and eSafety activities. Within the first project phases, AIDE could deliver a remarkable contribution to support the finalization of Revised European Statement of Principles and give empirical input to the work of ISO SC13 WG8.

8.2 Results of Subproject 4

No.	Self-descriptive title of the result.	Category A,B or C*	Partners owning the result
1	Review of existing HMI design guidelines and standards.	A	BASt, BMW,Bosch , JRC, Ertico
2	HMI design guidelines and standards recommendations	A	AIDE partners
3	A European User Forum for HMI design and development	A	ICCS, AIDE partners
4	Web based innovation observatory monitoring state of the art and technologies	A	ICCS, AIDE partners

* A: results usable outside the consortium / B: results usable within the consortium / C: non usable results.

The description of the result(s) is given in the following pages:

No.	Self-descriptive title of the result
1	Review of existing HMI design guidelines and standards.

SP	4

CONTACT PERSON FOR THIS RESULT

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Specific Result URL	

SUMMARY

This document gives an overview of all relevant design guidelines and standards for researchers and HMI developers. It provides the reader with a short summary of each guideline and is useful as a recommendation for HMI development. It is also valuable as a database, for a quick update of knowledge within an HMI development or within a researchers team.

No.	Self-descriptive title of the result
2	HMI design guidelines and standards recommendations

SP	4

CONTACT PERSON FOR THIS RESULT

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Specific Result URL	

SUMMARY

AIDE delivered an actual summary and review of existing HMI guidelines and standards, relevant for researchers, engineers and evaluators that are active in the domain of in-car HMI.

Meanwhile, further methodological ISO-standards were established and several other documents (codes of practice, MOUs) were refurnished.

No.	Self-descriptive title of the result
3	A European User Forum for HMI design and development

SP	4

CONTACT PERSON FOR THIS RESULT

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SUMMARY

This forum offers a platform to discuss questions on architectural concepts and HMI designs between AIDE partners and key stakeholders (EC, EUCAR, CLEPA, ERTICO, FIA, public authorities, etc.). Furthermore, AIDE results are going to be presented and discussed in this forum.

No.	Self-descriptive title of the result
4	Web based innovation observatory monitoring state of the art and technologies

SP	4

CONTACT PERSON FOR THIS RESULT

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SUMMARY

The innovation observatory serves as a tool to benchmark AIDE concepts against the state of the art outside AIDE and inform AIDE partners about ongoing developments along AIDE.

9. Conclusions

This deliverable gives an overview of the topics that are targeted for exploitation within the AIDE project after a period of two years. It can be shown that each subproject within the IP succeded – following the workplan - to reach remarkable results that serve as an important input for different parties. This effect is due to the profile of each SP and its mission within the IP.
The results were compiled following the IP structure, but it was necessary to install a new information compilation process inside AIDE that was suited to the huge number of individual and heterogeneous partners. For the initial exploitation the level of Subproject leaders and workpackage leaders was chosen to summarize and structure the results bottom up to the IP-level without loosing detailed information. This process will be reused for the final exploiation deliverable.
As this document is an initial version of the exploitation plan, final statements cannot be made describing typical items related to exploitation. Therefore time to market, target market, volume, pricing and socio-economic impact are not rated in this document. Those informations and data shall be given in the final exploiation plan and be collected following a comparable process.