



6th Framework Programme - Priority 2 "Information Society Technologies"
 "HUMAN centred design for Information Society Technologies"
 Proposal n° 507 420
 Contract n° 507420

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Collation of information on existing simulation and multimedia tools for driver training and education

TF G Activity SK-CW6:
 Use of ITS to train and to educate drivers

Reference: **GUPM-040830-T1-DA(1)**

| Rev. | Issuing date | Pages | Written by | Visa | Verified by | Visa | Approved by | Visa |
|--|--------------|-------|------------------|------|--------------|------|------------------------|------|
| | 04/08/31 | 18 | Jose M. Pardillo | ✓ | All partners | ✓ | Jean-Pierre Médevielle | |
| Modifications: creation of the document | | | | | | | | |
| | | | | | | | | |
| Modifications: | | | | | | | | |

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EXECUTIVE SUMMARY

Humanist Task Force G aims at describing and continuously updating the "state-of-the-art" on the application of ITS technologies to driver training and education.

According to its work plan, the first activity of TFG has consisted in the collation of information on existing simulation and multimedia tools for driver training and education. This activity has been designed to provide the information that is required to prepare an inventory of existing simulation and multimedia tools for driver training and education. The information will also be used as the base to assess the current situation in this field and to identify future research needs.

Two questionnaires were prepared and sent to TFG partners and other Humanist partners selected to represent all the countries that are part of the consortium.

As a result data on 33 driving simulators and 8 e-learning applications has been obtained. The results of the survey will be used in conjunction with the information gathered in previous research projects (TRAINER) to prepare an inventory of existing simulation and multimedia tools for driver education. The information will also be used to assess the current situation in this field and to identify future research needs.

1 INTRODUCTION

Simulators and interactive multimedia training tools are starting to be used to train drivers paying significant attention to the enhancement of risk awareness and to improve driver training under high risk situations or certain difficult decisions to make that cannot be expected to emerge when training in real traffic. In addition to the application of ITS to train novice drivers, other field that is being explored is the training of elderly and disabled people. In this context simulators can be of great use in helping the subjects to gain functional awareness of their abilities and to adapt their driving behaviour to them without being exposed to the risks of real traffic.

Although simulators hold considerable promise for enhancing driver training, testing, and licensing and in consequence for improving driver performance and highway safety, their effectiveness needs to be tested.

New communication technologies may also be applied to enhance the effectiveness of driver training and education. E-learning techniques are starting to be used in this field. In this area an analytical review of driver training and education to use in formulating guidelines and goals for future development of learning tools is required. Driver behaviour is conceptualised as a hierarchy, where the goals and motives of the driver play an essential role. The recent constructivist ideas in mainstream pedagogy and psychology of learning are combined with a hierarchical approach to driver behaviour. A comprehensive framework for goals and contents of driver education should be established and pedagogical methods should be re-evaluated, with more use of active learning methods and self-reflection.

Humanist Task Force G aims at describing and continuously updating the "state-of-the-art" on the application of ITS technologies to driver training and education by exchanging knowledge and experiences within the network. According to its work plan, the first activity of TFG has consisted in the collation of information on existing simulation and multimedia tools for driver training and education. This activity has been designed to provide the information that is required to prepare an inventory of existing simulation and multimedia tools for driver training and education.

2 METHODS

A survey of the existing applications in simulation and multimedia tools for driver education was conducted with the objective of gathering relevant information on ITS applications to train drivers.

Two questionnaires were prepared by UPM as TF coordinator with the assistance of VTI and DTF as WP leaders : the first one covers driving simulators and the second one e-learning applications. The questionnaires are presented in Annex A and B of this document.

The questionnaires were sent to all TFG partners (BAST, CDV, CUT, DTF, HIT, IFADO, INRETS, JRC, SWOV, UTL, UPM, VTI). Additionally, the survey forms were sent to the following Humanist partners that are not part of TFG, but whose countries were not represented in the Task Force: BIVV, NTUA, TOI, TRL, VTT.

Responses were received from BAST, CDV, CUT, IFADO, INRETS, SWOV, UPM, BIVV, NTUA, TOI and TRL.

3 RESULTS

The list of the simulators and e-learning applications for which information was received is included in Annex C.

In total, data from 33 driving simulators and 8 e-learning application was gathered.

The results of the survey will be used in conjunction with the information gathered in previous research projects (TRAINER) to prepare an inventory of existing simulation and multimedia tools for driver education. The information will also be used to assess the current situation in this field and to identify future research needs.

APPENDIX A: QUESTIONNAIRE ABOUT DRIVING SIMULATORS FOR DRIVER TRAINING

This questionnaire has been elaborated with the objective of gathering the information that is required to prepare an inventory of existing simulation and multimedia tools for driver training and education in Europe, and of identifying research needs to fill the gaps in them.

Each partner is requested to identify simulators existing in their country, and for each of them, fill one questionnaire. Please fill in the forms insofar as you are able to. If part of the information is not available leave the reply boxes empty and send the questionnaire with the rest of the information.

You are kindly requested to send your responses **before July, 30 2004** by e-mail, post or both, to the following addresses:

e-mail: jmpardillo@caminos.upm.es

mail: Prof. José M. Pardillo Mayora
ETSI Caminos, Canales y Puertos
Universidad Politécnica de Madrid
C/ Profesor Aranguren, s/n
28040 Madrid (Spain)

Please bear in mind that the results of this survey will be the key information for the two TFG deliverables during the first 18 months of the NoE. Therefore it is critical that every partner involved in the Task Force gathers all the relevant information in its country and sends its response in time. Thank you for in advance for your cooperation.

GENERAL DATA:

Location: _____
Country:..... _____
City:..... _____
Institution:..... _____
Owner:..... _____

Which are the current uses of the simulator? (X)

| | |
|--|---|
| <input type="checkbox"/> Vehicle tests | <input type="checkbox"/> Training novice drivers |
| <input type="checkbox"/> Research | <input type="checkbox"/> Training elder drivers |
| <input type="checkbox"/> Training professional drivers | <input type="checkbox"/> Training drivers with disabilities |
| <input type="checkbox"/> Other | |

Is it adaptable to other uses? Yes No
If so, please, specify the possibilities

Summary of main simulator characteristics. Please describe briefly the type of simulator and what it is used for.

APPLICATIONS

If the simulator is not currently used for driver training, is it adaptable to this type of application?
 Yes No No, but possible with improvements
If “No, but possible with improvements”, what improvements should be accomplished in order to adapt it?

Are there other new applications being developed?

• TECHNICAL DATA OF THE SIMULATOR

IMAGE

Type of screens: Monitors White screens

Total screen size (in inches):

Horizontal degrees

Vertical degrees

Number of monitors/screens? Number of projectors?

Rear view capabilities:

Number of mirrors

Is the image inserted in mirrors or in forward view?

Is it possible to change sight conditions? (X)

Clear sight

Rain

Night

Fog

No, not possible

Does the simulator incorporate virtual reality devices (i.e. head mounted vision devices, gloves with sensors, 3D trackers, etc.) Yes No

If so, please describe its characteristics

SOUND

Is there any feedback sound to the driver? Yes No

What types of sound?

engine

tyres

other road users/vehicles

Rain, wind and other weather conditions Sounds from car radio or CD-player

Voice messages from instructor other, (please specify):

ROAD

Is it possible to change the curvature of the road? Yes No

Is it possible to change road surface friction? Yes N

Is it possible to change road types? (X)

Freeway

Rural

Industrial

Urban

Residential

Others

Is it possible to change the number of lanes per direction? Yes No

Is it possible to involve other road users/vehicles/obstacles in scenarios?

Other cars

Bicyclists

Animals

Pedestrians

Busses/trucks

Others

Please describe:

VEHICLE

Is there a real car cockpit?

- Yes a complete car body
- Yes, the front half of a complete car body
- Yes, a driver seat and a complete mockup from a car
- Yes but only a simplification of the real car interior
- No

If so, can you change it?

- Yes, parts of it can be changed
- Yes, the complete cocpit may be exchanged to another vehicle
- No

Is there a moving base? If so please specify type of motion scaling of motion.

- vibration
- Lateral pitch
- Lateral roll
- Bilateral pitch
- Bilateral roll
- Pot hole simulation

What type of computer system is used?

- PC with windows application
- Pc with other application
- Other solution, please describe.....

Is it possible to simulate half and full beam from the vehicle when driving in darkness?

- Yes
- No

Is it possible to change the software definitions between different vehicle models? (X)

- Car
- Truck
- Van
- Bus

Is the simulator adapted to drivers with special needs? Yes No

If so, describe the types of drivers for which the simulator is adapted and the nature of the adaptation.

Is it possible to add new in-vehicle support systems such as navigation systems, intelligen speed adaption etc and make it cooperate with the simulation scenarios?

- Yes, fully possible
- Yes, possible to add, but not to coordinate with simulator scenarios
- No, not possible

Is the software open in the sense that end users can change the appearance of scenarios?

- Yes, but only minor components of scenarios
- Yes, complete scenarios
- No not at all. Must be done on demand by professionals

Is the simulator sold on commercial basis? Yes No

If yes, please indicate the price in Euros:

Has the simulator been validated?

- Yes: please enclose information about publications with results
- No

Has the simulator been evaluated concerning the effect of training programmes on driver behaviour or safety?

- Yes, please enclose information about publications with results
- No

Is the simulator described on any web-page?

- Yes, please add web page address:.....
- No

Is the simulator described in a brochure or other printed material?

- Yes, please send a copy to.....
- No, not available

Please add any comments that you feel that may help to better understand the nature and the capabilities of the simulator

■ **THANK YOU VERY MUCH FOR YOUR COOPERATION**

APPENDIX B: QUESTIONNAIRE ABOUT E-LEARNING APPLICATIONS FOR DRIVER TRAINING

This questionnaire has been elaborated by the Humanist NoE TFG Work Package leaders (UPM, VTI and DTF) with the objective of gathering the information that is required to prepare an inventory of existing e-learning applications for driver training and education in Europe, and of identifying research needs to fill the gaps in them as part of the activities of Task Force G.

Each TFG partner is requested to identify the existing applications in their country, and fill one questionnaire for each one of them. Please fill in the forms insofar as you are able to. If part of the information is not available leave the reply boxes empty and send the questionnaire with the rest of the information.

You are kindly requested to send your responses **before July, 30 2004** by e-mail, post or both, to the following addresses:

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Please bear in mind that the results of this survey will be the key information for the two TFG deliverables during the first 18 months of the NoE. Therefore it is critical that every partner involved in the Task Force gathers all the relevant information in its country and sends its response in time. Thank you for in advance for your cooperation.

GENERAL DATA:

Location: _____
Country:..... _____
City:..... _____
Institution:..... _____
Developer:..... _____

Please describe briefly the application.

For how long has the application been used?

Has it been improved since it was first developed? If so, please describe briefly the nature of the improvements.

Which are the current uses of the application? (X)

| | |
|--|---|
| <input type="checkbox"/> Training novice drivers | <input type="checkbox"/> Training drivers with disabilities |
| <input type="checkbox"/> Training elder drivers | <input type="checkbox"/> Updating experienced drivers |
| <input type="checkbox"/> Training professional drivers | <input type="checkbox"/> Research |
| <input type="checkbox"/> Other (Please specify) | |

Where is the application being used?

Are there other related developments available but still not in use? If so, please describe.

TRAINING CURRICULUM

| | | |
|--|------------------------------|-----------------------------|
| Is the training curriculum skill based? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Does it include attitudinal elements? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Does it include defensive driving techniques | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Please describe the main features of the curriculum

MEDIA USED

What media are used to support the application?

- Video
- CD-ROM
- Interactive CD-ROM
- Web page with interactive programs (please include the web page address)
- Other (please describe)

a) EVALUATION

Has the application been evaluated?

- Yes (please describe or enclose evaluation procedure description and results)
- No

Is the application described in a brochure or other printed material?

- Yes (please send a copy)
 - No, not available
-

b) FUTURE DEVELOPMENT AND NEEDS FOR RESEARCH

Are there plans to improve the application in the future

Yes (please describe)

No

What research would be required to enhance the application?

Please add any comments that you feel that may help to better understand the nature and the scope of the application

■ **THANK YOU VERY MUCH FOR YOUR COOPERATION**

APPENDIX C: RESULTS OF THE SURVEY

1. Driving simulators

| SIMULATOR /OWNER | OWNER CATEGORY | CITY/COUNTRY | USES | VALIDATION |
|--|----------------------------------|---|--|---|
| Drive Station International KG | Private company | Frankfurt/ Germany | Commercial product for driver training | By the developer |
| Krauss Maffei GmbH | Private company | Munich/ Germany | Commercial product for driver training Research Vehicle testing | No |
| DLR Institute of Transportation | Research centre | Braunschweig/ Germany | Research | No |
| Dr. Ing. Reiner Foerst GmbH | Private company | Gummersbach/ Germany | Commercial product for driver training Research Traffic Safety | Research projects: TRAINER, AGILE |
| Fraunhofer IAO University of Stuttgart | Research centre | Stuttgart/ Germany | Research | Validation under way |
| L-LAB/ Hella KgaA | Private company | Paderborn/ Germany | Research Product testing (vehicle headlamps) | As part of diploma thesis for light distribution. Not published |
| Simtec GmbH | Private company | Braunschweig/ Germany | Research Vehicle testing | No |
| Simtec GmbH | Private company | Braunschweig/ Germany | Research Vehicle testing | No |
| Helmut Schmidt University (German Army) | Research centre | Hamburg/ Germany | Research Vehicle testing | German Army |
| Würzburger Institut für Verkehrswissenschaften WIVW GmbH | Private company | Würzburg/ Germany | Commercial product for driver training Research Vehicle Training | No |
| German Army Driving School | Military drivers training centre | Bremen/ Germany | Professional, novice and elder drivers training | German Army |
| ASF GmbH | Private company | Bremen/ Germany | Commercial product for driver training | Rheinmetall Defence Electronics |
| Rheinmetall Defence Electronics GmbH | Private company | Bremen/ Germany | Commercial product Professional drivers training Research | German Army |
| Rheinmetall Defence Electronics GmbH | Private company | Bremen/ Germany | Commercial product for drivers training Research | |
| Dutch Police Academy | Police training centre | Rotterdam, Apeldoorn, Lelystad/ Netherlands | Professional drivers training | Dutch Police |
| Rehabilitation Clinic "Godeshöhe"/ ZNS | Health care centre | Bonn/ Germany | Drivers with disabilities training | Rehabilitation Clinic "Godeshöhe" |

| | | | | |
|--|----------------------------------|--------------------------------|--|-----------------------------|
| Berlin Public Transport BVG | Public Transport Company | Berlin/ Germany | Professional drivers training | BVG |
| Bavarian Alert Police | Police training centre | Rosenberd/ Germany | Professional drivers training | Bavarian Police |
| e-com Systems | Military training centre | Slavkov u Brna/ Czech Republic | Military vehicles drivers training | |
| Traffic Academy of Bohemia | Private drivers training centre | Prague/ Czech Republic | Professional and novice drivers training | No |
| JKZ spol sro | Private company | Olomuc / Czech Republic | Commercial product for driver training | |
| INRETS | Research centre | Arcueil/ France | Research | INRETS (research topic) |
| INRETS | Research centre | Bron/ France | Research | INRETS |
| INRETS | Research centre | Salon de Provence/ France | Research | INRETS |
| FAROS | Private company | Lannion/ France | Commercial product for driver training Research | INRETS |
| TRL | Research centre | Crowthorne/ UK | Research Vehicle testing | TRL |
| TRL | Research centre | Crowthorne/ UK | Professional drivers training | Dornier |
| VVCR/ ANWB | Private company | ¿?/ Netherlands | Commercial product for novice drivers training | No |
| Green Dino | Private drivers training centres | 25 locations/ Netherlands | Commercial product for novice training | No |
| BIVV CARA | Research Centre | Brussels/ Belgium | Research | Research project TRAINER |
| CEDINT UPM | Research Centre | Madrid/ Spain | Research | No |
| CITEF UPM | Research Centre | Madrid/ Spain | Research | EMT |
| EMT (Madrid Public Transport Company) CEFTRAL | Public Transport Company | Madrid/ Spain | Professional drivers training | EMT |

2 E-learning applications

| APPLICATION /OWNER | MEDIA | CITY/COUNTRY | USES | EVALUATION |
|--|--|---------------------------|--|------------|
| Virtual driving licence examination/ KRONE, ÖAMTC, FÜRBOCK | Web page | Viena/ Austria | Training novice drivers | No |
| Driving School 2000/ SPIS spol S.r.o. | CD ROM | Prague/ Czech Republic | Training novice drivers | No |
| Autoskola professional/ Jan Dobes Software | CD ROM | Plzen/ Czech Republic | Training novice drivers | No |
| KONTIS, s.r.o. | Interactive CD ROM | Prague/ Czech Republic | Training professional drivers | No |
| Leaning programs for driving test preparation/ 5 German publishing companies | Interactive CD ROM On-line learning | Bergish Gladbach/ Germany | Training novice and professional drivers | Yes |
| SenseAbility/ TRL | PC based hazard awareness test | Crowthorne/ UK | Training professional drivers | No |
| OCTRIJ (Driver Training Centre of the Dutch Army) | CD ROM | Oorscot/ Netherlands | Training novice and professional drivers | No |