

BROADENING INDUSTRY PERSPECTIVES OF VEHICLE TELEMATICS APPLICATION THROUGH VIRTUAL LEARNING ENVIRONMENTS

EADIS: EUROPEAN AUTOMOTIVE DIGITAL INTERACTION STUDIO

Bull, K.^{1*} Hull, N^{2*} Peck, D^{3*}

1. Director CEPAD UK, Coventry University, (00442476 888248)
k.bull@coventry.ac.uk

2. Project Co-Ordinator EADIS , CEPAD UK, Coventry University (0044 2476
888248) n.hull@coventry.ac.uk

3. Project Co-Ordinator EADIS, CEPAD UK, TU Delft NL (0031 1527 84895)
d.p.peck@tudelft.nl

ABSTRACT

EADIS is a two year international initiative funded by Leonardo Da Vinci UK. It involves five European design-related educational institutions who have developed a Vehicle Telematics Road Map. The map acts as the basis for an internationally available online training programme that shares knowledge about telematics and its innovative and appropriate application. This programme is highly targeted and ranges from defining concepts and terminology to exploring the challenges and opportunities for application including issues such as interface and usability from a social, ethical and technological perspective, and with particular emphasis upon developing sustainability and policy awareness.

KEYWORDS, vehicle telematics, knowledge dissemination, e-learning, EADIS, innovation, vle,

INTRODUCTION

European Automotive Digital Interaction Suite (EADIS) is an internationally focused collaborative initiative funded by Leonardo Da Vinci, part of the European Commission's Lifelong Learning Programme. This supports national training strategies by funding a range of transnational partnership projects aimed at improving quality, fostering innovation and promoting the European dimension in vocational training. EADIS was awarded 400,000 Euros to bring together five automotive and design-related educational institutions from across Europe to develop a knowledge map for vehicle telematics and an internationally accessible virtual learning environment (VLE) in the form of an online training programme. It aims to promote a multi-disciplinary awareness of telematics technologies, systems and their appropriate and innovative integration and application. This VLE is known as the Digital Innovation Studio (DIS) and will be used to train and develop professional designers and engineers in the automotive industry [1].

The five partners include: Coventry University (CEPAD – Centre for Excellence in Product and Automotive Design), UK; Oulu University of Applied Sciences, Finland; Munster University of Applied Sciences, Germany; Turin Polytechnic, Italy; and, Technical University of Delft in the Netherlands [2]. The team have diverse and complementary specialisms ranging from: e-learning and the technological development of online learning environments; software programming; automotive design and industry liaison; industry and project management. All have a common interest in promoting vehicle telematics awareness. Importantly, the project is also supported by an advisory panel made up of industry representatives including Tom-Tom, FIAT, BMW, MIRA, The Where Business & TNO. This panel helps to evaluate and advise on the development of the VLE content.

This paper scopes the opportunity and necessity for the VLE and provides an overview of the context and structure of its contents. It does not aim to explain the technical programming or content management system. The discussion explains the background to this initiative and the importance of developing a deeper understanding of the knowledge which underpins and shapes the technologies associated with vehicle telematics. EADIS believe that in order to be innovative with this complex topic, it is necessary to develop a structured and human-centred view of the technologies so they can be creatively and effectively integrated into designed products.

TELEMATICS AND VEHICLE DESIGN

The aim of EADIS is to help European companies to operate more innovatively and efficiently, to exploit the potential brought about by the

emergence of new technologies for transport that can help to solve a number of societal issues such as congestion and climate change. To this end, EADIS recognise the need for the automotive design industry to collaborate to develop products that assist, interest and excite their customers, engage with technology and recognise how it might improve the way people live, work and relate to their environment.

There are a number of challenges that the automotive design industry needs to consider fundamental when adopting Telematics technology. Telematics changes the way we interact with vehicles both in terms of usability, control and safety, and at a softer level it will influence our experiential and emotional engagement with vehicles e.g. location-specific information and infotainment [3].

Telematics is principally about the technologies associated with controls, sensors and their communication as well as those that enable the exchange and storing of digital information of the vehicle location, via telecommunication devices. At the application level these raise a number of innovation challenges that need to be considered by the designer. A few are listed below.

- Privacy of the user – location, movements and data
- Issues of de-skilling due to new technology - MMI & portability
- Vehicle to Vehicle issues – safety, liability, insurance
- Different development cycles of the emerging technologies
- Vehicle, infrastructure and communication – lack of standardisation
- Need for lower carbon footprints
- Robust infrastructure - energy and power supply, reliability and system life span
- Public policy – clarity and acceptance
- Deterioration in social communication
- Technology integration mobile/vehicle and infrastructure

Telematics applications are dependant on a high level of interoperability of systems at the product, service, and global level. This creates demand for effective standardisation and the need for developing a strong understanding of application potential. It is often this interconnected thinking that is lacking because of the parallel need to have strong specialist skills to resolve design problems in a highly technical domain. Therefore, a European/Global approach is required with collaboration between the specialist sectors. This co-operation and combining of expertise helps to form a collective understanding and recognition of opportunity generated through new combinations of business stakeholders and is essential for the development of new products and services.

EADIS assert that developing a more holistic understanding of the opportunities and issues associated with vehicle telematics will help design teams to make connections and develop a stronger integrative understanding of technology in applied contexts [4]. The outcome of this is the development of the DIS which will enable automotive designers and associated

professionals to appreciate, from a non-technical standpoint, the opportunities and issues surrounding vehicle telematics application.

KNOWLEDGE TRANSFER FROM ACADEMIA TO INDUSTRY

The target audience for the VLE is seen as automotive design teams, TIER 1 suppliers (those who supply direct to the major automotive manufacturers e.g. Bosch, Alpine, Sony) and telematics developers associated with both hardware and software applications. In addition, Higher Education institutions and their students can be catered for. This learning platform is recognised as the first stage in an ongoing development of telematics knowledge dissemination activities that could transfer to sectors such as health, architecture, product design and construction.

EADIS has developed its own website [2] and wikipedia site [3] and has engaged its developer partners from the UK, Holland, Finland, Germany and Italy to develop a culturally diverse learning context that can draw upon telematics industry experience from across Europe. The well-connected advisory group (which includes both industry and independent knowledge institutions) provide knowledge of current practice and feedback to support development of the structure and content of the VLE and equip EADIS with the expertise and experience of European design teams. It will provide the industry with knowledge and best practice relating to how to adapt knowledge sharing and learning environments to meet the needs of culturally diverse and globally distributed participants.

THE LEARNING PLATFORM

The team undertook a thorough analysis of approaches to e-learning which enable content to be clearly structured and easy-to-follow, as well as formats which offer a number of ways of presenting the content to the learner. It is considered that once the basic structure has been organised, the packages of learning may be transferable to other learning environments that offer different opportunities for flexibility and interaction. This equates to a more sophisticated view of e-learning. The lower levels of e-learning manifest themselves in 'in-school' learning or 'distance learning' ranging from CDs to online VLEs such as Moodle [5]. Education methodologies associated with these can be very structured and centred upon both asynchronous or synchronous communication and data exchange. However, they are not highly flexible and it is for this reason EADIS have considered steps towards more advanced learning solutions which focus upon mobile learning and ubiquitous learning (fig. 1). Such solutions put the learner and their context at

the centre of learning. Learning sessions can be broken down into smaller chunks that are seamlessly integrated into highly contextualised and personalised programmes of study which are omnipresent and always available [6].

Moodle was initially identified as the preferred platform for the VLE, as it is a proven software used by many universities. Initial development activity was focused here during the first year of the project. However because EADIS has leading expertise in e-learning technologies and their use, the team decided to adopt more cutting-edge approaches and environments by using Typo 3. This is an open source content management system [7] that supports highly individualised learning and more flexible forms of content interaction that is better suited to a complex topic such as Telematics. It also benefits learners who might not be familiar with current HE learning environments and may be working in diverse learner settings such as at home or whilst travelling. The Typo 3 DIS is still under development and not fully operational at this time and so Moodle is still being developed in parallel.

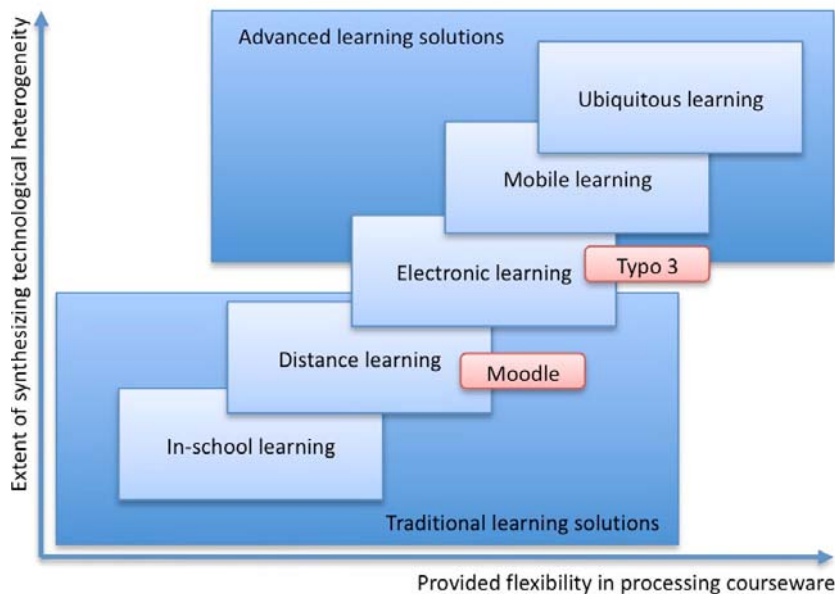


Figure 1: Categorization of learning approaches (adapted [5])

THE MODULE STRUCTURE

The module is designed to be flexible, interactive and personalised. To achieve this a complex framework of content is mapped and organised around particular pathways through the training programme depending on

information need and level of expertise. The learner will see content relevant to their learning goals and objectives. The system is centred on small, reusable units of learning known as 'learning objects'. This way of organising learning content centres on a non-hierarchical approach based upon specific learning goals. These objects can be used in multiple contexts e.g. it is possible to revisit a learning object with a different question or set of informational goals.

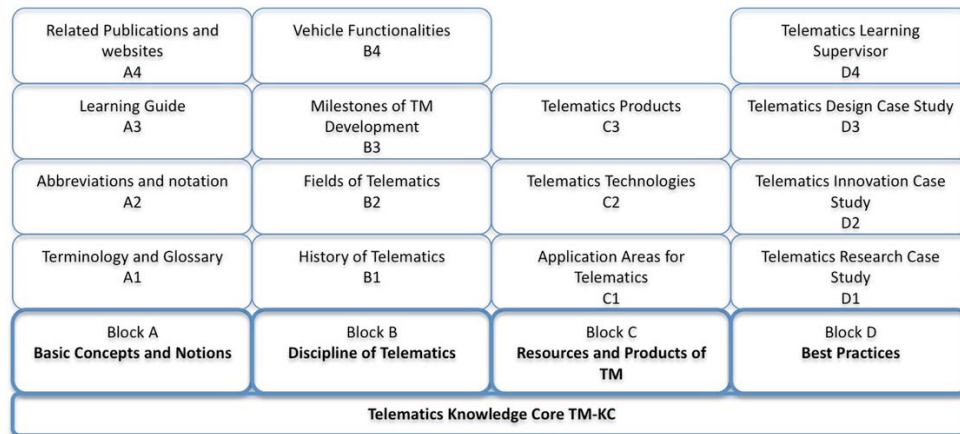


Figure 2 - The EADIS Telematics Knowledge Core

At the centre of the learning environment is the Telematics Knowledge Core (see fig. 2). This is the central framework around which different specialist paths of knowledge stem. Such pathways include: General Issues (e.g. specific solutions for driver assistance, studies of smart infrastructures); Automotive Design Issues: (e.g. markets, demands and drivers, Telematics standards and regulations, vehicle safety and driver distraction); Design Leadership (e.g. European and American foresight); and Business Management (e.g. principles of innovation, product lifecycle management) [8].

To help users navigate the VLE is centred upon a preferred path of engagement. Variants are determined at the log-in stage where responses to key questions inform a 'field hook' which helps to connect content with the learner creating individual learning pathways.

The module is organised in blocks and units (see fig.2). Block A includes a media rich introductory segment explaining how to use the VLE. It then leads the learner into Unit 1 which is about Basic Concepts and Notions. It contains definitions, movies and introduces the basic terminology. This unit can be referenced from any point in the training module when particular ideas are introduced or to refresh the memory.

It expected that you might begin the training programme with developing familiarisation of the Field of Telematics. This Block B unit helps the learner to appreciate some first principles of telematics through exploration of the landscape of telematics technology. From there, depending on the learners focus they may be directed to Telematics Technologies (Block C) to build upon technological awareness. The user can then relate technological knowledge to its context of use e.g. have gained deeper insight into technological evolution, societal and environmental impact, the roots of computing and information sciences, as well as future directions and possibilities.



Figure 3 - Example of a Telematics Technology Block C object.

The Telematics Technology unit focuses upon the resources and products of telematics (fig. 3). It provides an overview of communication and interaction technologies and explores vehicle telematic aspects such as display, sensing, safety and navigation. Block D is about integration and focuses upon research case studies and examples of best practice in the fields of design, innovation and research. It provides an opportunity for the learner to engage in assessment tasks through engagement with a telematics learning supervisor.

SUMMARY

As a multi-disciplinary subject, telematics is often seen as difficult to understand. Developing a holistic view with better understanding of the opportunities and wider issues of telematics is not easy and a number of factors add to the complexity of telematics applications, with a range of technical, commercial, political and ergonomic issues to deal with. The EADIS team has identified the need for a new learning package that presents the content in a structured, easy-to-follow format and to be accessible within an online environment using Moodle or Typo 3. This allows professional audiences to engage with learning materials remotely, using a website.

The EADIS training programme aims to promote and inform about the issues and opportunities for vehicle telematics. The new learning package has been developed with the aid of commercial partners in Europe and it is hoped that its use may become more widespread and ultimately broaden the industry perspective of vehicle telematics application in future. This project is seen as the 'first rung' on a long ladder and all of the partners have an interest to see the project continue past the current project end date in October.

REFERENCES

- [1] Peck, D., (March 2009) Introduction on EADIS, [Online] Available from: http://www.youtube.com/watch?v=9ICVCMbHymA&feature=channel_page, Last Accessed: 22nd July, 2009)
- [2] EADIS (2008) EADIS: Home-Introduction, [Online] Available from: <http://www.eadis.eu/>, Last Accessed: 22nd July, 2009
- [3] Wikipedia (2008) Telematics: Telematics Education [Online] Available from: <http://en.wikipedia.org/wiki/Telematics>, Last Accessed: 20th July, 2009
- [4] Hull, N., (March 2009) Nicholas Hull on the EADIS project, [Online] Available from: <http://www.youtube.com/watch?v=RwwnTCnwgOA&feature=related>, Last Accessed: 22nd July, 2009)
- [5] Horv ath, I., Peck, D., Verlindon, J., (2009) Demarcating Advanced Learning Approaches from Methodological and Technological Perspectives in the *European Journal of Engineering Education*
- [6] Lyytinen, K., Yoo, Y., (2002) Issues and challenges in ubiquitous computing: *Communication of the ACM*, Vol. 45, No. 12, pp 62 – 65
- [7] Typo 3 website (2009) *About Typo 3*, [Online] Available from: <http://typo3.com/>, Last Accessed 22nd July, 2009
- [8] Peck, D., (2009) European Automotive Innovation Studio, *Ecotec Year of Creativity and Innovation*, Birmingham, Powerpoint Presentation