Traffic Control and CO₂ Reduction: Utilisation of Virtual Modelling within University Estates Master Planning

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ABSTRACT

The aim of the research described in this article was to explore the use of intelligent virtual transport modelling, within the context of a case study involving the development of a University estate. Through the application of visualisation techniques, the study was able to explore how such techniques can lead to enlightenment of potential solutions, whilst simultaneously demonstrating the effects of design solutions on CO₂ emissions. The research used UC-win/Road software to support the visualisation component. The software supports the integration of road planning within urban settings and enables the creation of walkthrough visualisations, useful in communication with non-specialist end users. Outcomes of the research included an animation to assist planners in the consideration of travel time, distance and staff experience. Vitally, though, this is intrinsically connected with a study of how one can ensure that visual elements of a design process are undertaken to support complex technical, social and environmental decision making. The work is placed within a consideration of participation in the planning and design of sustainable transport approaches in urban areas, and the approach described should be viewed within this context.

Keywords: Design, Planning, Transport, University, Urban, Visualisation

INTRODUCTION

The aim of the research described in this article was to explore the use of intelligent virtual transport modelling, within the context of a case study involving the development of a University estate. Through the application of visualisation techniques, the study was able to explore how such techniques can lead to enlightenment of potential solutions, whilst simultaneously demonstrating the effects of design solutions on CO₂ emissions. The study arose from a line of research concerning the utilisation of computer-based visualisation in

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the planning and design of urban public space. Perhaps more importantly, though, the research concerns the manner in which the planning of our towns and cities, including the planning of infrastructure, must adapt to meet the pressures of climate change. It is arguably the case that the impact of most new buildings will be considered as part of a wider planning process, with consideration of the effects on infrastructure and possibly environmental issues. Architectural visualisation, and particularly computer based visualisation, has been championed for many years. Indeed, it is possible to also trace other strands of participatory design which use non-digital approaches, and which date back to the 1960s and earlier (for example: Arnstein, 1969). However, it is certainly not the case that such research has been widely adopted as normal practice, with visualisation often used to ‘sell’ designs, rather than to genuinely elicit opinion or instigate debate.

The research described in this article drew on experiences from CARE North, an Interreg-funded initiative (IVB North Sea Region Programme) aimed at developing ‘a comprehensive, strategic and practical approach to urban and regional transport accessibility in the North Sea Region’. CARE North extended across 9 partners and 4 countries, and included input from ICLEI, an association of local governments committed to sustainable development. Partners include the cities of Bremen, Malmo and Gothenburg, all of which have implemented ambitious programmes concerned with both sustainable transport and the urban realm, and have successfully implemented both technical and social programmes to encourage and support behavioural change among residents and decision makers alike.

The article takes a combined philosophical and practical approach, in that the work is placed within a consideration of participation in the planning and design of urban areas. The methods and approach described should be viewed within this context.

**CONTEXT**

Through actions of the EU and its constituent countries, towns and cities across Europe are beginning to address the challenges posed by climate change. The complexity of urban areas means that particular challenges are posed by the needs of residents including energy use in buildings, management of resources and transportation. Whilst it is certainly true that many of the challenges could be met through behavioural change on the part of individuals, it is also true that an integrated approach to planning is required to ensure that individuals are suitably empowered and able to act. The EU has instigated a range of mechanisms through which change can be planned, facilitated and implemented, including the relatively recent development of the Smart Cities programme (http://eu-smartcities.eu/). Such programmes recognise that technology must be introduced in such a way that it helps to support change, but cannot be regarded as a solution in itself. Within a context of participatory design, the starting point for this research was that urban development will continue to have a significant effect on the carbon footprint of cities, but that a potentially significant part of that impact (i.e. mass transportation) can be mitigated through visualisation of options in a manner which encourages engagement, and refinement of designs.

The research study reported here concerns a common situation, where an organisation (in this case a University) has decided to move a significant part of its activity to a new location. Where that location is part of a city centre, one could argue that the transportation implications are directly related to mass public transport, as space pressure would normally mitigate against the introduction of new car parking space. However, the situation studied here was one where the new site was to be within the peri-urban city edge, thus posing challenges of how to facilitate the transportation of thousands of
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