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EDITORIAL

Informatics research within built environment disciplines deals with those issues that are broadly related to the application of information and communication technologies (ICT) to the creation and management of the built environment. Given the acknowledged potential of ICTs to bring about improvements in the construction process, many initiatives have been (and are being) undertaken to develop appropriate tools, technologies and processes to support various activities and professionals involved in the making of place. These include: the use of ICTs and their integration in the early stages of building design; evaluating the impacts of ICTs on the architectural design process, and on buildings; the application and development of improved processes and tools for architectural design (e.g. 3D real-time technologies, intelligent and interactive virtual environments); the role of ICTs in design creativity and representation (e.g. 2D/2D CAD, parametric design, visualisation); virtual collaborative working in the early phases of building design; and the role of ICTs in design and architectural practice management.

This special issue on Architectural Informatics has five papers which focus on the advanced use of virtual reality technologies for design and in education, the use of computer-aided modelling to capture design rationale and intent, and the use of expert systems to capture and reuse knowledge on project variations in the design process.

The first paper, by Horne and Hamza, reflects on current developments in Virtual Reality (VR) technologies and describes an approach adopted for its phased integration into the academic curriculum of built environment students. The process and end results of implementing the integration are discussed and the paper illustrates the challenges of introducing VR, including the acceptance of the technology by academic staff and students, interest from industry, and issues pertaining to model development. It sets out to show that fairly sophisticated VR models can now be created by non-VR specialists using commercially available software and advocates that the implementation of VR will increase alongside industry's adoption of these tools and the emergence of a new generation of students with VR skills. The study shows that current VR technologies, if integrated appropriately within built environment academic programmes, demonstrate clear promise to provide a foundation for more widespread collaborative working environments.

The second paper, by Calderon, Cavassa and Diaz, presents a new framework for the use of Virtual Reality (VR) for configuration applications that support the expression of design knowledge in the Virtual Environment (VE) and the visualisation of the user's interactions with the configuration. This is in response to the limitations of traditional VR systems, which support the visual exploration of a design solution but do not assist the user in exploring alternative solutions based on domain knowledge. Extending previous work in the area of Intelligent Virtual Environments (IVEs), the authors propose an intelligent configuration system based on constraint logic programming (CLP), integrated in a real-time 3D graphic environment. This type of integration facilitates the expression of design knowledge in the VE and enables the user to interactively solve and/or refine a spatial configuration problem. Consequently and in order to demonstrate the viability of our approach, the authors implemented an intelligent configuration system in which the user can visually explore configurations, but his interaction with objects of the configuration problem triggers new cycles of constraint propagation from the modified configuration to produce a new compatible solution.

The third paper, by Calderon, Worley and Nyman, presents a methodological framework for the utilisation of a cinematic camera control engine in the exploration and representation of architectural designs. In this paper, the authors report on a fully developed modification (mod) of a real-time engine (Unreal TM): a cinematic control camera engine designed to enhance a real-time navigatable experience of architectural contexts. The mod enables the use of cinematographic techniques (Tracking, Cutaway, Exposure, etc) to explore architectural designs in a 3D real-time development and testing environment (the Unreal Engine). The aim is to use this

"spatial cinematic mediation" to improve the presentation of architectural designs by facilitating a reading of architecture in a design sense.

The paper by Charbonneau, Boulerice and Booth applies computer-aided modelling techniques to test whether it is possible to recreate the design of architectural artefacts. The aim is to initiate and propose novel methods of modelling design processes and to evaluate how computer-aided modelling software can enhance the design abilities of architects. A computerised model re-enacting the design of a Rose Window, and an interface to translate the designer's intentions into a virtual design space, were developed. Findings from this study include an evaluation of how modelling strategies can grasp a given artefact as a logical and articulate ensemble.

The final paper in this issue, by Arain and Pheng, focuses on the integration of project knowledge and experience in the design phase with the aim of improving overall project performance. The paper presents a knowledge-based system (KBS) for management of variations in educational building projects in Singapore. The KBS consists of two main components (a knowledge-base and a controls selection shell) and was developed from data contained in the source documents of 80 educational projects, questionnaire survey, literature review and in-depth interviews with construction professionals. The system provides detailed information about variations in the educational building projects and is designed to assist professionals in identifying the potential variations and their effective controls during the early stages of the construction projects. Furthermore, the KBS provides designers with information on what changes in design can lead to variations. With further generic modification, the KBS will also be useful for the management of variations in other types of building projects, thus helping to raise the overall level of productivity in the construction industry.

There are, obviously, many themes not covered in this issue. It is however hoped that the papers presented in this issue will provide an impetus for further debate and research into the role of ICTs in the creation and management of the built environment, and in particular, the ways that such technologies influence architectural design creativity, its representation and realisation in practice.