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EXPERIENCE OF USING BUILDING SIMULATION WITHIN THE DESIGN PROCESS OF AN ARCHITECTURAL PRACTICE

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ABSTRACT

This paper documents work that follows on from a previous study [Morbitzer et al 2001] on the implementation of a simulation-tool into an architectural practice at outline design stage. The use of simulation is now pervasively and routinely undertaken by designers within the company to evaluate energy and environmental performance of their design concepts.

The paper documents the changes to the interface, based on the feedback from designers. It includes a case study of how these improvements have impacted on the degree-of-use of the simulation-tool by designers, the impact of the tool on the design process and the design outcome, a discussion on the development of the simulation-tool, and the issues facing the architectural practice with use of simulation.

INTRODUCTION

Historically, the use of simulation on practical problems is undertaken, predominantly, by specialised environmental systems engineers or research groups (commercial, government funded or academic), usually focused on specific problems [McElroy et al 1999]. This situation gives rise to simulation exercises being undertaken, generally, later on within the design process (scheme or detail design stages [RIBA 1995]) with the purpose of validating design decisions. This situation is due to the limited availability of resources for simulation work at early design stages and limited understanding of the benefits of using simulation by design team members. However, changes in procurement methods and legislation have provided strong incentives for the use of simulation within architectural practice.

The use of simulation facilitates better understanding of the design problem with respect to energy performance, often highlighting poor performance of design concepts: the need to change designs to mitigate this under-performance at the later design stages can be costly.

In order to address these problems, an Outline Design Stage (ODS) interface was developed [Morbitzer et al 2001] with ESP-r [ESRU 2003] as the core simulator. The interface was introduced and used within an architectural practice, with the intention of using the tool routinely on projects at the outline design stage when it can have the greatest influence on energy and environmental aspects of the design.

The adapted software is currently in its final phase of development as described by [Maver and Ellis 1982]: *where commercial exploitation and development of user training and support procedures* is being undertaken.

Providing the analysis software is only part of the requirement. In order for the use of simulation to be exploited, significant investment of resources [Clarke 2001] in some crucial areas is required:

- obtaining an appropriate level of knowledge of the issues of computer modelling within practice;
- development of a robust understanding of how, where and when simulation can be used; and
- development of collaboration between key individuals within practice.

In this particular case (within the architectural practice) the requirement for increased resources has been facilitated through the UK government's TCS project. Funding from this provided the additional resources required for development of software.

The paper focuses on three core issues relating to the use of simulation in practice:

- Potential drivers for the increased use of simulation.
- Interface/software development to increase functionality and ease of use.