THE DEVELOPMENT OF AN INTEGRATED ENVIRONMENTAL BUILDING DESIGN TOOL

PREECHA MANESSATID AND DR PETER J SZALAPAJ
School of Architecture, University of Sheffield, UK
arp00pm@sheffield.ac.uk ; ar1ps@sheffield.ac.uk

1. Lack of Integration in Conventional EBS

Environmental design implementations are generally applied within limited and specialised areas of environmental design making them difficult to use intuitively by designers (Maneesatid and Szalapaj, 2003). Building simulations have mostly focused on accurate parameters and physical properties of building elements. Such tools typically require numerous numerical data which is often only accurately known in the detail design stages. Conventional environmental building design systems (EBS) have typically required highly experienced users who are familiar with extensive qualitative input and output requirements. A successful architectural design solution that is both energy efficient and environmentally friendly, cannot be obtained simply by additively combining a set of discrete specialist analyses. A move towards better architectural design with environmental considerations can be achieved by allowing designers themselves to express relationships between salient environmental parameters that can subsequently be analysed in integrated ways. This presentation is concerned with the issues involved in developing a quick and intuitive interface for expression of relationships between environmental parameters.

2. An Integrated Object-Oriented Interface Specification

This presentation, and the PhD thesis upon which it is based (Maneesatid, 2006) describes an object-oriented software specification that, when implemented, can provide a more coherent approach to environmental analysis within the context of the architectural design process. The key objects are shown in figure 1. The KBC is essentially a database containing information about building and climate data as well as various environmental properties. The CBD is a rule-based system that connects appropriate design

strategies with a wide variety of environmental situations. Figure 2 shows one of the many possible interaction states that can be reached, with relationships between design strategies, design rankings, climate data and output of various environmental analyses. The constant dynamic visual feedback of all data allows designers to progress design solutions with the particular aim of improving and extending the comfort zone in building proposals. The system developed supports cyclical progression of environmentally-sound design, analysis and re-design.

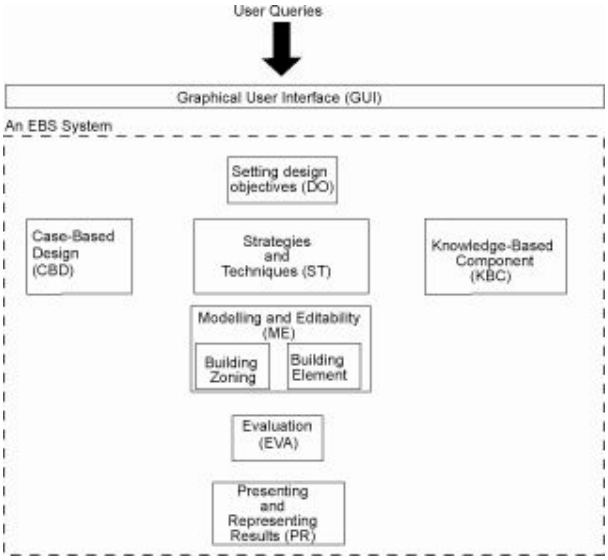

Figure 1. EBS Objects.

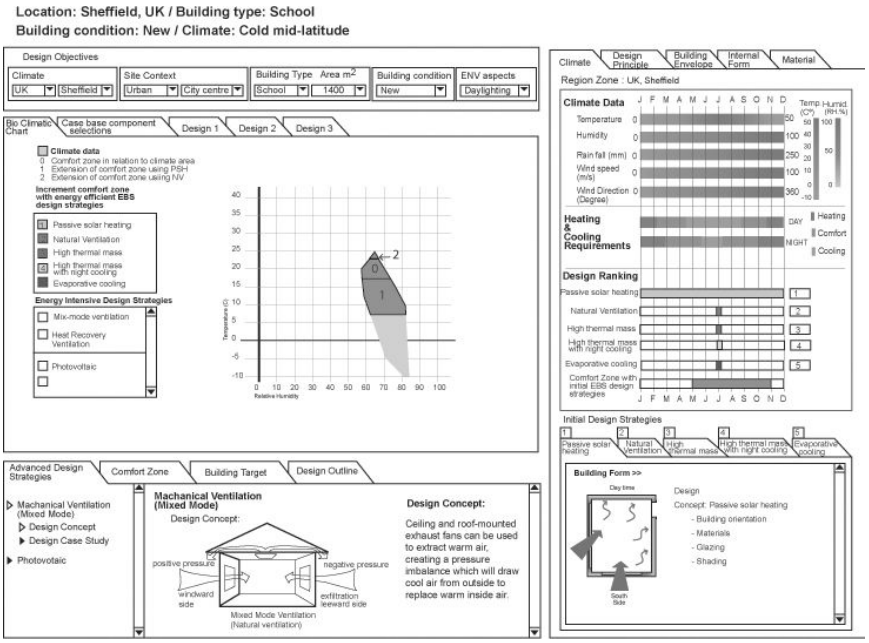

Figure 2. Sample Interface.

References

Maneesatid, P; 2006, A Specification for an Interactive Object-Oriented Environmental Building Design System, PhD thesis, University of Sheffield, UK, submitted January 2006.

P. Maneesatid and P.J.Szalapaj; October, 2003, "*The Role of CAD in Environmental Building Science*", the 8th **CAADRIA** (The Association for Computer Aided Architectural Design Research In Asia) Conference, at the Faculty of Architecture, Rangsit University, Bangkok, Thailand.