



Project No: Brite Euram 4670

## **Socio-Technological-Commercial Framework and Decision Support Systems for Building Refurbishment**

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### **Project Overview**

Refurbishment work currently accounts for more than one-third of the total construction output in the EC; this market is expected to grow stronger with progressive ageing of buildings and the environmental impetus to retain buildings, a further dimension being the need to adapt buildings for a greying population.

Refurbishment work is uniquely different from new build work. The existing building constraints design solutions, refurbishment technology and working methods which often involves some demolition work; despite this, refurbishment projects are often started without the benefit of condition surveys to determine the 'as built' information. It is furthermore difficult to mechanise, plan and efficiently organise refurbishment work due to the small, labour intensive and adhoc and dynamic nature of the work.

The heterogeneous nature of each refurbishment project and the lack of projects of sufficient size and scope have prevented the refurbishment industry from attaining the economies of scale needed for lowering the resource requirements per unit of refurbishment. Without the opportunity for standardisation and repetition, the opportunities for greater usage of prefabricated parts/industrialisation are limited. The problem is compounded by the fact that refurbishment contractors have hitherto in the main, been small and lowly capitalised; however larger-sized contractors are rapidly moving into this market in response to the shrinking new-build market and the higher technological demands of large-scale refurbishment projects.

The prevailing state-of-the-art has the consequence that refurbishment is generally performed inefficiently and at correspondingly higher costs. Other contributory causes are higher off-site regulatory bureaucracy costs and inefficient procurement methods with regard to the equitable distribution of the inherent higher risks of the unknown nature of work in refurbishments.

The central thrust in the research lied in the development of a socio-technological-commercial framework and corresponding decision support system to ascertain and meet customer requirements; to facilitate refurbishment design and process planning and to provide a commercial framework for supporting the efficient development of the industry. The research results comprised six prototype decision support systems:

- Decision Support System for Determining Refurbishment Demand and Ball Park Costs at Micro Level
- Information System for Refurbishment Design
- Decision Support System for checking Refurbishment compliance with Regulations and Codes
- Decision Support System for ascertaining Environmental Performance of Refurbishment Designs
- Decision Support System for Refurbishment Investment Appraisal
- Decision Support System for Refurbishment Process Planning and Control.

### **Research Consortium**

#### **Project Coordinator:**

Real Estate Management & Maintenance Research and Advisory Services: QD International (The Netherlands)

Project Leader: Dr Quah Lee Kiang

#### **Partners:**

Ipostudio Associated Architects (Italy):

Apogée-Périgée (France):

Climaconsult (Finland):

Costain Bldg & CE Engg (UK):

Calibre:Eindhoven University of the Technology (The Netherlands)

Interface: Eindhoven University of the Technology (The Netherlands):

TNO-Bouw (The Netherlands):

Architects

Building Owners Association

M&E Consultants

Building Contractors

University Research Institutes

National Research Institute

### **Project Budget**

2,566,804 Euros