

# Using BIM Throughout the Occupancy of Residential Buildings to Benefit Homeowners: A Roadmap to Viability

Stewart Long, Haijiang Li  
Cardiff University, United Kingdom  
stewartwork@live.co.uk

**Abstract.** This paper considers how homeowners can benefit from the use of Building Information Modelling (BIM) during the occupancy phase of residential buildings, and the issues that may arise, alongside the authors' proposed solutions. Four key deliverables have been considered; economic, social and environmental benefits, and the facilitation of efficient information management. These deliverables are to be achieved through home automation, the availability of building information, virtual house viewings and big data analytics. The core issues are considered to be user accessibility, ownership and viability. A "Home BIM" cloud application has been proposed as a workable solution. The application is based on a data-rich BIM model, enhanced with occupancy data using the Internet of Things (IoT). The outputs discussed include instructing actuators for home automation, and accessible information and functions displayed via a user-friendly interface. A roadmap to delivering such an application has been presented.

## 1 Introduction

### 1.1 Scope

This paper investigates the use of building information modelling (BIM) during the occupancy of residential buildings, to deliver benefits to homeowners. The paper anticipates what issues may arise, and proposes solutions to overcome these. The term "homeowner" is used as an umbrella term throughout to describe property owners and occupants.

### 1.2 Background Study

#### 1.2.1 Delivering Benefits beyond Environmental Performance

There has long been a drive toward improving the environmental performance of new homes in the UK, notably the use of SAP calculations and Code for Sustainable Homes (CfSH). In 2015 BRE launched the Home Quality Mark (HQM) which sets a precedent for home ratings by also considering the social and economic well-being of homeowners. This includes factors such as comfort, low running costs, digital connectivity, interaction with the local community and accessible home controls. It is recognised that decisions made during occupancy can help to achieve and maintain these desired outcomes. TEDDINET supports digital innovation in energy demand by covering topics including data availability and data visualisation.

#### 1.2.2 Maintaining and Using Information about the Building after Handover

New home rating schemes generally consist of a design stage and an as-built compliance check. Post occupancy evaluations are not frequently carried out in residential buildings, and so the accuracy of building information can deteriorate. This can cause safety concerns, planning and maintenance issues, and results in significant cost and time implications for building works. Data-rich, well-maintained BIM models may be able to avert these issues by providing accurate building data in a structured, accessible manner. That in turn will facilitate the delivery of economic, social and environmental benefits. This paper proposes that BIM is currently underutilised during occupancy, and can be a valuable resource to homeowners.