

# **SIMPLY BIM (Building Information Modelling) For Facilities Management**

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## CHAPTER 1

### INTRODUCTION TO BIM FOR FM

Building Information Modelling (BIM) has over the years become a well-known term used by software developers. Modelling (BIM) has over the years become a well-known term used by software developers across the globe and is associated with the construction/architecture/engineering sector and its related fields, to portray their software's potential in integrating the building lifecycle. It has therefore been subjected to varied definitions by numerous scholars, mostly based on the context within which it is being utilised. A good example is the description of BIM as the process of generating, storing, managing, exchanging, and sharing building information in an interoperable and reusable way (Eadie et al, 2013). Bazjanac (2008) fundamentally defines BIM as an instance of a populated data model of buildings that contains multi-disciplinary data specific to a particular building which they describe unambiguously.

BIM as a lifecycle evaluation concept seeks to integrate processes throughout the entire lifecycle of a building (Arayaci et al, 2012). A succinct definition by US National Building Information Modelling Standard (NBIMS) is "a digital representation of physical and functional characteristics of a facility" (National Institute of Building Sciences (NIBS), 2007). Based on the three important elements of building lifecycle as identified by NBIMS (2007), which are the process helix, the knowledge core and the external suppliers of products and services, Isikdag et al, (2007) defined BIM as a new way of creating, sharing, exchanging and managing the information throughout the entire building lifecycle. In recent times, BIM is said to provide a common repository of information upon which all facility production and management functions can draw and will significantly reduce non-value-added effort or waste from duplicative data collection (Smith Dana K., 2014). A current definition states that BIM is based on the 3D digital technology, is integrated engineering data and Information model, and is a digital expression of engineering facilities physical and functional properties (Zhang & Feng 2014).

The whole ideology of BIM was conceived in the 1970's. BIM stemmed from a need to transform the way the built environment functions by developing an integrated IT solution which focuses on storing and sharing technical information for building and facilities management. An attempt to develop an all-inclusive information system that captures or pulls information on building maintenance constituents and every related building constituents saw the use of several ideologies such as 'software fixing' (Yau et al., 1991) and integrated database solutions (Aouad et al., 1994; Underwood & Alshawi, 2000). However, numerous issues with information flow between different functions, inability to expand and sustain these systems with other software packages and low emphasis on knowledge capture eventually led to the development of BIM.

The concept and technology of BIM is utilized in several industries including Architecture, Engineering, Construction, and FM/building operations, and other building related fields. For instance, in FM, the functionality of BIM technology evidently manages all the information used in the building life cycle by enabling the facility to be viewed as a single component with sub components which has geometric, descriptive chronological, qualitative and quantitative database which are retrievable and kept up to date during the building life cycle.

Though BIM can be considered an ambiguous term (Aranda-Mena et al 2008), its application as an integrated design method has brought significant advances to design and delivery of new construction projects (Attar et al 2010). By adopting BIM, architects, engineers, contractor's operators and owners can easily create coordinated digital design information and documentation (Boutwell 2008); and use that information to more accurately visualize, simulate and analyse performance, appearance (Lenard 2010).

Adopting the BIM technique will also enable interoperability amongst industry professionals as the Industry Foundation Classes (IFC) creates the desired platform for Facility Managers to share digital datasets (Gillard et al 2008). Interoperability is the ability to work with each other and reliably exchange messages with little or no error or misunderstanding (Loosely Coupled 2010).

The importance of BIM tool with interoperable platform and dataset is reflected in the National Institute of Standards and Technology (NIST) study which quantified approximately \$15.8 billion in annual costs of inadequate interoperability in the U.S. capital facilities industry in 2004 (NIST 2004).

In order to understand the application of BIM for real FM purposes, a study was carried out on MediaCityUK building located in Salford United Kingdom. The MediaCityUK is a £500m development which is purpose built for media and creative. Phase 1 of MediaCityUK covers more than 36 acres, with the potential to develop up to 200 acres in the future.

For maximum benefits to be derived from the MediaCityUK building during its life cycle there is the need to optimise the building from an FM point of view. Industry research suggests that 85% of the lifecycle cost of a facility occurs after construction is completed and the NIST Interoperability Study indicated that fully two-thirds of the estimated \$15.8 billion lost are due to inadequate interoperability occurs during operations and maintenance phases (Jordani 2010, Rundell 2006). The maintenance requirement of the building (Hard issues) such as cleaning of window doors etc will require a managed approach due to the size of the facility. It is also important to identify designed and actual occupant functions (Soft issues) and allocate spaces during the building life cycle for operational efficiency. Space reallocation is a consideration that shouldn't be overlooked as the functional requirement of owner/user might change with time which also underscores building life cycle management.

It is accepted that BIM is certainly changing the way buildings are designed and constructed (Rundell, 2006), but is it changing how they're operated and maintained? The MediaCityUK a 14-storey medium-rise building study was aimed at exploring the benefits of BIM application for FM purposes. In this study, an attempt is being made to identify the benefits of BIM in the FM of the MediaCityUK building. Key FM tasks were identified and best practice for FM using BIM and BIM related guidance for FM were explored. The basic structure of this book is shown in Figure 1 below:

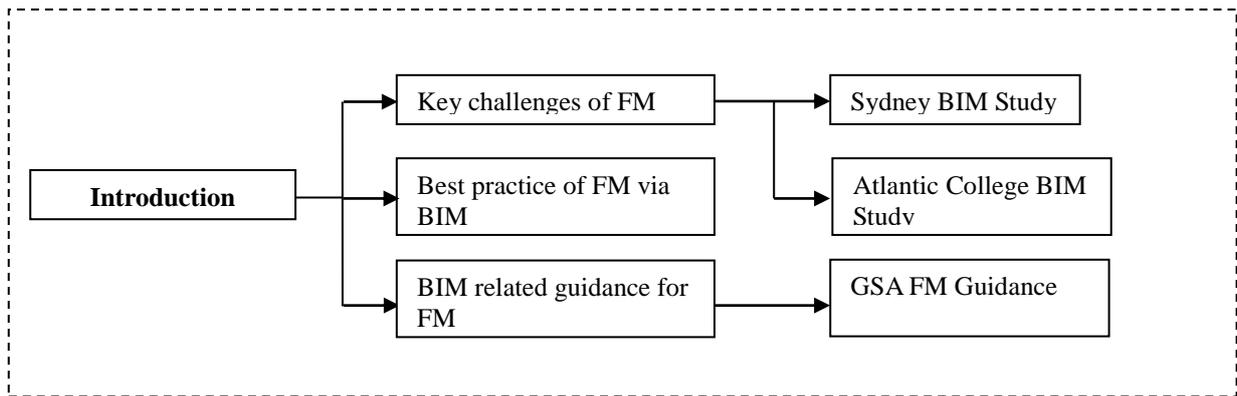


Figure 1: Literature Structure

The basic structure of the MediaCityUK case study which includes interviews from experts is also shown in Figure 2 below:

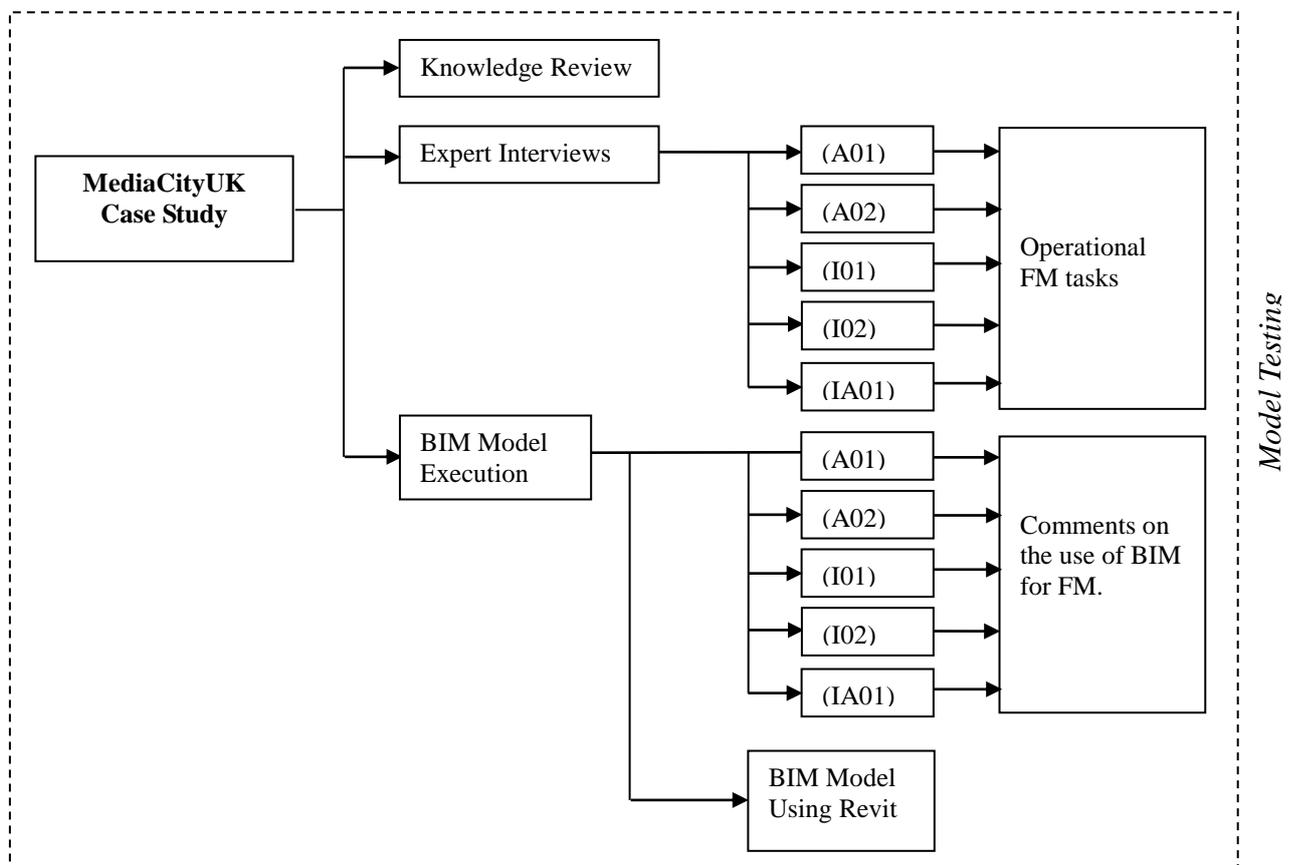


Figure 2: Case Study Structure for MediaCityUK

A BIM model of MediaCity is generated with information provided. The generated BIM model emphasis is on elements such as; the space topology and designated allocation, designed furniture layout, door and window openings, access routes

within the building, design character and location of vertical transport facilities within the building such as lifts and stairs (Attar et al 2010). The study was able to identify the contribution of BIM to the facilities management (*Building Maintenance, Building use Management*) (Autodesk 2007) of the MediaCity building.

The limitations of the study were encountered primarily during the BIM model production stage and involved lack of access to adequate accurate input information which is highly likely when attempting to reproduce an existing building in a BIM environment. However, efforts were made to generate a minimal error high accuracy BIM model. To achieve this, available input information/data were optimised leading to the execution of a “what if” scenario which is expected to be closely similar to the actual MediaCity UK building. However, critical information required to achieve the FM study objectives which cannot be acquired by physical observation of the facility, was to a good extent present in the drawings provided. Such information involves doors and curtain wall approximate dimensions and positions, space object topology and function. Entire layouts of each floor were provided (ground to third floor plans). It is also important to point out that without the section drawings it was rather difficult and time consuming but not impossible to articulate the double floor merger which involved voids in ground and first floor levels.

It is important to point out that the BIM model generated is considered sufficient for this study as the minor approximations described above are considered to have no significant effect on the validity of the study findings.