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SCIENCE AND ENGINEERING IN
ARTS HERITAGE AND ARCHAEOLOGY

Building Information Modelling (BIM) workflow analysis for heritage science practice

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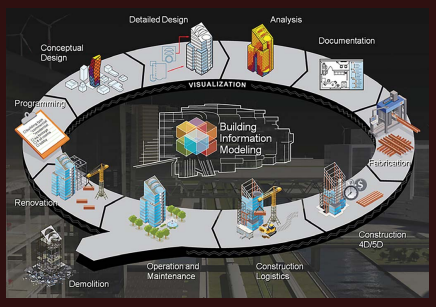
Introduction

The last decades have been characterised by the spread of Building Information Modelling (BIM) in the Architecture, Engineering and Construction (AEC) field [1]. BIM consists of 3D virtual models of buildings that are embedded with both data and metadata [2-3]. The virtual building elements are not just volumetries, but rather "**smart objects**" [1-5], identified by numerical parameters [6-8] and linked to schedules [3]. BIM is currently used for new buildings [9-10], as it features standardised planning procedures. The aim of this research is to **analyse the state-of-art** of one typical BIM workflow currently used in built heritage, in order to clearly identify gaps, such as **software deficiencies**, and, eventually, to **propose solutions** or **areas requiring further research**.

Building's life-cycle in BIM



HTTP://WWW.BUILTWORLDS.COM/

The Jewel Tower, case study

Research Questions

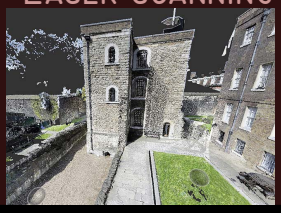
- What **information** is BIM able to hold?
- Which aspects require **further research**?
- Given BIM's state-of-the-art, **how** is it possible to describe a heritage building?

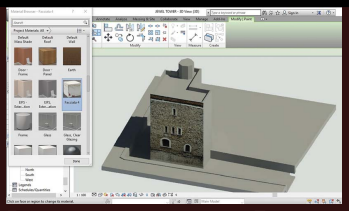
Methods

Laser scanning

Jewel Tower's point cloud

Laser scanning produces a **point cloud**, which has to be traced out using BIM software.





BIM: Autodesk Revit

Material application

Volumetry is embedded with visual surface information through **renderings**.

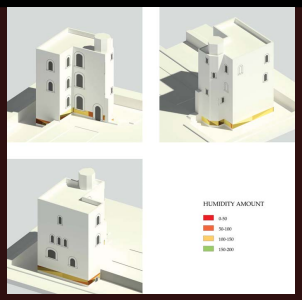
Moisture measurements

Moisture readings

Readings (TROTEC T660) are inserted into the BIM model via **schedules**.

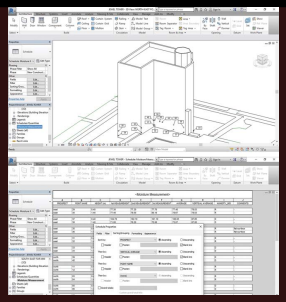
Results

BIM: Renderings



MM1

Moisture measurements



MM2

BIM integration

Visualisation of surface humidity is obtained through conceptual renderings [***MM1***].

Numerical data produced by moisture readings are inserted through the creation of new "smart objects", directly linked to a schedule. The spreadsheet contains humidity averages and comments [***MM2***].

Visual information is provided through **renderings**.

Numerical information is produced through the creation of new "smart objects" and **schedules**.

Issues

- Surface investigation had to be conducted using **old technology** (Autodesk AutoCAD)
- It is not possible to work with the BIM model whilst **displaying images**

Conclusions

- BIM **can** be used to describe heritage buildings
- With the current state-of-the-art, **strategies** are needed
- **Renderings** and **schedules**

Further research

- Modelling of **surface** degradation
- **Predictive capacity** of BIM models
- **Heritage-specific plug-ins** for existing BIM platforms

Benefits & Impact

- A BIM model of a heritage building allows both professionals and stakeholders to **access** all related information [1-2, 11]
- Help in **decision making** [3, 12] and **maintenance planning** [3-4, 13]
- A BIM model could be exploited to **attract and engage** visitors

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