

# Can heritage be high-tech?

## Building Information Modelling (BIM) for built heritage

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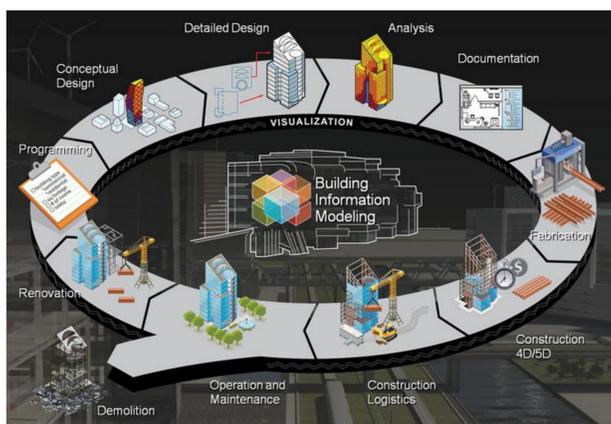


# UCL

### Introduction

Building heritage conservation is a sensitive task, as there are many issues that have to be considered [1][2]. In the analysis phase a lot of different kind of information has to be researched [2], such as building's history, its historic layers, material characterisation and properties, damage and temporal decay. Holding the correct data is the first step to achieve a successful renovation project [3]. BIM is a new technology used in new constructions that allows to have a holistic view of the building [5], thanks to its capability to retain different information in different formats, such as tables, graphs, images, texts, links, etc. [4]. This work aims to propose a solution developing a **new step-list** that will enable professionals to use BIM in the building heritage field.

### Building's life-cycle in BIM



### The Jewel Tower, case-study



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- How is BIM **useful** to building heritage conservation?
- What kind of **information** is it able to hold?
- Using BIM will bring a **revolution** in heritage? What kind of revolution?

### Research Questions

### Methods

The planned methodology deals both with material analysis, through material characterisation, and surveying, via Terrestrial Data Acquisition (TDA).

1. **Wet Chemistry** clarifies the pathology type;
2. **Optical Microscope** defines the pathology origin;
3. **Ultra-Violet (UV) Lighting and Infrared**
4. **Imaging** to detects organic matter;
4. **Fourier Transform Infrared (FTIR) Spectroscopy** to identifies materials.

### Material characterisation

### Sample extraction



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Concerning **TDA**, two different techniques will be studied:  
1. **Laser scanning** allows to detect the geometry and the volumetry of the building;

2. **Photogrammetry** permits to focus on the material characterisation and on the textures. Both tools create a **points cloud**.

### Terrestrial Data Acquisition

### Laser scanner



www.leica-geosystems.us/

### Processing the results

### Decay identification on a façade



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### Black crusts on bricks



http://www.wrduinn.co.uk/

Through material characterisation we will be able to recognise the pathologies and to plan adequate interventions.

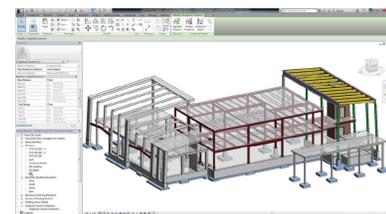
### Pathologies

### Points Cloud

Points cloud will be **post-processed** using Cyclone.



grail.cs.washington.edu



https://www.youtube.com/watch?v=AFRHeHgal2o

Revit Autodesk is a **BIM software** that creates **3D smart-objects**.

### Revit 3D Model

### Expected Outcomes

The above process will be applied to the Jewel Tower. A **conservation project** will be delivered, and a **step-list** will be developed, which will include suggestions based on the experience gained through the case-study. Information will be **unified in a unique model** through BIM.

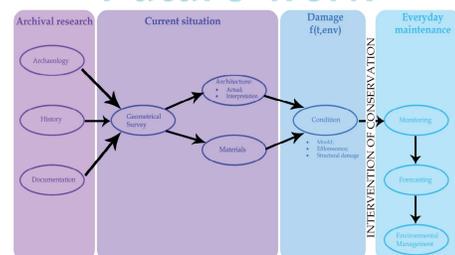
### Step-list & unification

### Benefits & Impacts

This project is an opportunity to deepen the research in both **material characterisation/ways of decay and the use of BIM in built heritage**. The conservation project will affect the former topic, whilst the step-list and the unique model will be a benefit for **heritage science professionals** dealing with historic buildings.

Future work should focus on the development of a **new software**, which will be able to hold all the information, including intervention records. Moreover, it will output a real-time model of the building, based on the monitoring data/forecasts.

### Future work



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