Historic England

Historic England “BIM for Heritage” Guidance

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COTAC BIM for Heritage Conference
London 8 December 2017

• We are the public body that looks after England’s historic environment
• We champion and protect historic places, helping people understand, value and care for them
• Based in York I run a team of three surveyors that undertake heritage based surveys using laser scanning, photogrammetry, digital imaging and GNSS technologies
• We also advise upon, procure, research, provide training and publish guidance on geospatial imaging methods and techniques suitable for heritage

https://historicengland.org.uk

• Up until 1st April 2015 I worked for English Heritage, who were the English Governments principal adviser on all aspects of the historic environment
• English Heritage are now an independent charity that looks after the National Heritage Collection of more than 400 historic properties
• Through these monuments EH brings the story of England to life for over 10 million people each year

http://www.english-heritage.org.uk/

Our BIM journey

• I first heard about BIM whilst attending the Association for Preservation Technology (APT) 2009 conference in USA
• The event included a special session on:
  “Capturing the Past for Future Use: Integrating Documentation with Repair, Design and Construction Practice in Historic Buildings”
• Included a variety of historic building related presentations that referred to BIM - a new term that I hadn’t heard before!

BIM Special Interest Group (BIMSIG)

• In January 2013 I established English Heritage’s BIM Special Interest Group (BIMSIG)
• Chaired by me this comprised representatives from a variety of teams across the organisation:
  • Estates
  • Heritage Protection & Planning
  • Archaeology & Architecture
  • Remote Sensing
  • Conservation & Science Coordination
  • Archive
• Linked to the National Heritage Science & English Heritage Science Strategies - important development for EH & HE

BIMSIG aimed to:
• Assess the relevance and potential adoption of BIM across English Heritage’s own estate of more than 400 historic properties

https://historicengland.org.uk/research/aggregate/Thematic-strategies/heritage-science/
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• Assess the relevance and potential adoption of BIM across English Heritage’s own estate of more than 400 historic properties
• Assess the impact of BIM on English Heritage and Historic England’s external advice
• Facilitate the development of research within heritage and heritage science contexts

Laser scanning undertaken by Digital Surveys, 2013
Images courtesy of Digital Surveys and Pendle Borough Council

BIMSIG (BMSIG) Research

The application of Building Information Modelling (BIM) within a heritage science context

“The overall finding of this project is that BIM within a heritage context is likely to be more complex than for New-Build as it nearly always involves measurement to establish any kind of model, the coordination of different types of legacy information and the organisation of often unique objects”
Carl Brookes, Tiziana Meciani, Dan Niziolek

BIMSIG (BMSIG) Research

Building Information Models from monitoring and simulation data in heritage buildings

“Aims to develop a new Building Information Modelling (BIM) paradigm that supports the management and future-proofing of the built heritage. Research will focus on exploring the integration of types of information that are relevant for heritage science, and which are not part of current BIM practice”
Danae Pocobelli, Completion in October 2019

BIMSIG (BMSIG) Research

Guidance development

Offers guidance on BIM for building owners, end-users, heritage and construction professionals and the potential advantages a BIM approach now offers across heritage projects.


https://historicengland.org.uk/images-books/publications/bim-for-heritage/
BIM is:

“A collaborative process for the production and management of structured electronic information and illustrating, in digital terms, all the elements that compose a building”

(Historic England 2017)

BIM isn’t:

- A specific software package or a type of 3D digital model
- Simply a newer version of 3D CAD or a 3D visualisation tool
- New technology

It’s origins are in object-based parametric (rule-based) modelling applications for mechanical systems design in the 1980’s

BIM has been in use for the last 20 years in the architectural, engineering and construction (AEC) industry

Now widely applied in the UK and internationally, mainly in the new-build sector (building and infrastructure)

BIM (specifically Historic BIM) consists of:

- Geometry (2D and 3D) – typically generated from data captured by laser scanning, photogrammetry (ground-based or mounted on a drone), lidar, closer range scanning, mobile mapping or a combination of methods

- Non-geometric information – refers to physical building characteristics such as materials, appearance & condition

- Linked documents and data - includes archival data, product specifications, operation and maintenance (O&M) manuals, reports, condition surveys, audio and video recordings documenting visitor experience, inspection logs or other digital file types

• A ‘BIM-ready’ 3D model formed as an assembly of native BIM components which represents the geometry of the existing fabric

• Often the result of Scan-to-BIM - the process of creating, manipulating and placing BIM components by directly referencing the underlying point cloud

• Scan-to-BIM workflows depend on BIM software ability to import point clouds

• Modelling tolerance refers to how accurately a model fits against the as-existing survey, usually a point cloud

• Level of detail (LOD) is used to describe how much geometric detail is included in the derived BIM components

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Historic England Metric Survey Specifications for Cultural Heritage


4.3 BIM Development

A laser scanner

A laser scanner is an instrument that measures the one-dimensional position of a point in space. It typically consists of a laser transmitter, a collimator, a detector, and a range processor. The scanner emits a laser beam which is reflected by the target and then received by the detector. The position of the target is calculated based on the time it takes for the laser beam to make a round trip to the target and back to the detector. This is known as time-of-flight measurement.

The beam can be steered through a range of angles using a rotating mirror assembly. The scanner can be used to map the exterior of the building or to create a detailed model of the interior spaces. The data collected can be used for various purposes such as engineering design, facility management, and surveying. It is often used in conjunction with other tools such as GPS and GIS to create accurate and detailed digital models of the built environment.

Level of detail (LOD) is used to describe how much geometric detail is included in the derived BIM components.

Historic England Metric Survey Specifications for Cultural Heritage.

Construction Industry Council (CIC) BIM Protocol - an important document that provides the legal framework which will facilitate and promote the use of BIM.

BIM and collaborative working processes offer considerable benefits for construction and asset management, with similar potential for heritage sector.

Successful implementation, especially in large or complex projects, based on:

- A robust IT infrastructure – software for producing, managing, exchanging, using and archiving information.
- Well-thought-out workflows governed by standards and protocols - there are currently no BIM standards specifically developed for the heritage sector.
- A sustainable strategy for long-term data management.

Asking for 'BIM' or 'full BIM' on a project is simply not enough without further defining what that requirement involves.

Knowing what you want - clear vision of what you’re using BIM for is the first and fundamental step when commissioning it.

Within standard BIM approach client requirements take the form of the EIR (Employers Information Requirement).

For Historic BIM the BEP (BIM Execution Plan) outlines selected survey acquisition approach and use of existing legacy data.

BIM specifications can help clients define their requirements for the procurement of BIM-ready datasets.

Are you required to procure/deliver a project using BIM?

Currently the UK government mandate for BIM Level 2 adoption applies to all centrally procured public projects regardless of value.

How could you benefit from adopting BIM on a heritage project?

BIM can be a valuable tool for historic asset management and offers a robust information management framework that can be highly beneficial for heritage research and analysis.

Who will be responsible for maintaining the Asset Information Model (AIM)?

Imperative it is maintained, checked and updated to reflect changes in physical asset.
Do you always need a 3D geometric model?  
3D enables better understanding of spaces and components that constitute an historic building  
2D is appropriate for linking documents and data within small or less complex sites

Can you do this yourself?  
Delivering a project using BIM tools and processes, especially involving complex or significant historic assets, can be a daunting prospect

In heritage sector adoption of BIM and collaborative working requires organisations and individuals to embrace change and accept traditional roles and practices may need to be adapted to successfully deliver BIM projects