

# Building Information and Facilities Management in Historic Buildings

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## Overview:

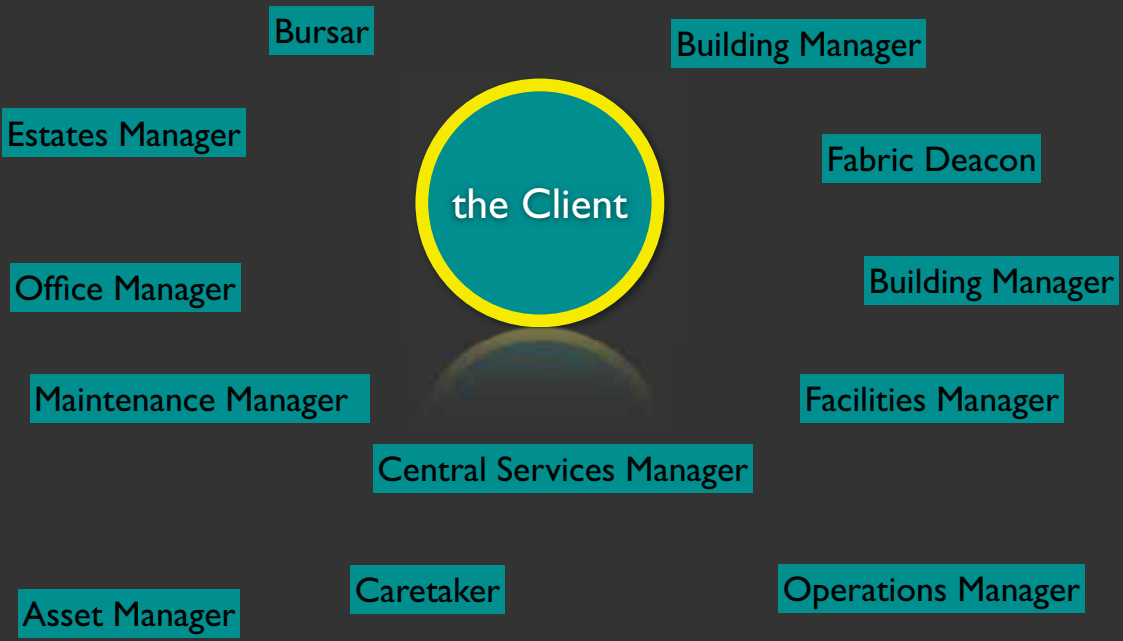
- About Facilities Management
- Issues affecting the use of building information for managing historic buildings
- Building Information Modelling (BIM) for Historic Buildings
- Issues to consider in relation to Digital Information and BIM for managing historic buildings

# About Facilities Management

- Relatively new discipline
- Still being defined
- International FM Association definition:

*A profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, processes and technology.*

Term “facilities manager” is new, but the role has been around for a long time:



# Professional Institutions - Where are the facilities managers?



## Defining the Role:



It's the responsibility of facilities managers to make sure that a building and its services fulfil the needs of the organisation using it. Once construction is completed, facilities managers are employed to take care of all the different issues required to make a building work. This allows people using the property to continue living and working in it.

### In depth

Their work involves:

- planning how the inside of a building should be organised
- taking charge of renovations and office moves
- maintaining buildings and ensuring everything is in good working order
- ensuring all IT systems function effectively (eg phones, computers, faxes, photocopiers)
- managing a building's security
- organising the cleaning and general upkeep of a building
- negotiating the best possible deals for all of the above.

# Defining the Role:



## FM Competency Guidance:

- Analysis of client requirements
- Conflict avoidance, management and dispute resolution procedures
- Construction technology and environmental services
- Consultancy services
- Contract administration
- Contract practice
- Corporate real estate management
- Design and specification
- Environmental management
- Fire safety
- GIS
- Health and safety
- Landlord and tenant (including rent reviews and lease renewals)
- Maintenance management
- Procurement and tendering
- Project audit
- Project financial control and reporting
- Property management
- Strategic real estate consultancy
- Supplier management
- Sustainability
- Works progress and quality management

# Defining the Role:



## Facilities Management Taxonomy

- 1 Business Organisation
- 2 FM Development and Trends
- Business Management**
- Physical asset management**
  - 1 Land
  - 2 Buildings/Property
  - 3 Workplace
  - 4 Information & Communications Technology
  - 5 Fleet Management
  - 6 Decommissioning & Disposal
- Services Management**
  - 1 Reception
  - 2 Post & Messengers
  - 3 Waste Management
  - 4 Catering
  - 5 Cleaning
  - 6 Laundry
  - 7 Security
  - 8 Information & Knowledge
- 9 Library & Document Archive
- 10 Reprographics, Printing & Stationary
- 11 Travel Booking
- 12 Stores
- Process Management**
  - 1 Human Resources Management
  - 2 Consultancy
  - 3 Customer Service
  - 4 Financial Management
  - 5 Procurement, Project & Contract Management
  - 6 Health & Safety Management
  - 7 Quality Management
  - 8 Performance Management
  - 9 Risk Management



Issues affecting the use and effectiveness of building information for facilities management of historic buildings



- Leading professional body doesn't have a strong focus on the building fabric
- FM qualification structure doesn't explicitly refer to historic buildings
- Lack of conservation awareness across other professions involved with FM - e.g. building control, structural engineers



## Lack of property data

1989 study showed that:  
75% of private organisations and  
68% of public organisations  
had a full property inventory

3% of both public and private  
organisations had **no property  
inventory** at all.



## Lack of of Formal Guidance

Facilities Managers look for information  
from a variety of information Sources:

- Contractors
- Trade literature
- Certification Schemes
- Building Regulations

These sources are not specific to  
historic buildings and their  
requirements

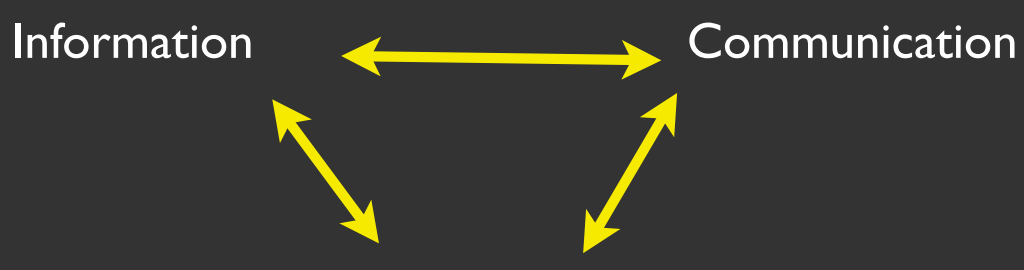


## Old buildings vs. Modern priorities

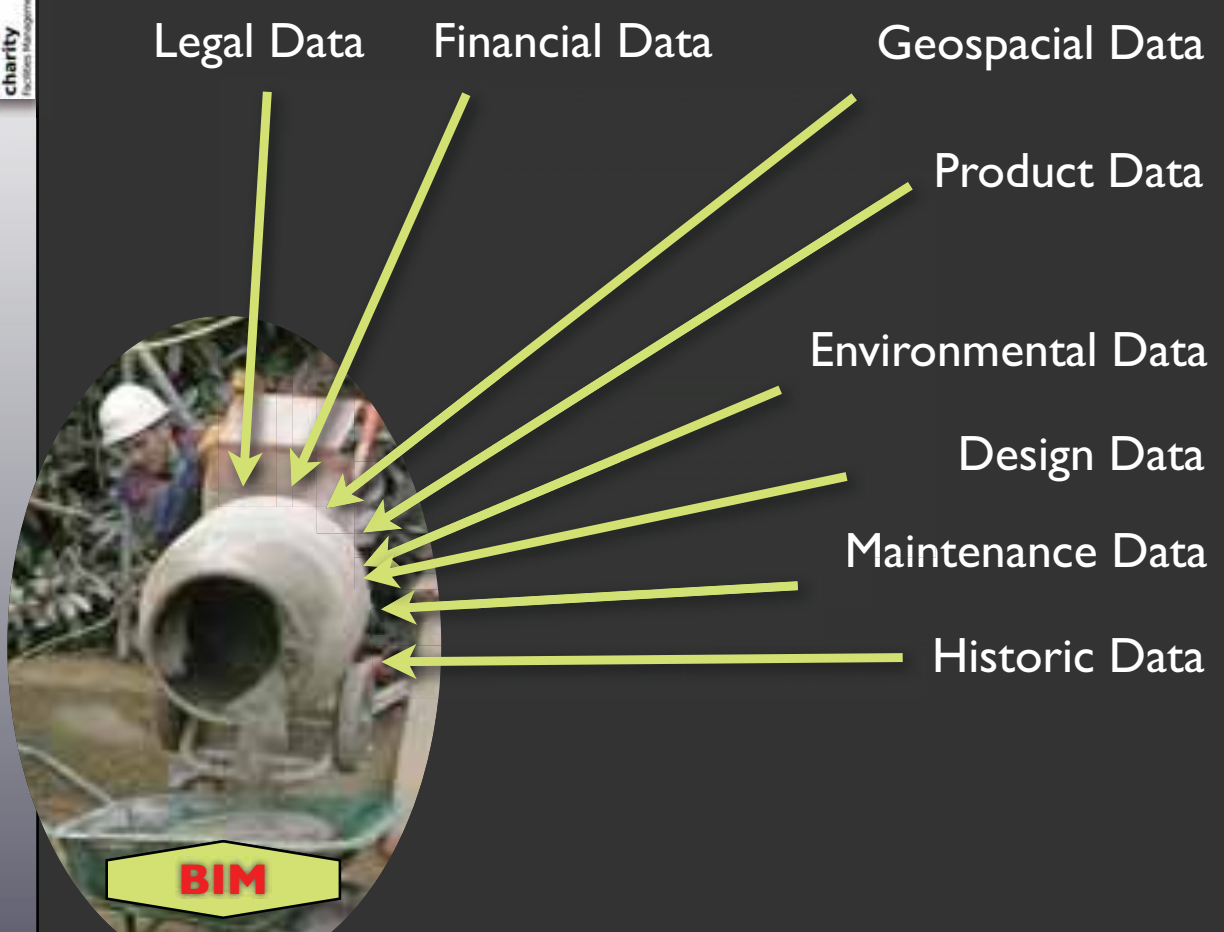
- Work to be done on best way to measure the energy performance of older buildings
- Work to be done on identifying and communicating good practice in retrofitting
- Work to be done on assessing the impact of retrofitting and the resulting environmental changes on older materials and finishes



- Information about properties is often not collected in one place.
- Computer-based solutions are frequently home-made and based on the i.t. knowledge of one person
- Poor communication skills - facilities managers may not be good at sharing information



# The Building Information Model





A Building Information Model is:  
a digital representation of the physical and functional characteristics of a facility.

- a knowledge resource for **all aspects** of a building
- covers the **entire building lifecycle**
- to be **shared** across professions
- **aggregates** data to provide more analysis
- forms a reliable basis for decisions

## BIM and Historic Buildings - Current Examples

- Hard to find examples of full BIM implementation for historic buildings
- There is a difference between full BIM and 3d surveys



Chapel at the Royal Sussex County Hospital  
Hospital is currently being modernised  
All design elements provided in BIM form



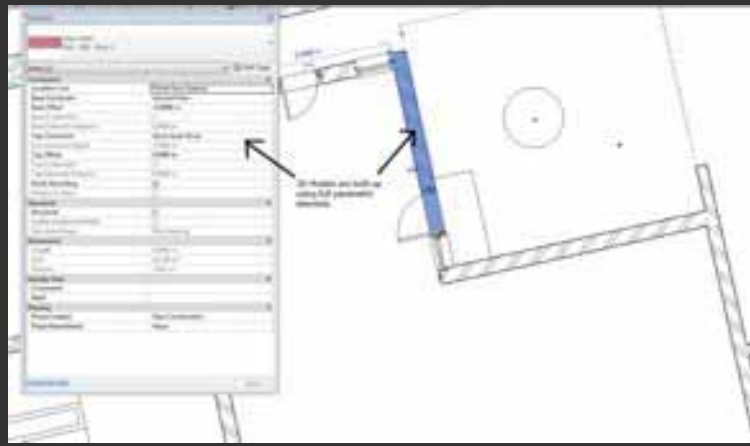
Greenhatch Group providing BIM details to the interior of the Chapel  
Data to be integrated into the new building scheme and also satisfy listed building consent requirements.  
Interior surveyed using a laser scanner and then drawn up in a traditional 2D manner in order to allow plans and internal elevations to be manipulated in a 3D form.



Drawn using the Autodesk Revit Architecture software, which is designed for BIM:

- allows for extracting different views from a building model for drawing production and other uses.
- different views are automatically consistent
- supports mechanical, electrical, and plumbing systems modeling, analysis of systems design
- allows for easier export of design models for cross-discipline collaboration.





Software includes “Cloud” services

- data is stored online and can be accessed from any terminal.
- facilitates sharing.
- includes analysis and rendering capabilities via the cloud
- frees up the users’ terminal while the computing work is done in the cloud.



### Learning:

- the requirement to provide all historical and architectural details in BIM required the use of many differing modelling techniques to build up in 3D
- highlights the difficulties of portraying an entire historical building as a BIM product
- cost and time involved to build up accurate historic details in 3D that are dimensionally correct to English Heritage Metric Survey Specifications
- on larger scale, a more simplified structure might be more cost-effective, with specification being dependent on the BIM usages envisaged for the structure

## What is the current state of play?

- Government is pushing for BIM to be implemented across the government estate.
  - All professional institutes have developed BIM working parties.
  - Big firms are increasingly working to BIM standards
- 
- English Heritage:
    - not as yet done any work on how BIM might be applied across the estate
    - attempts to apply it to existing buildings at an early stage
    - EH current working on a Asset Management Planning System



## Asset Management Planning System

Will consist of:

- Database
  - survey information
  - defect information
- Maintenance Records
- Drawings & Plans
- Records of changes made



## Issues EH is dealing with:

- Finding information about buildings
- Getting information from widely distributed sources
- Time and cost - resources are limited
- Storing information in a consistent way
- Ensuring the information is accessible
- Training users
- Security issues



Harmondsworth Barn, built in 1426



Sir John Betjeman: The Cathedral of Middlesex

## English Heritage has documented a tremendous amount of historical information

### SOURCES

This section includes the sources, both published and unpublished, for our current knowledge and understanding of Harmondsworth Barn.

#### Primary Sources (Unpublished)

##### British Library

- Additional MS 6164 [18th-century copy of extent of Harmondsworth manor, 1293–4]

##### London Metropolitan Archives

- Acc0446/EM/040 [list of properties in manor of Harmondsworth, c 1587–8]
- Acc0446/ED/151 [agreement concerning lease of Court Lodge and Great Barn, 1613]
- Acc0446/ED/152–164 [leases of Court Lodge, 1632–98]
- Acc0446/EM/015 [rental of Harmondsworth, 1662]

##### The National Archives

- E 132/3/57 [14th-century copy of a charter of King Offa of Mercia to Aeldred, his minister, of 20 hides of land at Harmondsworth in return for 100 mancuses of gold in a bracelet, 781]
- E 31/2/1 fol 129 [entry concerning Harmondsworth in Domesday survey, 1086]
- SC 11/444 [late 14th-century copy of custumal of Harmondsworth manor temp Henry III/Edward I]
- E 101/2/1 [extent of the manor of Harmondsworth, 1293–4]
- E 106/13/31 [undated inventory of possessions at Harmondsworth manor temp Edward II]
- SC 6/1126/5 [account of Harmondsworth manor, 7 Oct–10 Dec 1324]
- SC 8/69/3428 [petition concerning Harmondsworth manor, c 1300–50]
- SC 8/203/10143 [petition of tenants of Harmondsworth manor against the Prior of Harmondsworth, c 1307–27]
- E 106/7/18 no. 8 [extent of Harmondsworth manor, 1324]
- C 270/17 no. 7 [extent of Harmondsworth manor, 1337]
- C 145/139 no. 19 [extent of Harmondsworth manor, 1340]
- SC 8/116/5765 [petition of the Prior of Harmondsworth for new copies of charters and relief from his rent, c 1381–2]
- SC 6/1126/6 [account of Harmondsworth manor, 1388–9]
- SC 6/1126/7 [account of Harmondsworth manor, 1433–4]
- SC 12/11/20 [late 14th-century copy of custumal of Harmondsworth manor temp Henry III/Edward I with rental of manor, c 1377–91]
- SC 2/191/14–SC2/191/31 [court rolls of Harmondsworth manor, 1377–1531]
- E 315/463 [lease of the manor of Harmondsworth, 1540]
- SC 6/HenVIII/2105 [account of Harmondsworth manor, 1544–5]
- E 178/1430 [survey of the manor of Harmondsworth, 1587]

##### Staffordshire Record Office

- D 603/N/51/2 [account of livestock and stores at Harmondsworth manor, c 1550–60]
- D (W) 1734/3/2/15–27 [summary accounts of estates of the Paget family including Harmondsworth, 1546–60]
- D 603/B/11/2 [lease of the tithes of Harmondsworth manor including tithe barn, 1738]

### Winchester College Muniments (WCM)

- Accounts of Harmondsworth manor: WCM 11501 [1386–7], 11502 [1397–8], 11503 [1406–7], 11504 [1450–51]
- Bursars' accounts: WCM 22078 [1394–5], 22080a [1396–7], 22083 [1397–8], 22084 [1398–9], 22100 [1418–19], 22103 [1424–5], 22104 [1426–7], 22111 [1434–5], 22151 [1484–5]
- WCM 11335 [confirmation charter of Henry II to the Abbot and monks of Holy Trinity and St Katherine, Rouen, 1170–78]
- WCM 11336 [undated copy of confirmation charter of Henry III to the Abbot and monks of Holy Trinity and St Katherine, Rouen]
- WCM 11338 [exemplification of entry from Domesday Book relating to the manor of Harmondsworth, 1341]
- WCM 10744 [extent of Harmondsworth manor, 1378]
- WCM 11346 [copy of petition of William of Wykeham to the Pope for licence to annex to Winchester College the churches of Isleworth, Heston, Twickenham and Hampton, the churches of Hamble, Hound and West Worldham and the manor of Harmondsworth, c 1391]
- WCM 11354 [copy of authoritative instructions handed by Wykeham to his agents in negotiation with the monastery of St Katherine, Rouen, c 1390–91]
- WCM 11369 [memorandum concerning Wykeham's intentions in founding his colleges and endowing them with possessions acquired from religious houses, c 1390–91]
- WCM 11355 [letter describing progress of negotiations with the Abbot of St Katherine's, Rouen, c 1391]
- WCM 11356 [copy of indenture between the Abbot and Convent of St Katherine's, Rouen, and attorneys of William of Wykeham concerning Harmondsworth, c 1391–2]
- WCM 11376–77 [copy of licence by Richard II to the Abbot and Convent of St Katherine's, Rouen, to grant to William of Wykeham the manor of Harmondsworth and other estates, 1391]
- WCM 11380 [charter of alienation of manor of Harmondsworth to William of Wykeham, 1391]
- WCM 11382 [acquittance by Abbot of St Katherine's, Rouen, to Wykeham for 8,600 francs, 1391]
- WCM 11381 [quitclaim of manor of Harmondsworth to William of Wykeham, 1392]
- WCM 11379 [letter of attorney from Wykeham to his agents to receive and deliver all muniments relating to acquisition of Harmondsworth, 1392]
- WCM 70a–b [petition of Warden and College concerning expenses of works at Winchester College and various estates including Harmondsworth, c 1395–1401]
- WCM 78 [expenses of works at the College and various estates including Harmondsworth, 1402]
- WCM 20151 [bond of John Downer, carpenter of Harrow Weald, and others (named) to Robert Thurbern, Warden of Winchester College, for 100 marks, 1434]
- WCM 11393 [petition to Henry VI concerning exactions by royal household officials on manor of Harmondsworth, c 1440]
- WCM 11394 [order by Henry VI to issue letters of protections to Winchester College concerning taking of goods in the manor of Harmondsworth, 1441]
- WCM 11451 [valor (summary) of the manor of Harmondsworth, 1542]
- WCM: uncatalogued letters of T Kirby, Albert Hartshorne and John Harvey in Winchester College Archives concerning Harmondsworth great barn

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- Oschinsky, D (ed), *Walter of Henley and Other Treatises on Estate Management and Accounting* (Oxford, 1971)
- Pen and wash drawing of 1792 by Daniel Lysons, showing the barn from the south-west  
© London Metropolitan Archives

### Visual Sources

#### London Metropolitan Archives

- [Pen and wash view of the 15th-century manor house at Harmondsworth](#), 1794 (Lysons' Environs of London Collection, vol V, p 138; catalogue no. k1247547)
- [Pen and wash drawing of the east side of the barn](#), 1792 (Lysons' Environs of London Collection, vol V, p 138; catalogue no. k1248274; see above)
- [Photograph of the barn from the south-west](#), 1974 (London County Council Photograph Library, catalogue no. sSC\_PHL\_01\_606\_74\_13302)

#### Royal Institute of British Architects

- SKB283/4: Two sketches of interior details by George Gilbert Scott

#### English Heritage Archive

- CC005203–6: Photographs of the barn, 23 May 1950



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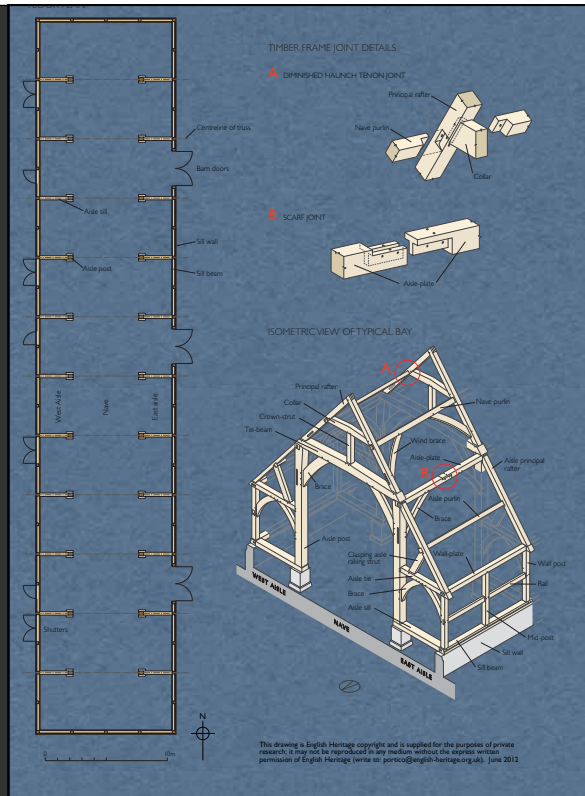
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A detailed, high-quality drawn record of the barn prepared in the 1980s.





Next week start recording highly detailed 3d data using a laser scanner.

## Conclusions:

Issues to consider in relation to Digital Information and BIM for managing historic buildings:

- Requirements – the data monster is always hungry!
- Agreed Standards
- Open Source Software – avoiding “lock in”
- Cost
- Security
- Useability
- Training