A Bentley Perspective on BIM

Neville Glanville
Building Industry Sales Director
What is BIM?
A Confusion of Technology
Words & Aspirations
Many Reports
Amongst the common themes........

• Supply chain integration throughout the Life Cycle
• Greater collaboration between clients and the supply chain
• A Unified Industry
• Short Term Thinking
• The Need for Innovation
Owners asking for BIM … but what is BIM?

BIM describes an activity, not an object. To describe the result of a modeling activity, we use the term ‘Building Information Model”, or simply Building Model.

Prof. Rafael Sacks
Technion University
Owners asking for BIM … but what is BIM?

BIM “is the process of generating and managing building data during its life cycle”

(Automation in Construction 2006)
Industry Adoption of Technology

LEVEL 0 | LEVEL 1 | LEVEL 2 | LEVEL 3

CAD

2D | 3D | AIM | SIM | BSIM | BRIM | CIM | FIM

CPIC
AVANTI
BS1192 2007
User guides on each

iBIM

IDM, IFC, IFD

ISO BIM

Building Lifecycle Management

Drawings of lines, arcs, texts etc
Models, object based collaboration
Integrated, Interoperable data

© Bew & Richards 2008
“Integrated Teams and Integrated Supply Chains are crucial to delivering the continuous performance improvements necessary in the construction industry today.”

Accelerating Change published by the Strategic Forum
Understanding the User Eco-system

- There is a broad set of participants on a construction project.

<table>
<thead>
<tr>
<th>Design</th>
<th>Construction</th>
<th>Owner</th>
<th>Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small design practices</td>
<td>Sub contractors and fabricator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single discipline designer</td>
<td>Specialist sub contractors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large multi discipline consultancy</td>
<td>Main contractors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design and Build contractors</td>
<td>Building Facilities Manager</td>
<td>Private/National Utilities</td>
</tr>
<tr>
<td></td>
<td>Large Construction Services</td>
<td>Estate Managers</td>
<td>Local/Statuary Authorities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Government statute and archives</td>
</tr>
</tbody>
</table>

- 10’s 100’s 1000’s 10,000’s 100’s 1000’s 10,000’s
Power of Influence

- Each organisation can influence other within the supply chain.
The Potential Return is Substantial

Ability to impact cost / schedule

20 – 30% Cost savings potential
Bentley assumptions

• There will always be different file formats
  – Revit, Rhino, Maya, 3DS, Graphisoft, ADT, Autocad, Sketchup, Nemetschek, Catia …..

• Each industry (discipline) has its own workflow

• The data is more important than the software

• Work to support industry standards (IFC, PDF, ISO 15926, BS1192, ….)

• Open, not closed systems!
Building Information Management
Building Industry Lifecycle
Building Industry Lifecycle
Benefits of BIM for Design

• Design in 3D
• Fully coordinated model
• Automatically generate 2D documentation which is fully coordinated
• Automatically generate schedules
• Ability to clash check against other discipline models
• Perform cost analysis against design brief
• Improved ability to coordinate and share
Design & Analysis Applications
Design & Analysis Applications
What is a BIM model?

Single model?

Federated model?
Centralized vs Federated

20th Century (Centralized)

“The Mother of All Databases”

(Federated)

Index and Search
BIM in a Project Context

Federated model
Federated Approach

- Retain Ownership
- Manage
- Share
- Review
- Structural
- Mechanical
- Electrical
- Civil
- Architecture
Big BIM or Little BIM?

- Little BIM is the discipline based approach with varying degrees of integration within a building.

Architectural  Structural  MEP
Big BIM or Little BIM?

- Big BIM the total integration of the building with the environment that surrounds it referred to as the federated approach.

Required controled the sharing of models and other technical documents by version and status.

Prevents the use of out of date information or non approved version of documents.
Managing the Information

• Connecting the project team
• “Single Source of Truth”
• Know where to find the information
• Support BS1192
• Only transfer the changes
• Version control
• Document issue
Building Industry Lifecycle
Benefits of BIM for Construction

• Fully coordinate 3D design data
• Ability to resolve clashes between different disciplines before getting to site
• Provides review markup and collaboration workflow
• Ability to link to project planning workflow, task scheduling and construction simulation (4D)
• Ability to extract quantity data and feed into cost estimation workflow (5D)
• Leads to full asset or ‘as built’ model (6D)
Interoperability through i-models

- **V8i**
- **PLUG-IN**
- **COMPOSER**
- **SDK**

Graphics and data
- Provenance
- Secure
- Signed
- Accurate

i-model files are much smaller
Interoperability through i-models

Architect
Bentley Architecture

Structural Engineer
Revit Structures

M&E Engineer

Civil Engineer
Power Civil
Interoperability through i-models

Architect
Bentley Architecture

Structural Engineer
Revit Structures

M&E Engineer
CADduct

Civil Engineer
Power Civil

COMPOSER
SketchUp 3DS Rhino ...etc.

Visual Coordination
Dynamic Sections
Clash Detection
Model Interrogation
Extract Schedules
Construction Simulation
Mobile Apps
Bills of Quantities

![Bills of Quantities Diagram](image_url)
Benefits of BIM for the QS

• No need to measure drawings
• Saves time
• Be involved earlier
• Project model has structured data (Uniclass & BS1192)
• Extract quantity data direct from design model or iModel.
• Reduce RFI’s
• Utilise Navigator markup workflow for improved communication
BIM Based Quantity Surveying

Return on Innovation through improved project predictability
32 Buildings ......

Baltimore Convention Center
Problem: “How much concrete, exactly?”

- 32 Buildings
- 360 spreadsheets per average building
- 1,000 pages per average report
- 32,000 spreadsheet pages

- *Every Month*, for over 3 years!

- Over 1,100,000 QS Report spreadsheets needed during project construction…

- …with no errors.
Solution: Automated BIM Based QS

- With BIM QS methods and tools:

- New QS team profile:
  - 2 QS Engineers full-time, on-site
  - 8 BIM Staff full time, on-site
  - 15 fewer staff required!

- 30 Man-Years work saved

- QS team savings: $7,000,000 US
Building Industry Lifecycle
Benefits of BIM for Owner/Operator

- Full asset model
- Reduced risk of delays and cost
- Improved supply chain delivery
- Better control
- Ensure compliance
- Leverage all project data
- Basis for asset management and FM
Commitment to Interoperability

• ‘Interoperability Platform’ White Paper
  – Embrace existing applications
  – Synchronize project information
  – Generate integrated views of project information
  – Create dynamic deliverables
  – Utilize powerful client applications for extracting value from project information
  – [www.bentley.com/interoperability](http://www.bentley.com/interoperability)
A Bentley Perspective on BIM

Thank you!