WHY BIM LEVEL 3?
TARGET: BIM LEVEL 3
Internet of Things (IoT) & Asset Performance

Self Driving Cars and Improved Air Quality

Machine Learning and Heat Mapping

Managed Energy and Transport Assets

Connected Built Assets

BIM Level 3 Delivers Smart Cities

Smart Cities Are the Start of the Future
WHY SMART CITIES?
BIG DATA

CONNECTED FACILITIES & SERVICES

IoT ENABLED ASSETS & DATA FEEDBACK
Level 3 BIM + Data + Machine Learning

DeepMind AI Reduces Google Data Centre Cooling Bill by 40%
Construction 2025...

HM Government 2013
Industrial Strategy: government and industry in partnership

Lower costs 33%
Faster delivery 50%

Lower emissions 50%
Improvement in exports 50%

Towards a Digitally Built Britain.
WHY BIM?
What needs to change

• Lack of spatial co-ordination;
• Poor management of data, drawings and documents;
• Poor management of information flow;
• Poor appreciation of manufacturing and construction tolerances.

BAA Gatwick office building, outcomes review and learning, mid 1990s
CPIC - Construction Project Information Committee
Genesis of BIM Level 2

Heathrow Express Tunnel Collapse 1994, Tunnel Talk, 3/99
Precursor to BIM Level 2

4. Avanti, UK Department of Trade and Industry, 2001-2005:

- The objective was to deliver improved project and business performance through the use of ICT to support collaborative working by getting people to work together

- The Avanti approach increased the quality of information, the predictability of outcomes and reduced risk and waste.

- Avanti was not an IT system. It was a process method, applied to projects using 2D CAD as well as those using 3D modelling

- The Avanti method was an approach where all CAD information was generated with the same origin, orientation and scale, and organised in layers that could be shared. All layers and CAD model files were named consistently within a specific Avanti convention to allow others to find the relevant CAD data

- “Price & Cost reductions – up to 50% in client management, 40% in cost”
Precursor to BIM Level 2

4. Avanti, demonstration projects:

Endeavour House, Stanstead, BAA, 1999 – £10m with 10% savings vs. overspend on similar projects
Construction 2025...

HM Government 2013

Industrial Strategy: government and industry in partnership

**Lower costs** 33%

Reduction in the initial cost of construction and the whole life cost of built assets.

**Faster delivery** 50%

Reduction in the overall time, from inception to completion, for newbuild and refurbished assets.

**Lower emissions** 50%

Reduction in greenhouse gas emissions in the built environment.

**Improvement in exports** 50%

Reduction in the trade gap between total exports and total imports for construction products and materials.

Towards a Digitally Built Britain.

digital-built-britain.com
WHY CHANGE?
The Productivity Problem

Productivity in manufacturing has nearly doubled, whereas in construction it has remained flat.

Overview of productivity improvement over time
Productivity (value added per worker), real, $2005

Source: Expert interviews; IHS Global Insight (Belgium, France, Germany, Italy, Spain, United Kingdom, United States); World Input-Output Database

McKinsey & Company
Where The Whole Life Costs Are

1 : 10 : 100
Design : Construct : Own
THE SHIFT TO BIM LEVEL 3 WILL NEED NEW TECHNOLOGY TO CONNECT THE WHOLE LIFE CHAIN OF PARTICIPANTS.
DESIGN TEAM – SEQUENTIAL DATA FLOW & MAIN COMMUNICATION CHANNEL

- COST
- ARCHITECT
- PROJECT MANAGEMENT
- SUPPLIERS
- ENGINEER
- SPECIALISTS
- MEP

EMAIL
CDE ENABLES MULTI-PARTY ON DEMAND DATA PUSH & DATA PULL – LIMITATIONS OF CDE?
BIM LEVEL 2 –
AROUND 15% - 20% ADOPTION SO FAR
WHY BLOCKCHAINS?
Moving data between databases in different organisations:

- Download to Excel and email
- PDF and email
BIM needs data to move between databases:

- API with one or two applications
- Download & Upload Using Excel
- Copy / Paste
- PDF and email
- Shared drives
- CDE
Moving data using Blockchains:

• Synchronise mainly meta data with internal and external network participants
• FinTech Security
INTEROPERABLE BLOCKCHAINS & CREATING A NETWORK EFFECT TO DRIVE DIGITAL UPTAKE
WHY COBIE?
BS 1192-4:2014 defines expectations for the exchange of information throughout the lifecycle of a Facility. The use of COBie ensures that information can be prepared and used without the need for knowledge of the sending and receiving applications or databases. It ensures that the information exchange can be reviewed and validated for compliance, continuity and completeness.
COBIE = META DATA OF BUILT ASSETS FOR OPERATING AFTER CONSTRUCTION COMPLETION

Table A.2 COBIE Contact example

<table>
<thead>
<tr>
<th>Contact</th>
<th>Example</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email</td>
<td><a href="mailto:name@email.com">name@email.com</a></td>
<td></td>
</tr>
<tr>
<td>CreatedBy</td>
<td><a href="mailto:name@email.com">name@email.com</a></td>
<td></td>
</tr>
<tr>
<td>CreatedOn</td>
<td>2009-02-12T11:00:00</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>CT2: Quality management</td>
<td>pick</td>
</tr>
<tr>
<td>Phone</td>
<td>01 1111 11111111</td>
<td></td>
</tr>
<tr>
<td>Company</td>
<td>Company name</td>
<td></td>
</tr>
<tr>
<td>ExtSystem</td>
<td>Authoring Application</td>
<td></td>
</tr>
<tr>
<td>ExtObject</td>
<td>IfcPersonAndOrganisation</td>
<td></td>
</tr>
<tr>
<td>ExtIdentifier</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Department</td>
<td>Standards</td>
<td></td>
</tr>
<tr>
<td>OrganizationCode</td>
<td>Company name</td>
<td></td>
</tr>
<tr>
<td>GivenName</td>
<td>First Name</td>
<td></td>
</tr>
<tr>
<td>FamilyName</td>
<td>Surname</td>
<td></td>
</tr>
<tr>
<td>Street</td>
<td>Address Road</td>
<td></td>
</tr>
<tr>
<td>PostalBox</td>
<td>PO Box 11</td>
<td></td>
</tr>
<tr>
<td>Town</td>
<td>New Town</td>
<td></td>
</tr>
<tr>
<td>State&amp;Region</td>
<td>Country</td>
<td></td>
</tr>
<tr>
<td>PostalCode</td>
<td>AA11 1AA</td>
<td></td>
</tr>
<tr>
<td>Country</td>
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<td></td>
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</table>

Table A.3 COBIE building Facility example

<table>
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<tr>
<th>Facility</th>
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<th>Notes</th>
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<tbody>
<tr>
<td>Name</td>
<td>Same School</td>
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</tr>
<tr>
<td>CreatedBy</td>
<td><a href="mailto:name@email.com">name@email.com</a></td>
<td></td>
</tr>
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<td>CreatedOn</td>
<td>2012-12-12T13:28:49</td>
<td></td>
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<tr>
<td>Category</td>
<td>P77: Secondary schools</td>
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<tr>
<td>ProjectName</td>
<td>School Extension</td>
<td></td>
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<tr>
<td>SiteName</td>
<td>SchoolPark</td>
<td></td>
</tr>
<tr>
<td>AreaUnits</td>
<td>millimeters</td>
<td></td>
</tr>
<tr>
<td>AreaUnits</td>
<td>squaremeters</td>
<td></td>
</tr>
<tr>
<td>AreaUnits</td>
<td>cubicmeters</td>
<td></td>
</tr>
<tr>
<td>CurrencyUnit</td>
<td>Pounds</td>
<td></td>
</tr>
<tr>
<td>AreaMeasurement</td>
<td>BIM Authoring Application</td>
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<td>OWGS4.2R718Eq5G67Lx</td>
<td></td>
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<tr>
<td>ExternalSiteObject</td>
<td>IfcProject</td>
<td></td>
</tr>
<tr>
<td>ExternalIdentifier</td>
<td>OWGS4.2R718Eq5G67Lx</td>
<td></td>
</tr>
<tr>
<td>ExternalFacilityObject</td>
<td>OWGS4.2R718Eq5G67Lx</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Single storey secondary school</td>
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</tr>
<tr>
<td>ProjectDescription</td>
<td>New build secondary school.</td>
<td></td>
</tr>
<tr>
<td>SiteDescription</td>
<td>Same school, Address Road., New Town, Country, AA11 1AA</td>
<td></td>
</tr>
<tr>
<td>Phase</td>
<td>CIC 6: Handover</td>
<td></td>
</tr>
</tbody>
</table>
COBIE META DATA IS CURRENTLY HELD IN A SPREADSHEET

COBie is currently spreadsheet based so that everyone in the supply chain can populate it with their O&M data.

Spreadsheets:

- Are Grey IT
- Cause version control problems
- Prone to errors
- Can be easily lost
- Can be emailed to anyone

Template examples:
http://www.bimtaskgroup.org/cobie/A-Z.html#C
COBIE META DATA NEEDS TO BE IN A DATABASE
PropTech Merges With FinTech
TARGET: BIM LEVEL 3
BIM LEVEL 3 + BLOCKCHAINS = SMART CITIES