Lecture: Future Systems: ITC (CAD BIM APPs)

Advanced Technology
Module Leader: Ilona Hay
Module Coordinator: Kenny Fitzmaurice
Technology Campion: Brian Murphy

Lecturer: Brian Murphy

Created: 16th 18th March 2019
Presented: 19th March 2019
Updated:

>40 years into 1 Hour won't go

- So I am providing links to other information if you want to know more
  - I offer you the doors, you open them and see where it takes you
- Question Everything
  - Use what you know, join up your thinking, keep learning and refining what you know
- Don't assume that I know everything
  - (I know a lot but not everything)
- Don't assume I have cherry picked the best bits
  - (new stuff keeps appearing)
- Don't assume what your being told is the whole story
  - Some will hide what they don't want you to know
  - And tell greenwash porkies
- Do your best with what you know
  - When you know better
  - Do better

This Presentation on GBE:

- Find this file on GBE website at:
- https://GreenBuildingEcyclopaedia.uk/?P=20897
- Find related image folders on Pinterest
- https://www.pinterest.co.uk/bmurphy1390/BIM
- Schedule of related pages:
- https://GreenBuildingEcyclopaedia.uk/?P=17699

BIM on GBE 1 of 2

- BIM Jargon Buster Theme
- https://greenbuildingencyclopaedia.uk/?p=1409
- BIM Periodic Table
- https://greenbuildingencyclopaedia.uk/?p=12691
- Communicating Product Data BIM4M2
- https://greenbuildingencyclopaedia.uk/?p=11309
- Sustainable Design & Manufacturer's Information
- https://greenbuildingencyclopaedia.uk/?p=2046
- Specifications within BIM
- https://greenbuildingencyclopaedia.uk/?p=4394
- Whole Building Calculators
- https://greenbuildingencyclopaedia.uk/?p=600

Another GBE CPD/Lecture to download
And https://greenbuildingencyclopaedia.uk

Another GBE CPD/Lecture to download
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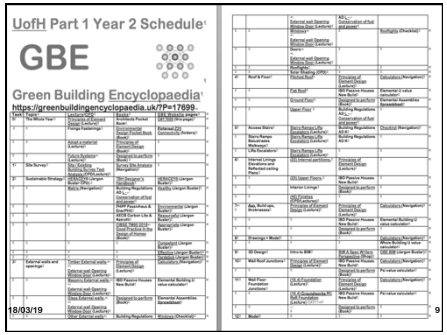
BIM on GBE 2 of 2

- Specification Development RIBA Plan of Work 2013
- https://greenbuildingencyclopaedia.uk/?p=1339
- National BIM Report 2013
- https://greenbuildingencyclopaedia.uk/?p=1003
- Product Data Templates (PDT)
- https://greenbuildingencyclopaedia.uk/?p=8097
- Digital Object Identifiers (DOI)
- https://greenbuildingencyclopaedia.uk/?p=7314
- Green BIM Building Conference Leeds
- https://greenbuildingencyclopaedia.uk/?p=1867
- Blockchain Timber Chain of Custody
- https://greenbuildingencyclopaedia.uk/?p=20312
- EUTR EU Timber Regulations NEPCon Hub
- https://greenbuildingencyclopaedia.uk/?p=16016



Today's Lecture

- Future Systems: ITC Technology CAD BIM & APPs

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Quotes for the Day

- CAD is not BIM BIM is not CAD
- Excel killed the development of BIM for a 40 years
  - (Paul Fletcher: "Beyond BIM" 2012)
- All the CAD software providers helped suppress it too

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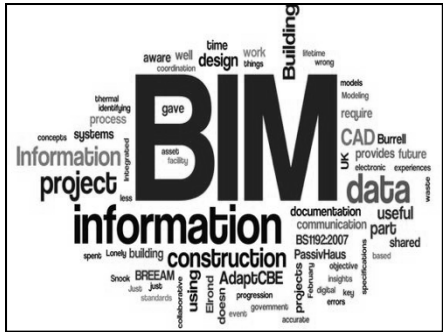

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BIM Past and Future:

- Jules May started programming 3D intelligent CAD
  - Bridge Software
  - CAD companies tried to destroy his Software
  - Brian Murphy helped develop an early prototype specification output
- For BIM to become really intelligent:
  - It needs current data, lots of it,
    - about products & materials
  - BOM Bills of Materials generated from BIM model
  - APPs to interrogate BOM and data:
    - Datasets + equations = calculators
  - Neither are well developed yet
    - Some will arrive when you join the profession

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BIM & 2016

- Government in a review of the state of the construction industry decided yet again the industry competency was still not up to par
- They determined Intelligent CAD = BIM Building Information Modeling was the way forward for future Government Procurement
- 2016 was set as the threshold date by which all future projects will be delivered with BIM Level 2
- And they want to see 10% price reductions year on year

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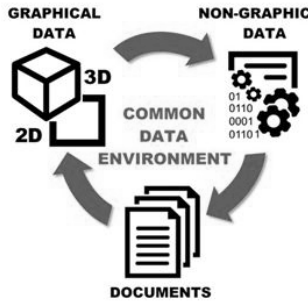

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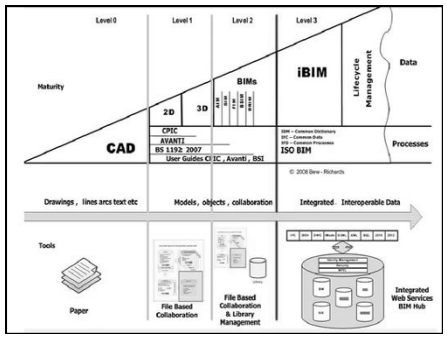
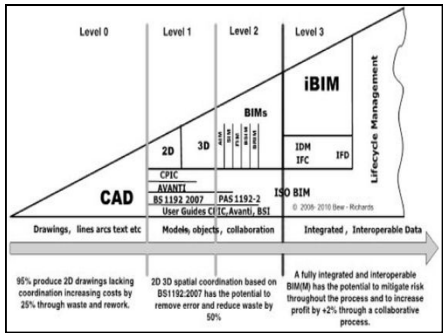
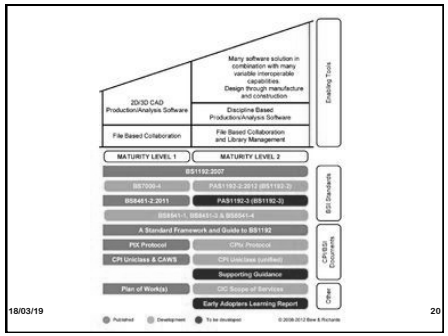



Level 0
Level 1
Level 2
Level 3
iBIM
BIMs
2D
3D
CPIC
AVANTI
BS 1192 2007
User Guides
CAD
PAS 1192-2
IC,Avanti, BSI
IDM
IFD
IFC
ISO BIM
© 2006-2010 Bew - Richards
Lifecycle Management
Drawings, lines arcs text etc
Models, objects, collaboration
Integrated, Interoperable Data
95% produce 2D drawings lacking coordination increasing costs by 25% through waste and rework.
2D 3D spatial coordination based on BS1192:2007 has the potential to remove error and reduce waste by 50%
A fully integrated and interoperable BIM(M) has the potential to mitigate risk throughout the process and to increase profit by +2% through a collaborative process.


2D/3D CAD Production/Analysis Software
Many software solution in combination with many variable interoperable capabilities. Design through manufacture and construction
Discipline Based Production/Analysis Software
File Based Collaboration
File Based Collaboration and Library Management
Drafting Tools
MATURITY LEVEL 1
MATURITY LEVEL 2
BS1192:2007
BS7000-4
PAS1192-2:2012 (BS1192-2)
BS8541-2:2011
PAS1192-3 (BS1192-3)
BS8541-1, BS8541-3 & BS8541-4
A Standard Framework and Guide to BS1192
PIX Protocol
CPIx Protocol
CPI Uniclass & CAWS
CPI Uniclass (unified)
Supporting Guidance
Plan of Work(s)
OIC Scope of Services
Early Adopters Learning Report
BSI Standards
CPIx/BSI Documents
Other
Published
Development
To be developed
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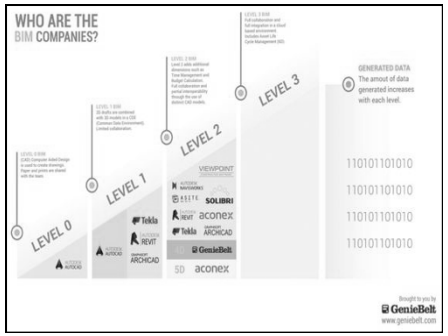
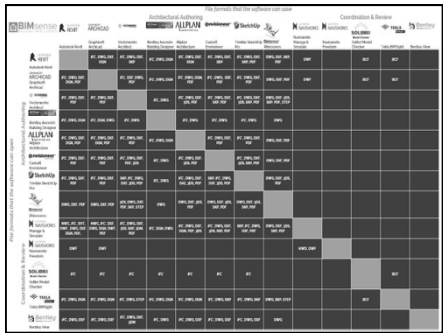
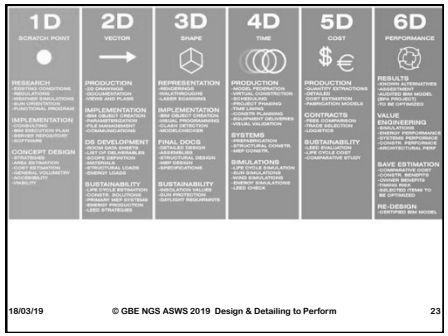

WHO ARE THE BIM COMPANIES?
LEVEL 0
LEVEL 1
LEVEL 2
LEVEL 3
GENERATED DATA
The amount of data generated increases with each level.
110101101010
110101101010
110101101010
110101101010
SOLIBRI
aconex
GenieBelt
5D
Brought to you by
GenieBelt
www.geniebelt.com


BIMsense
Architectural Authoring
Coordination & Review
File formats that the software can save
Coordination & Review
Architectural Authoring
File formats that the software can open


1D
SCRATCH POINT
RESEARCH
CONCEPT DESIGN
2D
VECTOR
PRODUCTION
IMPLEMENTATION
DS DEVELOPMENT
SUSTAINABILITY
3D
SHAPE
REPRESENTATION
IMPLEMENTATION
FINAL DOCS
SUSTAINABILITY
4D
TIME
PRODUCTION
SYSTEMS
SIMULATIONS
5D
COST
$ €
PRODUCTION
CONTRACTS
SUSTAINABILITY
6D
PERFORMANCE
RESULTS
VALUE ENGINEERING
SAVE ESTIMATION
RE-DESIGN
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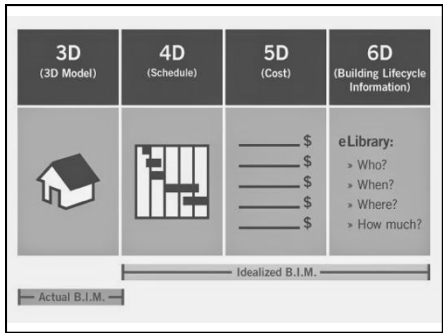
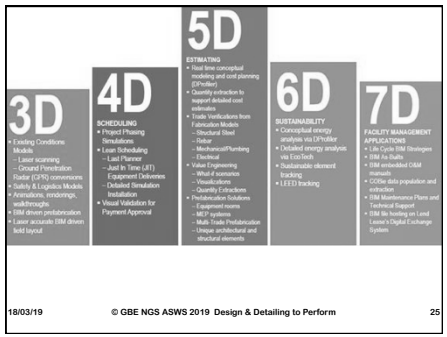

3D
(3D Model)
4D
(Schedule)
5D
(Cost)
6D
(Building Lifecycle Information)
eLibrary:
Who?
When?
Where?
How much?
Idealized B.I.M.
Actual B.I.M.


3D
Existing Conditions Models
Laser scanning
Ground Penetration Radar (GPR) conversions
Safety & Logistics Models
Animations, renderings, walkthroughs
BIM driven prefabrication
Laser accurate BIM driven field layout
4D
SCHEDULING
Project Phasing Simulations
Lean Scheduling
Just In Time (JIT)
Equipment Deliveries
Detailed Simulation
Installation
Visual Validation for Payment Approval
5D
ESTIMATING
Real time conceptual modeling and cost planning (DProfiler)
Quantity extraction to support detailed cost estimates
Trade Verifications from Fabrication Models
Structural Steel
Rebar
Mechanical/Plumbing
Electrical
Value Engineering
What-if scenarios
Visualizations
Quantity Extractions
Prefabrication Solutions
Equipment rooms
MEP systems
Multi-Trade Prefabrication
Unique architectural and structural elements
6D
SUSTAINABILITY
Conceptual energy analysis via DProfiler
Detailed energy analysis via EcoTech
Sustainable element tracking
LEED tracking
7D
FACILITY MANAGEMENT APPLICATIONS
Life Cycle BIM Strategies
BIM As Builts
BIM embedded O&M manuals
COBie data population and extraction
BIM Maintenance Plans and Technical Support
BIM file hosting on Lend Lease's Digital Exchange System
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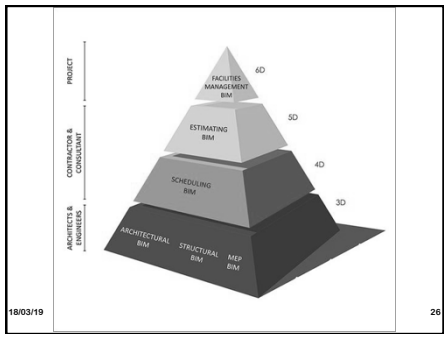
PROJECT
CONTRACTOR & CONSULTANT
ARCHITECTS & ENGINEERS
FACILITIES MANAGEMENT BIM
6D
ESTIMATING BIM
5D
SCHEDULING BIM
4D
3D
ARCHITECTURAL BIM
STRUCTURAL BIM
MEP BIM
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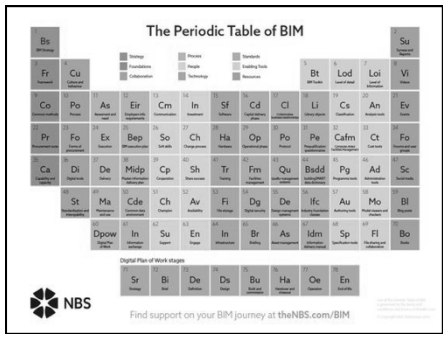
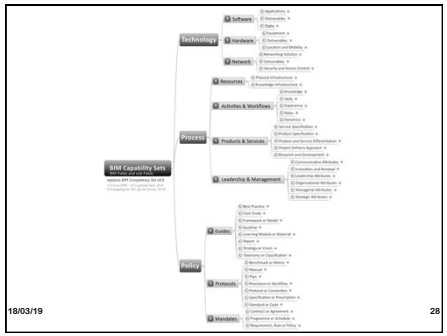
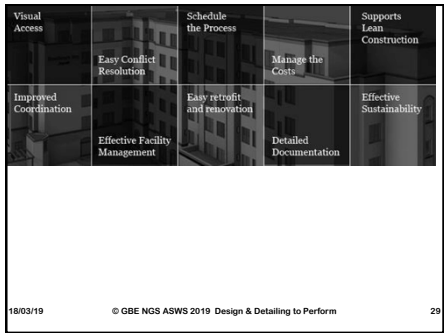
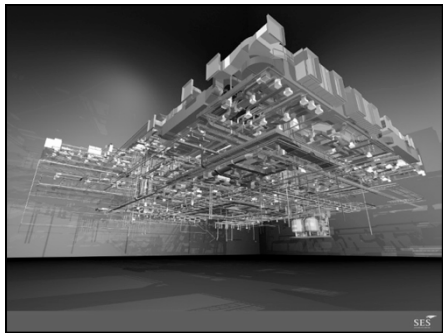
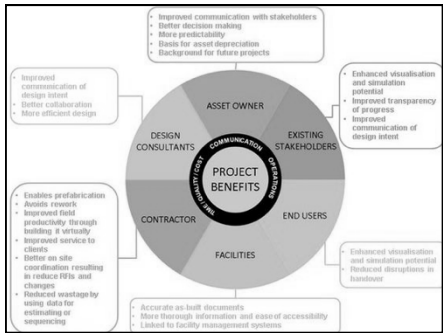
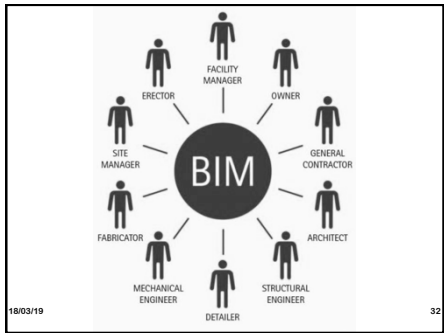

The Periodic Table of BIM
Digital Plan of Work stages
NBS
Find support on your BIM journey at theNBS.com/BIM

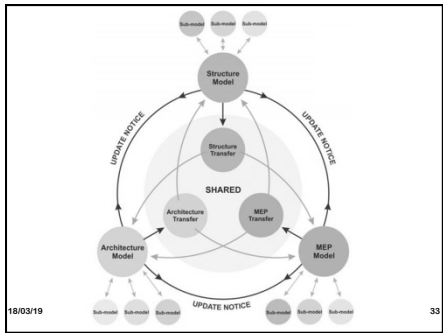












Professional Responsibility

ACA ASSOCIATION OF CONSULTANT ARCHITECTS

- Shared data in shared environment:
  - Aim is to resolve issues/clashes and coordinate all disciplines outputs before site
  - But is there a risk of blurred responsibility boundaries?
  - Can you see who is responsible?
  - Needs to carry a time line against all actions
  - Can you extract yourself from the firing line when things go wrong, despite all efforts
- ACA Newsletter discussed this at length

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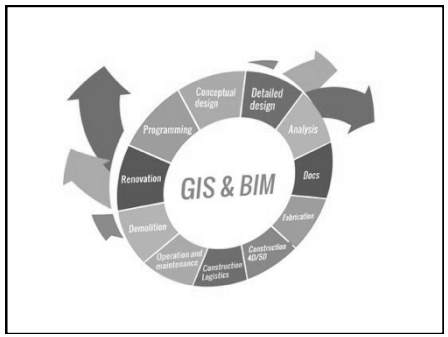

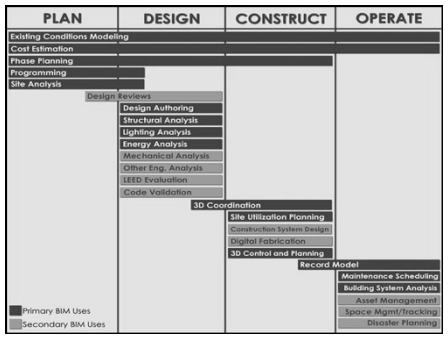

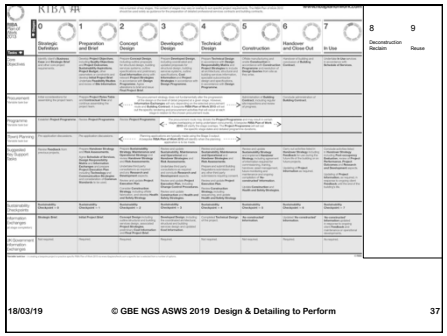
RIBA
0
1
2
3
4
5
6
7
8
9
Deconstruction Reclaim
Reuse
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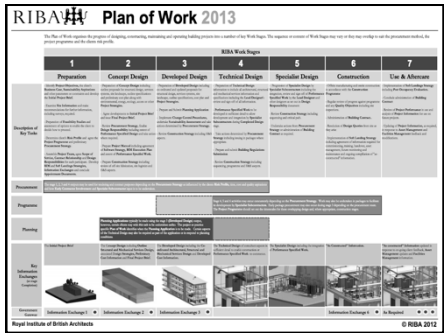
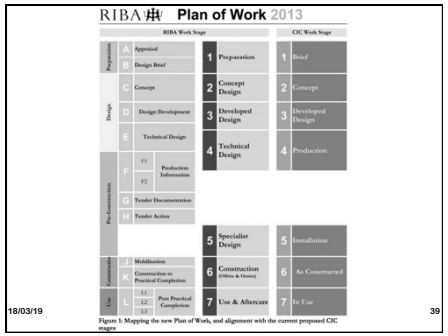

RIBA Plan of Work 2013
1 Preparation
2 Concept Design
3 Developed Design
4 Technical Design
5 Specialist Design
6 Construction
7 Use & Aftercare
Royal Institute of British Architects
© RIBA 2012


RIBA Plan of Work 2013
RIBA Work Stages
CIC Work Stage
1 Preparation
2 Concept Design
3 Developed Design
4 Technical Design
5 Specialist Design
6 Construction
7 Use & Aftercare
1 Brief
2 Concept
3 Developed Design
4 Production
5 Installation
6 As Constructed
7 In Use
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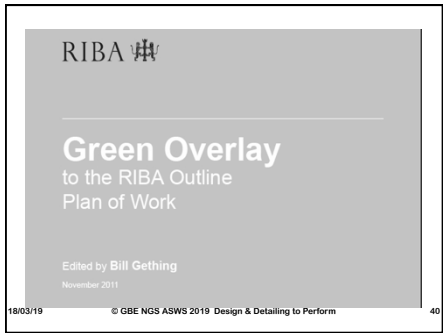
RIBA
Green Overlay
to the RIBA Outline
Plan of Work
Edited by Bill Gething
November 2011
18/03/19
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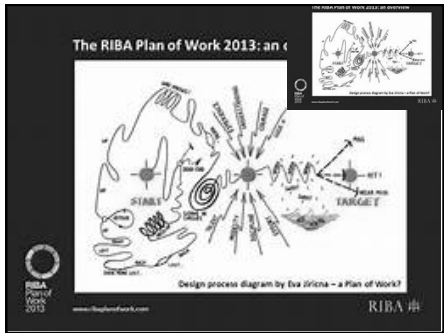
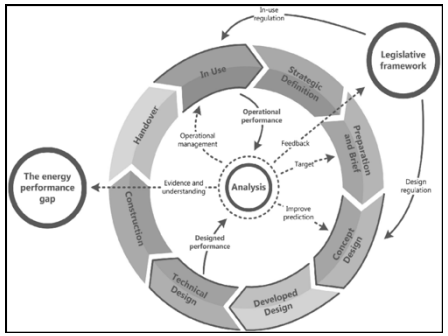

The RIBA Plan of Work 2013: an
Design process diagram by Eva Jiricna – a Plan of Work?
RIBA


In-use regulation
Legislative framework
In Use
Strategic Definition
Handover
Preparation and Brief
Operational performance
Operational management
Feedback
Targets
Evidence and understanding
Analysis
Improve prediction
Designed performance
The energy performance gap
Construction
Technical Design
Developed Design
Concept Design
Design regulation

NBS
BIM
Object
Standard
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BIM
PROJECT
EXECUTION
PLANNING
GUIDE
VERSION 2.0
18/03/19
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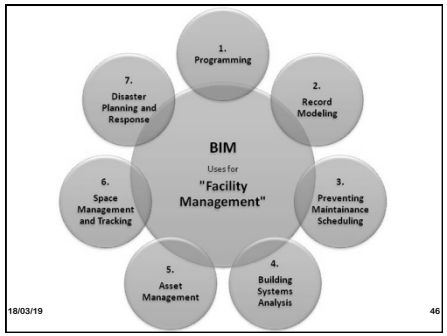
RIBA Plan of Work 2013
Designing for Manufacture and Assembly
45


1. Programming
2. Record Modeling
3. Preventing Maintainance Scheduling
4. Building Systems Analysis
5. Asset Management
6. Space Management and Tracking
7. Disaster Planning and Response
BIM
Uses for
"Facility Management"
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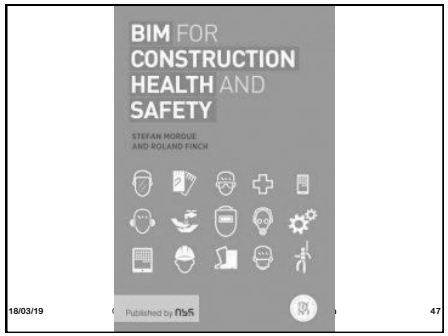
BIM FOR CONSTRUCTION HEALTH AND SAFETY
STEFAN MORDUE AND ROLAND FINCH
Published by NBS
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Beneficial to Building, Structural and MEP Engineers
BIM for Fire Safety
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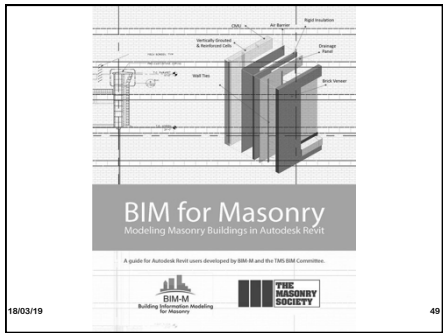
BIM for Masonry
Modeling Masonry Buildings in Autodesk Revit
A guide for Autodesk Revit users developed by BIM-M and the TMS BIM Committee.
BIM-M
Building Information Modeling for Masonry
THE MASONRY SOCIETY
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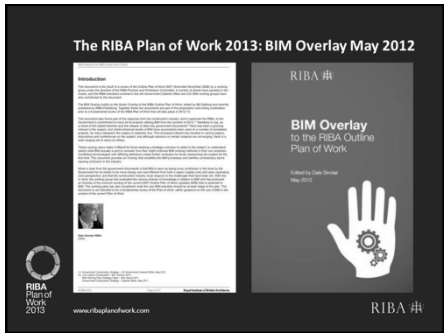
The RIBA Plan of Work 2013: BIM Overlay May 2012
BIM Overlay
to the RIBA Outline Plan of Work
RIBA Plan of Work 2013
www.ribaplanofwork.com
RIBA

RIBA
RIBA Plan of Work 2013 Guide
Handover Strategy
Royal Institute of British Architects
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BIM regional hubs
Yorkshire & Humber
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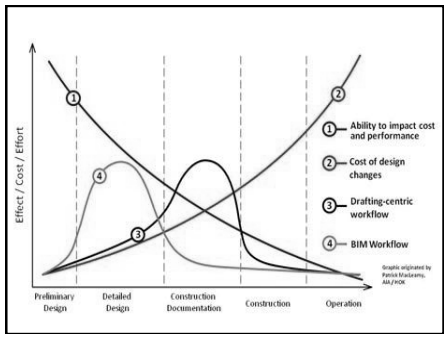
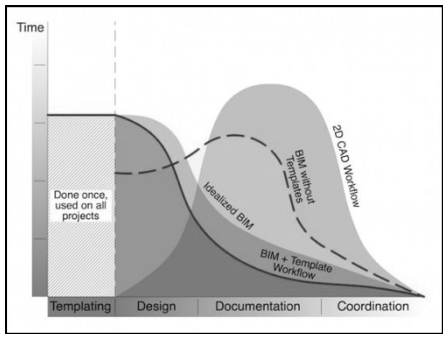
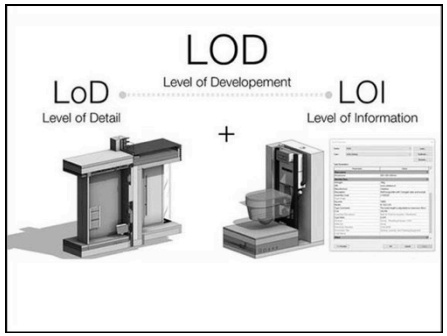
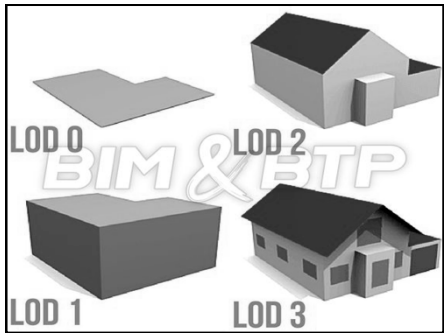
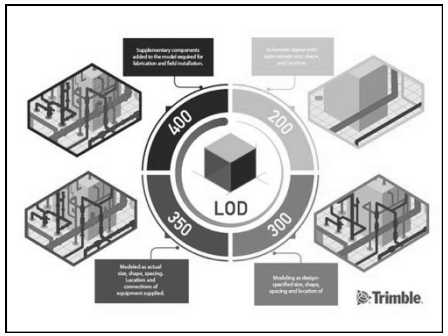
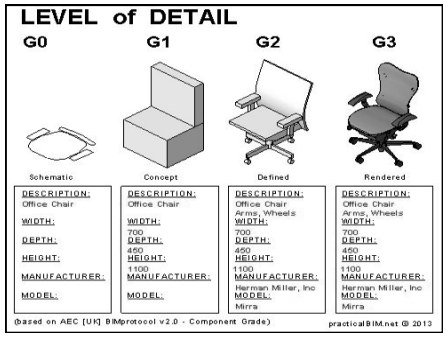

Effect / Cost / Effort
1 Ability to impact cost and performance
2 Cost of design changes
3 Drafting-centric workflow
4 BIM Workflow
Preliminary Design
Detailed Design
Construction Documentation
Construction
Operation

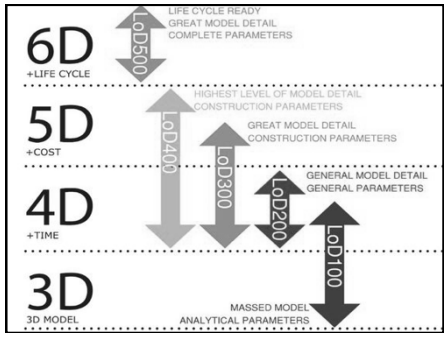

Time
Done once, used on all projects
Idealized BIM
BIM without Templates
2D CAD Workflow
BIM + Template Workflow
Templating
Design
Documentation
Coordination


LOD
LoD
Level of Developement
LOI
Level of Detail
Level of Information
+

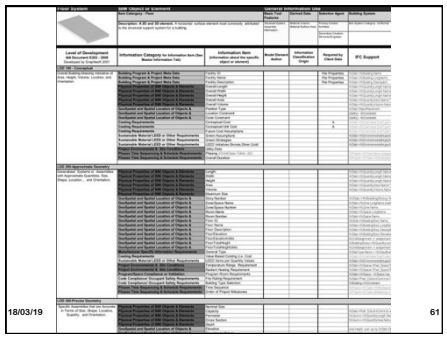

LOD 0
LOD 2
BIM & BTP
LOD 1
LOD 3

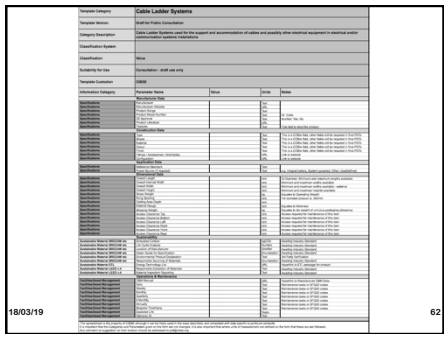

400
200
LOD
350
300
Trimble.


LEVEL of DETAIL
G0
G1
G2
G3
Schematic
Concept
Defined
Rendered
DESCRIPTION: Office Chair
WIDTH:
DEPTH:
HEIGHT:
MANUFACTURER:
MODEL:
DESCRIPTION: Office Chair Arms, Wheels
WIDTH: 700
DEPTH: 450
HEIGHT: 1100
MANUFACTURER:
MODEL:
DESCRIPTION: Office Chair Arms, Wheels
WIDTH: 700
DEPTH: 450
HEIGHT: 1100
MANUFACTURER: Herman Miller, Inc
MODEL: Mirra
DESCRIPTION: Office Chair Arms, Wheels
WIDTH: 700
DEPTH: 450
HEIGHT: 1100
MANUFACTURER: Herman Miller, Inc
MODEL: Mirra
(based on AEC [UK] BIMprotocol v2.0 - Component Grade)
practicalBIM.net @ 2013


6D
+LIFE CYCLE
LoD500
LIFE CYCLE READY
GREAT MODEL DETAIL
COMPLETE PARAMETERS
5D
+COST
LoD400
HIGHEST LEVEL OF MODEL DETAIL
CONSTRUCTION PARAMETERS
LoD300
GREAT MODEL DETAIL
CONSTRUCTION PARAMETERS
4D
+TIME
LoD200
GENERAL MODEL DETAIL
GENERAL PARAMETERS
LoD100
3D
3D MODEL
MASSED MODEL
ANALYTICAL PARAMETERS

BIM4M2
BIM 4 Manufacturers and Manufacturing
BIM Adoption by Product Manufacturers
Survey conducted July to October 2014
updated 03 February 2015


18/03/19
61


Cable Ladder Systems
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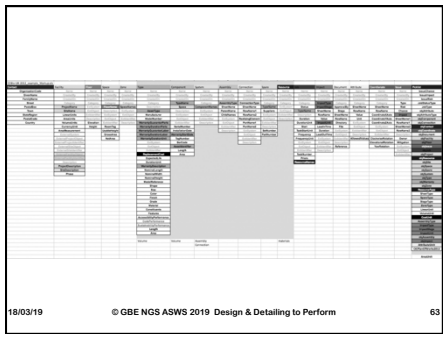
62


18/03/19
© GBE NGS ASWS 2019 Design & Detailing to Perform
63

			Human Health		DALY
Climate change	0.00E+00	kg CO2 eq	Ecosystems	0.00E+00	species.yr
Ozone depletion	0.00E+00	kg CFC-11 eq	Resources		$
Human toxicity, cancer effects	0.00E+00	CTUh			
Human toxicity, non-cancer effects	0.00E+00	CTUh			
Particulate matter	0.00E+00	kg PM2.5 eq			
Ionizing radiation HH	0.00E+00	kg U235 eq			
Ionizing radiation E	0.00E+00	CTUe			
Photochemical ozone formation	0.00E+00	kg C2H4 eq			
Acidification	0.00E+00	molc H+ eq			
Terrestrial eutrophication	0.00E+00	molc N eq			
Freshwater eutrophication	0.00E+00	molc P eq			
Marine eutrophication	0.00E+00	molc N eq			
Freshwater ecotoxicity	0.00E+00	CTUe			
Land use	0.00E+00	kg C deficit			
Water resource depletion	0.00E+00	m3			
		kg Sb eq			
cumulative energy demand	0.00E+00	MJ			

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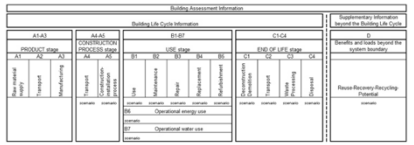

Figure 1: Life cycle stages and modules used in CEN/TC 350 standards such as EN 15804

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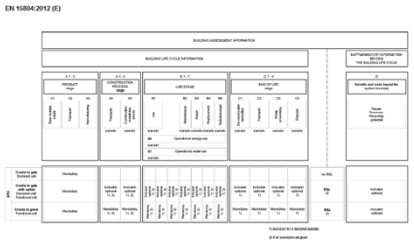

Figure 1 —Types of EPD with respect to life cycle stages covered and life cycle stages and modules for the building assessment

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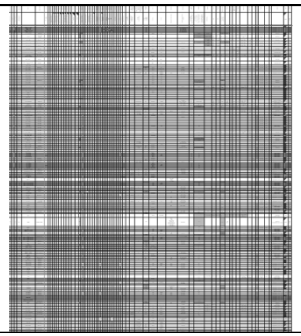
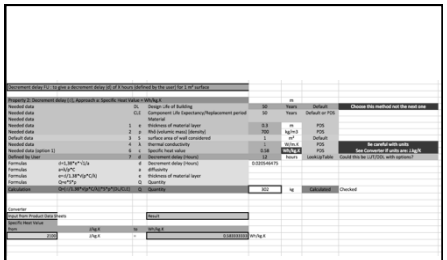


18/03/19 67



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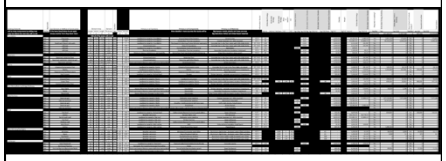

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Interoperability and Integration

- The success of Applications to work with each other is to release the code of one to developers of the other, so they can interrogate it and write code to interoperate seamlessly with each other then test it and have on line updating
- Plugins and Apps become a doddle to load and start using
- All existing building analysis applications must migrate towards BIM APPs so there is no or little file transferring or translating between applications

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Built2SpecProject

- EU funded Project
- Avoiding compromise in specification without accountability
- Accountability through Smart Phone
  - All decisions makers recorded against all actions/decisions made
    - All decision points know in advance through templates built from specification review/approval sign off clauses out of NBS Create software
  - Approving: Prototypes, Samples, Mock ups, Control samples
  - Responding to: RFI Requests for Information
  - Recording: works completed
  - Recording: snagging points

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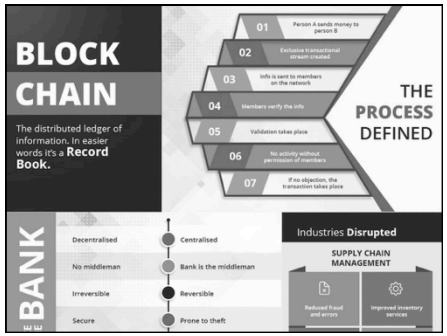

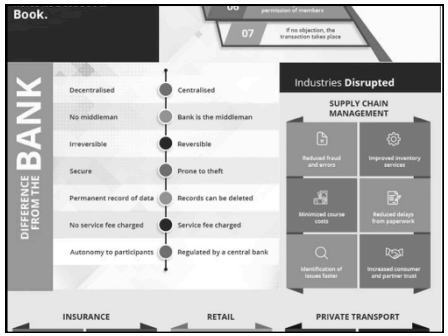

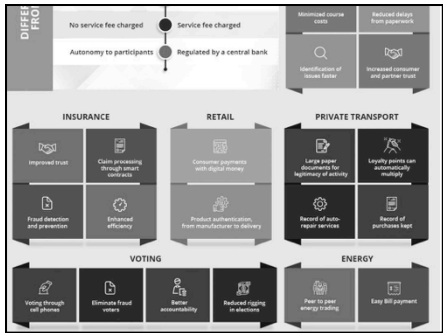

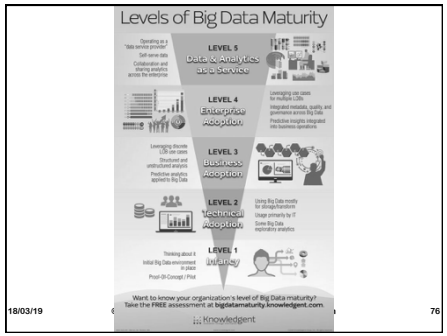

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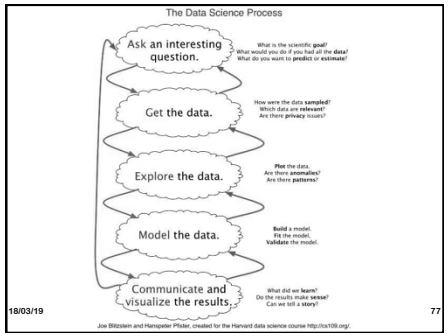

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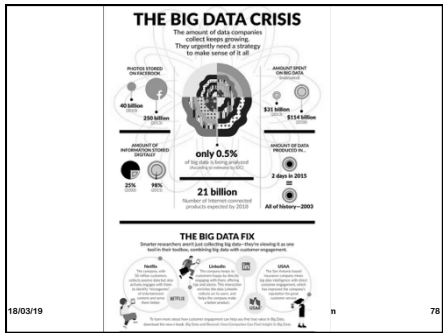

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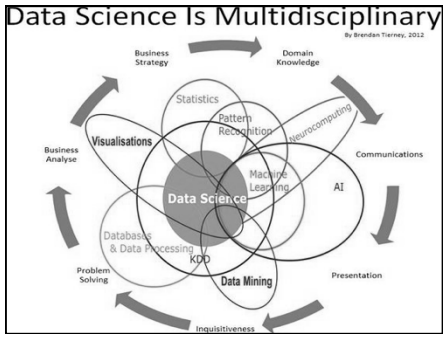

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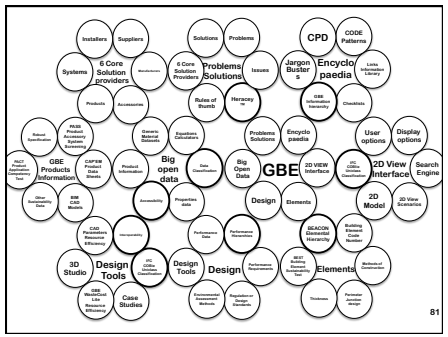

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- Brian Murphy BSc Dip Arch (Hons+Dist)
  - Technician and Architect by Training
  - Specification Writer by Choice
  - Environmentalist by Actions
- Greening up my act since 1999
- Founded National Green Specification 2001
- Launched www.greenspec.co.uk 2003
- Created: GBE at https://greenbuildingencyclopaedia.uk 2015
- E: BrianSpecMan@icloud.com
- Twitter: http://twitter.com/brianspecman
- Twitter: @GBEGreenBuild
- Scribd: BrianSpecMan
- LinkedIn: BrianSpecMan
- Facebook: BrianSpecMan Facebook: http://www.facebook.com/brianspecman
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