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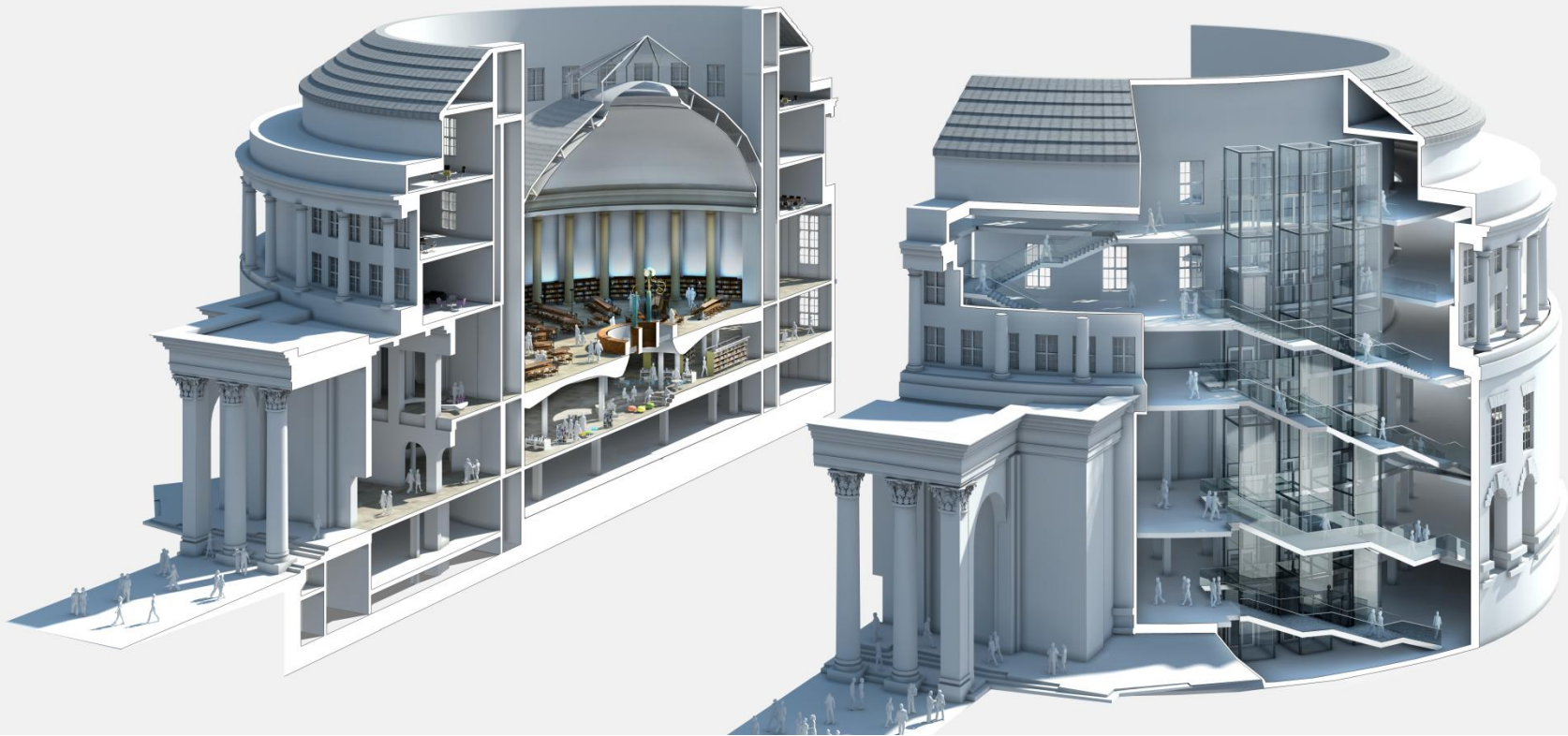
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Building Information Modelling in Quantity Surveying Education



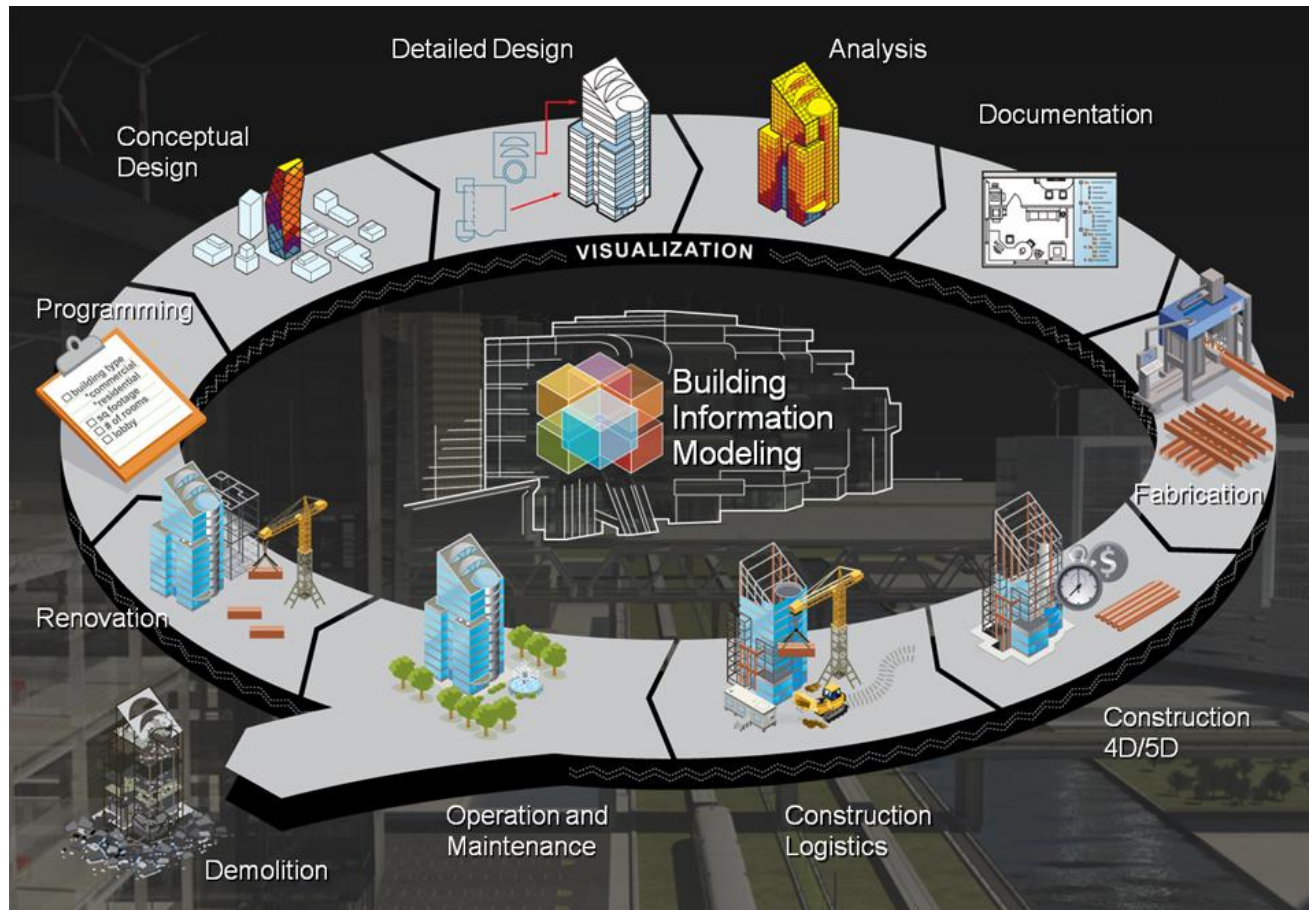
Kevin Thomas – Head of Department
of Property and Surveying

bimacademy

northumbria
UNIVERSITY

Ryder
www.ryderarchitecture.com

What is BIM ?



“An integrated digital process providing coordinated, reliable information about a project throughout all phases, from design through construction and into operation”

What is BIM ?

BIM benefits

Clients

Designers

Contractors

Suppliers

Operators

By allowing

Better informed decisions

Quicker decision making

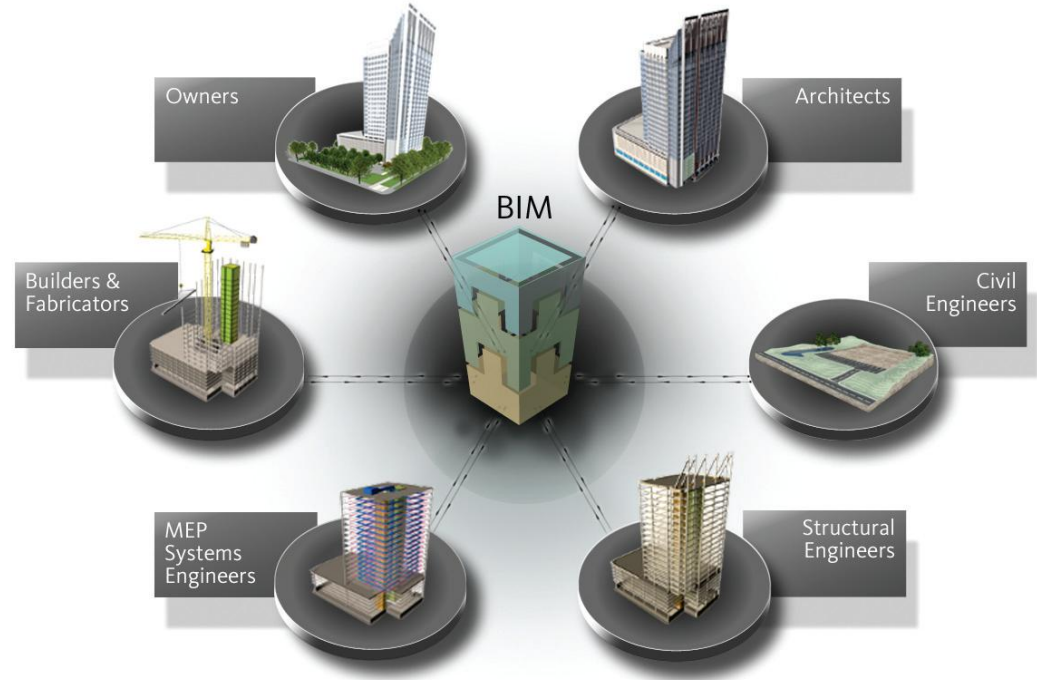
Improved quality

Improved safety

Reduced waste

Greater cost certainty

Increased profitability



What BIM is not

BIM is not 3D CAD

BIM is not a single building model

BIM is not a single software technology

BIM is not a replacement for good communication, team working and due diligence

THEREFORE critical that QS students and graduates are aware of and can use BIM comfortably and effectively and can act as “champions” to promote and spread

Why adopt BIM ?

The UK Construction industry in 2011:

Fewer projects

‘More for less’

Low carbon agenda

Increased competition

Disjointed procurement

Technology ‘generation gap’

Lower fees

Staff reductions

Building.co.uk | Wednesday 07 September 2011

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Worst orders figures on record suggest the worst on the ground is yet to come

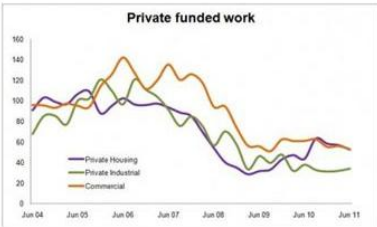

From: Brickonomics

Tag 2011, Brian Green, construction industry, infrastructure, new orders data, ONS, private funded work, public funded work

EMAIL SHARE COMMENT SAVE

Posted by: Brian Green
2 Sep 11

The index, which represents a seasonally-adjusted price-adjusted measure of orders taken by contractors for new work has hit a record low. It stands at 57.5 for the second quarter of this year. Five years ago it stood at almost double that. (see graphs below)

From Brickonomics
Figuring out trends in housing, construction and property

Tags
Bank of England, construction, construction industry, construction output, Construction Products Association, Council of Mortgage Lenders, double dip, economy, forecast, forecasts, GDP, Halifax, house builders, house building, house prices, housing market, inflation, interest

Why adopt BIM ?

30% of projects do not meet original programme or budget

92% of clients said that designers drawings are typically not sufficient for construction

37% of materials used in construction become waste

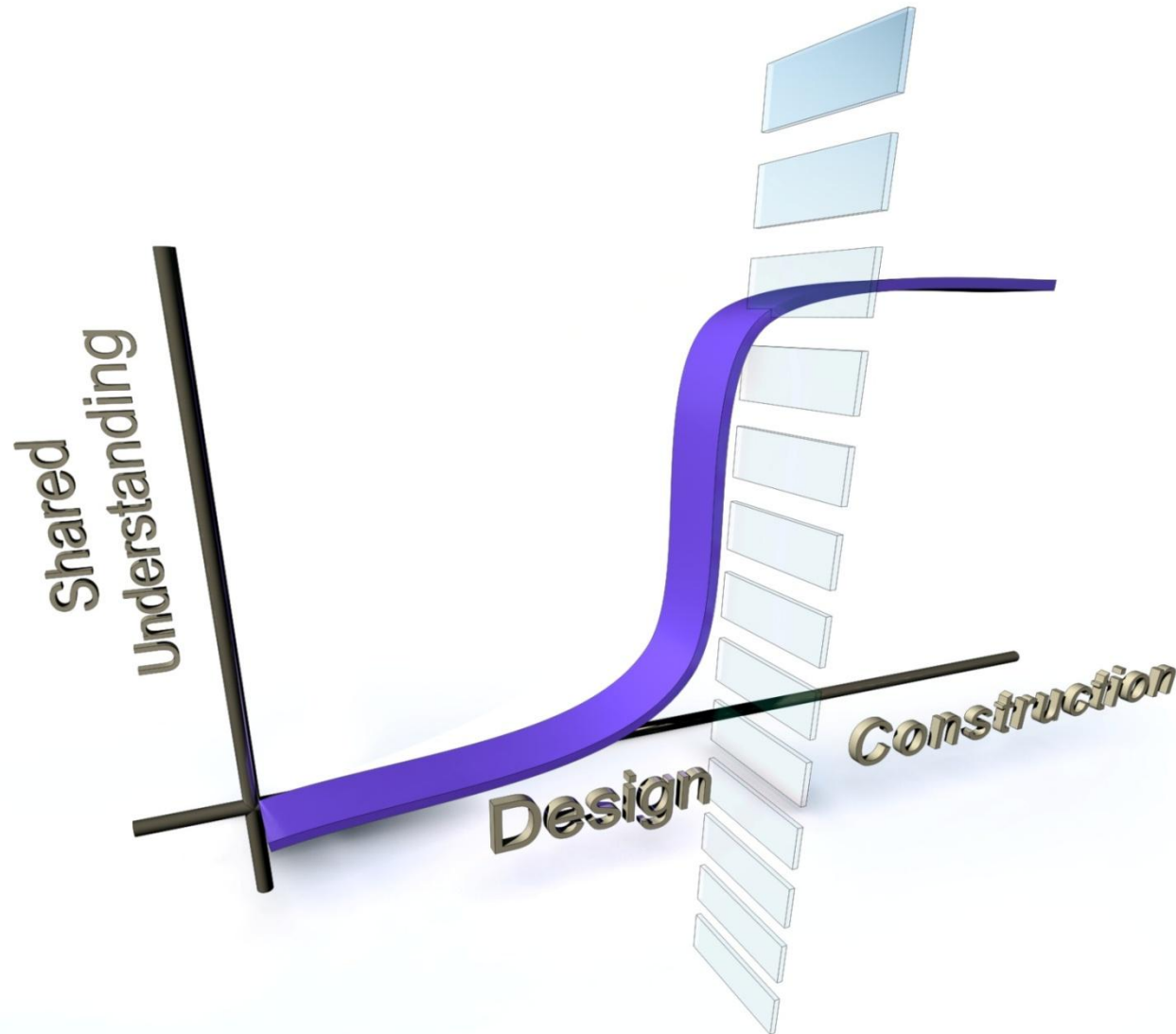
10% of the cost of a project is typically due to change orders

38% of carbon emissions are from buildings not cars

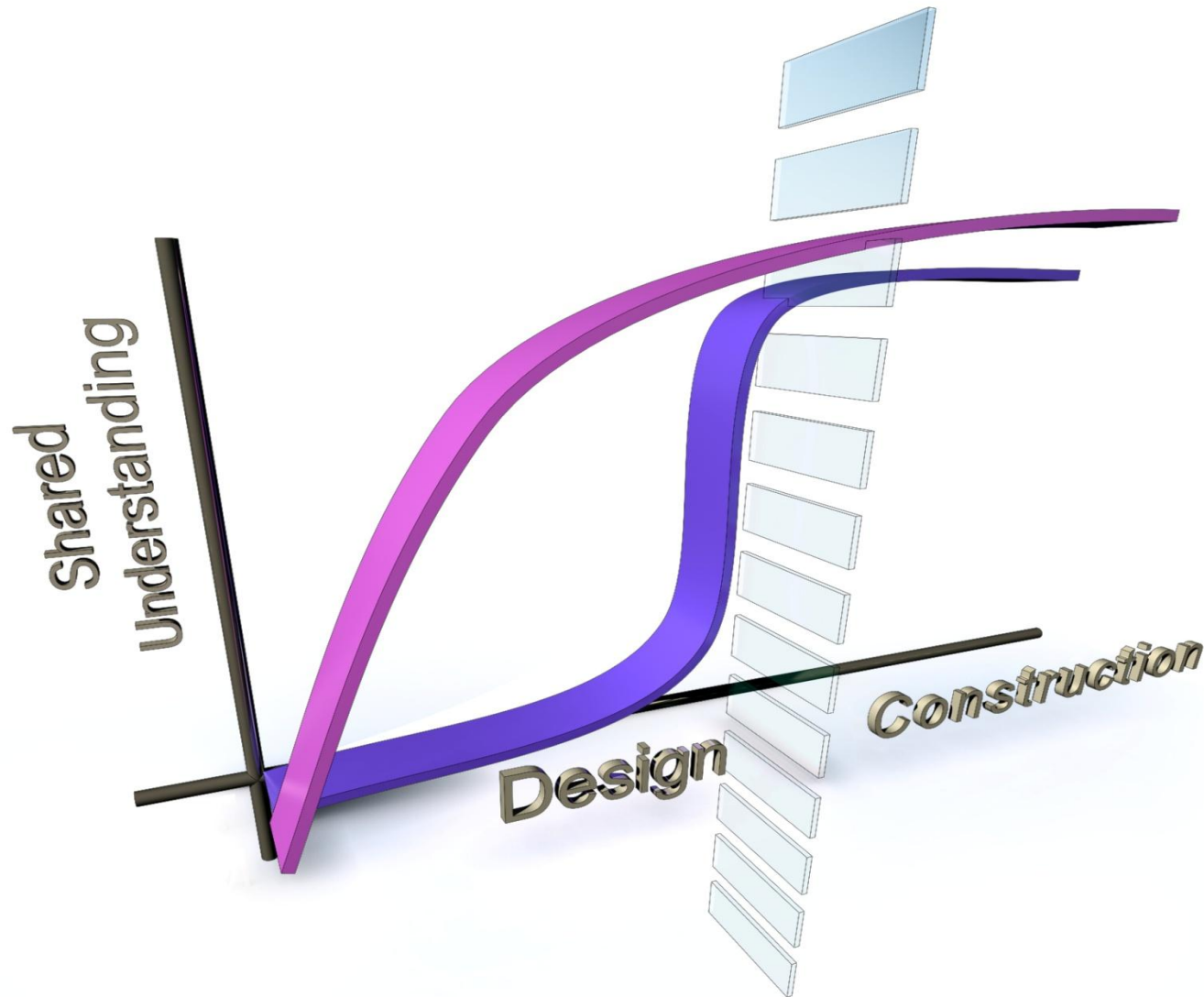
Why adopt BIM ?



Why adopt BIM ?



Why adopt BIM ?



Why adopt BIM ?



“BIM is seen as having the greatest potential to transform the habits, and eventually the structure, of the industry”

Why adopt BIM ?

 CabinetOffice

Government Construction Strategy

May 2011

“Government will require fully collaborative BIM (with all project and asset information, documentation and data being electronic) as a minimum by 2016. A staged plan will be published with mandated milestones showing measurable progress at the end of each year”

Where are we? – RICS Survey 2011

10% of QSs are using BIM regularly.

4% of QSs invest regularly in BIM training.

A further 10% of QSs are actively assessing BIM tools.

Surveyors who work on BIM projects generally felt using it would be appropriate on 2.5 times as many projects.

Respondents felt the RICS should provide BIM guidance and training.

QSs felt the barriers to BIM adoption were lack of client demand, lack of training, lack of application interfaces and lack of standards.

BIM technologies

Briefing



Design



Analyse



Manage
&
Review



BIM technologies – Quantity Surveyors

Briefing



Design



Analyse

Manage
&
Review



From Theodolites to Total Stations to Laser Scanning

Point Cloud output of laser scanning

Use of high definition scanning equipment

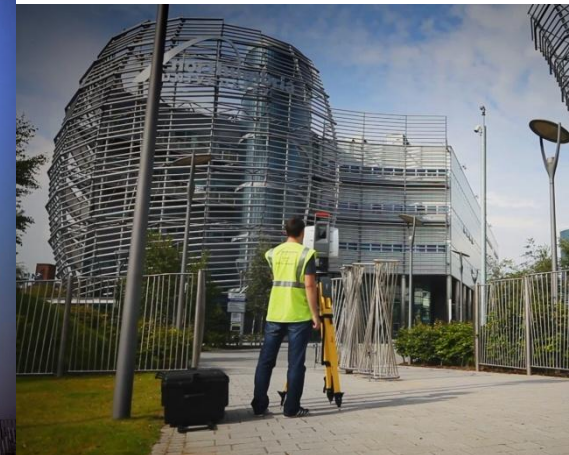
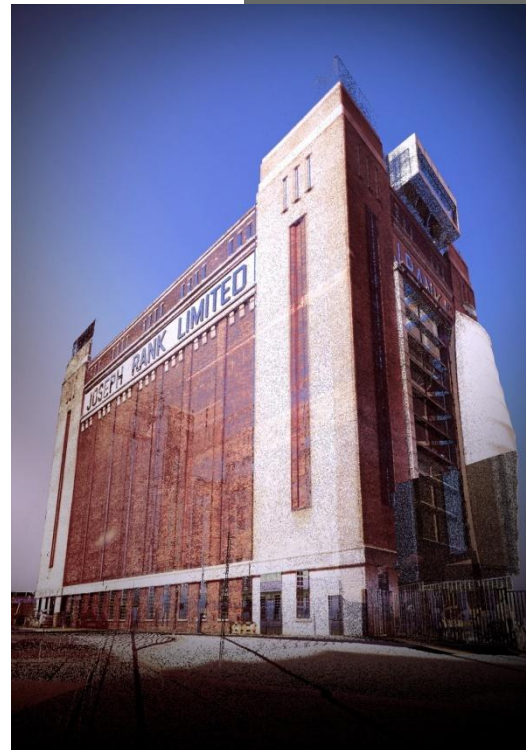
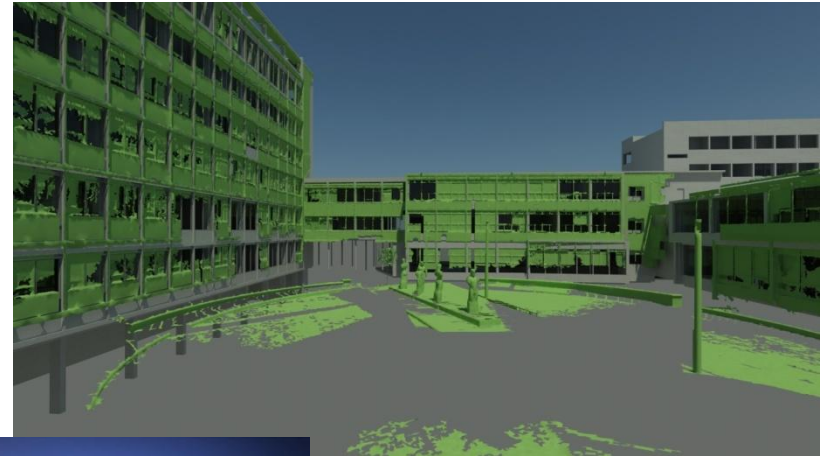
Captures millions of survey points (3D)

Provides accurate as-built information

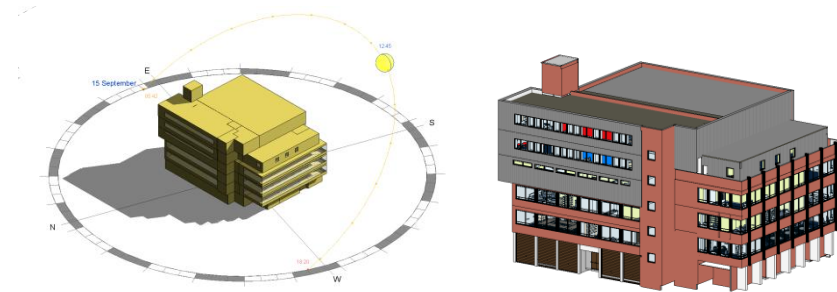
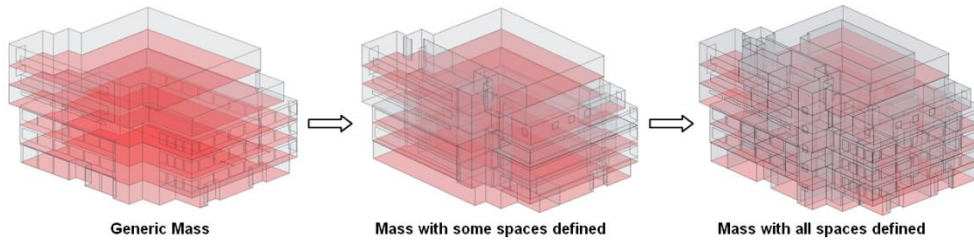
Interoperable with BIM tools

Used as basis for design development

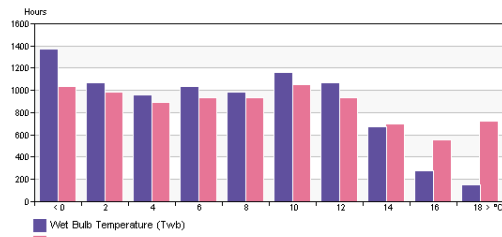
Validates accuracy of existing model



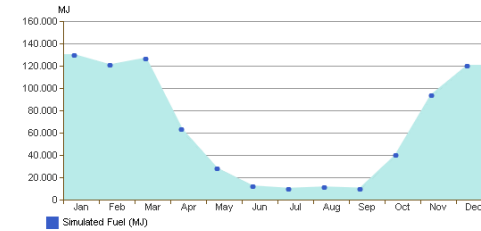
Building performance analysis



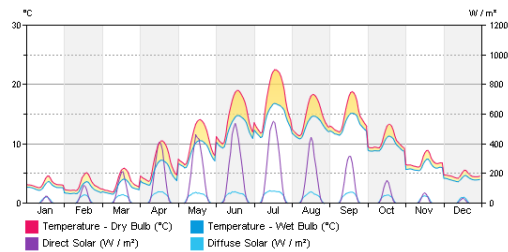
Annual Temperature Bins



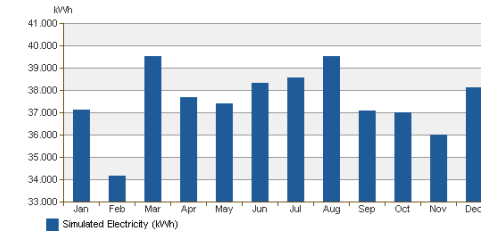
Monthly Fuel Consumption



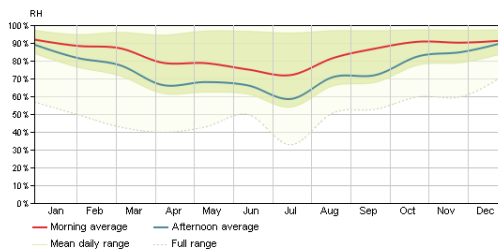
Diurnal Weather Averages



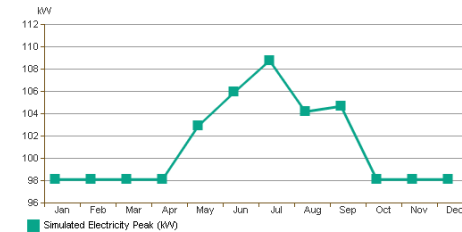
Monthly Electricity Consumption



Humidity



Monthly Peak Demand

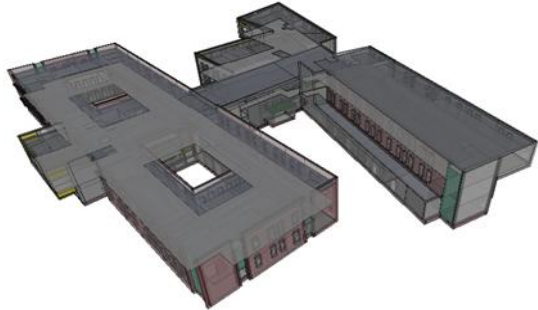


Visualisation

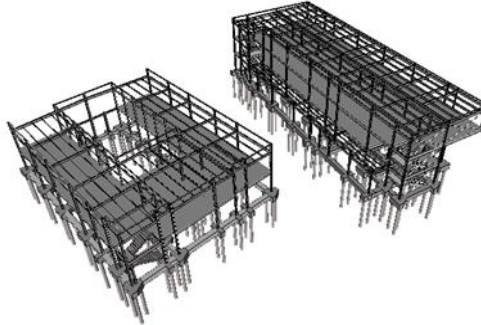


Design Coordination

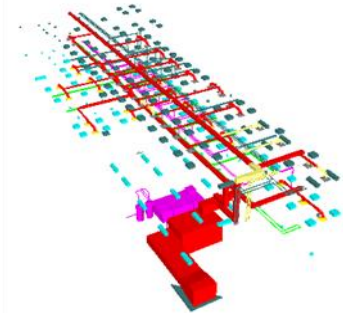
Architectural



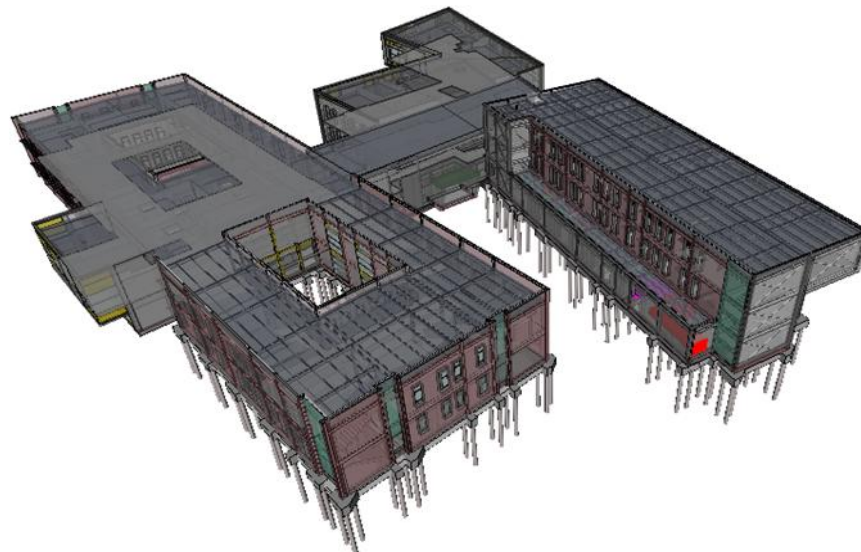
Structural



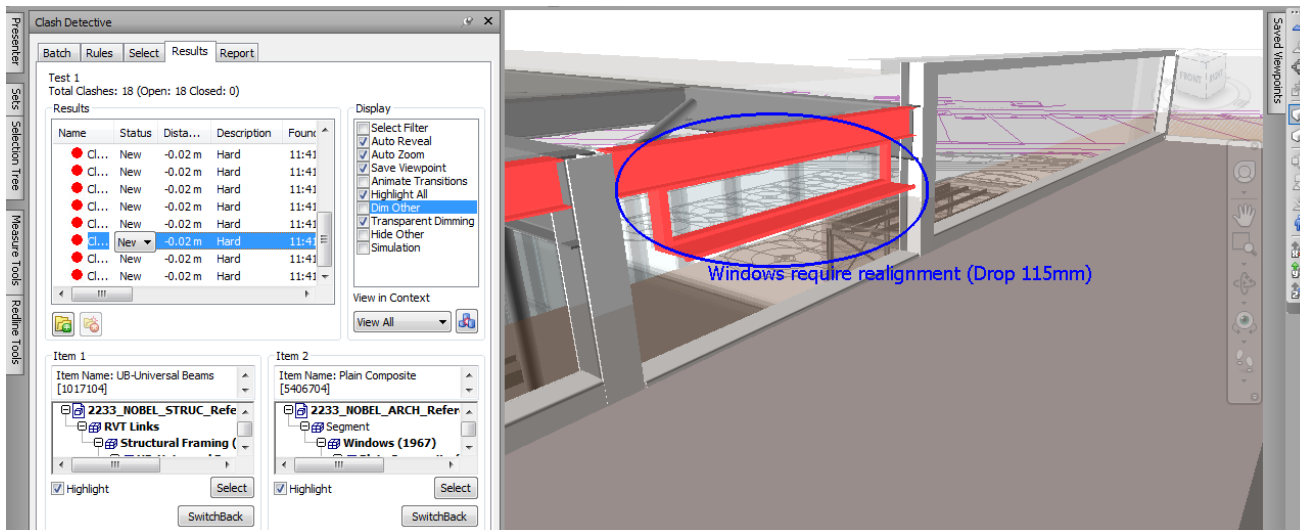
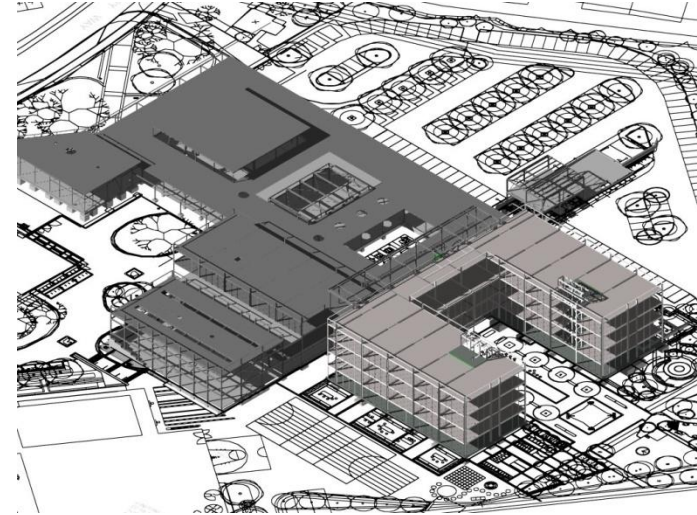
MEP



Multi-Discipline Model



Design Coordination



The screenshot shows a software interface with a 'Clash Detective' window on the left and a 3D model of a window frame on the right. The 3D model has a red highlight on a window frame, with a blue circle around it and the text 'Windows require realignment (Drop 115mm)' below it.

Clash Detective

Batch Rules Select Results Report

Test 1
Total Clashes: 18 (Open: 18 Closed: 0)

Name	Status	Dist...	Description	Found
Cl...	New	-0.02 m	Hard	11:41
Cl...	New	-0.02 m	Hard	11:41
Cl...	New	-0.02 m	Hard	11:41
Cl...	New	-0.02 m	Hard	11:41
Cl...	New	-0.02 m	Hard	11:41
Cl...	New	-0.02 m	Hard	11:41
Cl...	New	-0.02 m	Hard	11:41
Cl...	New	-0.02 m	Hard	11:41
Cl...	New	-0.02 m	Hard	11:41
Cl...	New	-0.02 m	Hard	11:41

Display

- Select Filter
- Auto Reveal
- Auto Zoom
- Save Viewpoint
- Animate Transitions
- Highlight All
- Dim Other
- Transparent Dimming
- Hide Other
- Simulation

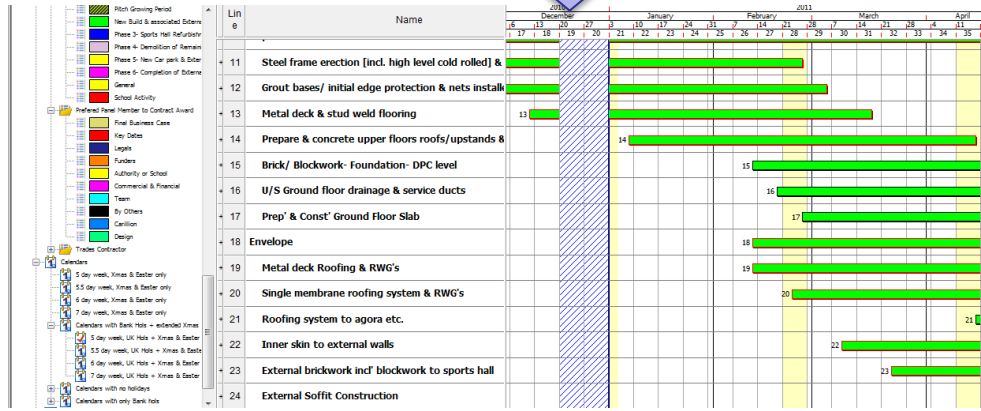
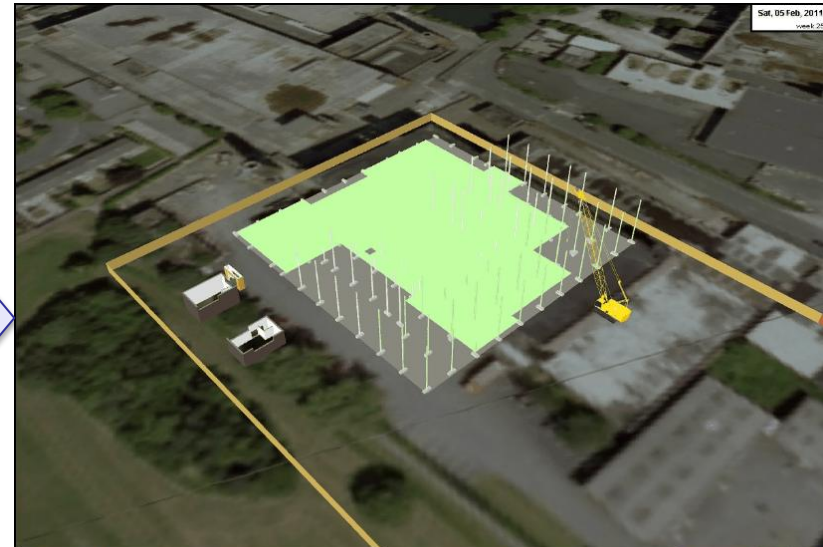
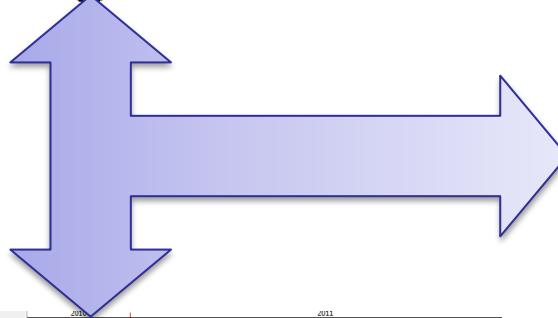
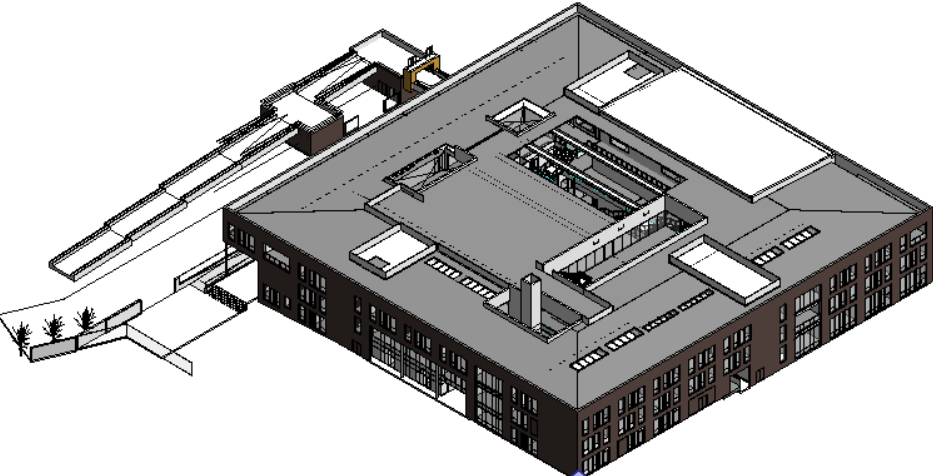
View in Context
View All

Item 1
Item Name: UB-Universal Beams [101710-4]
2233_NOBEL_STRUC_Ref
RVT Links
Structural Framing (

Item 2
Item Name: Plain Composite [540670-4]
2233_NOBEL_ARCH_Ref
Segment
Windows (1967)

Windows require realignment (Drop 115mm)

Model-based programming (4D)



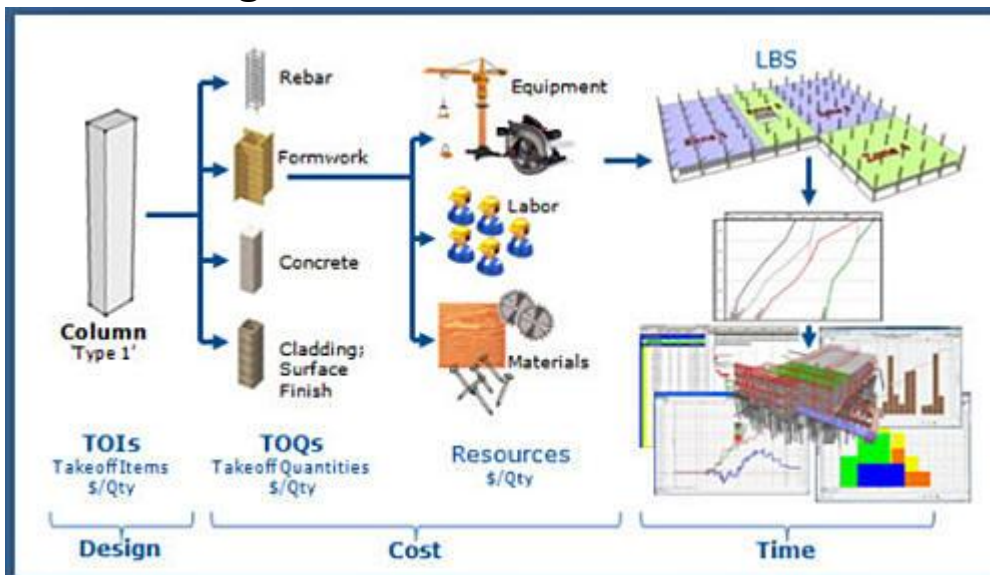
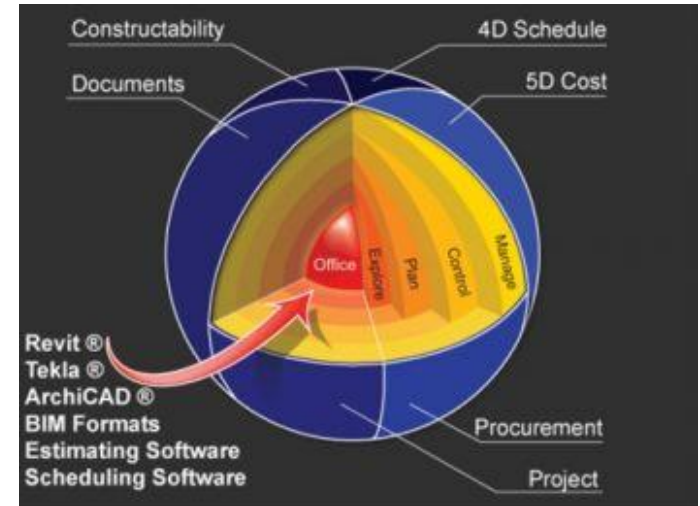
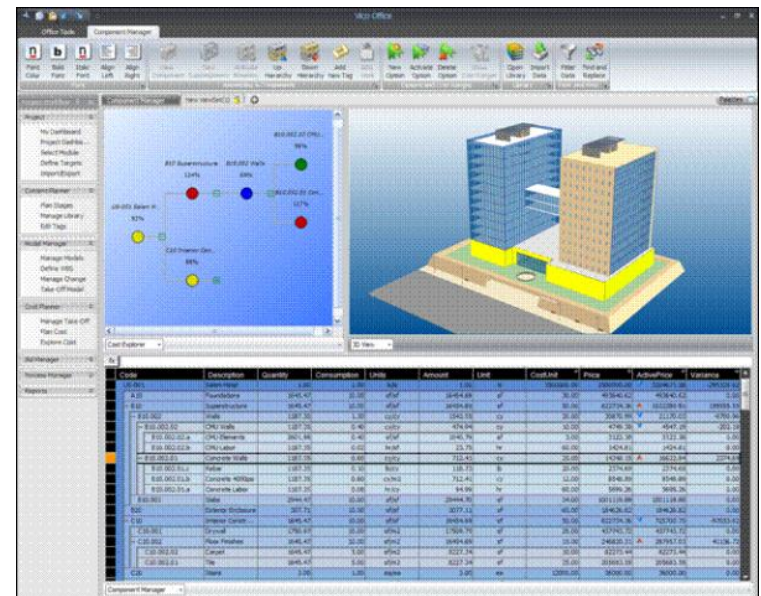
Model-based cost management (5D)

5D = 3D Model + Time + Cost

Quantities, Labour, Schedules, Equipment...

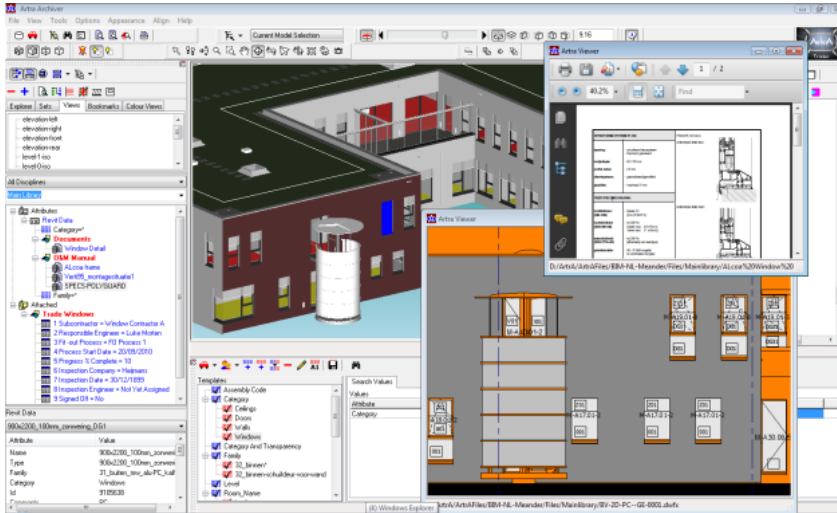
Comparative analysis

Interoperability with 3D modelling technologies

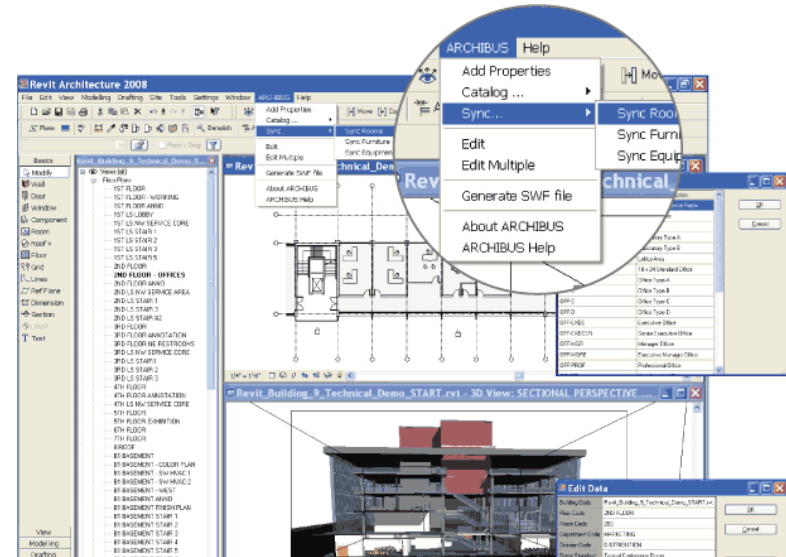



Code	Description	Quantity	Consumption	Unit	Amount	Unit	Cost/Unit	Price	Actual Price	Variance
A.01	Foundation	2045.42	0.25	m ³	5054.89	m ³	30.05	4534.72	4534.72	0.00
A.02	Superstructure	2045.42	0.25	m ³	5054.89	m ³	30.05	4534.72	4534.72	0.00
B.01.001.01	Rebar	1287.76	1.30	kg	2474.13	kg	1.92	2474.13	2474.13	0.00
B.01.001.02	Formwork	1287.76	1.40	m ²	474.94	m ²	3.70	474.94	474.94	0.00
B.01.001.03	Concrete	2045.42	2.40	m ³	2445.76	m ³	1.20	2445.76	2445.76	0.00
B.01.001.04	Cladding	1287.76	0.02	m ²	23.76	m ²	18.43	23.76	23.76	0.00
B.01.001.05	Concrete Wall	1287.76	0.80	m ³	712.45	m ³	55.35	712.45	712.45	0.00
B.01.001.06	Rebar	1287.76	0.10	kg	188.75	kg	18.00	188.75	188.75	0.00
B.01.001.07	Concrete Wall	1287.76	0.80	m ³	712.45	m ³	55.35	712.45	712.45	0.00
B.01.001.08	Concrete Labor	1287.76	0.08	hr	94.90	hr	118.00	94.90	94.90	0.00
B.01.001.09	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.10	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.11	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.12	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.13	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.14	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.15	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.16	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.17	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.18	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.19	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.20	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
B.01.001.21	Formwork	2045.42	0.20	m ²	2045.42	m ²	1.00	2045.42	2045.42	0.00
C.01	Plant	1.00	1.00	hr	1.00	hr	1.00	1.00	1.00	0.00


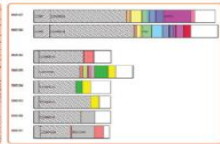

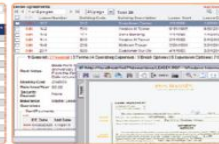
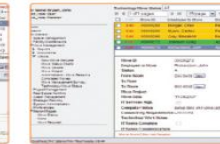

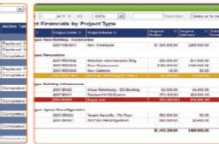





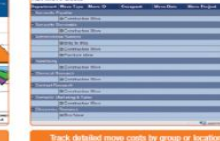



6D (model-based facilities management)



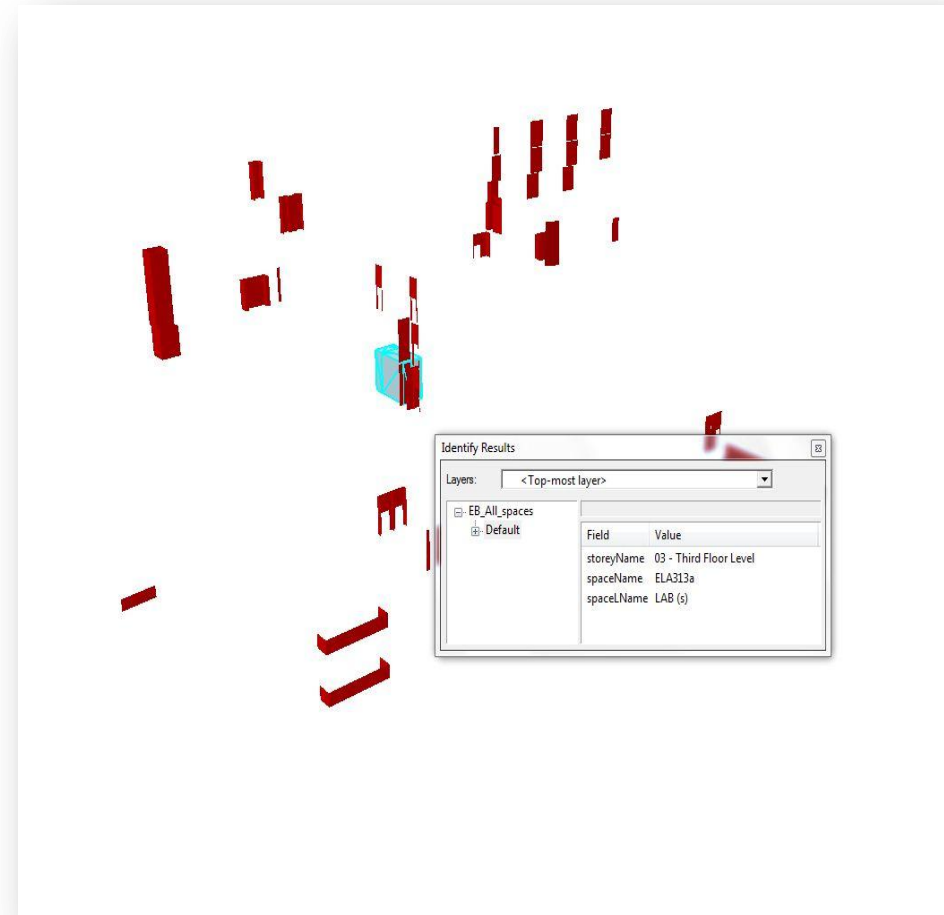
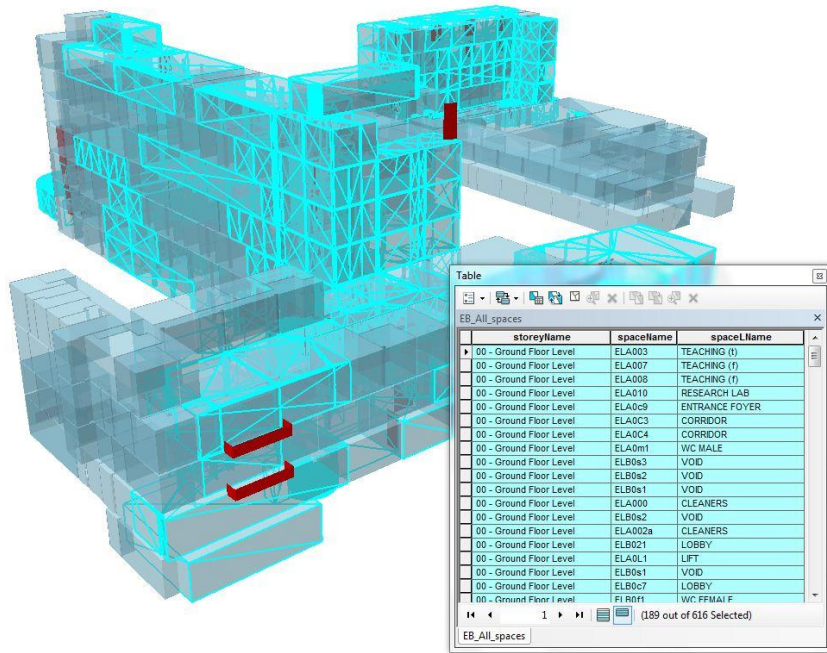
Artra: Asset and Plant Lifecycle



ArchiBus

SPACE MANAGEMENT	STRATEGIC PLANNING	ASSET MANAGEMENT	REAL ESTATE PORTFOLIO MANAGEMENT	MOVE MANAGEMENT	FACILITY MAINTENANCE	PROJECT MANAGEMENT	SUSTAINABILITY
Improve occupancy rates and space utilization with detailed space inventories, accurate occupancy data, and facilities benchmarks. Track departmental allocations and easily produce chargeback reports. Link facility information to the detailed spatial information in your AutoCAD drawings and use a Web browser to navigate and visualize real-time facility data on your floor plans.	Align real estate and facilities plans with business operations by analyzing space requirements and forecasting future space needs. Create multiple "what if" scenarios and tracking plans to uncover opportunities for portfolio savings.	Track corporate assets such as furniture, equipment, computers, life safety systems, building systems and network.	Reduce real estate costs by analyzing property performance data and monitoring portfolio performance against key performance indicators and industry benchmarks. Track lease information and monitor key events such as expiration and renewal dates.	Reduce move costs and churn rates by automating move processes, notifications and reports. Improve communication with partners and internal customers with Web-based access to real-time move data.	Streamline work order and preventive maintenance processes for technicians and vendors with automatic notifications, mobile access and detailed reports. Improve internal customer satisfaction with Web-based service request forms and work order status views.	Keep facility projects on schedule and on budget by tracking key financial and schedule information. Manage multiple contracts, vendors and project phases.	Plan and analyze sustainability projects and building performance across your portfolio. Assess buildings and manage certifications (e.g. LEED, Green Globes, GREEN) Integrate with EPA's Portfolio Manager to calculate Energy Star ratings and your carbon footprint. Share results enterprise-wide with intuitive dashboards and reports.
							
View detailed occupancy data on floorplans.	Develop multiple occupancy scenarios with interactive tracking diagrams.	Track asset depreciation for financial reporting and compliance.	Associate multiple documents with lease records.	Keep everyone up to date with move status views and notifications.	Maintain an accurate history of equipment service and costs.	Track key project thresholds and identify projects with budget risks.	Forecast the financial and environmental impact of your sustainability efforts.
							
Compare utilization data with portfolio performance.	Gather and forecast bandwidth and space requirements.	Easily locate assets on floorplans.	Analyze portfolio costs and historical trends.	Track detailed move costs by group or location.	Easily locate equipment on floorplans.	View project timelines and keep work on schedule.	Track and manage building environmental performance.

6D (model-based facilities management)



Northumbria University –
Ellison Building – linking
asbestos records with BIM
and visualising in a wire
frame model

Relevance of BIM Workstreams

Quantity Surveyor

Space Programming	
Laser Scanning	
Pedestrian Simulation	
3D Modelling	✓
Room Loading	✓
Standardisation	✓
Information	✓
Visualisations	✓
Building Performance Analysis	
Design Coordination	✓
Systems building / Offsite manufacture	✓
4D Planning (time)	✓
5D Planning (cost)	✓
6D Planning (operations)	✓

BIM – Learning & Teaching



Currently:

BE0890 – Measurement & Technology 2 (Year2)

- Visualisation

BE0778 – Construction Economics (Year 2)

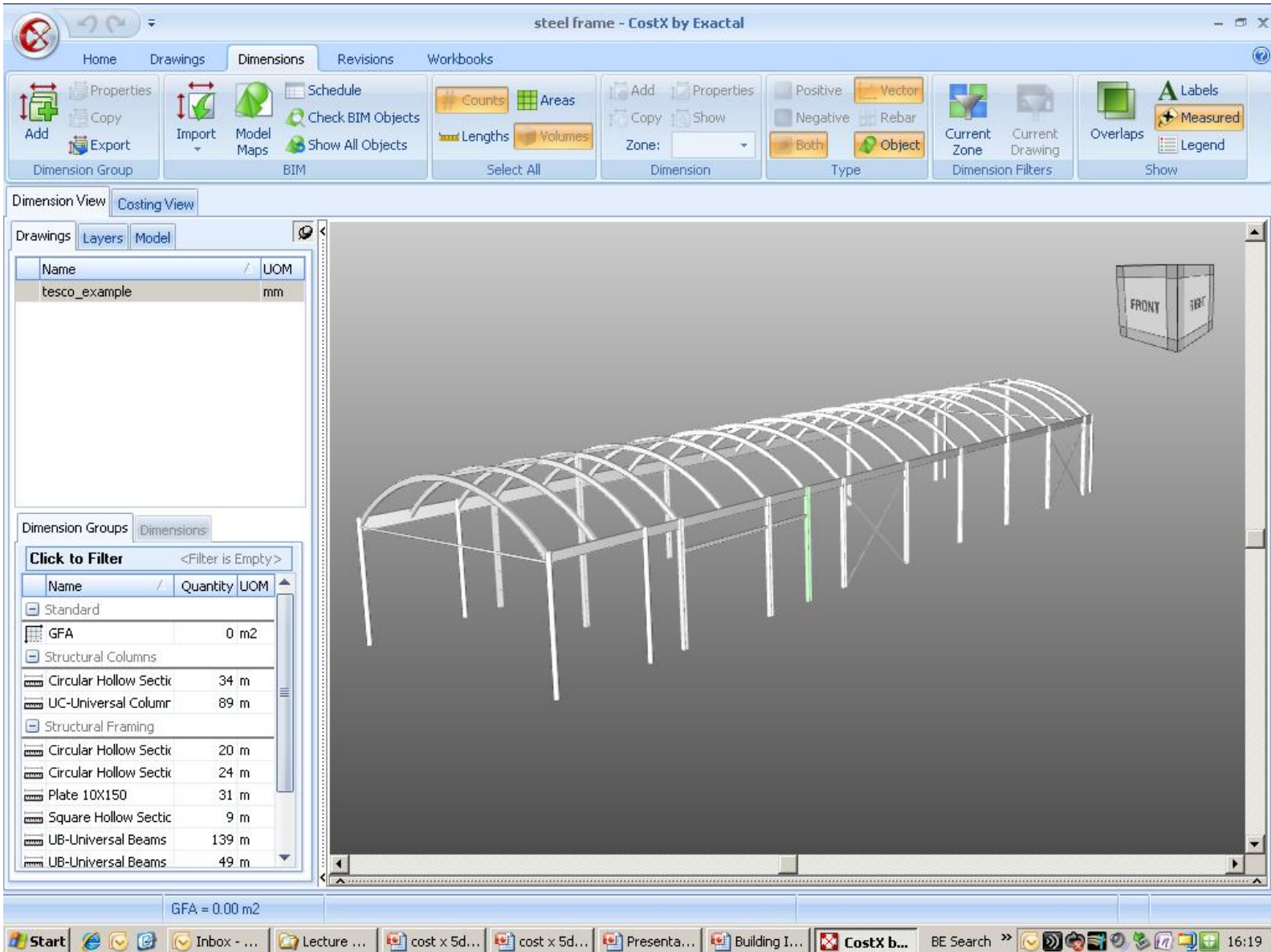
- 3d models (revit software)/Data scheduling/ quantification/ pricing
- Coursework

Future:

BIM technology & collaboration techniques will be incorporated into QS modules for:

- Enhance the learning experience
- Up to date industry methods & techniques
- Development of QS specific skills
 1. Visualisation – 3d viewing
 2. Quantification
 3. Data Scheduling & pricing
 4. Multi disciplinary work based projects

BIM – BE0890 Visualisation



The screenshot displays the CostX software interface for a project named "steel frame - CostX by Exactal". The interface is divided into several sections:

- Top Ribbon:** Contains tabs for Home, Drawings, Dimensions, Revisions, and Workbooks. The Dimensions tab is active, showing various tool groups like Dimension Group, BIM, Select All, Dimension, Type, Dimension Filters, and Show.
- Dimension View:** Shows a "Costing View" with a table listing dimension groups. The table has columns for Name and UOM.
- Dimension Groups Table:**

Name	Quantity	UOM
Standard		
GFA	0	m2
Structural Columns		
Circular Hollow Sectic	34	m
UC-Universal Columr	89	m
Structural Framing		
Circular Hollow Sectic	20	m
Circular Hollow Sectic	24	m
Plate 10X150	31	m
Square Hollow Sectic	9	m
UB-Universal Beams	139	m
UB-Universal Beams	49	m
- 3D Model:** A 3D wireframe model of a steel frame structure with a curved roof. A small 3D box labeled "FRONT" is visible in the top right corner of the model view.
- Status Bar:** Shows "GFA = 0.00 m2".
- Taskbar:** Displays various open applications including "cost x 5d...", "Presenta...", "Building I...", and "CostX b...". The system clock shows "16:19".

The BIM Academy

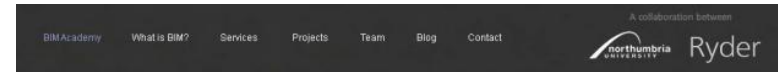


- Aims**
- Promote collaborative working
 - Support the supply chain through facilitation, training and resource
 - Innovation in partnership with industry
 - Independence and impartiality
 - Evidence based design, delivery and operation

Services Research and Development, Education, Consultancy



Material change for a better environment



Transforming building through collaboration and innovation



Welcome to BIM Academy

We are a partnership between experienced industry professionals and academics who have come together to create a centre of excellence in Building Information Modelling (BIM).

We undertake consultancy, education, research and development.

We support all members of the construction community in realising the benefits of BIM, we drive innovation and promote collaborative working. We can help overcome the barriers to successful BIM adoption, provide support through peaks and troughs of workload and assist the transition to higher levels of BIM implementation and true integrated project delivery.

Our staff includes design and construction professionals, senior academics, research graduates and BIM technologists who are experienced in the practical application of BIM from design through construction and operation.

Search

Latest Blog posts

- CloudBIM
- Big BIM and Little Finance
- Four ways the PQS can get into BIM - without spending any money.
- Has it become a Creative Groundhog Day....for architects! - Rethinking Design with a capital 'D'
- Tekla BIMsight - free collaboration software



Why teach BIM ?



New MSc Building Design Management and Building Information Modelling

Commences September 2012 - 1 year FT, 3 years PT

Aims of the programme

- To provide a better understanding of the future of construction and how the industry will develop in a BIM enabled future
- To provide an understanding of the complexity of working in interdisciplinary teams and managing collaborative design and production
- To allow students to develop new skills which will enhance their ability to plan and execute design for construction, producing more efficient, sustainable and buildable projects
- To allow construction industry professionals to enhance their existing skills in order to improve project delivery through the use of Building Information Modelling and Management.
- To foster leadership, decision making, strategic thinking and communication

<http://www.northumbria.ac.uk/?view=CourseDetail&code=DTFBBD6>