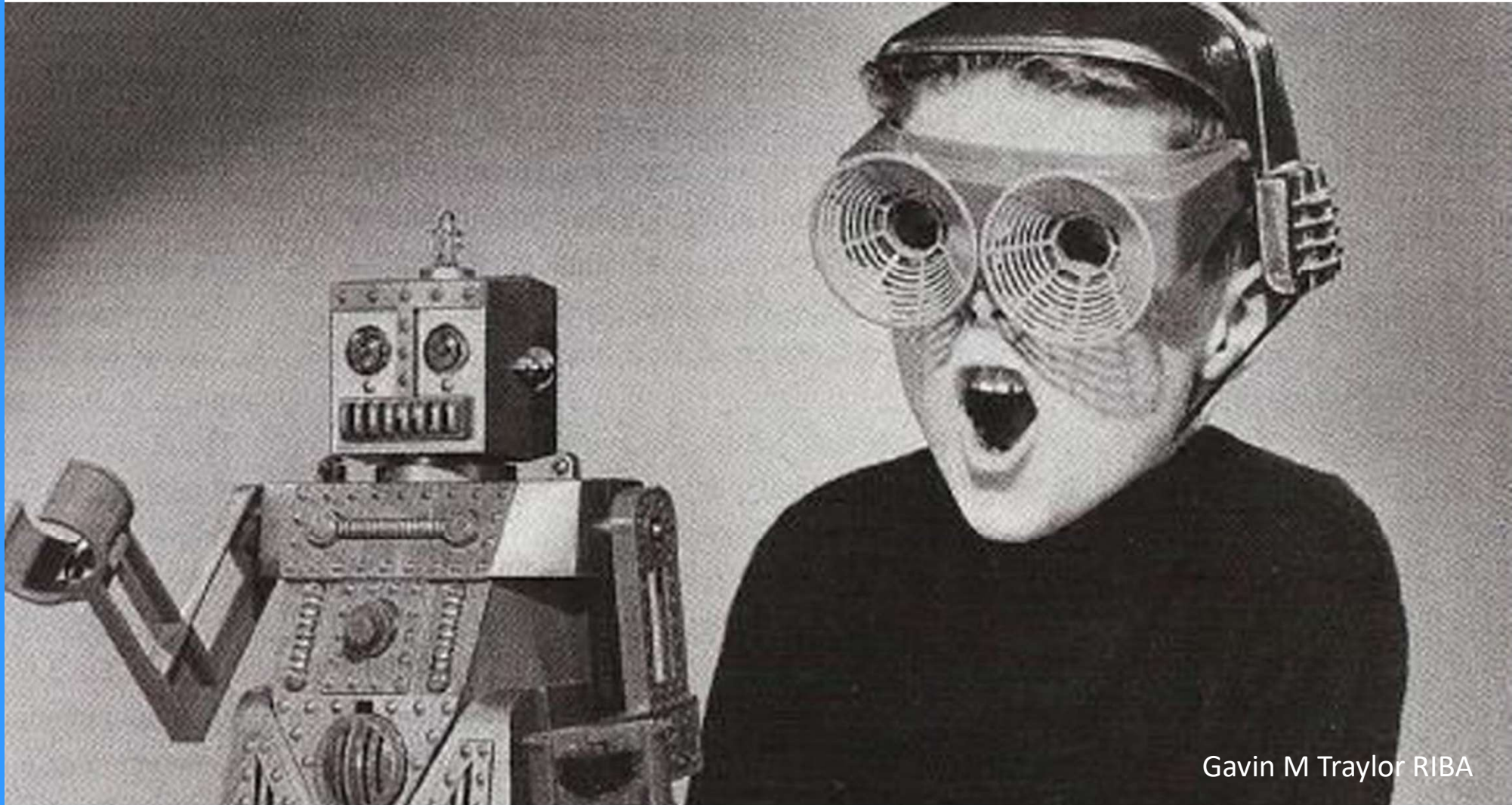


Session 2: Advanced Technology



Gavin M Traylor RIBA

Activity

Chat

Teams

Assignments

Calendar

Calls

OneDrive

mC
mConnect

...

Apps

< All teams

SY

SSoA Year 4_M.Arch_2025-26_GRP

...

Home page

Class Notebook

Classwork

Assignments

Grades

Reflect

Insights

▼ Main Channels

General

ACAA6005 Advanced Technology

ACAA6006 Architecture Studio A

ACAA6007 Current Issues

ACAA7000 Architecture Studio B

ACAA7001 Architecture Studio C

ACAA7002 Research Methods for Architects

Program of Studies Handbook

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ACAA6005 Advanced Technology

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ACAA6005 Advanced Technology

	Name ▾	Modified ▾	Modified By ▾	+ Add column
📄	Assessments	A few seconds ago	Gavin Traylor	
📁	Lecture Notes	A few seconds ago	Gavin Traylor	

What is it all about?

AIM(S)

- To review the principles of structural design, building construction and environmental science covered in the Part 1 qualification and encountered during professional experience.
- To allow students to investigate and share the latest developments in structural design, building materials, construction techniques, Fire and Safety Design and sustainable design.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

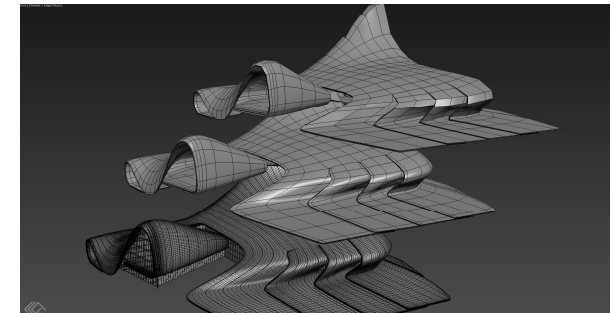
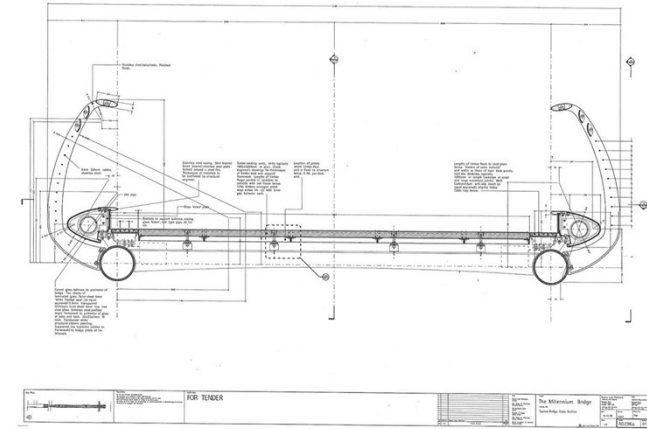
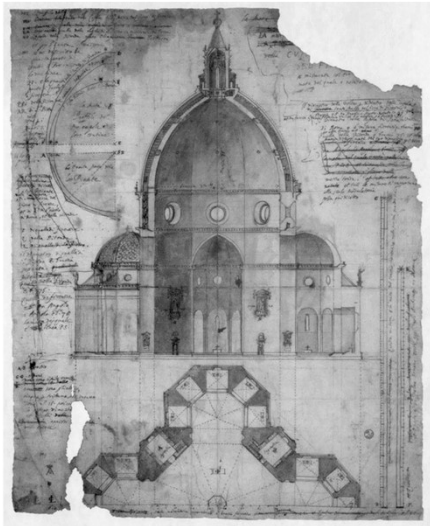
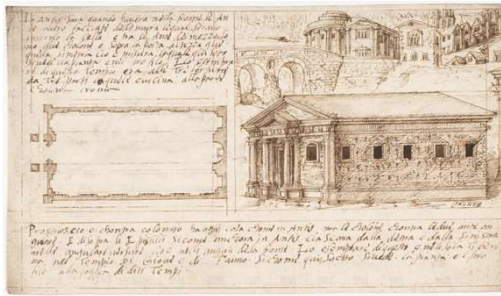
- demonstrate a systematic understanding of the main concepts of structural design, building construction and environmental science as they relate to the construction of buildings, including the science of fire, smoke generation and spread and design principles to minimise the risk of smoke and fire;
- outline the main current developments in structural design, building materials, construction techniques and sustainable design;
- explain the methods of investigation and information resources available to establish the state of current knowledge in construction technology;
- communicate the methods of utilising fabric first thermal efficiency, regenerative design solutions and ethical sourcing of products.

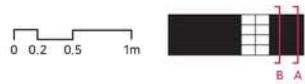
Core Themes

Understanding Buildings
Technology for creating data rich building stock
How Buildings Learn
Retrofit
Elemental Construction Methods
Structural Systems and Frames
Offsite
Material Science
Environmental & Low Carbon Approach
Fire Safety

Assessed through a Case Study
CW1 Technical Portfolio
CW2 Presentation

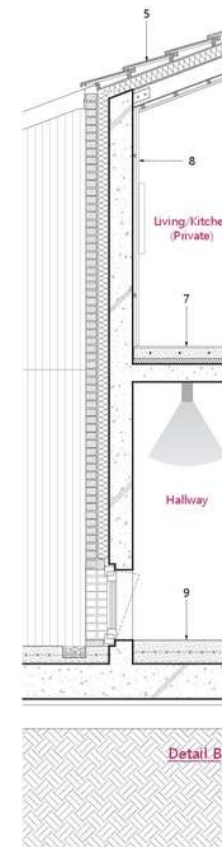
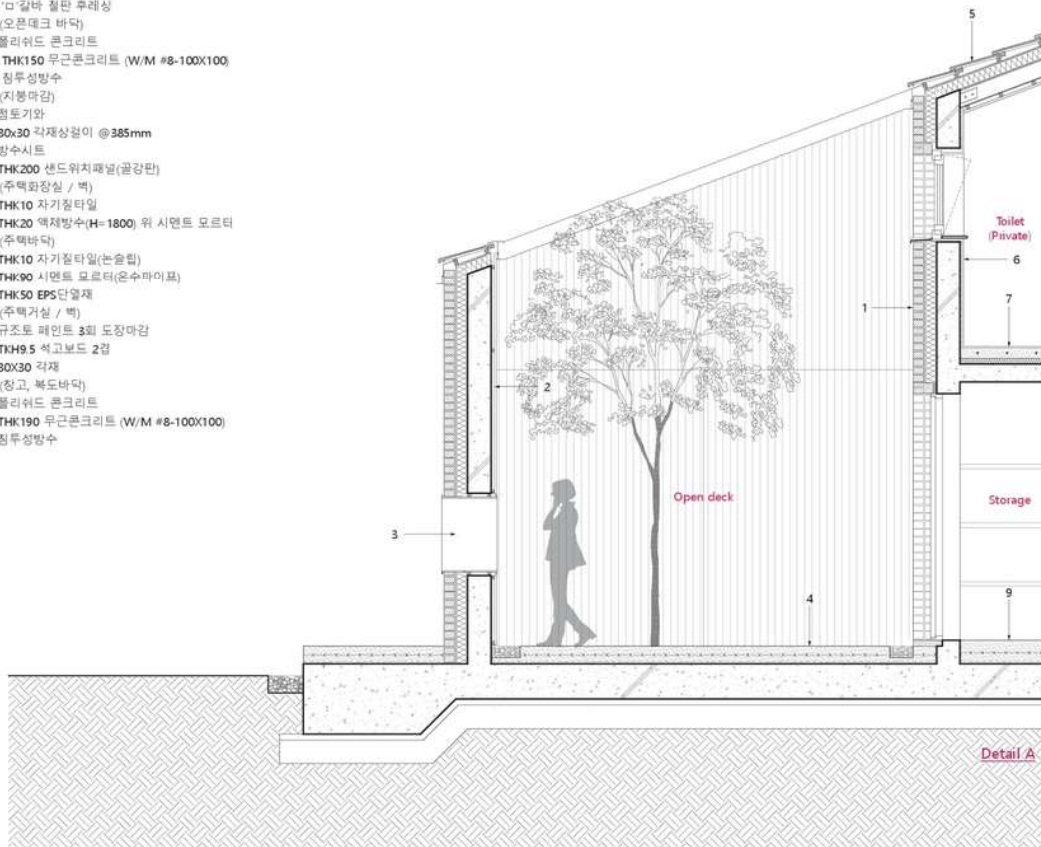
A picture is worth a thousand words





detail A, B

- 1 (외장재)
57X90X230 전벽돌 0.58쌓기
THK120 단열재
- 2 (오픈데크_벽)
알바우목재 마감
THK9.5 합판 1겹
30X30 각파이프 @600
- 3 (띠창마감)
폴소도창
'O'칼바 철판 후레싱
- 4 (오픈데크 바닥)
폴리워드 콘크리트
THK150 무근콘크리트 (W/M #8-100X100)
점투성방수
- 5 (지붕마감)
점토기와
30x30 각재상철이 @385mm
방수시트
THK200 샌드위치패널(열강판)
- 6 (주백화장실 / 벽)
THK10 자기질타일
THK20 액체방수(H=1800) 위 시멘트 모르타
- 7 (주백바닥)
THK10 자기질타일(눈솔집)
THK90 시멘트 모르타(운수마아포)
THK50 EPS단열재
- 8 (주백거실 / 벽)
규조토 페인트 3회 도장마감
TKH9.5 석고보드 2겹
30X30 각재
- 9 (창고, 복도바닥)
폴리워드 콘크리트
THK190 무근콘크리트 (W/M #8-100X100)
점투성방수



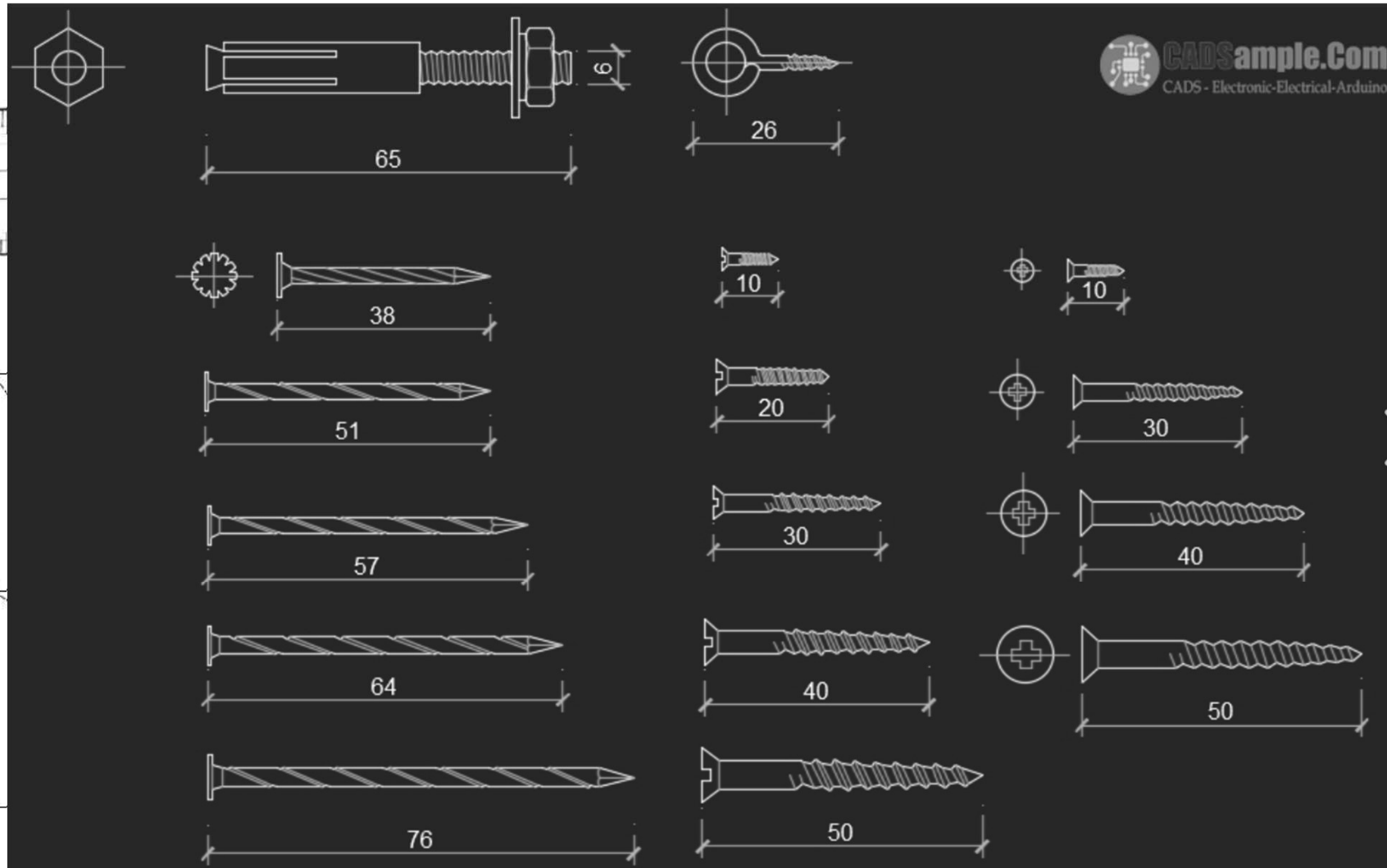
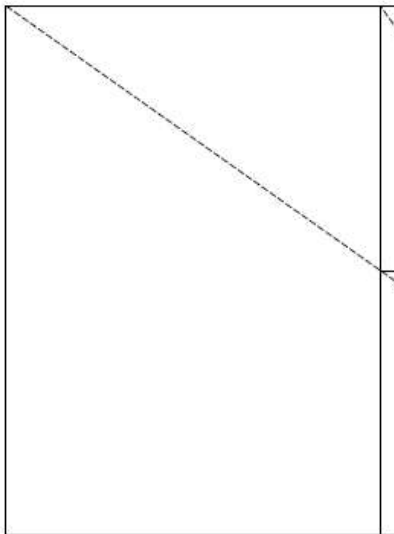
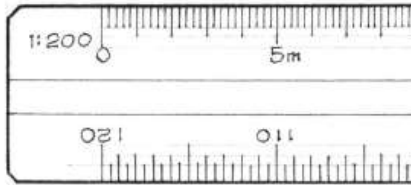
Drawings prepared in the Construction Industry

Must:

- Convey a message
- Read with understanding
- Demonstrate Knowledge
- Convey Ideas
- Explain a Narrative / Story

Industry conventions assist in the legibility of drawn information.

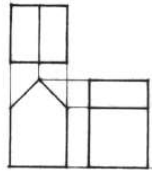
Appropriate Scale Drawings



Conventions

Projection Systems

Orthographic Projection



When we study how each projection system represents the same subject, we can see how different pictorial effects result. We categorize these pictorial systems into multiview drawings, parallel drawings, and perspective drawings.

Pictorial Systems

Multiview Drawings

- Multiview drawings consist of plans, sections, and elevations.
- The principal face in each view is oriented parallel to the picture plane.

Parallel Drawings

Isometrics: The three major axes make equal angles with the picture plane.

Dimetrics: Two of the three major axes make equal angles with the picture plane.

Trimetrics: All three major axes make different angles with the picture plane.

Axonometric Projection

Oblique Projection

Elevation obliques: A principal vertical face is oriented parallel to the picture plane.

Plan obliques: A principal horizontal face is oriented parallel to the picture plane.

Perspective Projection

Perspective Drawings

1-point perspectives: One horizontal axis is perpendicular to the picture plane while the other horizontal axis and the vertical axis are parallel with the picture plane.

2-point perspectives: Both horizontal axes are oblique to the picture plane and the vertical axis remains parallel with the picture plane.

3-point perspectives: Both horizontal axes as well as the vertical axis are oblique to the picture plane.

These pictorial views are available in most 3D CAD and modelling programs. The terminology, however, may differ from what is presented here.

Orthographic Projection

Drawings that can be prepared through orthographic projection to produce

PLANS

SECTIONS

ELEVATIONS

Typical CAD packages



AUTODESK
AUTOCAD
2020



VECTORWORKS®
A NEMETSCHEK COMPANY

GRAPHISOFT®
ARCHICAD



RhinoCeros®



AUTODESK
CIVIL3D



SketchUp



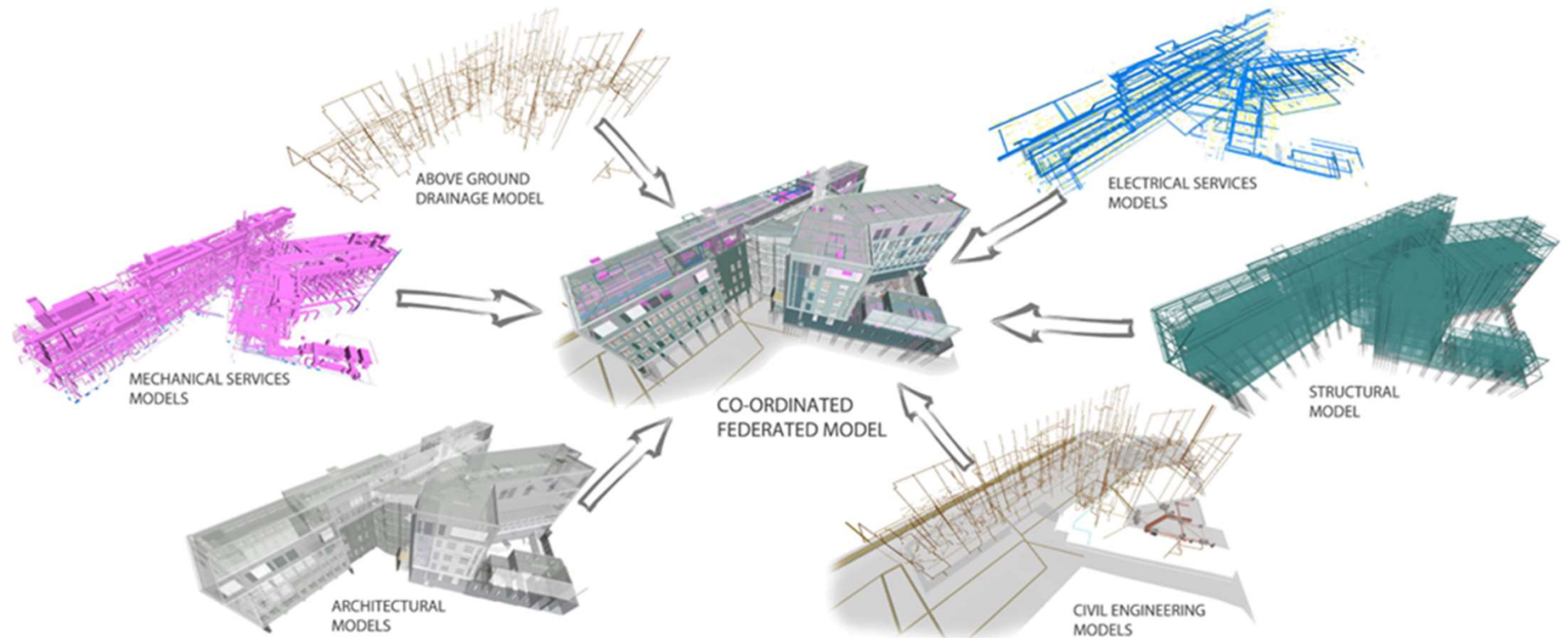
AUTODESK®
REVIT®

Is this enough?

How can we improve the way
we communicate?

BIM?

An Introduction to BIM



1 The accelerating pace of change ...



2 ... and exponential growth in computing power ...

Computer technology, shown here climbing dramatically by powers of 10, is now progressing more each hour than it did in its entire first 90 years

COMPUTER RANKINGS

By calculations per second per \$1,000



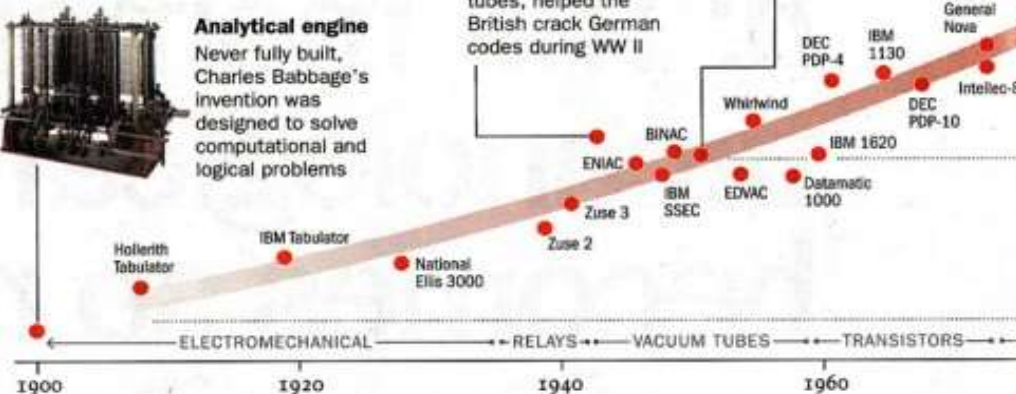
Analytical engine
Never fully built, Charles Babbage's invention was designed to solve computational and logical problems



Colossus
The electronic computer, with 1,500 vacuum tubes, helped the British crack German codes during WW II



UNIVAC I
The first commercially marketed computer, used to tabulate the U.S. Census, occupied 943 cu. ft.



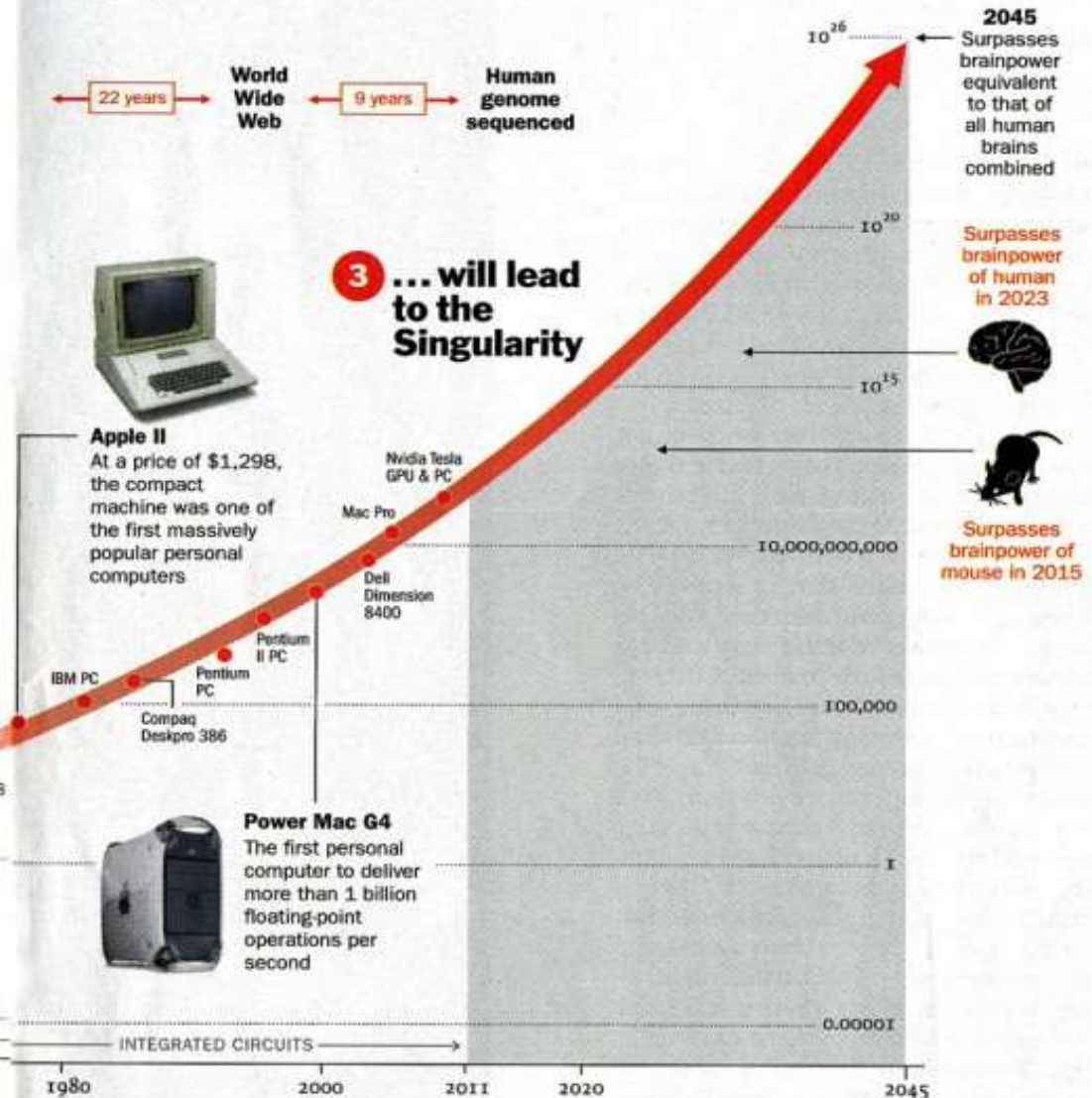
3 ... will lead to the Singularity



Apple II
At a price of \$1,298, the compact machine was one of the first massively popular personal computers



Power Mac G4
The first personal computer to deliver more than 1 billion floating-point operations per second



Building Information Modelling

What it really means is a PROCESS of.....

Better Information Management



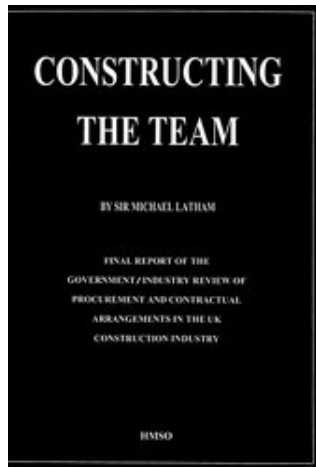
Why BIM?



Origins in UK

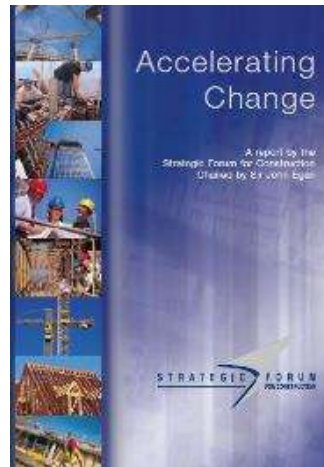


Latham
Report



Egan Report

Accelerating
Change



Never
Waste A
Good Crisis



BIS BIM
Strategy



Government
Construction
Strategy

1994

1998

2002

2009

2011

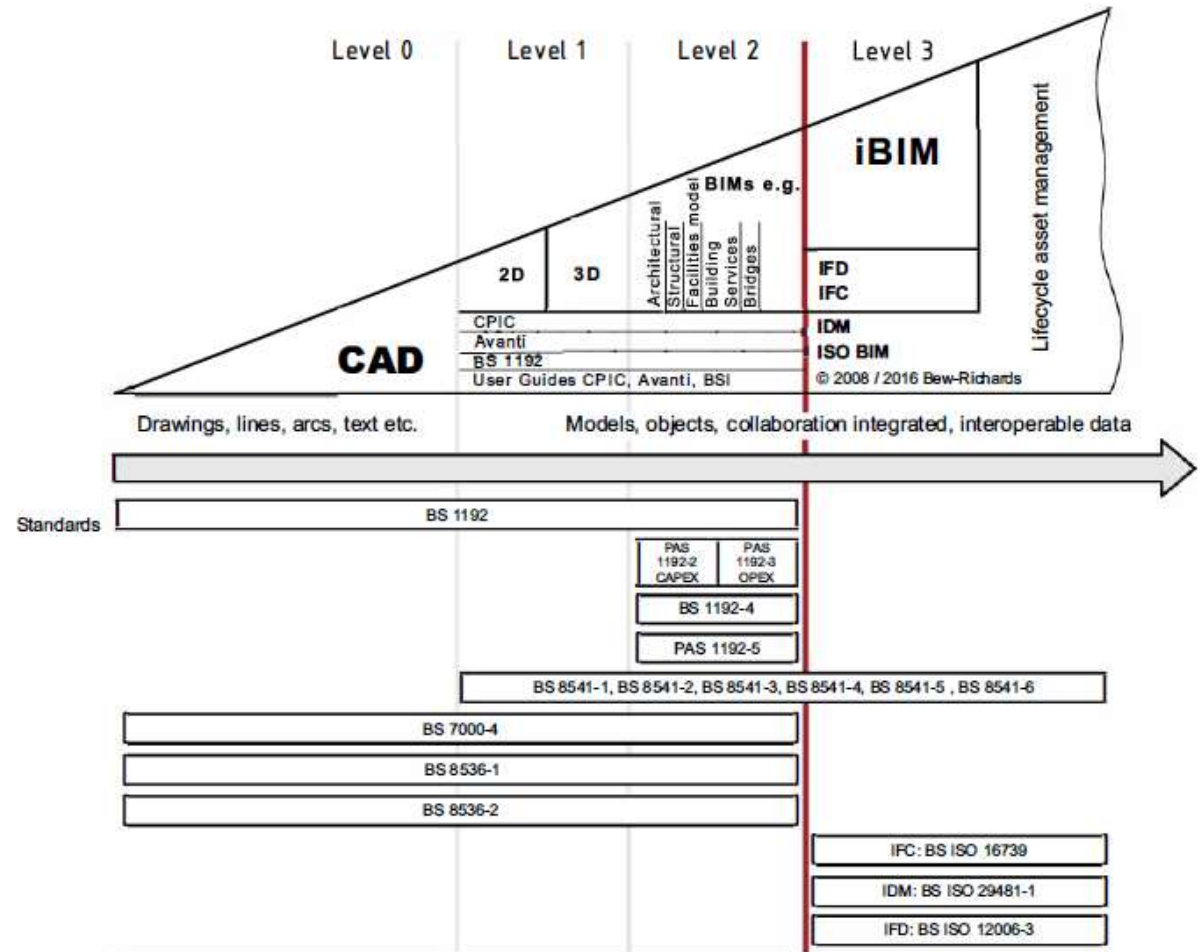
2011

Sir Michael **Latham** described as 'ineffective', 'adversarial', 'fragmented' and 'incapable of delivering for its customers'.

Maturity



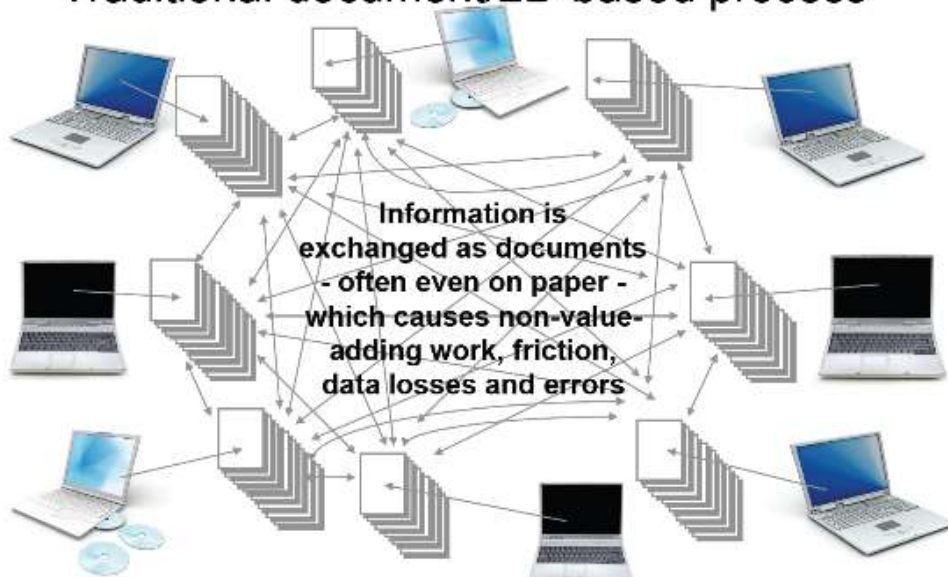
The Construction Strategy aimed at reducing the cost of public sector assets by up to 20% by 2016. To achieve this strategy, the government mandated that construction suppliers tendering for centrally-procured government projects to be working at BIM Level 2.



Bew Richards Wedge

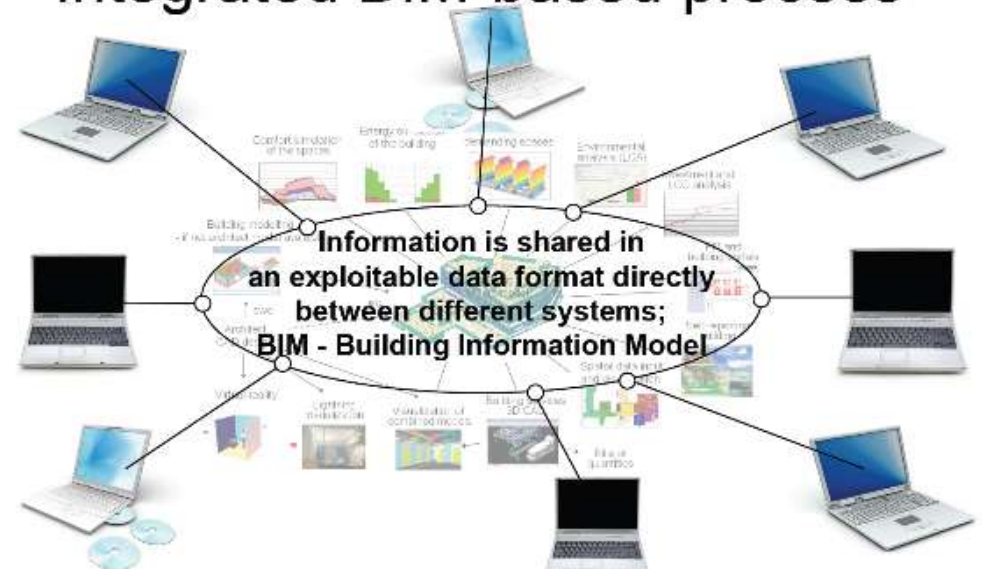
Benefits

Traditional document/2D-based process



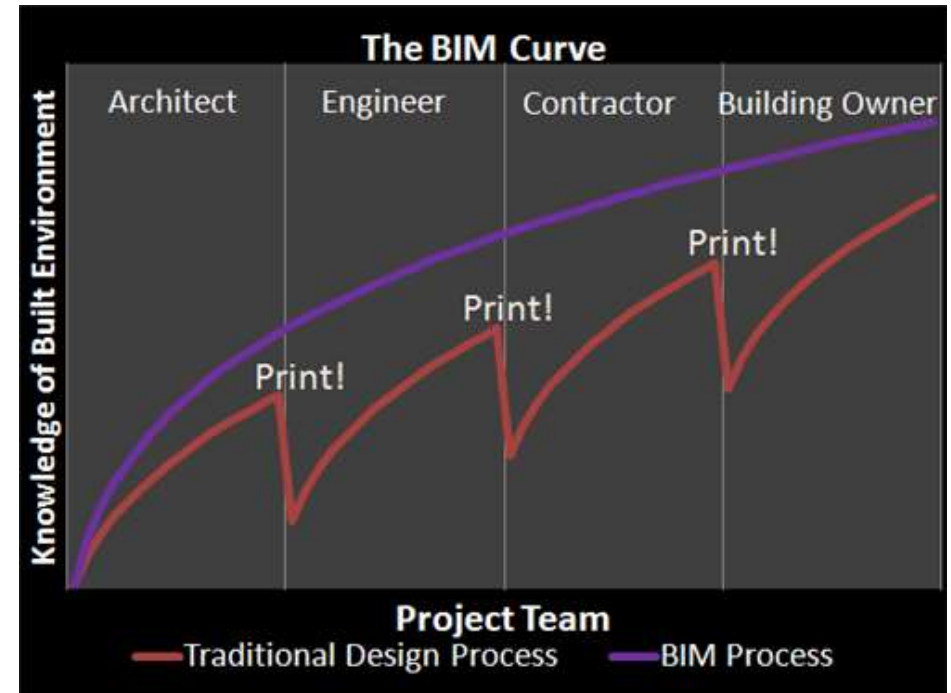
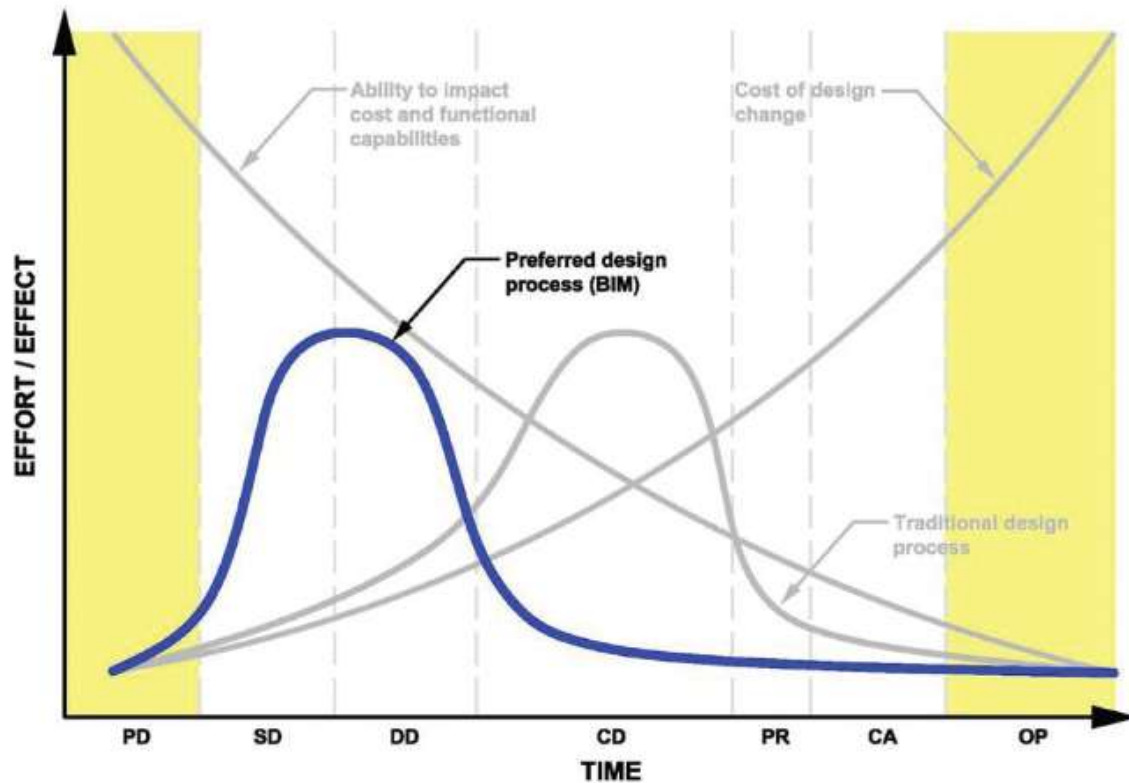
BIM Advanced, CE Wales, 16/01/2013

Integrated BIM-based process



Design, Construct, Operate and Maintain. **One Truth!**

Change Management

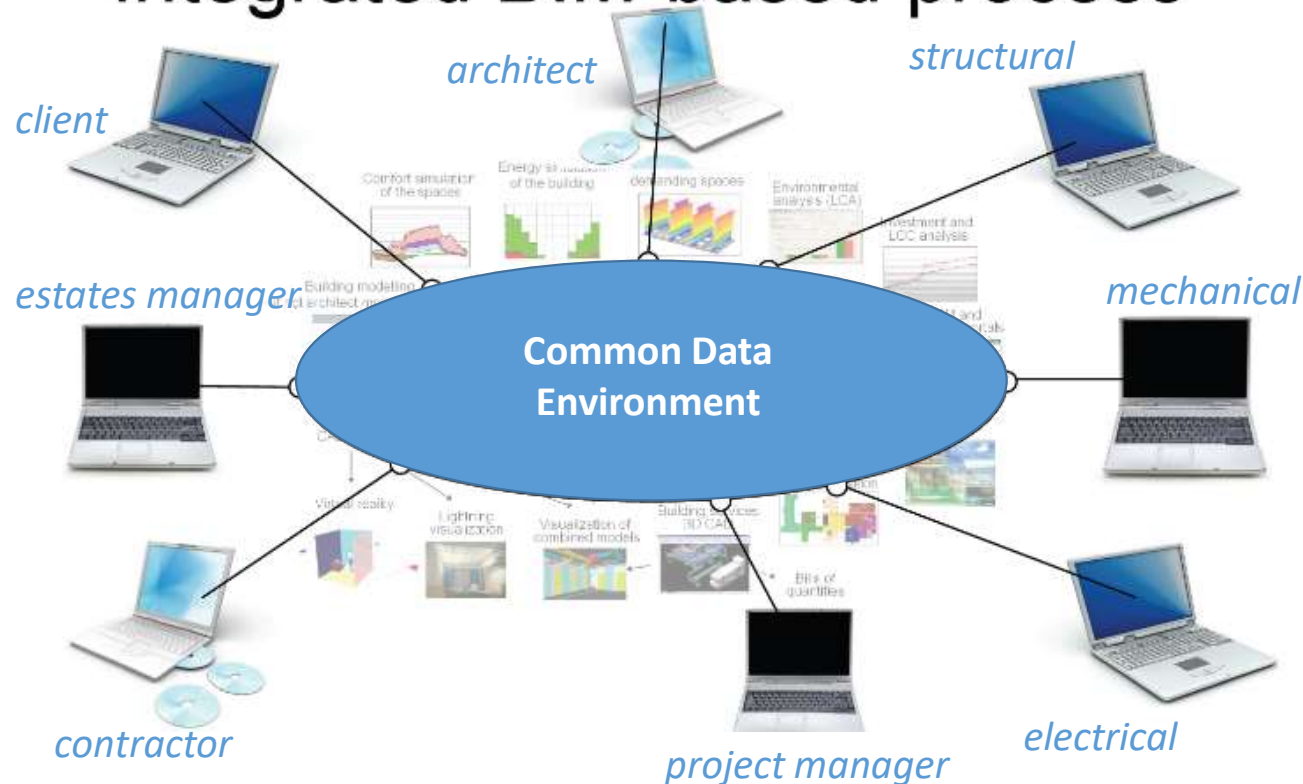


Clash Detection



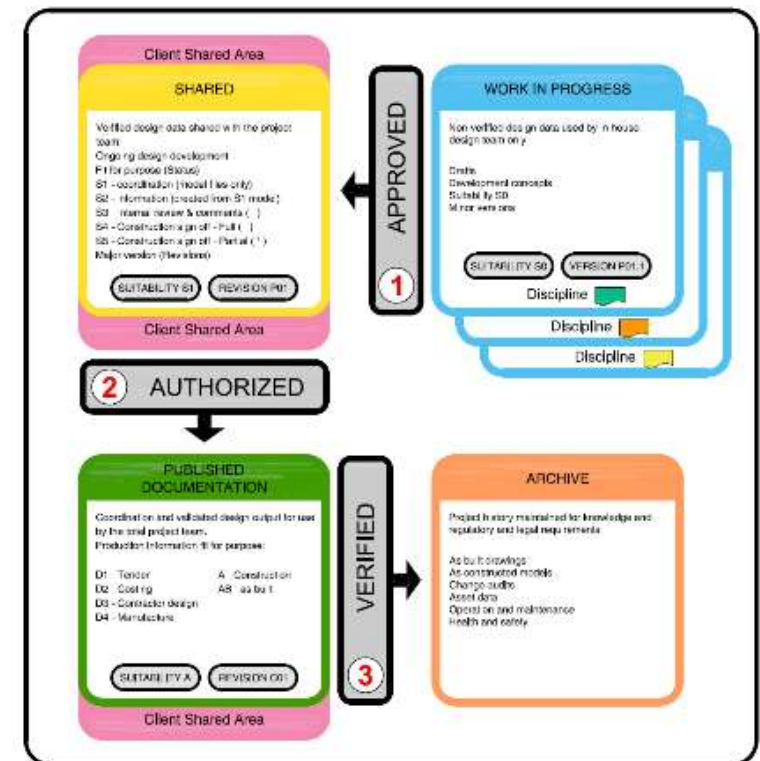
Application

Integrated BIM-based process



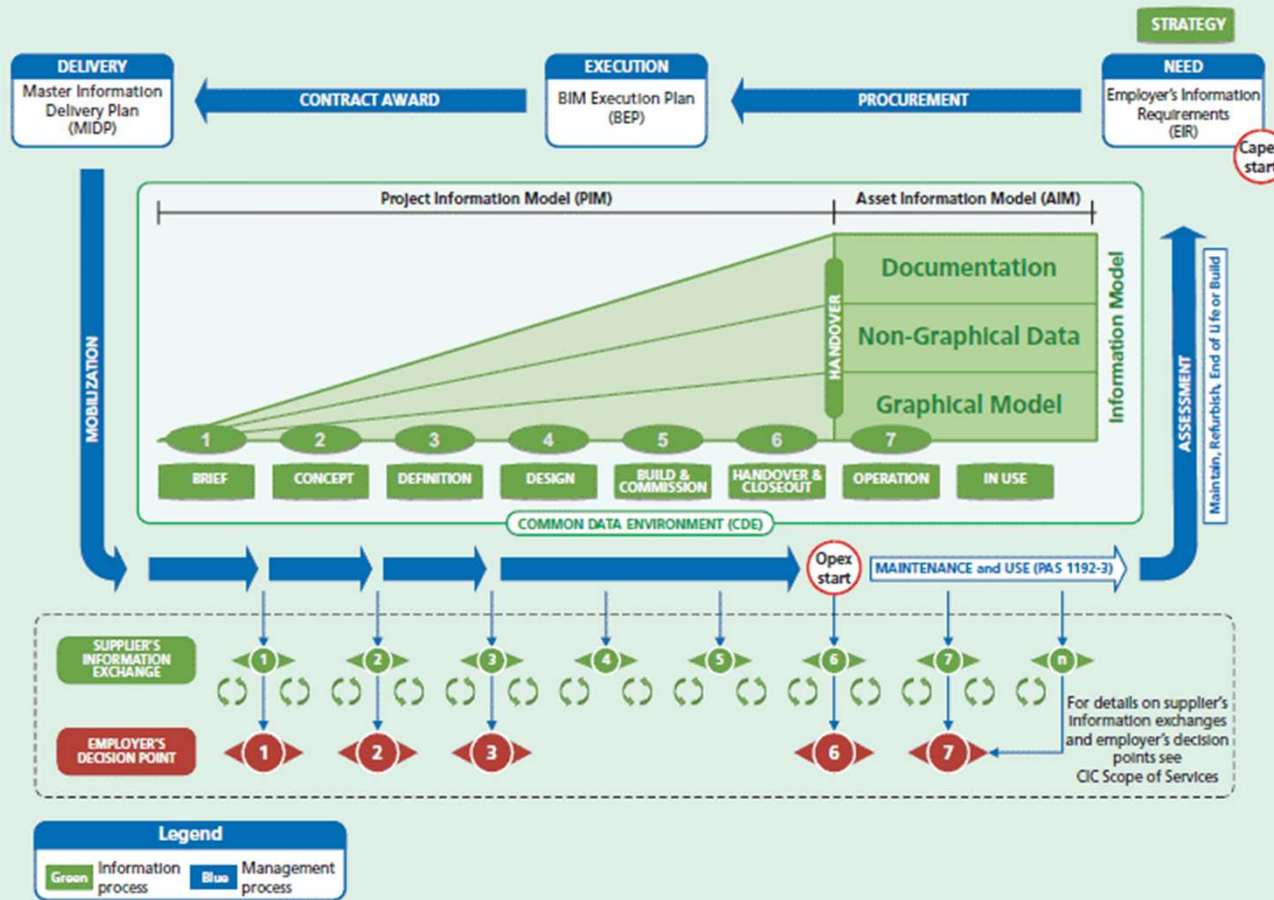
The structured use of a Common Data Environment (CDE) requires strict discipline by all members of a design team in terms of adherence to agreed approaches and procedures, compared with a more traditional approach. The benefits can only be realized with a commitment to operate in a disciplined and consistent manner throughout a project.

PAS 1192-2:2013

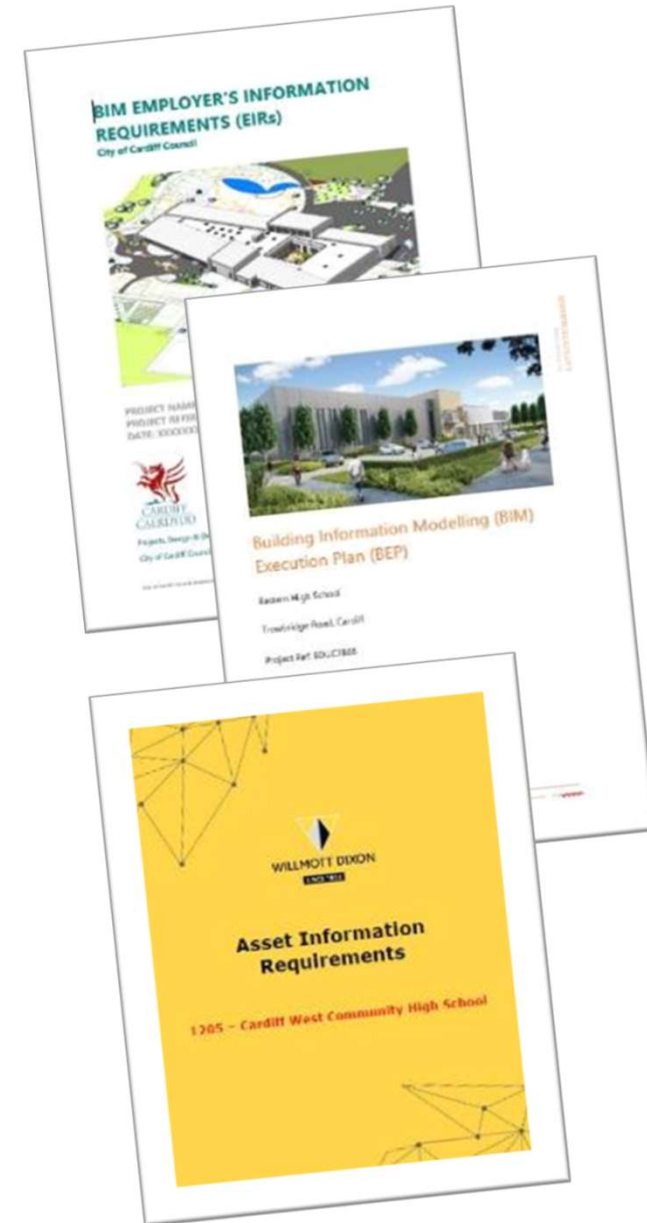


BIM Process Diagram

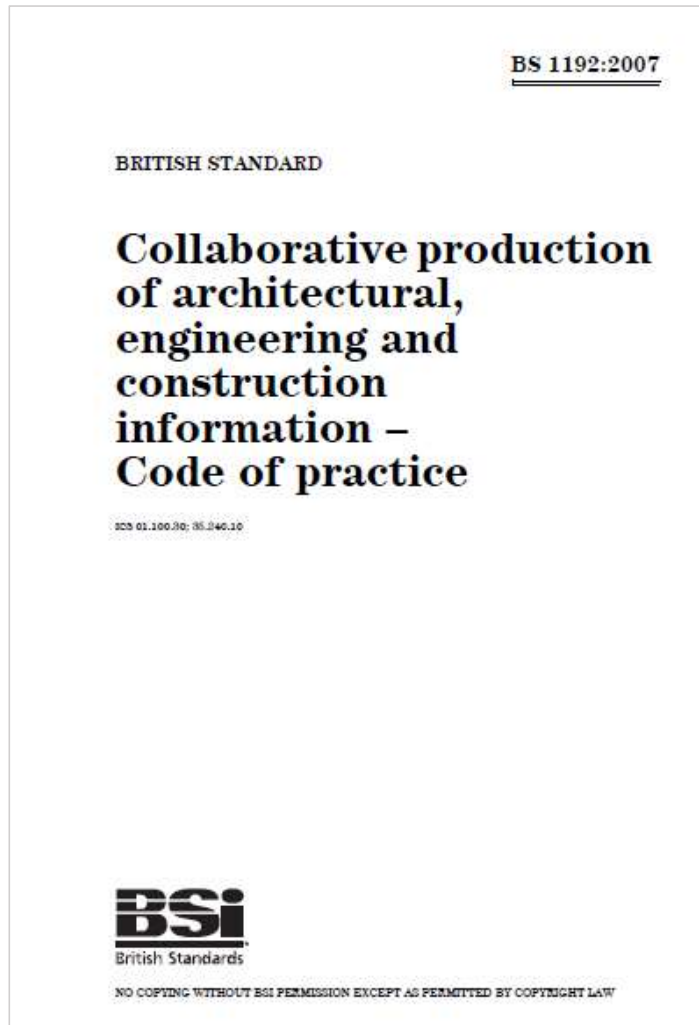
The information delivery cycle



PAS 1192-2:2013

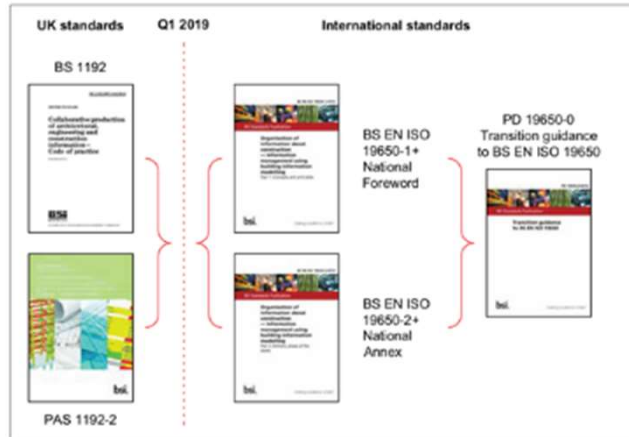


Key Standards



New
Guidance
came into
place
January
2019...

New Standards Q1 2019



BS EN ISO 19650-1:2018



BSI Standards Publication

Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling

Part 1: Concepts and principles

bsi.

BS EN ISO 19650-2:2018



BSI Standards Publication

Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling

Part 2: Delivery phase of the assets

bsi.

	UK Standards		International Standards
2019	BS 1192:2007+A2:2016 PAS 1192-2		BS EN ISO 19650-1 + National Foreword BS EN ISO 19650-2 + National Annex
			PD 19650-0 + Guide to BS EN ISO 19650
2020	PAS 1192-3 PAS 1192-5		BS EN ISO 19650-3 BS EN ISO 19650-5

Moving from the UK 1192 series to the ISO 19650 series

The good news is that the differences between the ISO standards and the UK standards are not major as the approach to BIM is very similar with the main differences relating to the terms and definitions. This milestone publication creates a fantastic opportunity to achieve even greater improvements in collaboration and customer satisfaction using BIM.

BSI clients currently holding BIM certification or verification, including the BSI Kitemark, will have the opportunity to transition their system to reflect the new ISO. To help you

upgrade we will be producing lots of supporting materials and services including webinars, training courses developed by experts, and informative whitepapers and articles.

If you are new to BIM, there's no better time to take advantage of the benefits this can mean for your organization.

Little Book of BIM

2019 edition

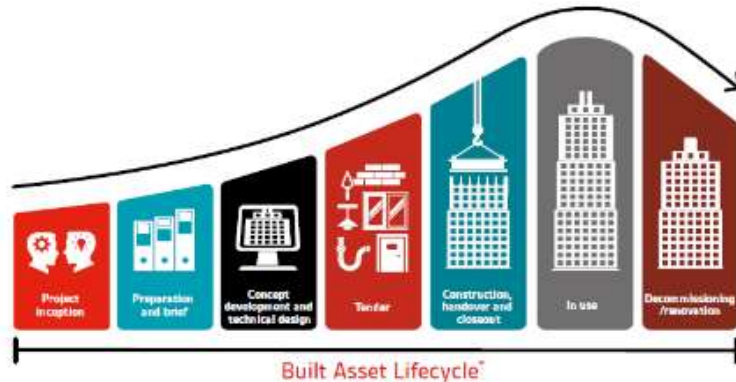
Includes ISO 19650 Standards

bsi.

...making excellence a habit™

BIM Definition

Building Information Modelling (BIM) is a collaborative way of working underpinned by digital technologies, which allow for more efficient methods of designing, delivering and maintaining physical built assets throughout their entire lifecycle. Greater efficiencies can be realized due to significant pre-planning during the design and construction phases, providing comprehensive information at handover stage.



* This asset lifecycle concept is based on the RIBA Plan of Work 2013

3

Key Standards for BIM

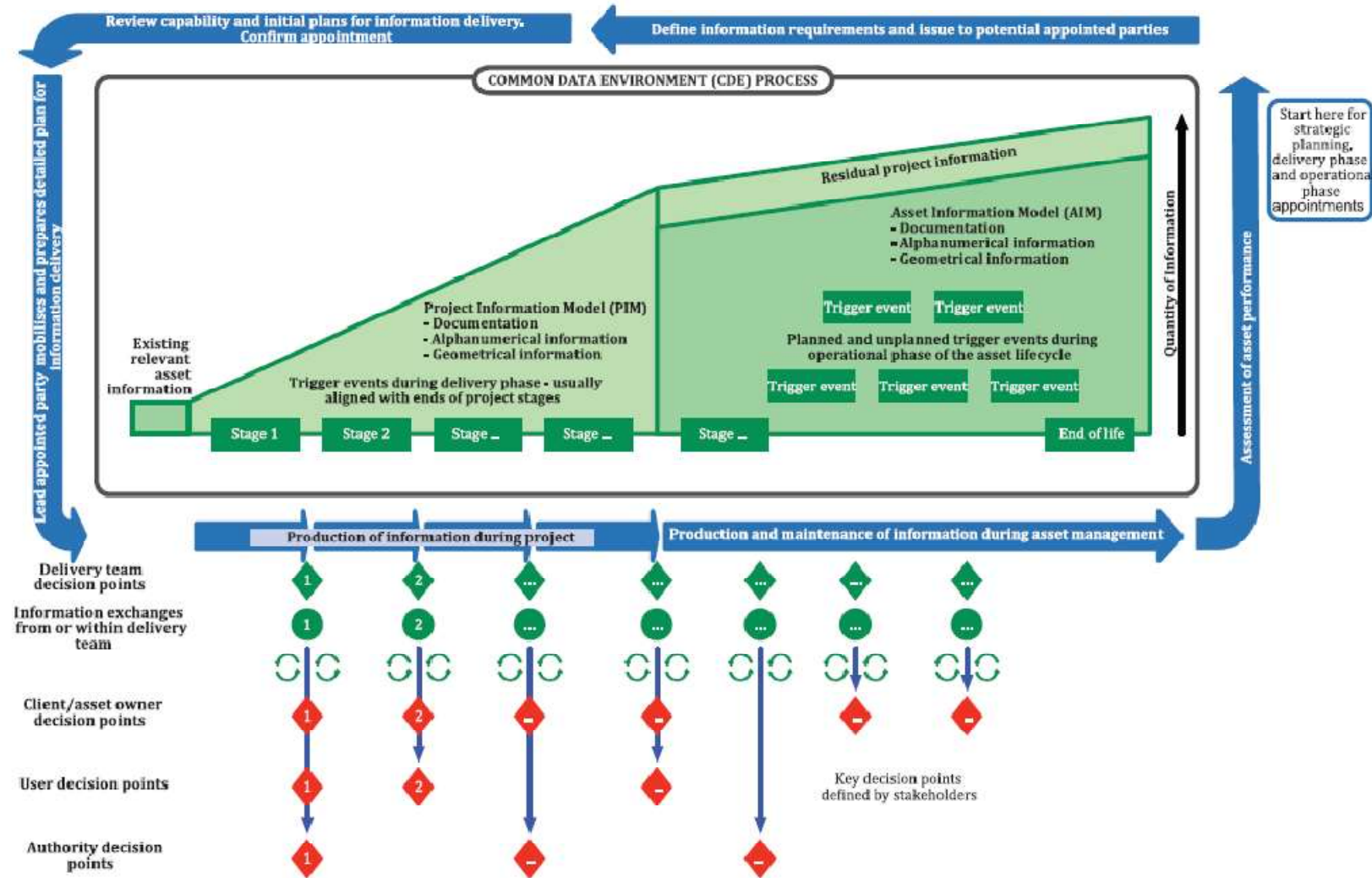
BS EN ISO 19650-1:2018 – Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Concepts and principles. This will supersede BS 1192:2007+A2:2016.

BS EN ISO 19650-2:2018 – Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Delivery phase of the assets. This will supersede PAS 1192-2:2013.

PD 19650-0:2019 – Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM). Guide to BS EN ISO 19650:2018

PAS 1192-3:2014 – Specification for information management for the operational phase of assets using building information modelling.

BIM Process Diagram



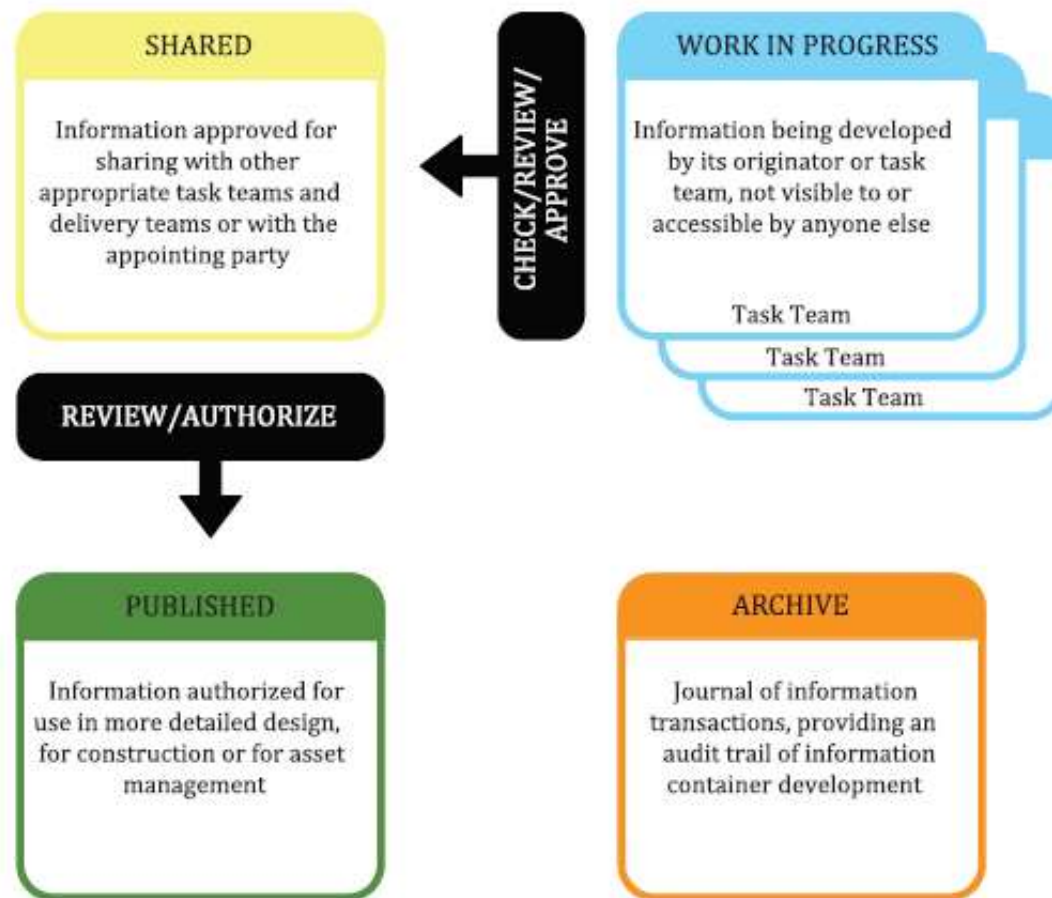


Figure 10 — Common data environment (CDE) concept

Conventions

UNIVERSITY OF WALES TRINITY SAINT DAVID

BIM NAMING CONVENTION GUIDE: All files: Models, Drawings & Documents

THE CODE	Project	Originator	Functional Breakdown	Spatial Breakdown	Form	Discipline	Number	Description*	Status*	Revision*
CODE LENGTH	2-6 Characters	3 - 6 Characters	1-2 Characters	2 Characters	2 Characters	1 Character Only	4 Characters	6-8 Characters	2 Characters	Single Character
DESCRIPTION	A single common project identifier that is recognizably distinct from any individual organization's internal job number.	The company that produced the data.	Use XX as the default. Only use Zones if project requires. This is then defined by the chosen Model segregation. There should be at least one 'zone' per role. EG, Arch Model, Mech Model, Struct Model, etc.	The level the data refers to: ZZ – Multi Level XX – No Level 00 - Ground Flr 01 – First Flr 02 – Second Flr Etc. Mezzanines M1 M2 Etc. All levels below ground floor prefix 'B' B1 B2 Etc.	This is simply the type or form of data eg: For Files: D - Drawing G Diagram I Image L List M Model T Textual V Video/Audio	A Architect / Architectural B Building Surveyor C Civil Engineer D Demolition/Dismantling E Electrical Engineer F Facilities Manager G Ground Engineering H Highways & Transport I Interior Designer K Client L Landscape Architect M Mechanical Engineer Other P Public Health Engineer Q Quantity Surveyor Project Mgmt S Structural Engineer T Planner W Water Engineering X non discipline specific Y Topographical Z Multi Discipline	This is a 4 digit code denoting drawing grouping and number. It consists of a 1 digit Drawing Group plus the 3 digit individual drawing no: Eg- 1001 Where 1 at the beginning is the drawing group and the 3 latter digits are sequential numbers.	Drawing / Model description ie. GAPLAN SITE GEO MOD SECTION SCHEMAT BREEAM FINISHES etc.	This is for the 2 digit suitability code that indicates and governs the development stages of information and documents throughout the BIM process.	The revision number of the drawing. eg: Preliminary revisions and Construction revisions as image opposite
NOTES	Use the 4 digit Company project numerics here - NB. NUMBER ONLY For Student Projects MODULE CODE ie 4005	NB. A specific unique identifier for each organisation should be defined upon them joining the project ie. Use company initials	NB. A more complex project may need to be divided into several diff zones. If so the Zone Strategy should be agreed at beginning of project	IE. Roof plan would be multi level.			Drawings Groups are as follows: 0 - General 1 - Substructure 2 - Superstructure 3 - Openings 4 - Finishes 5 - Piped & ducted services 6 - Electrical 7 - Fixtures & Fittings (Fixed) 8 - Loose Furniture 9 - External Works	There is no specific standard for description but avoid long, unwieldy descriptions as this will affect your ability to file in Windows		
EXAMPLE	4005	UWTSO	XX	ZZ	D	A	1001	GEO MOD	SI	A

* = Optional add ons within schema that we as UWTSO have chosen to include.

NB. There are other optional fields in the schema that we have opted to leave out ie: Classification (uniclass codes)

UNIVERSITY OF WALES TRINITY SAINT DAVID										
BIM NAMING CONVENTION GUIDE: All files: Models, Drawings & Documents										
THE CODE	Project	Originator	Functional Breakdown	Spatial Breakdown	Form	Discipline	Number	Description*	Status*	Revision*
CODE LENGTH	2-6 Characters	1-6 Characters	1-3 Characters	3 Characters	3 Characters	1 Character Only	1 Character	4 Characters	2 Characters	Single Character
DESCRIPTION	A single common project identifier that is recognisably distinct from any individual organisation's internal job number.	The company that produced the data.	Use XX as the default. Only use Zones if project requires. This is then defined by the chosen Model designation. There should be at least one 'zone' per role. EG. Arch Model, Mech Model, Struct Model, etc.	The level the data refers to: ZZ - Multi Level XX - No Level 00 - Ground Flr 01 - First Flr 02 - Second Flr Etc. Mezzanines M1 M2 Etc. All levels below ground floor prefix 'B' B1 B2 Etc. If roof plan would be multi level.	This is simply the type or form of data eg: For Files: D - Drawing G - Diagram I - Image L - List M - Model T - Textual V - Video/Audio	A Architect / Architectural B Building Surveyor C Civil Engineer D Demolition/Dismantling E Electrical Engineer F Facilities Manager G Ground Engineering H Highways & Transport I Interior Designer K Client L Landscape Architect M Mechanical Engineer O Other P Public Health Engineer Q Quantity Surveyor R Project Mgmt S Structural Engineer T Planner W Water Engineering X non discipline specific Y Topographical Z Multi/Outsourcing	This is a 4 digit code denoting drawing grouping and number. It consists of a 1 digit Drawing Group plus the 3 digit individual drawing no. eg. 1001 Where 1 at the beginning is the drawing group and the 3 letter digits are sequential numbers.	There is no specific standard for description but avoid long, unwieldy descriptions as this will affect your ability to file in Windows	This is for the 2 digit suitability code that indicates and governs the development stages of information and documents throughout the BIM process. eg: Preliminary revisions and construction revisions as image supports	The revision number of the drawing. eg: Preliminary revisions and construction revisions as image supports
NOTES	Use the 4 digit Company project numbers here - NB: NUMBER ONLY For Student Projects MODULE CODE ie 4000	NB: A specific identifier for each organisation should be defined upon them joining the project ie, use company initials	NB: A more complex project may need to be divided into several off zones. If so the Zone Strategy should be agreed at beginning of project							
EXAMPLE	4000	UWTSO	XX	ZZ	D	A	1001	GEO MOD	S1	A
* - Optional add ons within schema that we as UWTSO have chosen to include. NB: There are other optional fields in the schema that we have opted to leave out ie: Classification (uniclass codes)										
Guide extracted by S. Taites - UWTSO - October 2019. Based on BS11380:1-2										

Source: authored by S. Tucker, UWTSO, October 2018. Based on BS11380 1:2

Conventions: Working in a Common Data Environment CDE

Status code	Which information containers should the status code be used for?	Revision
Work in Progress (WIP)		
S0	Information containers being developed within a task team	P01.01 to Pnn.nn
Shared (non-contractual)		
S1	Information containers that are suitable for geometrical and/or non-geometrical coordination by other task teams within the delivery team	P01 to Pnn
S2	Information containers that are suitable for information/reference by other task teams within the delivery team	
S3	Information containers that are suitable for review and comment within the delivery team	
S4	Information containers that are suitable for review and comment by the Lead Appointed Party (Kier)	
S5	Information containers that are suitable for review and comment by the Appointing Party (Client)	
Published (contractual)		
A3, A4, A5, A6 etc. (number correlates with work stage)	Information containers where there are no comments from the party being invited to either: - authorise them (if they are in response to a lead appointed party exchange information requirement) or; - accept them (if they are in response to an appointed party exchange information requirement)	C01 to Cnn
B3, B4, B5, B6 etc. [Deprecated]	Information containers that are partially signed off where there are comments from the party being invited to authorise or accept them	P01 to Pnn

Conventions

5010 _UWTSD _XX _01_D _A _0001 _GenArr _AB

An 'As Built' First Floor, General Arrangement plan drawing produced by the architect.

5010 _UWTSD _XX _XX_T _QS _0001 _CostPlan

A Cost Plan suitable for construction, produced by the QS

Guidance in a World of Acronyms



<https://www.thenbs.com/knowledge/periodic-table-of-bim>

Tools

Drawing, Modelling and Specifications



Clash Detection, Virtual Build



Collaboration and CDE Platforms



BIMXtra

revizto™

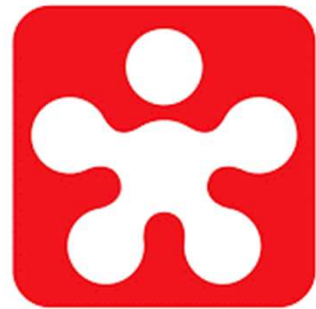
CAFM and COBie Outputs



A screenshot of a software interface displaying a table with multiple columns and rows of data. The table appears to be a data management or reporting tool, possibly for BIM or CAFM data. The columns include various identifiers and descriptive text. The rows contain detailed information, likely representing different elements or components in a project.

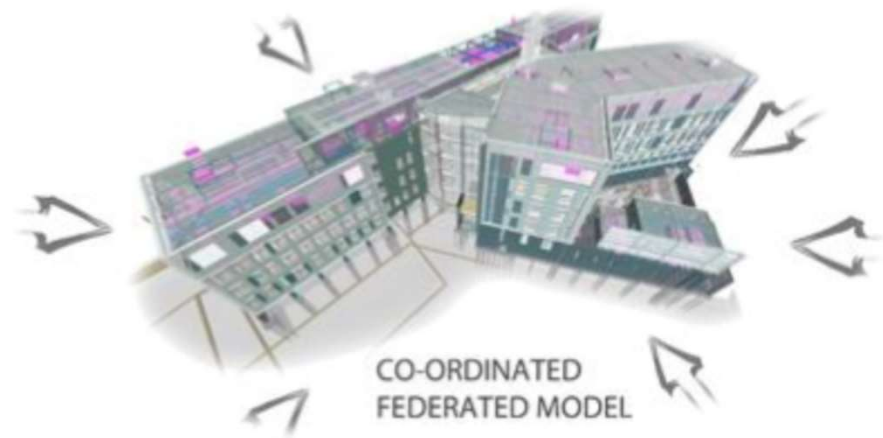
How can we collaborate?

Tools such as Revizto enable a collaborative process using
2D and 3D Modelling with Intelligent Data



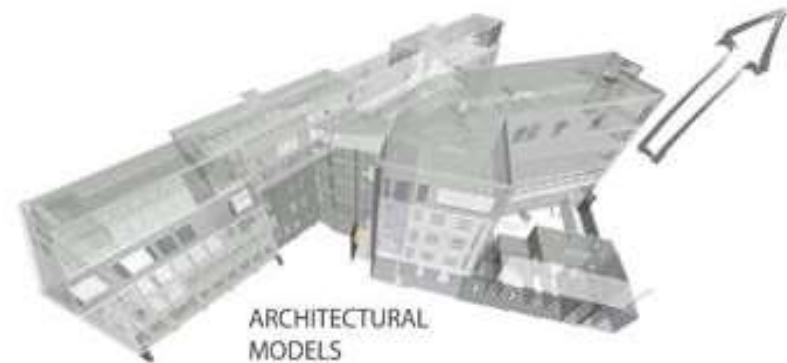
revizto™

<https://revizto.com/en/>



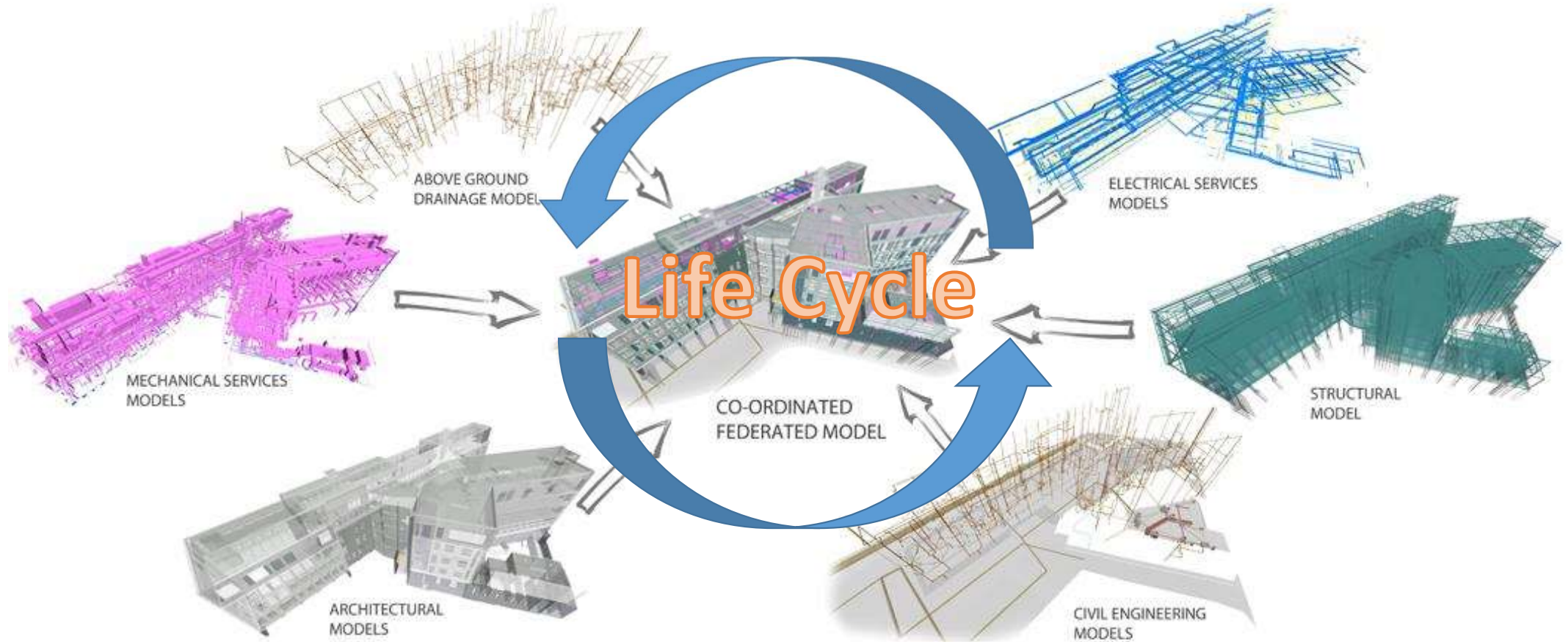
How can we create data rich intelligent models?

Tools such as Revit enable intelligent 3D Modelling that can be linked into a BIM Process.



Remember a Revit Model alone is not BIM

Building Information Modelling





EIR

Exchange Information Requirements

BEP

BIM Execution Plan

AIR

Asset Information Requirements

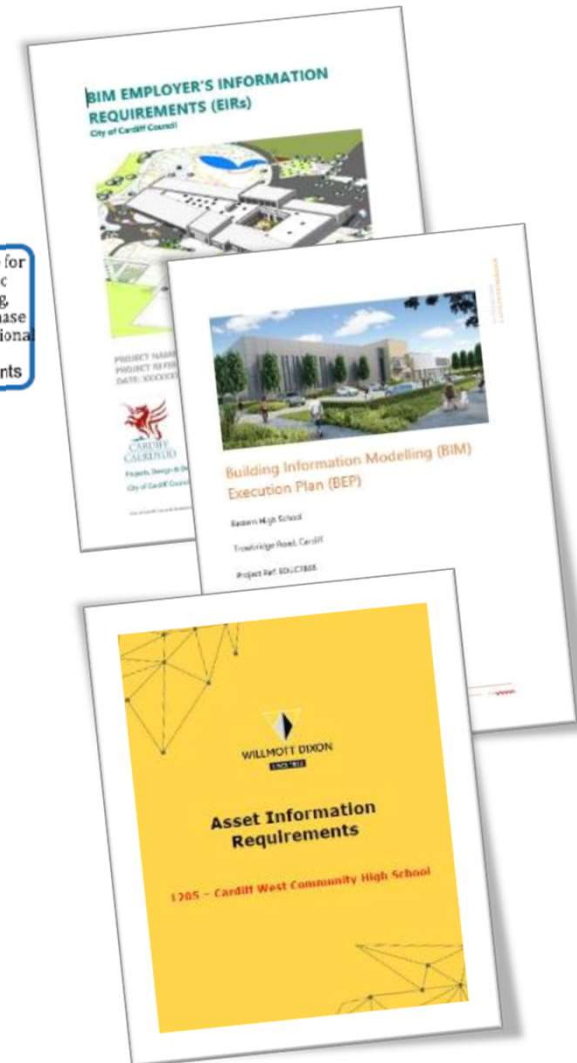
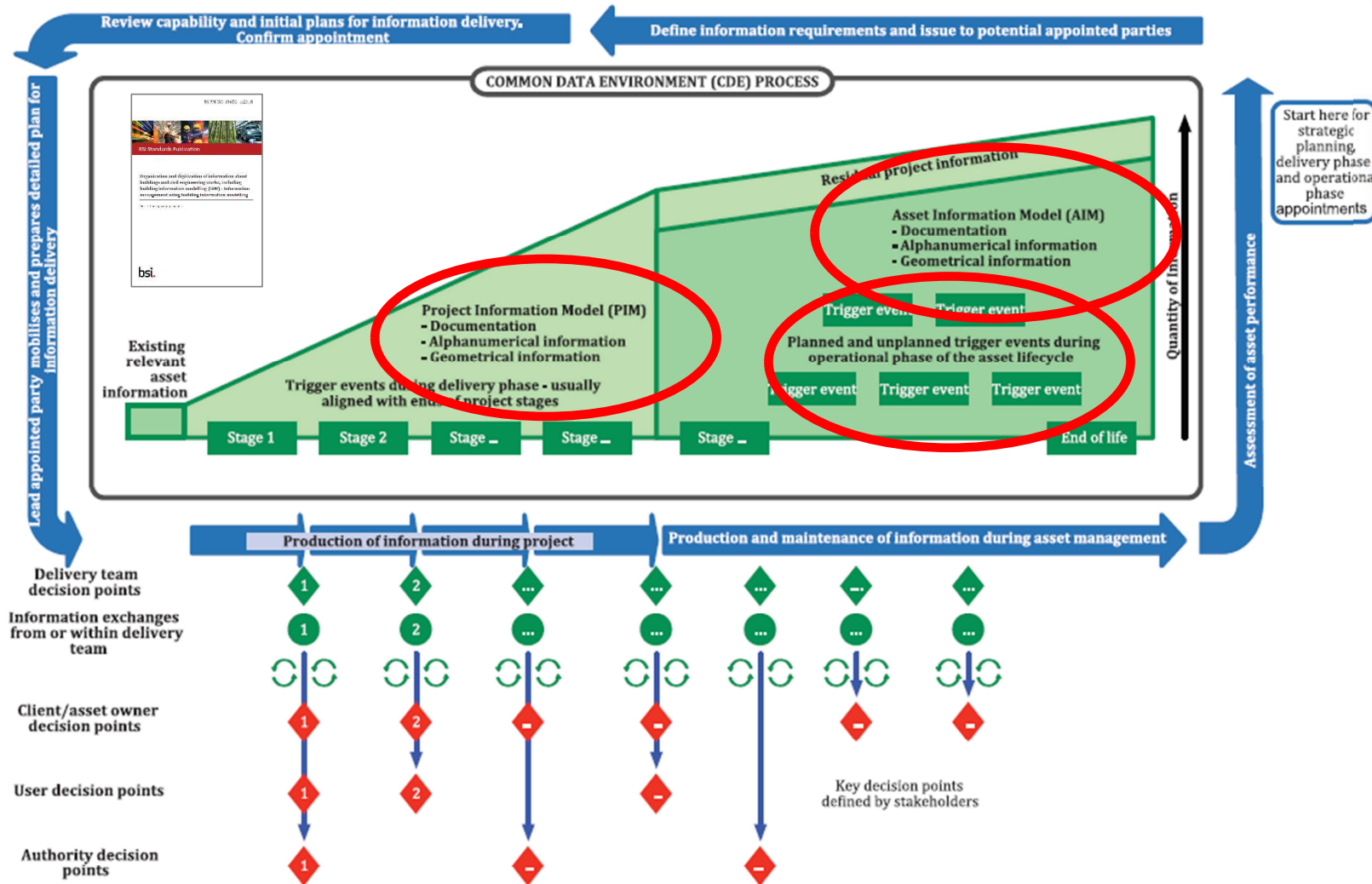
BIM Handover Package

01-Documentation

02-Models

03-COBie Construction Operations Building Information Exchange

BIM Process Diagram



Are these the same?

How do we evaluate?

What can we learn?

How can we improve?

How is this managed?

What about existing building stock?

Life Cycle of the Asset

What about?

Management and Controls for Maintenance

Introduction of Sustainability Measures

Monitoring Energy Performance

Health and Safety - Statutory Observations

Management of Alterations, Adaptations and

Refurbishment

Introduction of New Technologies

New Build BIM Project

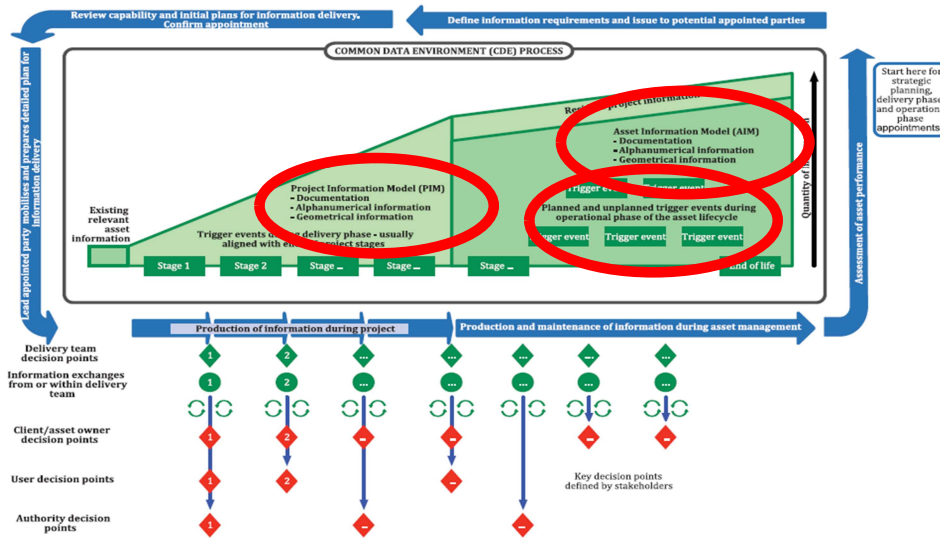
Are these the same?

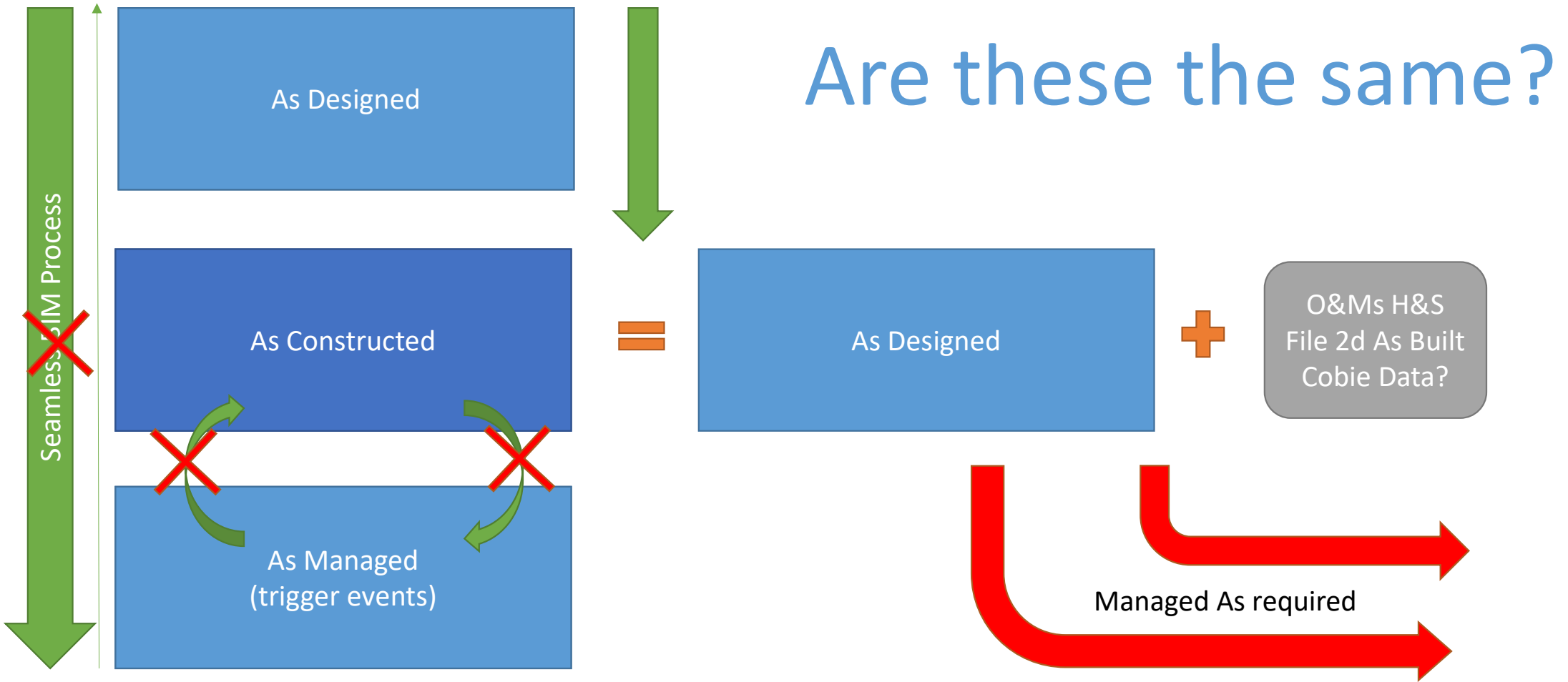
How do we evaluate?

How is this managed?

What can we learn?

How can we improve?





Design, Construct, Operate and Maintain? **One Truth?**

How do we evaluate?

Post-Occupancy Evaluation (POE)

Many buildings do not perform as planned - in some cases this can impact on running costs, staff and client satisfaction and performance, health, safety and comfort. For repeat construction clients, learning from and correcting past mistakes in design and commissioning of buildings can be extremely cost-effective and greatly improve workplace productivity.

Stewart Brand 'How Buildings Learn' 6 part series.

<https://youtu.be/AvEqfg2slH0>



1 Project Delivery	6 System Behaviour (FM's Experiences)
11 Discuss Clients Experience	61 Analyse Health And Safety Strategy
12 Discuss Project Team Experience	62 Analyse Ventilation Strategy
2 Project Outcomes	63 Analyse Heating And Cooling Strategy
2.1 Review Strategic Brief	64 Analyse Lighting Strategy
2.2 Review Business Case	65 Analyse Control Strategy
2.3 Review Sustainability Aspirations	66 Analyse Maintenance Strategy
3 Building Use/Occupant Behaviour	7 Environmental Performance
3.1 Analyse Building Layout	71 Measure Light Levels
3.2 Examine Building Fabric And Detailing	72 Measure Thermal Comfort
3.3 Analyse Occupants Use of Building And Systems	73 Measure Indoor Air Quality
3.4 Analyse Occupation Patterns	74 Measure Acoustics
4 Occupant Feedback	75 Measure Air Tightness
4.1 Conduct Questionnaires/Surveys	76 Measure Heat Loss (Thermal Imaging)
4.2 Conduct Semi Structured Interviews	8 Comparisons
5 Energy Use	81 Intended Building Use Against Actual
5.1 Analyse Utility Invoices And Meter Readings	82 Design Performance Predictions Against Actual
5.2 Analyse Metering Strategy	83 Benchmark Against Published Datasets
5.3 Conduct Equipment Survey	9 Report
5.4 Analyse Embodied Carbon	91 Client, FM's, Users
5.5 Analyse Measurement And Verification Strategy	92 Project Team
	93 Open Dissemination to Industry

<https://www.architecture.com/-/media/GatherContent/Post-Occupancy-Evaluation/Additional-Documents/RIBAPOEBPEPrimerpdf.pdf>

How do we evaluate?

Manual Survey & Observations



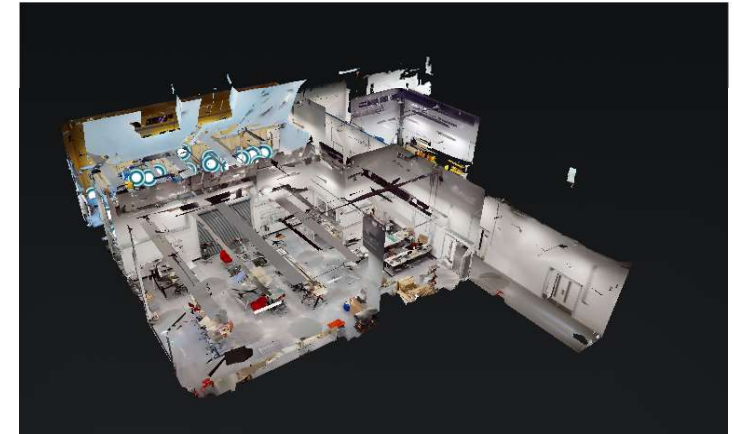
- As built drawings
- Building File / O&M Manuals



How do we evaluate?

Digital Surveys:

- Thermal Imaging
- Drones
- Point Cloud



<https://my.matterport.com/show/?m=6NoRsYdFY4Y>



How do we evaluate?

Laser Scanners

Requires: Tripod, detail pole, prism, reflected target and scanner.

Laser scanners undertake highly accurate detailed surveys, through to production of basic point cloud and rendered photographic imagery.

Typically used for to check as designed against as constructed.

Data can be downloaded and digitally transferred for use in industry software.



How do we evaluate?

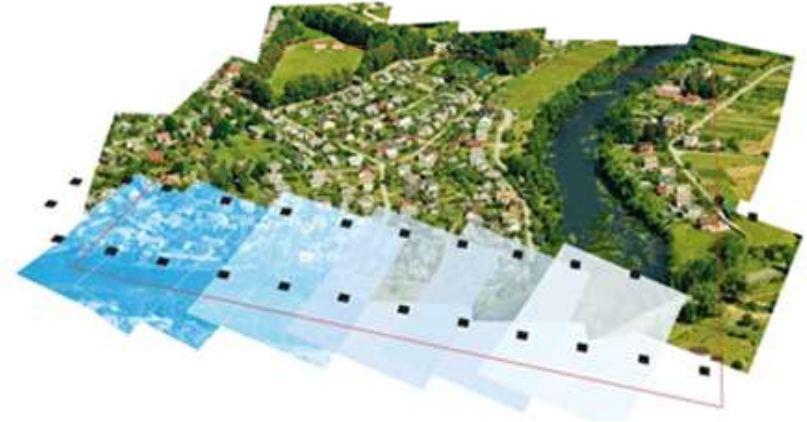
Photogrammetry

Aircraft mounted photographic system, with GPS and inertial navigation system.

Photogrammetry requires ground control and ground markers produced by a conventional surveying. Fixed patterns of flight are used to produce overlapping photographs.

Stereoscopic images are produced from the photography to produce a 3D image of the site.

With the rise of the use of Drone technology photogrammetry is now becoming a more favourable and affordable option.



Use collaborative digital tools



How do we evaluate?

Single Source of Truth for Any Project

Central Hub for All Models

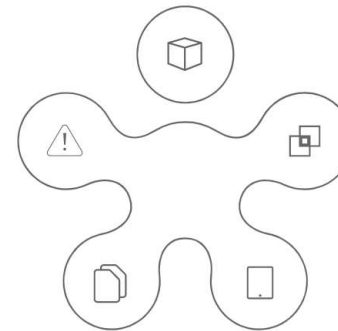
View the entire project by federating all intelligent BIM data including reality capture into a centralized user-friendly location and get all teams in-sync.

Real-time Issue Tracker

Easily standardize the way data moves through the project and effectively communicate model-based tasks with the team.

2D/3D Model Synergy

Leverage a unique 2D/3D combined view, easily compare 2D sheets and work with live CDE documentation seamlessly from inside Revizto.



Revizto Total Solution

VR Immersive Experience

Explore real-model data and coordination issues by leveraging Revizto's immersive, true-to-scale VR experience within seconds!

Clash free projects

Import and manage all your clashes inside Revizto. View issues in native modeling software, assign accountability and track changes to ensure all clashes are quickly and fully resolved.

Collaboration from Anywhere

Contribute from the office or on-site. Keep all trades on task and monitor their progress in the field and access all the project data on a mobile device.

Our Compatibilities

Plugins

ArchiCAD	AutoCAD	CADmep
Civil 3D	Inventor	MicroStation
Navisworks	OpenBuildings	OpenRoads
Revit	Rhinoceros	SketchUp
Tekla	Vectorworks	

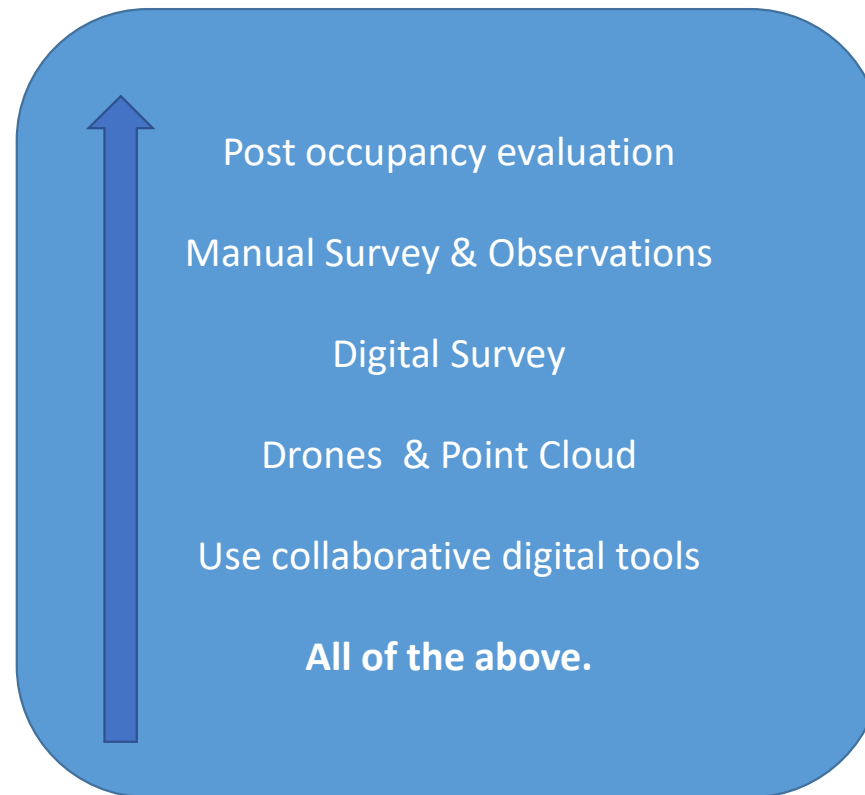
Supported Formats

BCF	DWF
Faro	FBX
IFC	LAS
OBJ	PDF
Solibri	ReCap

Integrations

BIM360
Box
Procore

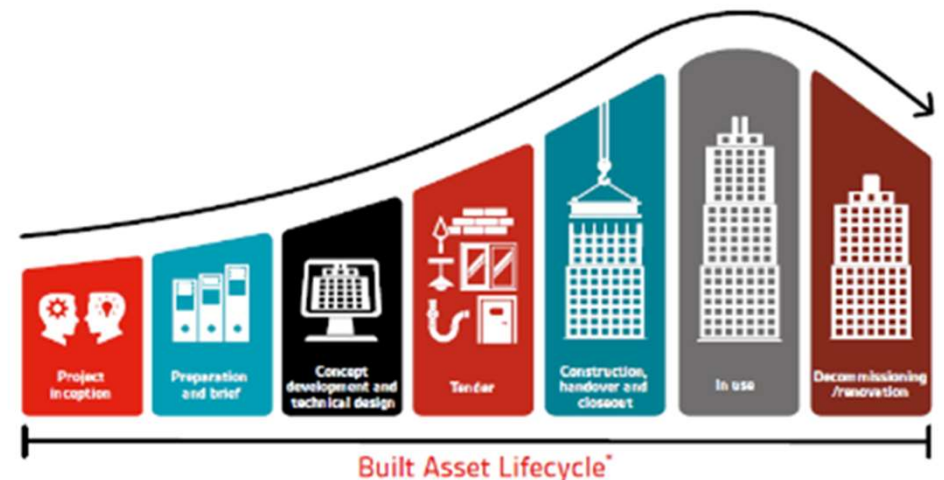
How do we evaluate?



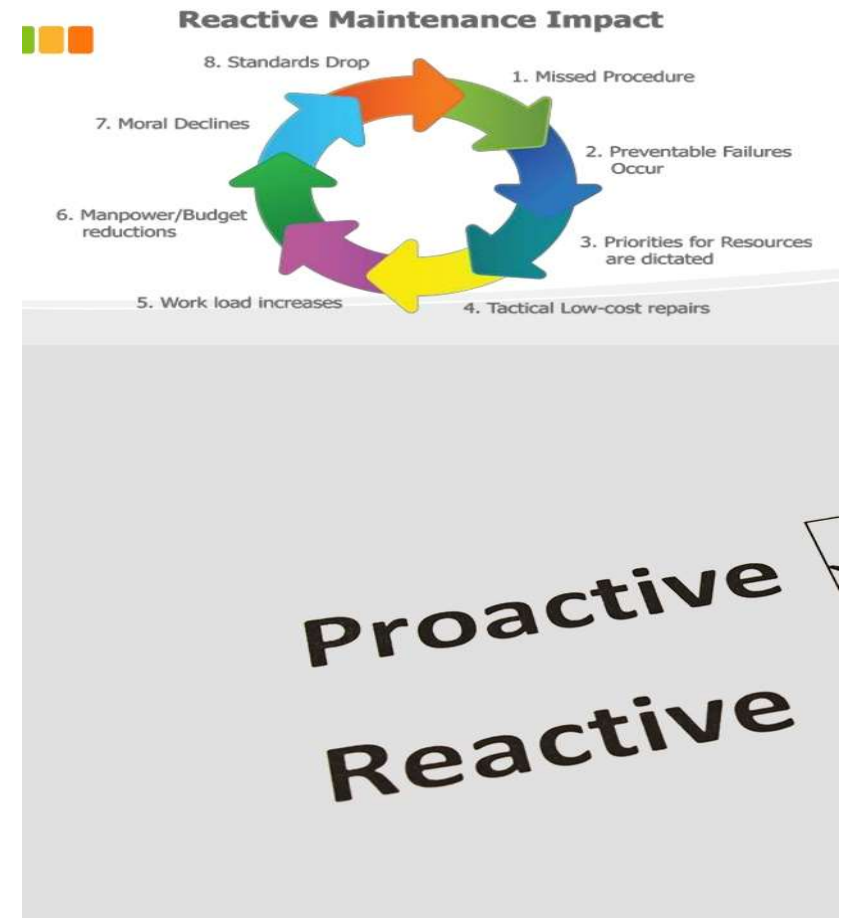
How is this managed?

Life Cycle of the Asset that considers:

- Management and Controls for Maintenance
- Introduction of Sustainability Measures
- Monitoring Energy Performance
- Health and Safety - Statutory Observations
- Management of Alterations, Adaptations and Refurbishment
- Introduction of New Technologies



How is this managed?



Planned 'Preventative'
Maintenance and
Cyclical Testing



Data Base

How is this managed?



Old School Data Base

Basic CAFM

How is this managed?

FileHomeInsertPage LayoutFormulasDataReviewViewACROBATTell me what you want to do...Gavin TraylorShare

CutCopyPasteFormat PainterClipboard

Calibri10A⁺⁻B**I**U Merge & Center

GeneralConditional FormattingFormat as Table

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InsertDelete Format

AutoSumFillClear

Sort & Find & FilterSelect

V18

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	Transfer Frequencies		Unit	Partition	Model	Serial Number	QTY	Type	Asset Description	Manufacturer	Vendor	Cost	Install Date	Warranty Start Date	Warranty End Date
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QFM Asset Loader

Cloud Based CAFM

How is this managed?

thetechnologyforge

HOME SOLUTIONS NEWS ABOUT US SUPPORT CONTACT US Search ... Call 0113 288 2575

Solutions

- tf tf cloud
- tf tf facility

Latest News

G-Cloud 12

Posted on 28/09/2020

The Technology Forge is delighted to confirm its continued presence on the Crown Commercial Service (CCS) G-Cloud 12 framework.

Business as Usual

Posted on 27/03/2020

Products & Services

For almost 20 years, The Technology Forge has been providing Property and Asset Management Solutions to the public and private sectors. Our current product offering includes two versatile systems to meet the needs of any organisation.

tf cloud

tf cloud is our web based property management system with modules including: Property and Plant, Help Desk, Condition Survey, Suitability, Inspections, Estates, Projects, Risk Assessments, Valuations, Resource Booking, Reporting and much more. tf cloud is completely web based and hosted in the cloud which means there are no setup costs. It can be used with a variety of devices connected to the Internet including PCs, laptops, smartphones and tablets. There are also a number of apps available on Android, Apple and Windows devices.

tf cloud

tommywhittle logged in to General Properties Logout

Home Property Resource Booking Estates DLO Finance Contract Cost Plus Grounds Help Calls Condition Education Inspection Project Assessment Questionnaire Utility Reports Help Admin

Property Details Plant Fixed Assets Occupancy

Home > Property > Sites > Edit Site > External Area and Building List > Room List

Room List

Site

Show	Action	Site Code	Description	LA Code	UPRN
1	Edit Del	10001	Marshall's Hill		12/3791

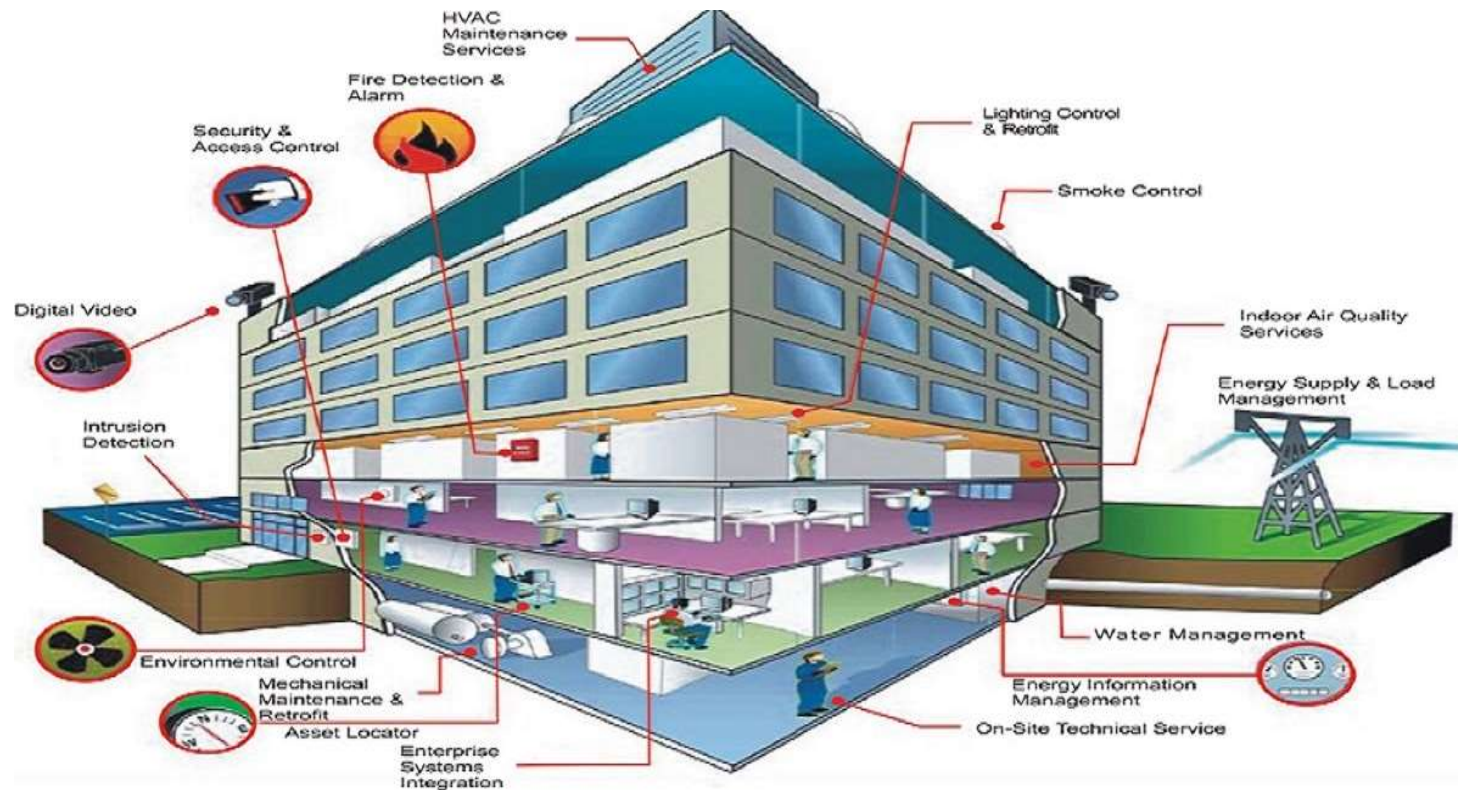
Building

DATA IN

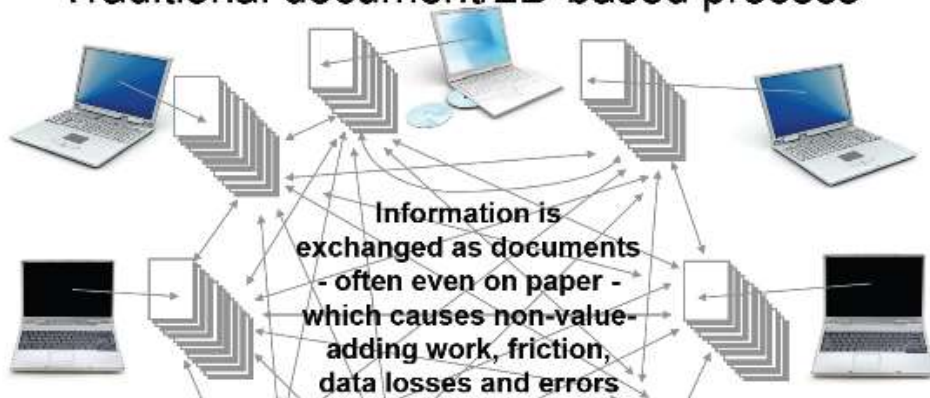
DATA OUT

Building Management Systems BMS

How is this managed?



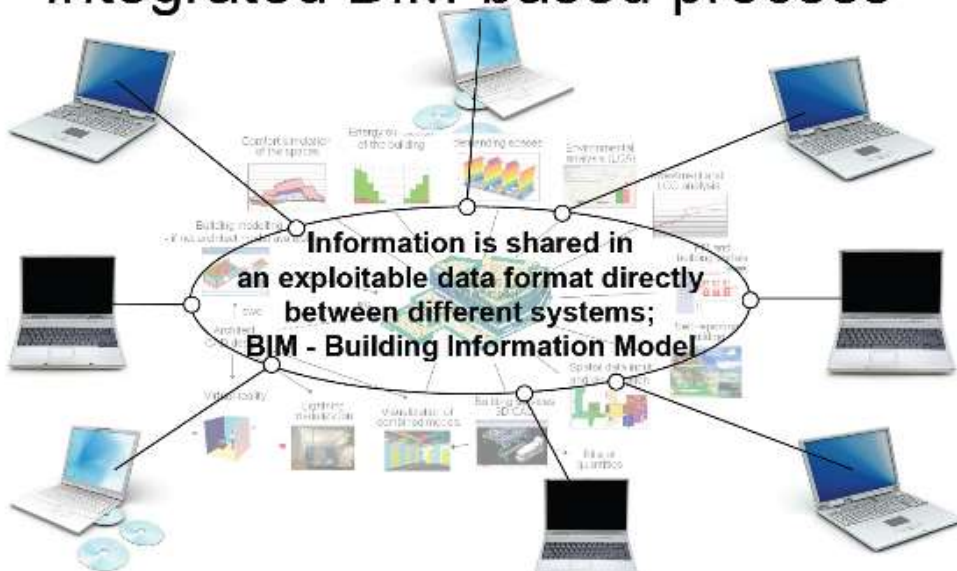
Traditional document/2D-based process



How is this managed?

Interoperability

Integrated BIM-based process



Cobie

Trigger events

1 The accelerating pace of change ...



2 ... and exponential growth in computing power ...

Computer technology, shown here climbing dramatically by powers of 10, is now progressing more each hour than it did in its entire first 90 years

What can we learn?

COMPUTER RANKINGS

By calculations per second per \$1,000



Analytical engine
Never fully built, Charles Babbage's invention was designed to solve computational and logical problems



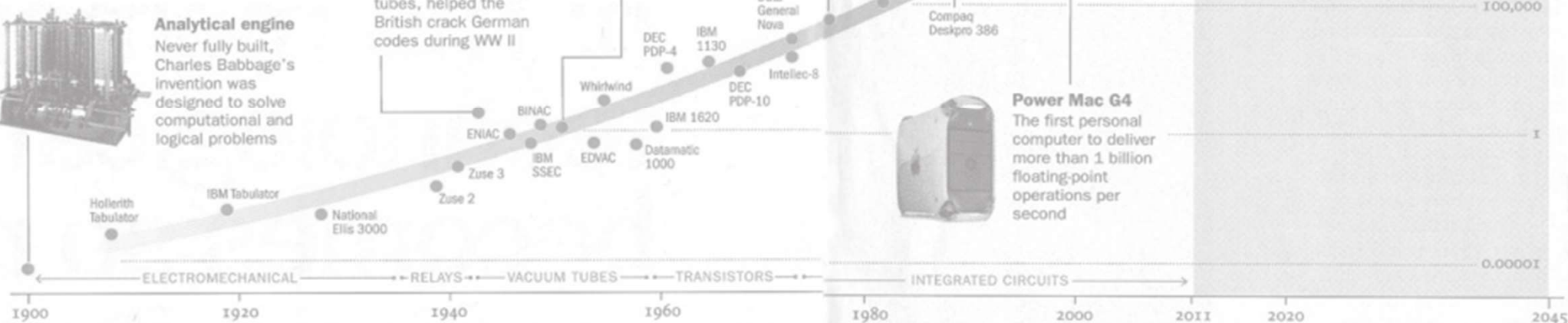
Colossus

The electronic computer, with 1,500 vacuum tubes, helped the British crack German codes during WW II



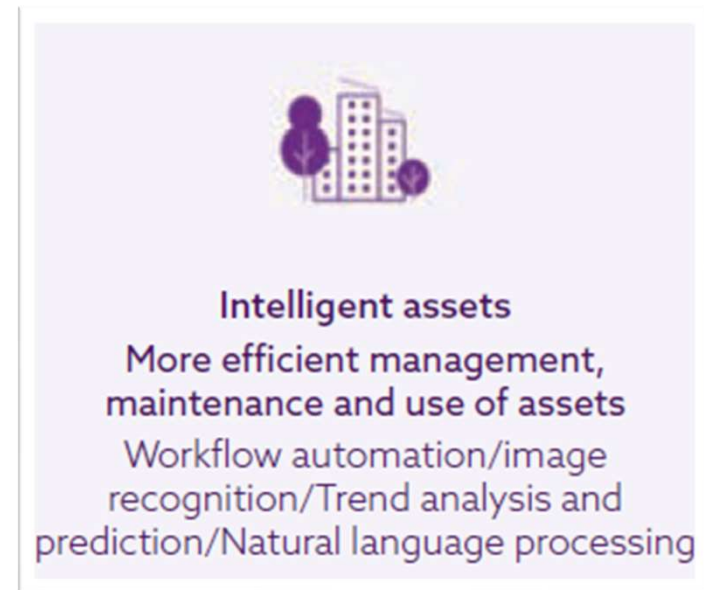
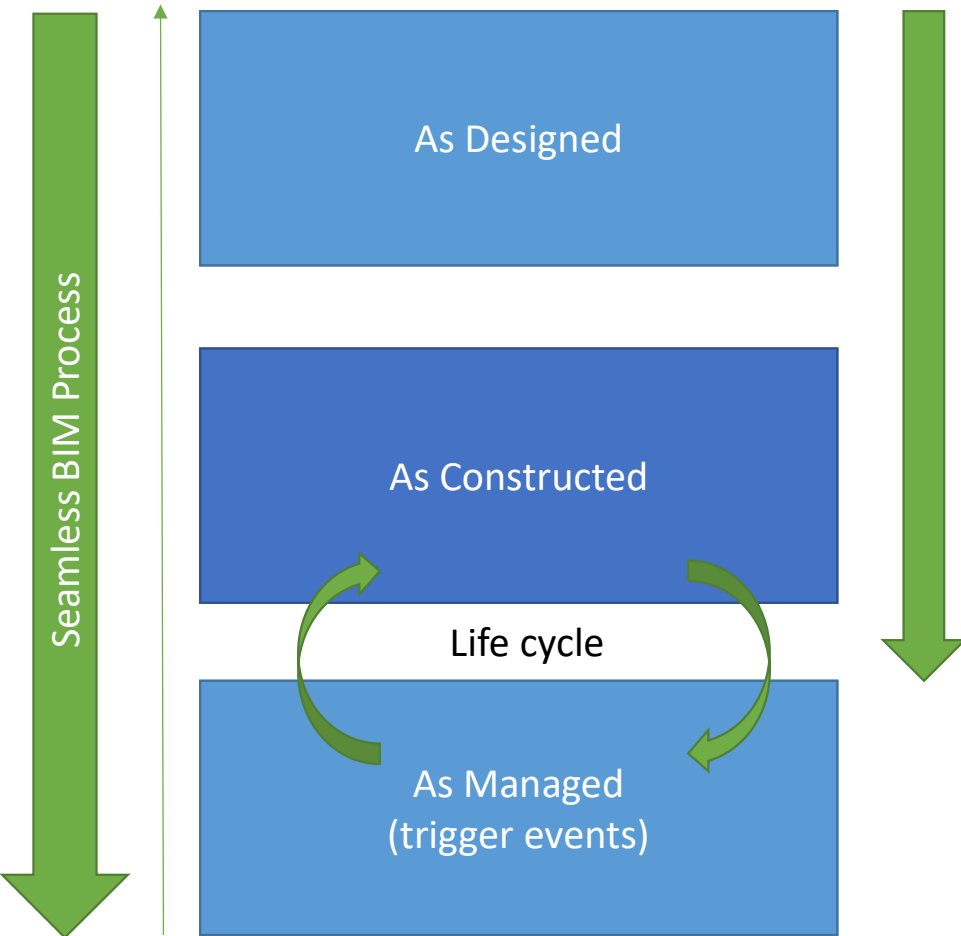
UNIVAC I

The first commercially marketed computer, used to tabulate the U.S. Census, occupied 943 cu. ft.



3 ... will lead to the Singularity

Ensure these the same



Design, Construct, Operate and Maintain **One Truth.**

Use of Digital Technology and Interoperable collaborative platforms



<https://youtu.be/dSLZVfrKgRs>

5.00 – 50.00

“Many in the Facility Management industry have struggled to make use of information from BIM. Is it surprising? Not really, as a sector, we’re all as diverse and different as the buildings we manage’ Mike Ford BIM Manager UWE (2020)

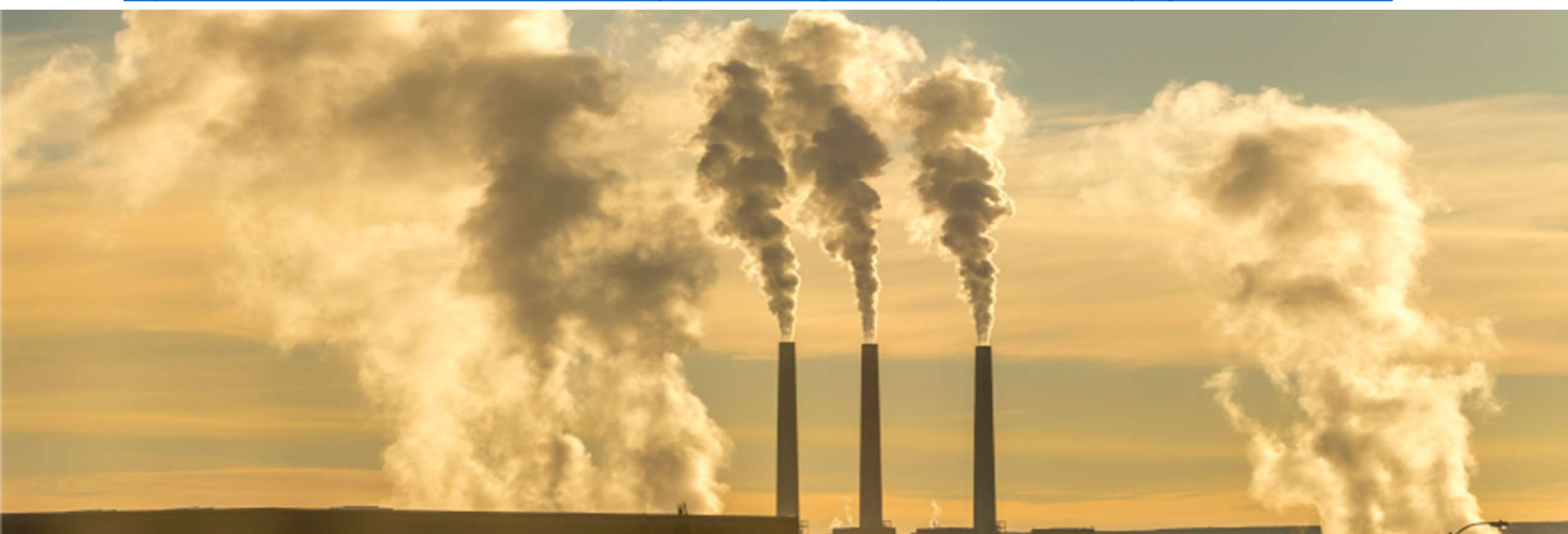
What about existing building stock?
What challenges do we face?

Challenges of Decarbonisation

Speaking at the CN [Decarbonising Construction](#) conference, Sonal Jain warned viewers that the UK Government's target of a net-zero carbon economy by 2050 is at risk because 80 per cent of the buildings that will be around in that year have already been built.

Jain said: "Because 80 per cent of the building stock for 2050 already exists, we cannot deliver on our net-zero goal without fully upgrading this. There is a limited time to upgrade the existing building stock, and delivering net-zero will require deep retrofits of these buildings."

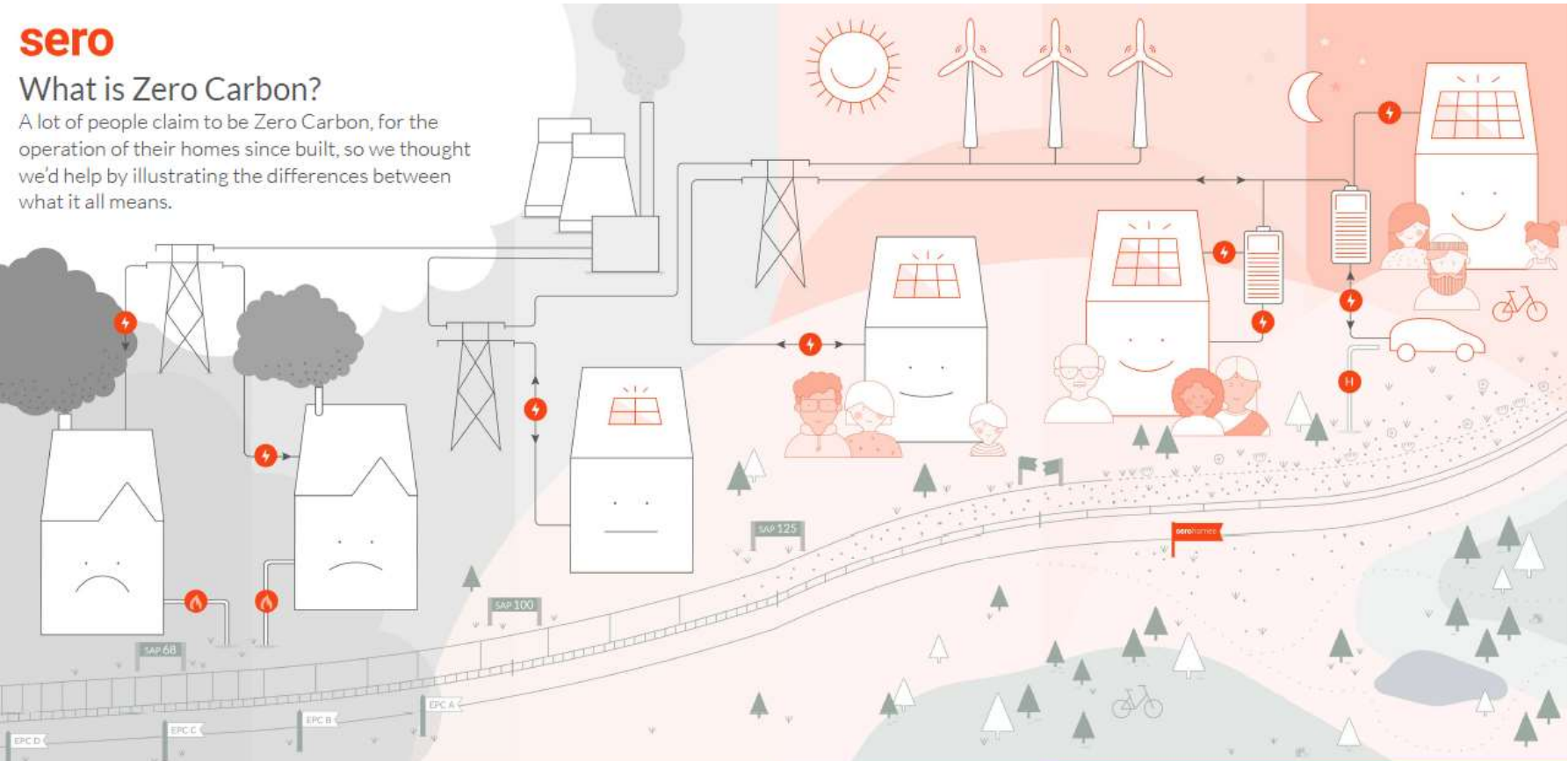
<https://www.constructionnews.co.uk/sustainability/consultant-urges-delivery-of-mass-retrofit-programme-30-09-2020/>



sero

What is Zero Carbon?

A lot of people claim to be Zero Carbon, for the operation of their homes since built, so we thought we'd help by illustrating the differences between what it all means.



8,159 kgCO_{2e}

2,704 kgCO_{2e}

1,165 kgCO_{2e}

143 kgCO_{2e}

0 kgCO_{2e}

... kgCO_{2e}

Average Home

What's average? Well, every home is different, but for this we've used a typical 100m² 1930's UK semi-detached home with a family of four living in it, using an efficient gas condensing boiler for heating and hot water. We've used reliably published data for occupancy energy demand and National Grid electricity carbon intensity data for 2019 (thanks www.CarbonIntensity.org.uk/!)

New Build Home

We've transported our family of four into a new home that's the same size, built to 2014 Building Regulations with an efficient gas boiler for heating and hot water. We've assumed the house is actually built as it was designed, so haven't made an allowance for any issues with construction faults or failures (we know, that might be a bit optimistic of us!).

Zero Regulated Energy

This is basically everything without a plug socket. So it includes extract fans, fixed lights, heating and hot water, but not washing machines, floor lamps and so on. The oven is in, the fridge & freezer isn't! Zero means that over a year, the home generates as much energy as it needs to power the regulated equipment. To do this, our family are now in a matching size home that has a 14 panel photovoltaic array on the roof, facing South.

Zero Energy

This is the first level to allow our family's to plug in their stuff = home + humans! All the energy used in the home over the course of a year, whether from kettles, games consoles, heating, lights or mobile phone charging, is balanced by the same amount of power being generated. Our much-relocated family have now moved into an efficient home with a pretty big PV array on the roof, generating just over 9MWh of electricity a year!

Zero Carbon

Our family can finally settle down! Their zero carbon home goes beyond the zero energy home by using energy storage, so the electricity they generate can be stored for their use, or exported to the National Grid when it can help avoid the most carbon emissions. This supports the National Grid to decarbonise their large scale generation, and with intelligent energy services from Sero, our family also get cheaper electricity bills too.

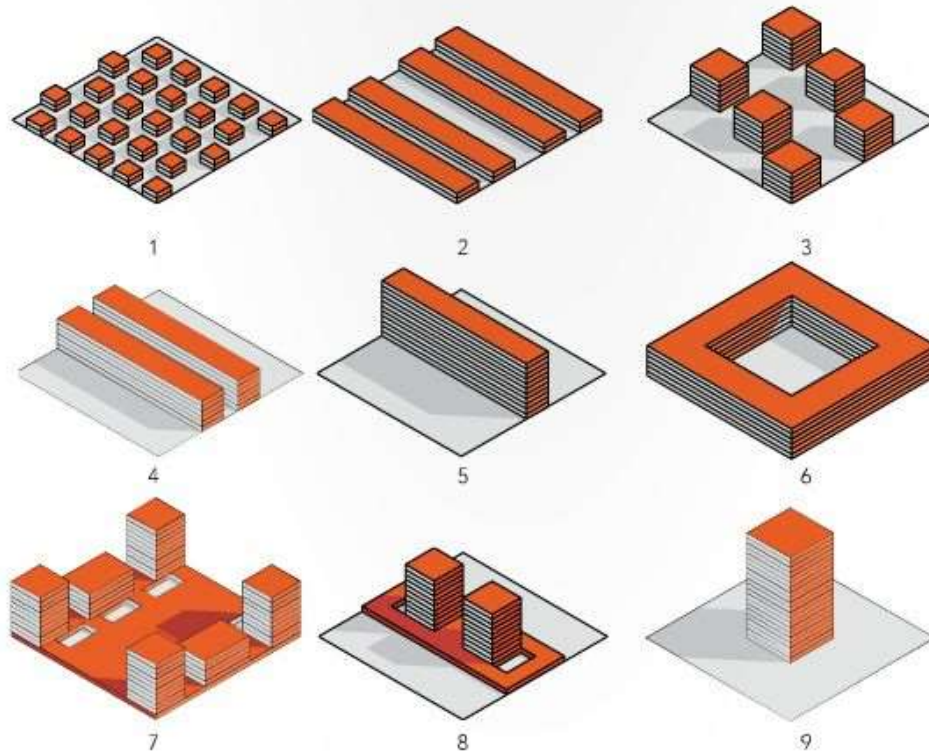
Beyond Zero Carbon

At Sero, we're aiming to go beyond zero carbon homes with humans in them, we also want to cover our family for their transport. With electrification of cars and bikes, we're working to include the energy demands of these into our intelligent systems. So our families can live, work and play, knowing they're effortlessly zero carbon and saving money. Happy Days!

seroenergy.com

We're happy to discuss our workings if you'd like to get in touch. We might even buy the coffee...

Challenges of Building Typologies



Functions of Buildings

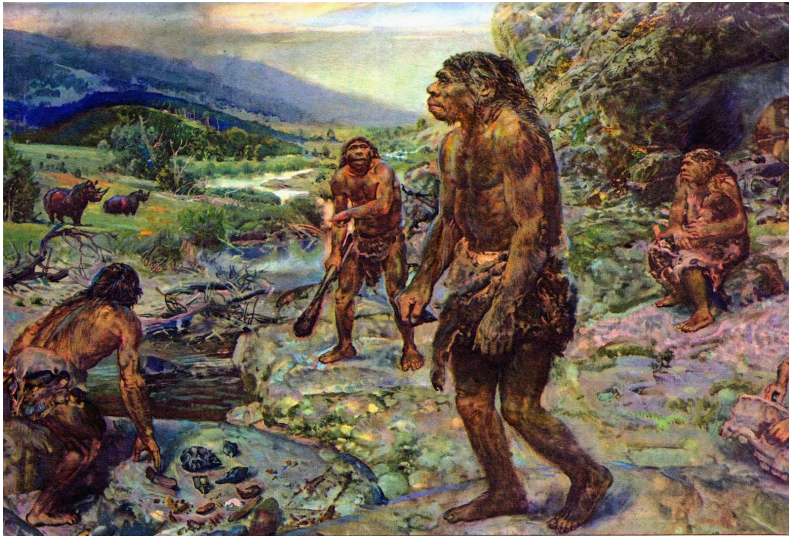
Why do we Build?

The use of buildings as protective structures or enclosures.

Since fire was first used by primitive people to provide light and heat, the use of energy to aid in environmental moderation has developed internal environments that reduce the effects and extremes in the external climate.



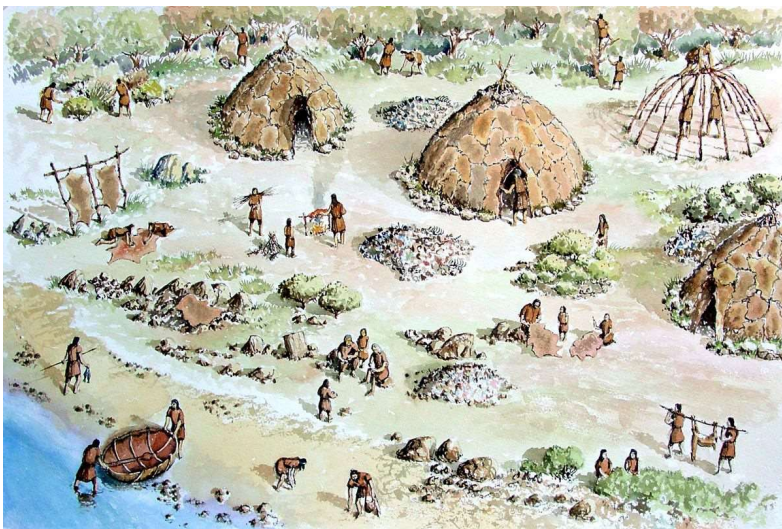
https://i.dailymail.co.uk/i/pix/2015/07/03/14/2A338A5800000578-3148511-image-a-21_1435930837225.jpg



http://4.bp.blogspot.com/-6CWvcEKKHBV/T6CVotA7KyI/AAAAAAAAAGTU/ySIEcOU92LQ/s1600/the_neanderthal_encampment_by_zdenek_burian_1950.JPG



https://kise.i3investor.com/files/my/blog/img/b1338_gonnersdorfsettlement.jpg



<https://i.pinimg.com/originals/41/ce/63/41ce63be5c59f90e1150a7ea6d97de51.jpg>



<https://museum.wales/stfagans/buildings/bryneryr/>

The use of buildings to house people, equipment and processes have resulted in the development of buildings that can control these internal environments with greater accuracy.

As well as protection and enclosure we can now consider:

- Thermal Insulation and temperature control
- Acoustic insulation
- Provision of Light (natural and artificial)
- Controls for humidity and ventilation
- Exclusion of contaminants.



Case study 1: Styles of buildings

Thermally light structures in Thailand

These dwellings are located in Thailand. The lightweight construction form is created by the use of locally available materials. The large openings allow air to pass through the building to cool the interior quickly. Thermally light structures of this type are common throughout the Far East. They utilise local materials that are readily available. However, with the advent of more modern construction forms and the incorporation of air conditioning systems they are now restricted to rural areas.



European vernacular buildings

These are examples of heavyweight construction forms found in England and France. The use of local stone and slate for the walls and roofing reflects regionally available materials, although the 'gothic' style of the building above is actually a copy of earlier styles. The building was constructed in the Victorian period. The windmill, in contrast, is typical of simple rural building styles.



A simple cottage dwelling located in the North of England is above. The use of slate for the roof and brick for the external walls is typical of many buildings of this age and type. In contrast, the buildings in the right-hand picture reflect an earlier form of building in which a structural timber frame is used rather than loadbearing external walls. Note that the upper floors project outwards over the street. This allows more floor area to be created within the dwelling while minimising the area of land utilised. This style was actually driven by economics rather than functionality. At the time of its construction taxes were based on the ground floor area of the building.





SAIN FFAGAN

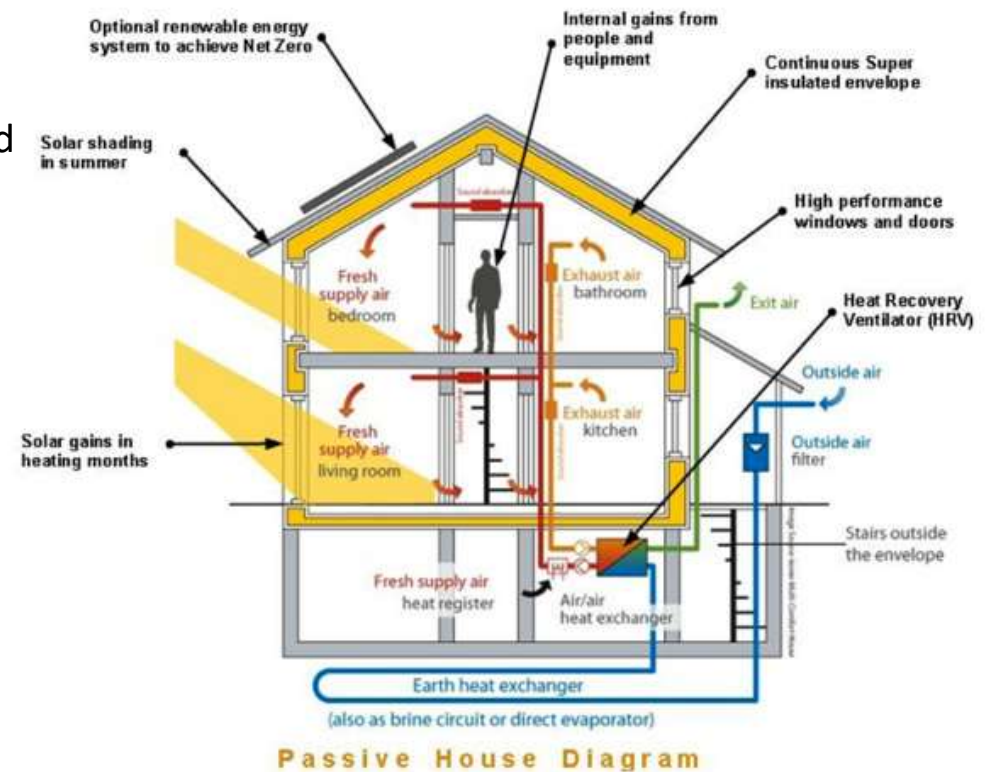
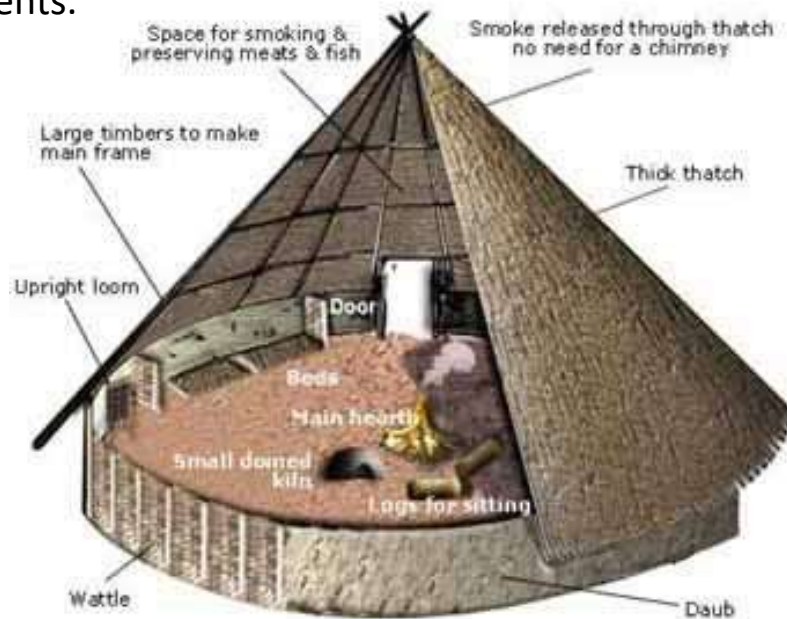
<https://museum.wales/stfagans/thesite/>

Welsh Vernacular Building types

Building Styles:

A vernacular building style is specific to a region and uses the local materials available in its construction to form the building fabric.

Modern House construction uses a wide variety of materials and techniques and is not specific to any particular region. Construction methods, materiality of the building envelope and performance of the building fabric can be modified to suit the requirements.



Thermally Light V's Thermally Heavy:

Thermally light buildings are physically light in weight and have a fabric which has little capacity to absorb heat. Such buildings respond quickly to changes in external temperatures.



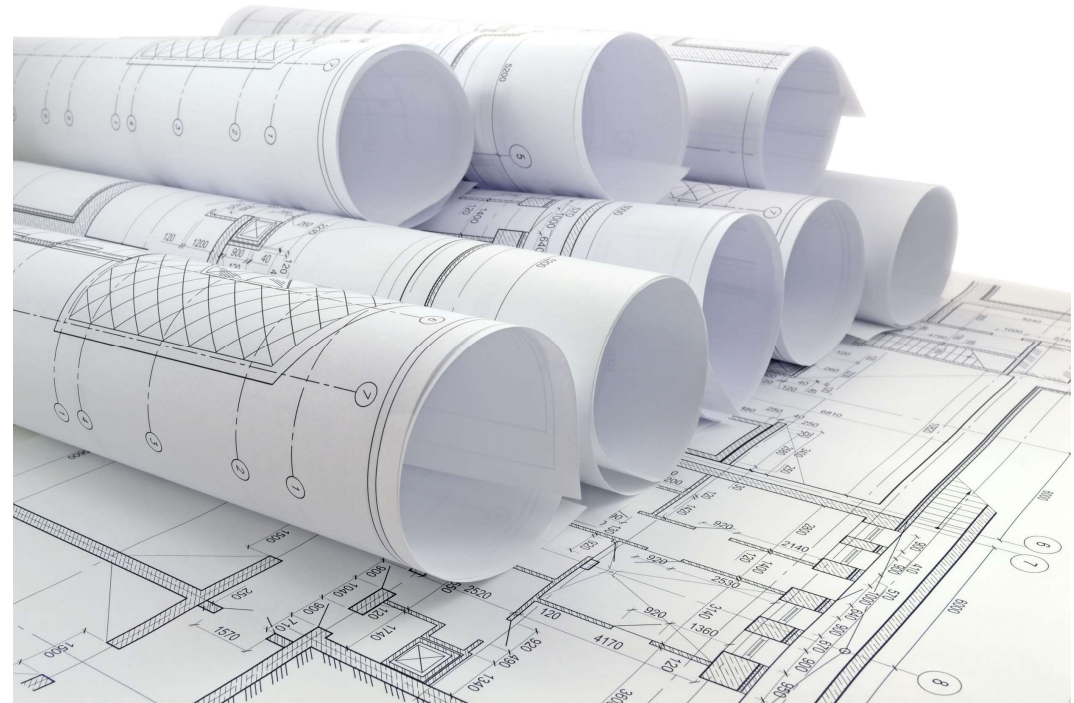
By contrast thermally heavy often have a heavy dense fabric which reflects some heat and absorbs much of the rest. They insulate the interior by reacting slowly to variations in external temperature.



Performance Requirements of the Building Fabric

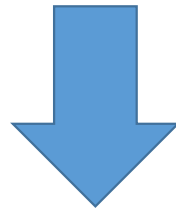
What are the key drivers in providing a building that is suitable for the need?

- Structurally Stable
- Durability
- Thermal insulation
- Protection from weather and exclusion of moisture
- Acoustic performance
- **Flexibility to change to changing needs**
- Aesthetics
- Buildability
- Sustainability

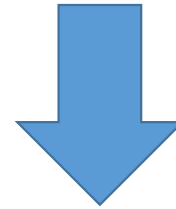


Trigger events?

Flexibility to change to changing needs



How Buildings Learn



How Digital Technologies can Assist

Creating a Data Rich Building Stock

FOCUS ON NEW BUILD

Other methods are useful for digitizing an estate

Data Availability

New Build

- Accurate geometry
- Asset data available



Laser Scan and Model

- Accurate geometry
- Very limited data available



Conversion of Existing 2D information

- Inaccurate geometry
- Data limited to drawing notes





St Mary's Church – Grade II listed.



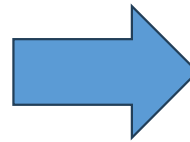
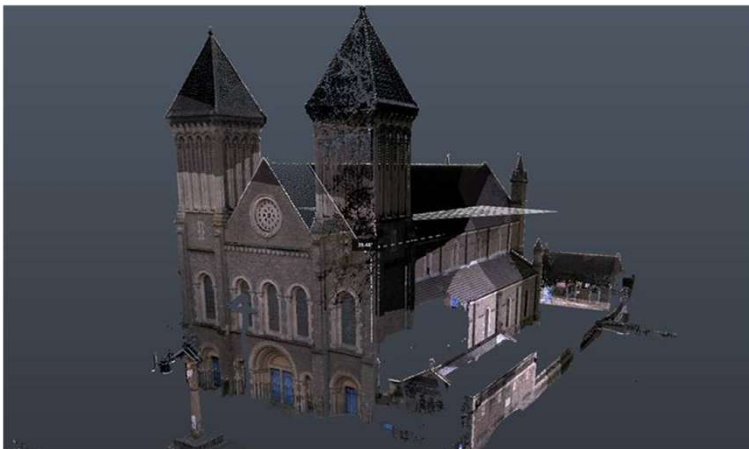
St Mary's Church – Grade II listed.



St Mary's Church – Grade II listed.

Swansea city to Youtube here: <https://youtu.be/uYdlqqvqhsW>

A full building scan <https://youtu.be/pyfHtGJyxU0>



How can we create data rich intelligent models?

Tools such as Revit enable intelligent 3D Modelling that can be linked into a BIM Process.

 **AUTODESK®
REVIT®**

