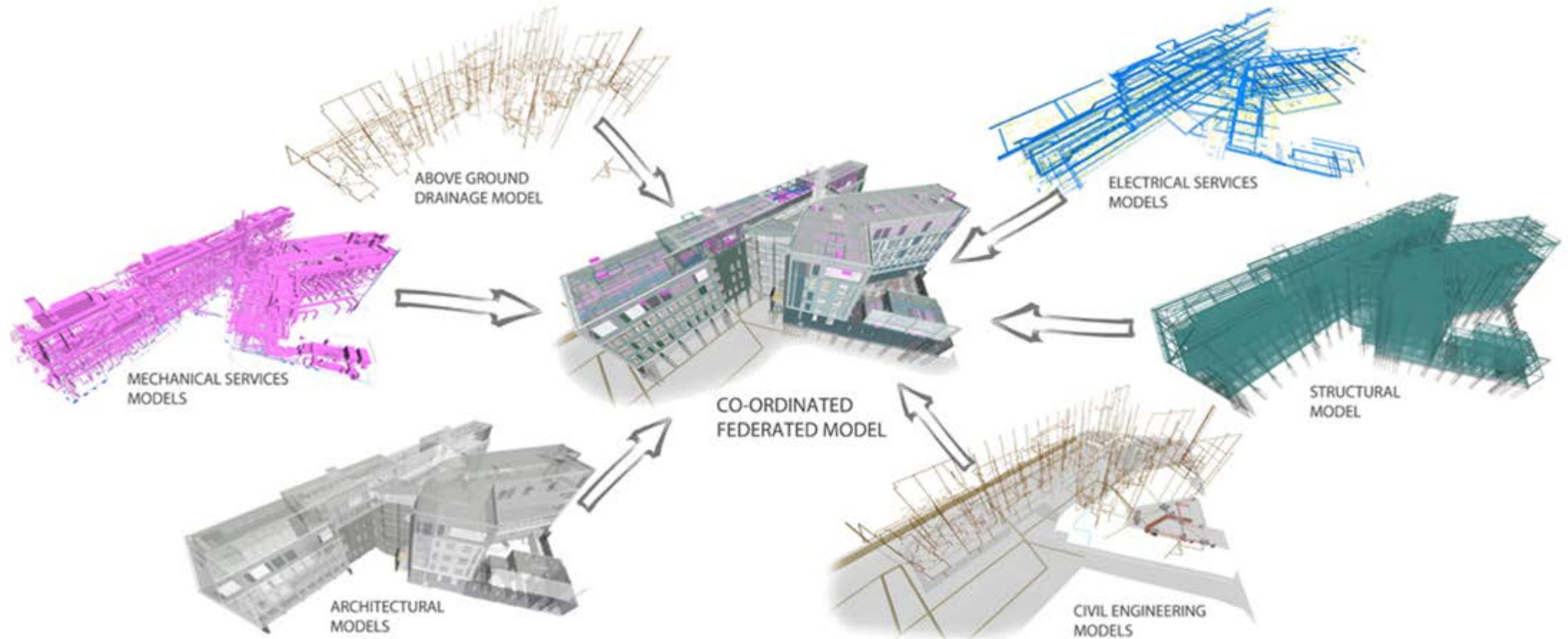


Session 2: Construction Technology & BIM



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Search

Activity

Teams

Assignments

Calendar

Files

...

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All teams



ACBA 7002 Construction Technol... ⋮

General

Wk 07 GT Lecture 11-11-20

Wk 08 GT Lecture 18-11-20

Wk 10 GT Lecture 02-12-20

Wk 11 GT Lecture 09-12-20

Wk 12 GT Lecture 16-12-20



General

Posts

Files

Class Notebook

Assignments

Grades

+

+ New ▾

↑ Upload ▾

↻ Sync

🔗 Copy link

↓ Download

+ Add cloud storage

🔗 Open in SharePoint

General

	Name ▾	Modified ▾	Modified By ▾
📁	Class Materials		Gavin Traylor

What is it all about?

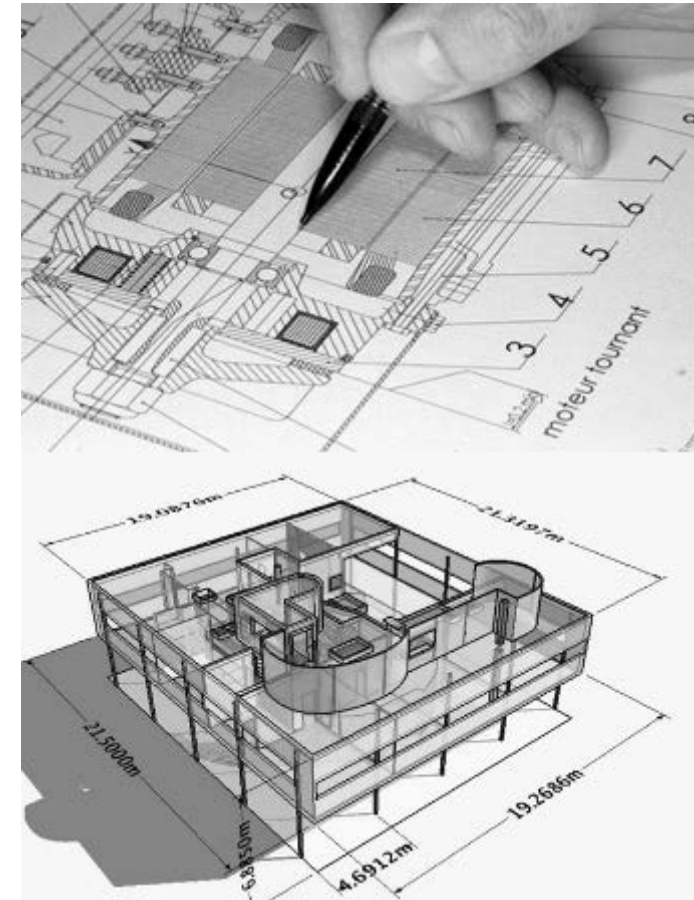
Aims:

To generate knowledge and understanding of the design, construction and evolution of our traditional and future building stock by providing a vehicle for 'Learning from the Past' to aid the buildings and facilities that will shape tomorrow.

To critically review the impact that BIM, laser scanning, robotics, drones and virtual digital technologies will have in helping shape and enhance the performance of buildings in the future.

Learning Outcomes

- Evaluate how past and present technologies can inform decisions for future design, construction, use and new uses.
- Critically analyse and appraise existing developments and settlements making recommendations that can enhance sustainability and performance.



What am I expected to do?

Mixture of lecture based and practical activities over semester 1.

General Overview (Me)

Fundamentals of BIM

Building Typologies, Challenges, Opportunities.

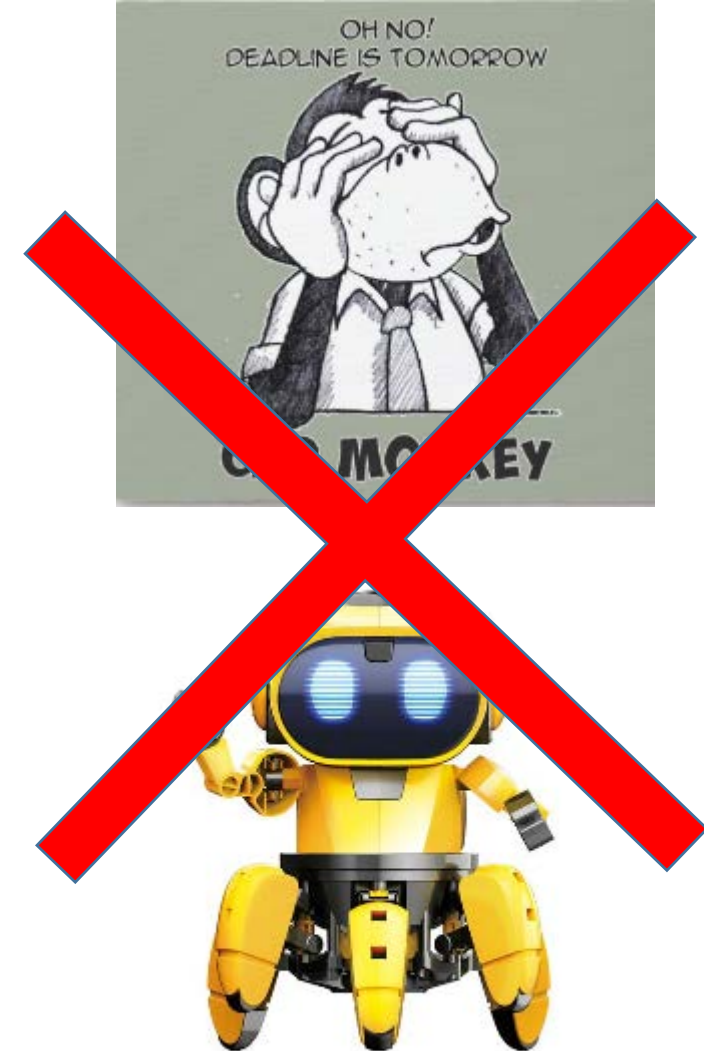
BIM as a strategic design, management and evaluation tool

Analysis using Digital technologies

Evaluation using Digital tools

General Overview (You)

- You need to know how to use the Library and Online resources
- You need to attend all timetabled activities
- You need to manage your time and meet deadlines
- Ask Gavin / Trevor if you have any problems regarding the module



Module Code	ACBA7002	
Module Title	Construction Technology and Building Information Management	
Classification	Reading List entry	Electronic*
Essential	Wu, P., and Wang X. (2019) Innovative Production And Construction: Transforming Construction Through Emerging Technologies.	☐
Essential	Sacks, R. Eastman E., et al. (2018) BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, Contractors, and Facility Managers. Wiley.	☐
Essential	Watts, A. (2016). Modern Construction: Case Studies Paperback – 31 Oct 2016	☐
Further	Journal of Building Pathology and Refurbishment http://www.emeraldgrouppublishing.com/products/journals/journals.htm?id=ss#	☐
Further	Groak, S. (1992).The Idea of Building: Thought and Action in the Design and Production of Buildings. E & FN SPON	☐
Further	Bryan, T., (2010) Construction Technology: Analysis and Choice	☐
Further	Brand, S. (1994) How Buildings Learn. Viking Press. ISBN 978-0-670-83515-7	☐
Further	Building Conservation Directory: Accessed at: http://buildingconservation.com . This long-established portal contains numerous papers written by experts that address the underlying case material.	☒
Further	Brand, S. (1998) - How Buildings Learn A book and six-part BBC 2 documentary video series which is intended for public domain use and today openly accessible via the internet on 'You Tube'.	☒



Supplementary Reading List.

Key BIM Standards, ISO and PAS – refer to 'Little Book of BIM' guide.

BSi (2019) *The Little Book of BIM*

BSi (2019) *Introduction to the New International Standard ISO 19650*

Reid, E (2016) *Understanding Buildings*

Hall & Greeno (2017) *Building Services Handbook*

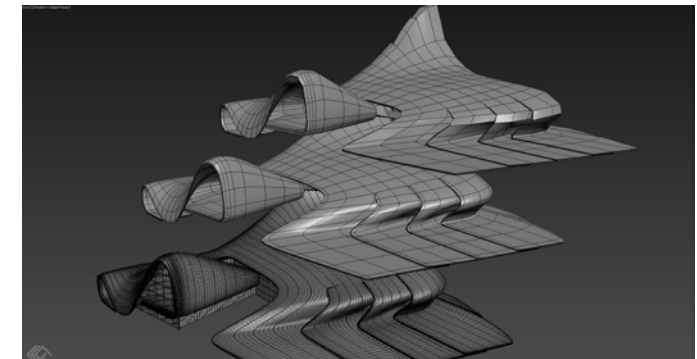
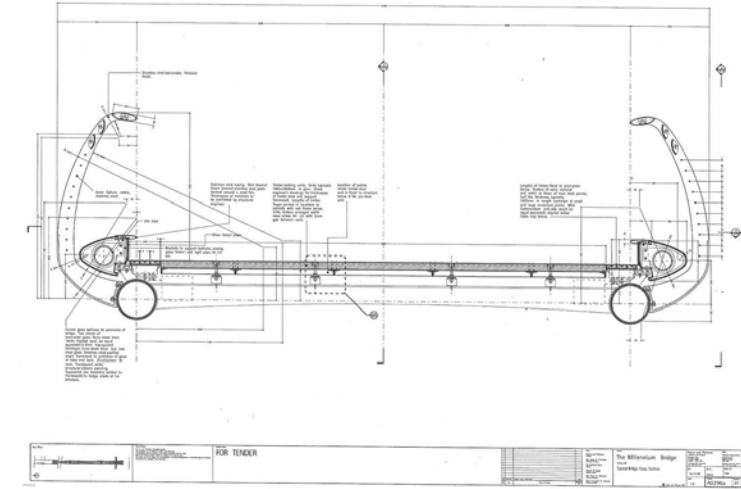
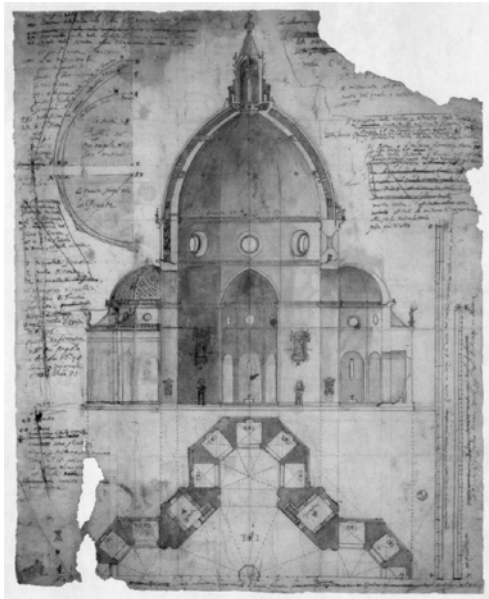
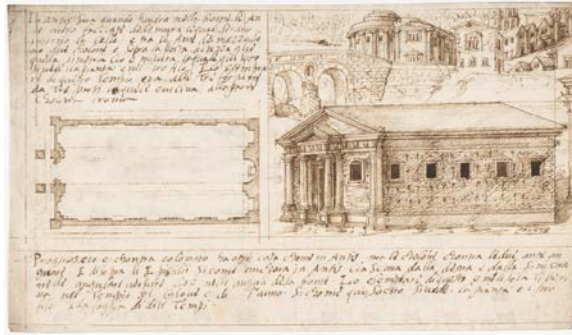
Chudley, Greeno, Merritt (2016) *Building Construction Handbook*

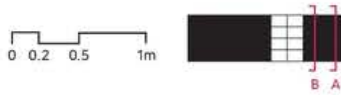
Feilden Clegg Bradley (2017) *The Environmental Handbook*

<https://bimblog.house/> Dan Rossiter (BSi)



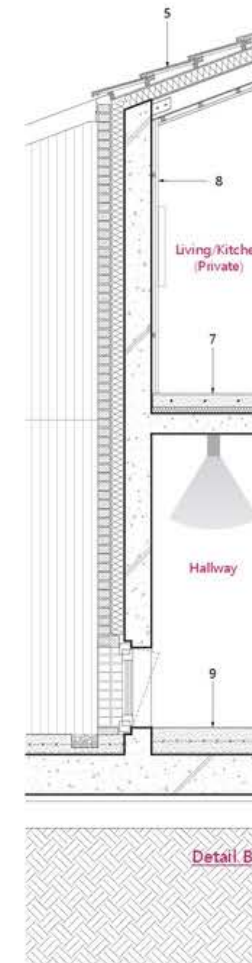
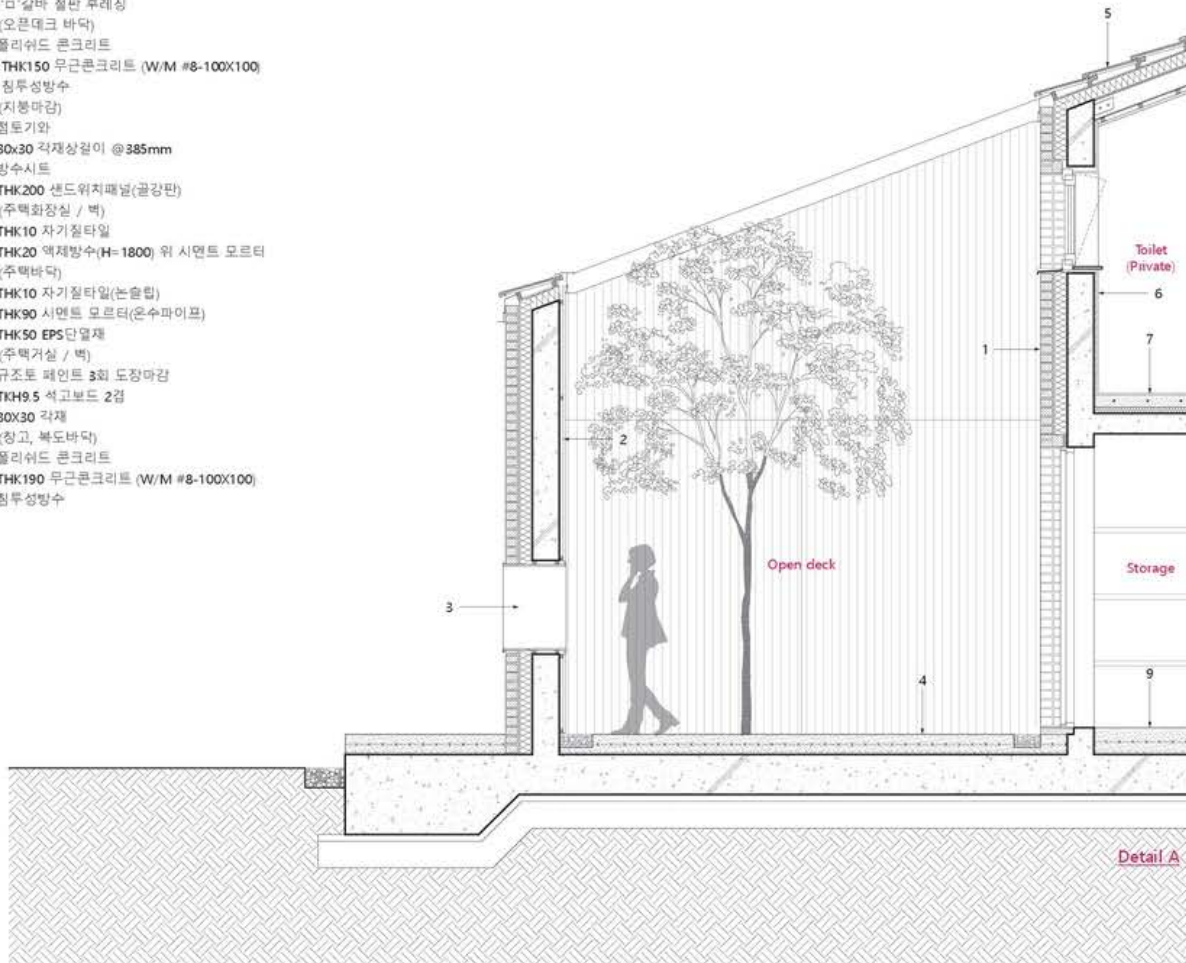
A picture is worth a thousand words





detail A_B

- 1 (외장재)
57X90X230 전벽돌 0.5B쌓기
THK120 단열재
- 2 (오픈데크_벽)
열차우목재 마감
THK9.5 합판 1겹
30X30 각파이프 @600
- 3 (마감마감)
폴소도장
'모'갈바 칠판 후레싱
- 4 (오픈데크 바닥)
폴리우드 콘크리트
THK150 무근콘크리트 (W/M #8-100X100)
침투성방수
- 5 (지붕마감)
점토기와
30x30 각재상철이 @385mm
방수시트
THK200 샌드위치패널(골강판)
- 6 (주벽화장실 / 벽)
THK10 자기질타일
THK20 액체방수(H=1800) 위 시멘트 모르타
- 7 (주벽바닥)
THK10 자기질타일(눈솔림)
THK90 시멘트 모르타(운수파이프)
THK50 EPS 단열재
- 8 (주벽거실 / 벽)
규조토 패인트 3회 도장마감
THK9.5 석고보드 2겹
30X30 각재
- 9 (창고, 복도바닥)
폴리우드 콘크리트
THK190 무근콘크리트 (W/M #8-100X100)
침투성방수



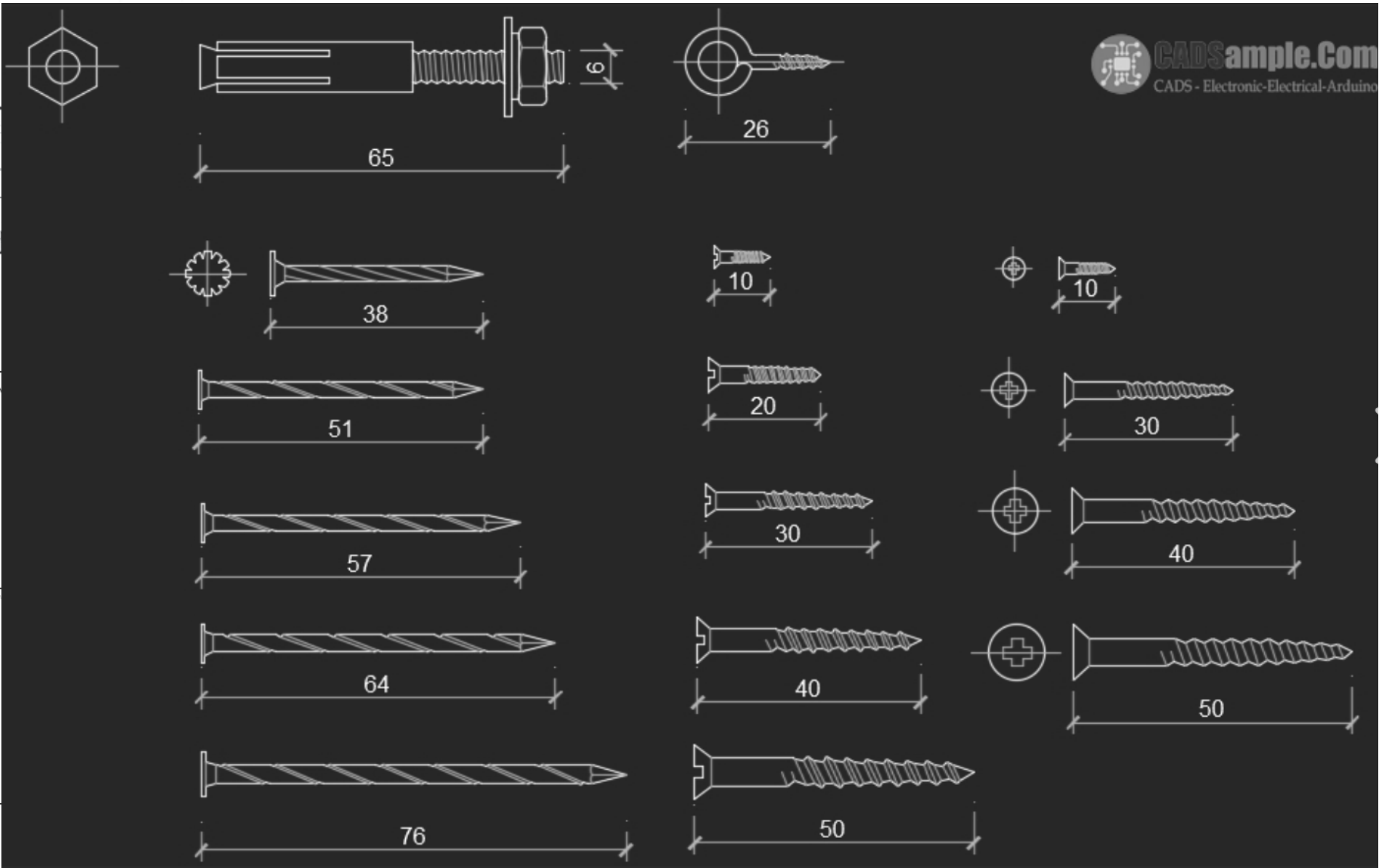
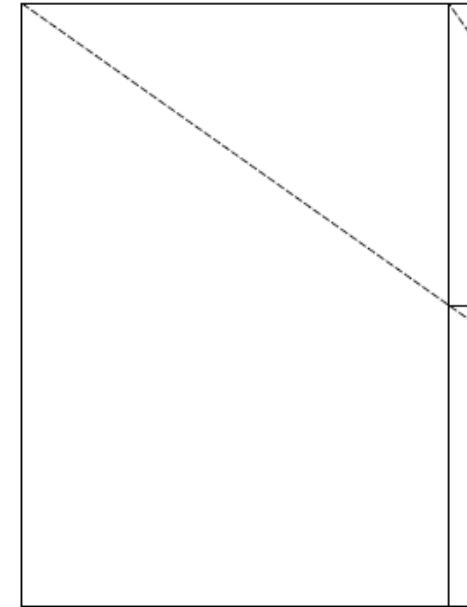
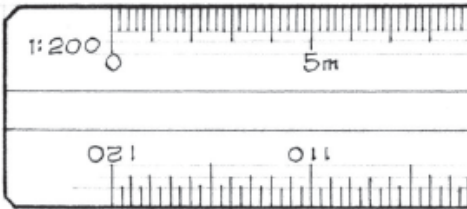
Drawings prepared in the Construction Industry

Must:

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

Industry conventions assist in the legibility of drawn information.

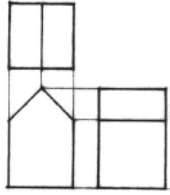
Appropriate Scale Drawings



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, paraline 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.

Paraline 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.

Axometric 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 modeling 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



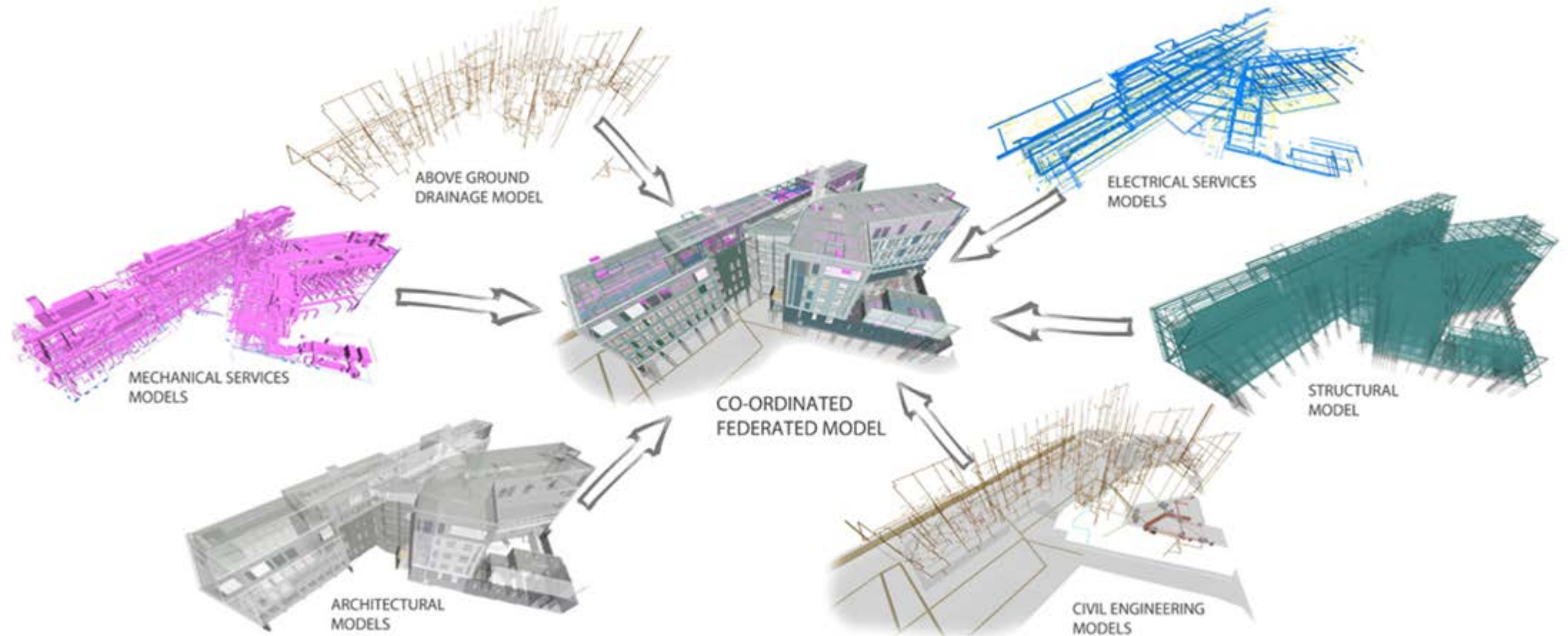
AUTODESK®
REVIT®

Is this enough?

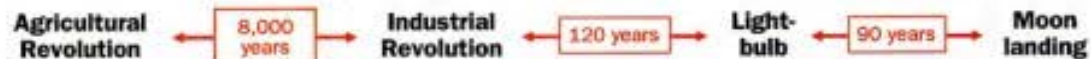
How can we improve the way
we communicate?

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



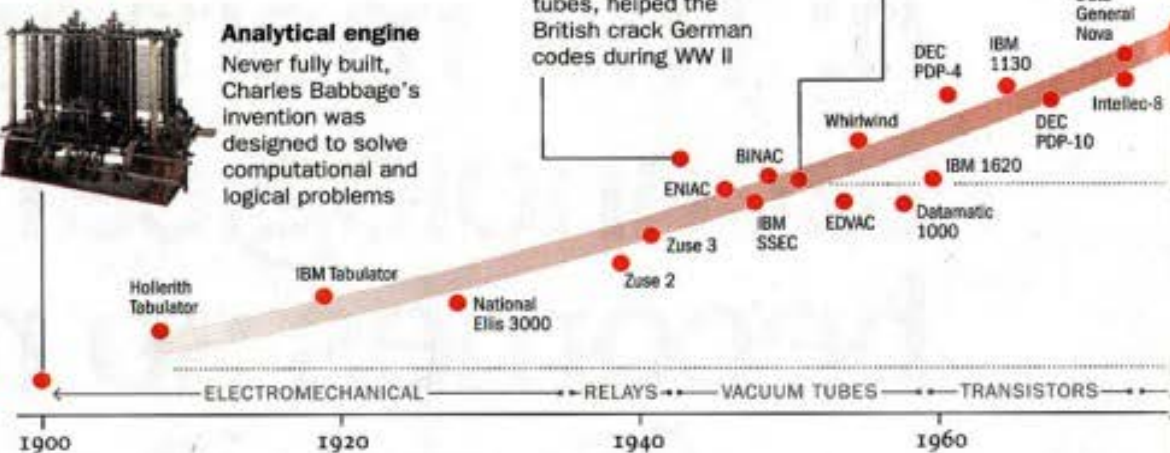
Colossus

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



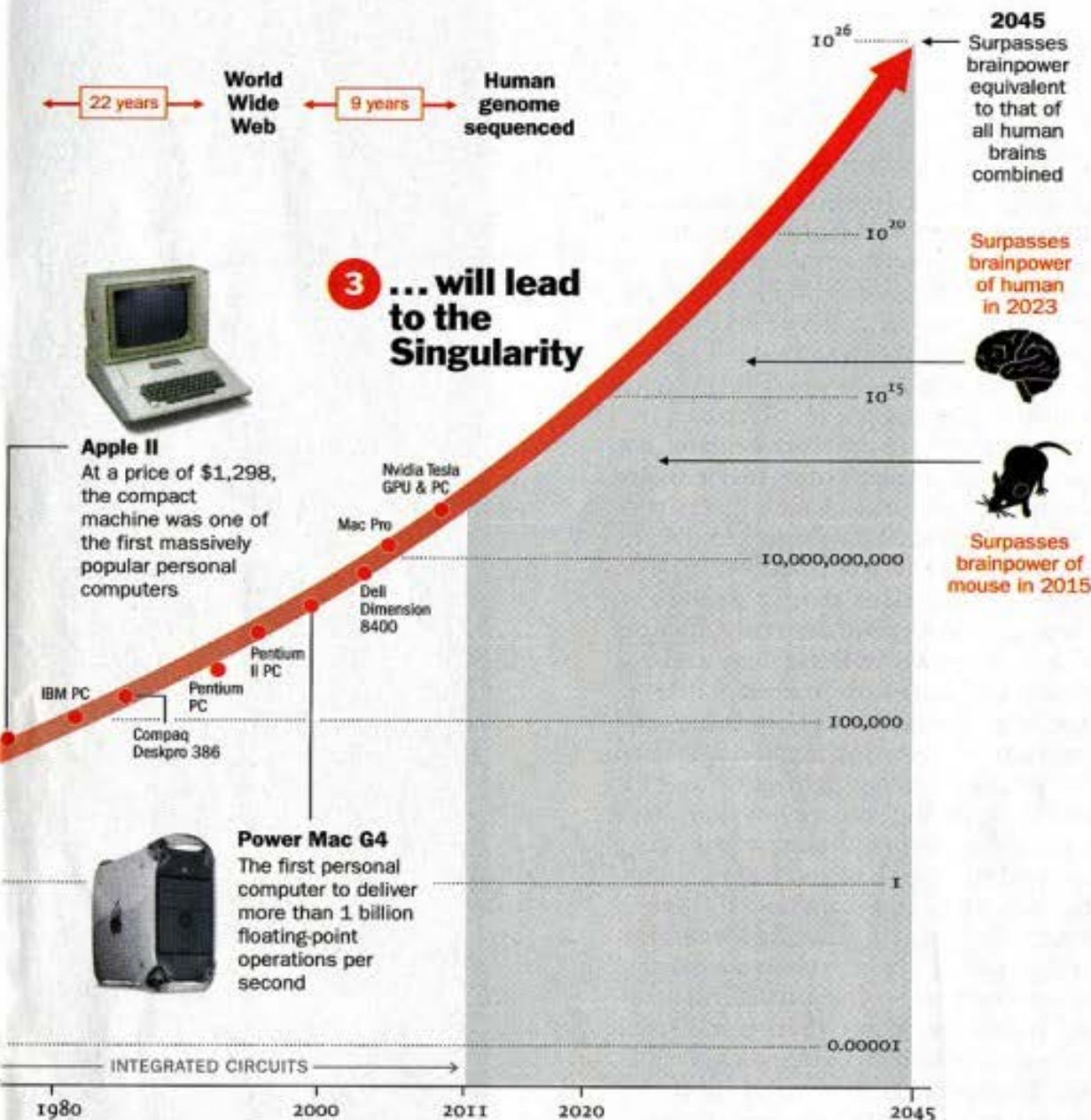
Apple II

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



Power Mac G4

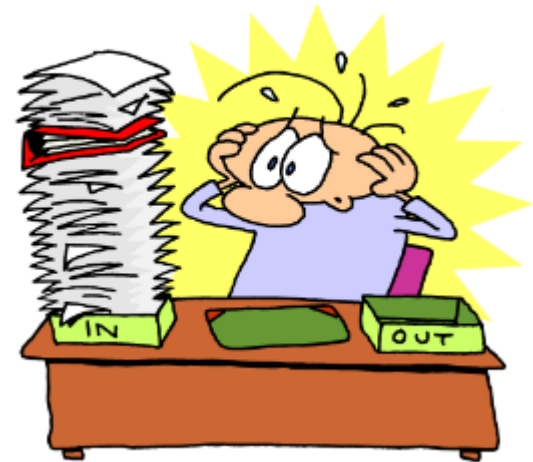
The first personal computer to deliver more than 1 billion floating-point operations per second



Building Information Modelling

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

Better Information Management



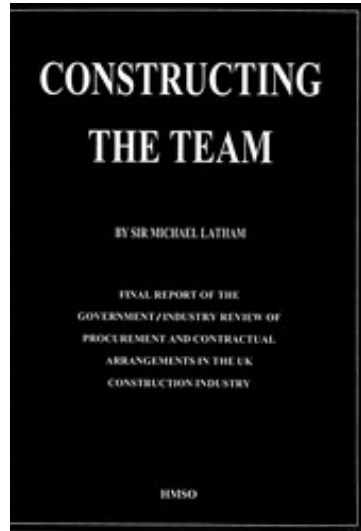
Why BIM?



Origins in UK



Latham
Report



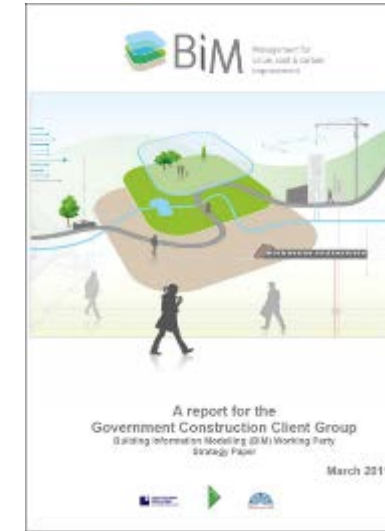
Egan Report

Accelerating
Change



Never
Waste A
Good Crisis

BIS BIM
Strategy



Government
Construction
Strategy

1994

1998

2002

2009

2011

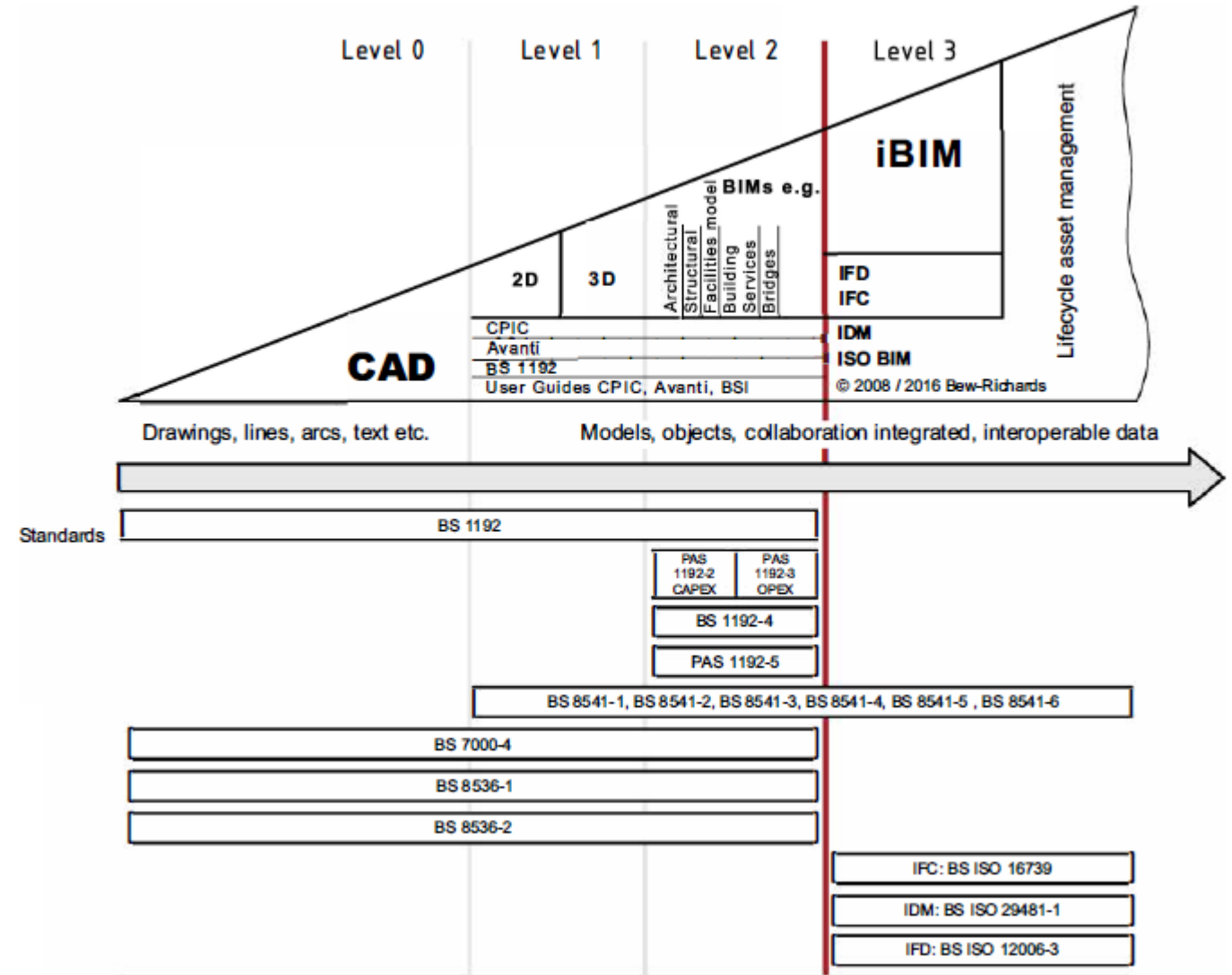
2011

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

Maturity



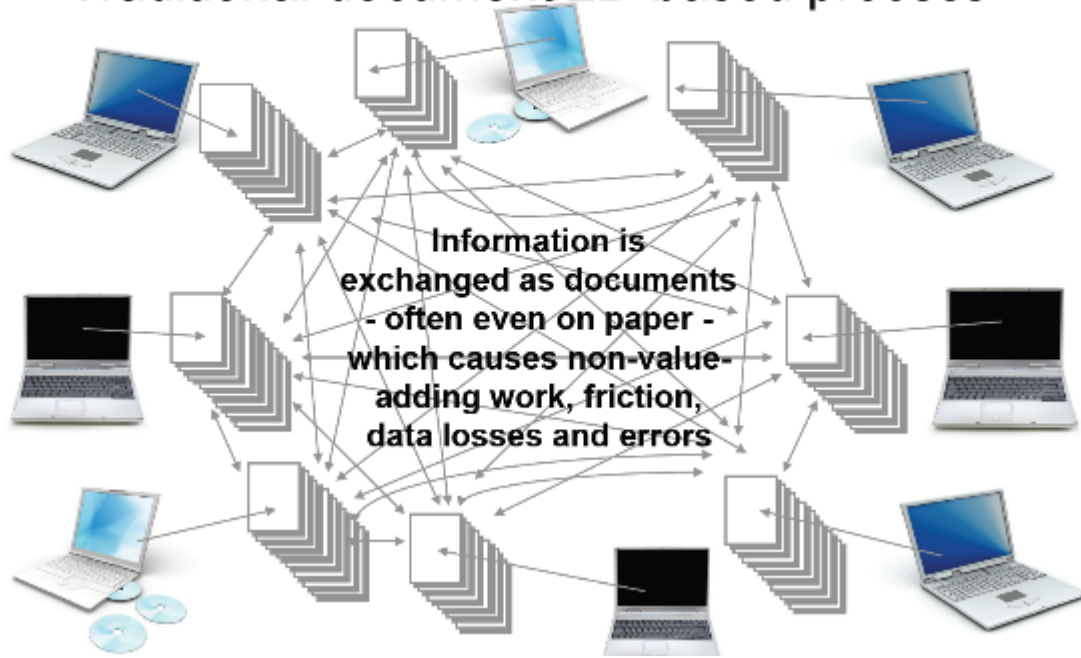
The Construction Strategy aimed at reducing the cost of public sector assets by up to 20% by 2016. To achieve this strategy, the government mandated that construction suppliers tendering for centrally-procured government projects to be working at BIM Level 2.



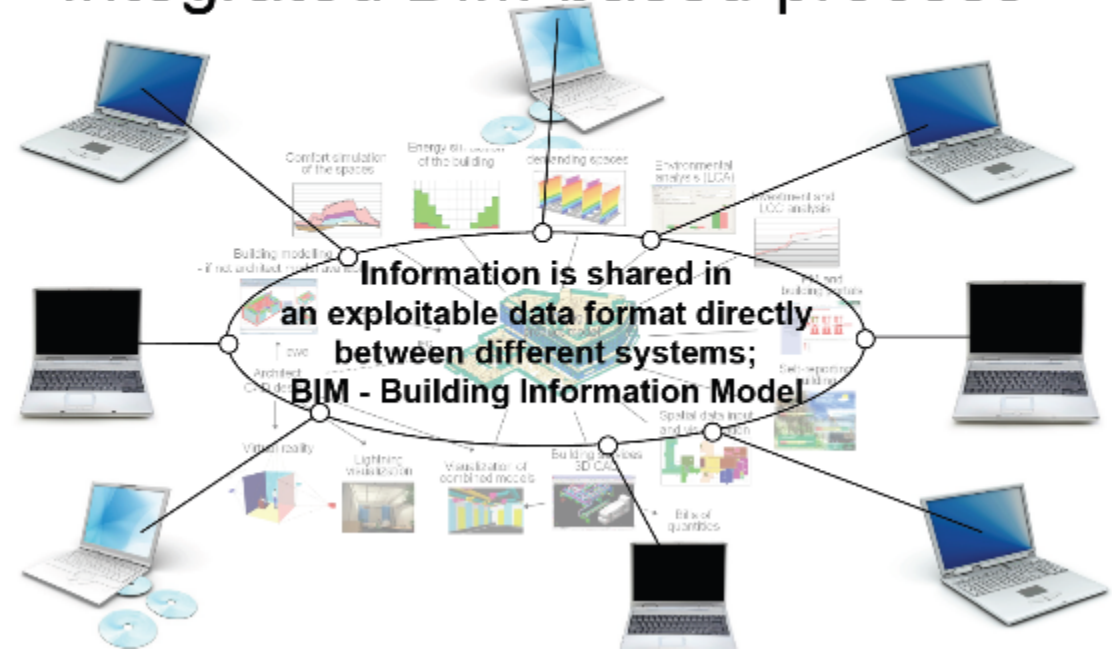
Bew Richards Wedge

Benefits

Traditional document/2D-based process



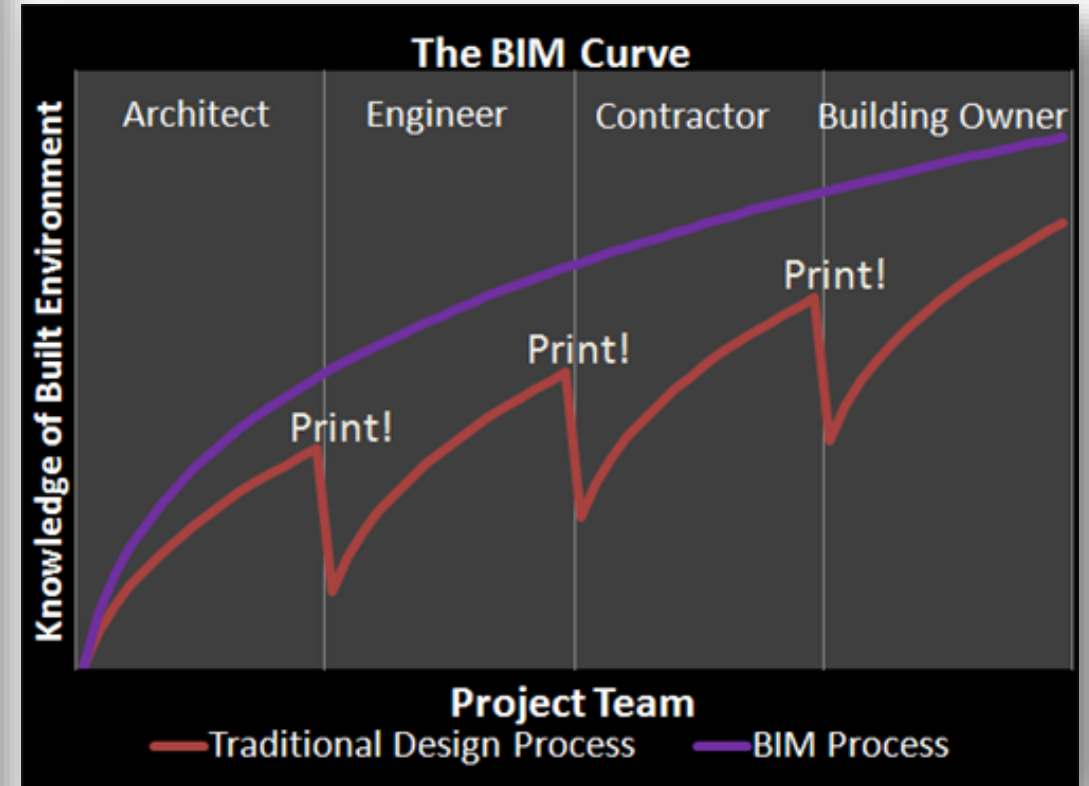
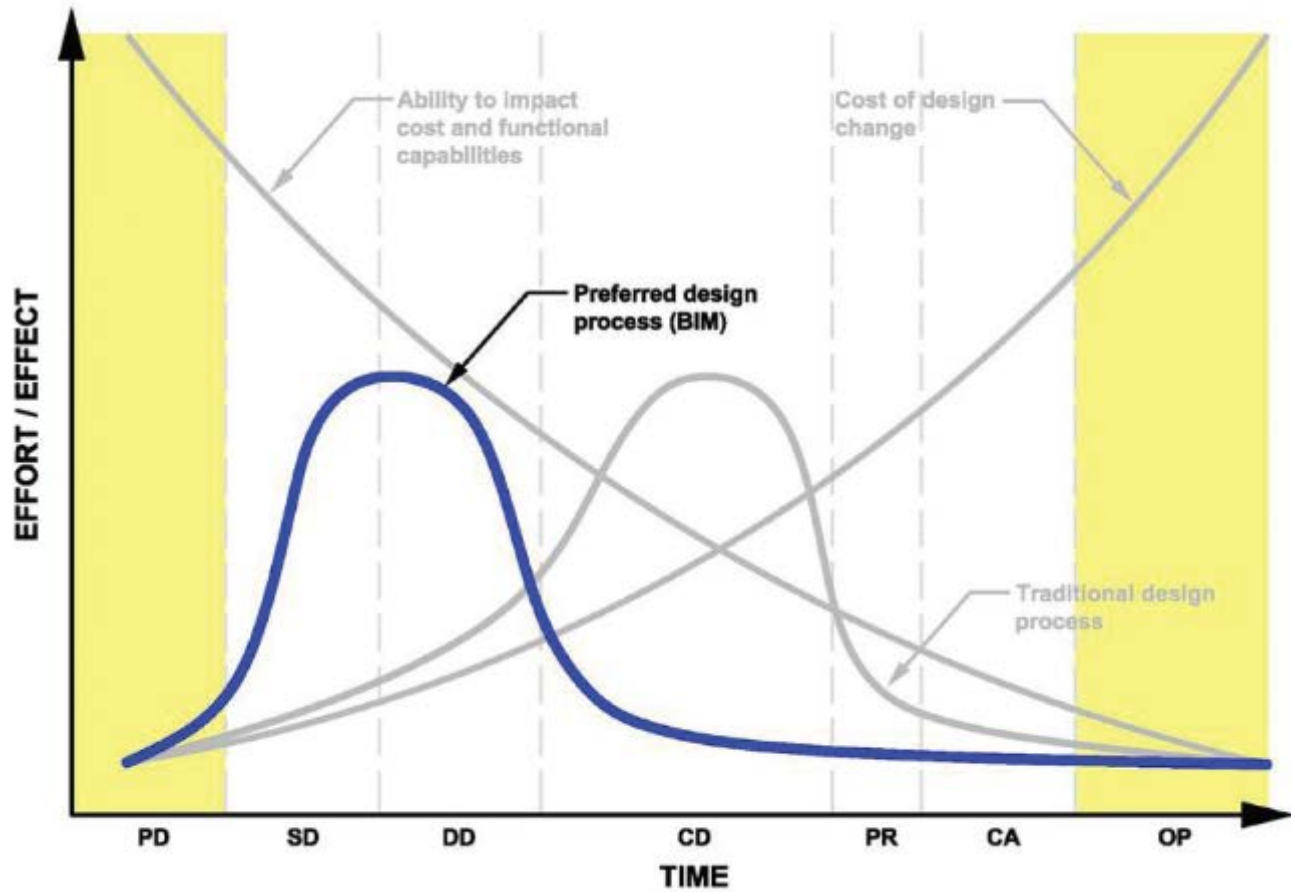
Integrated BIM-based process



BIM Advanced, CE Wales, 16/01/2013

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

Change Management

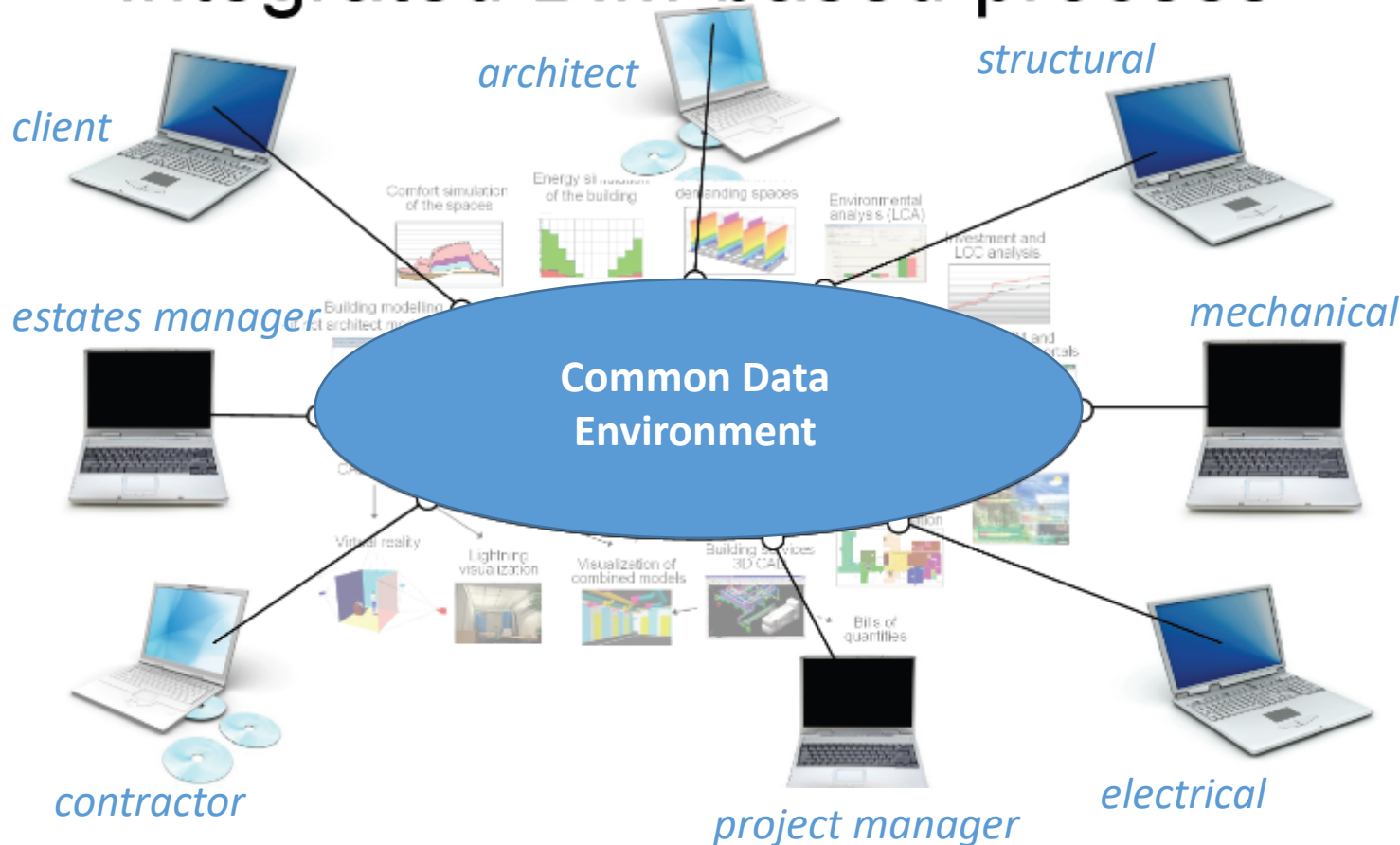


Clash Detection



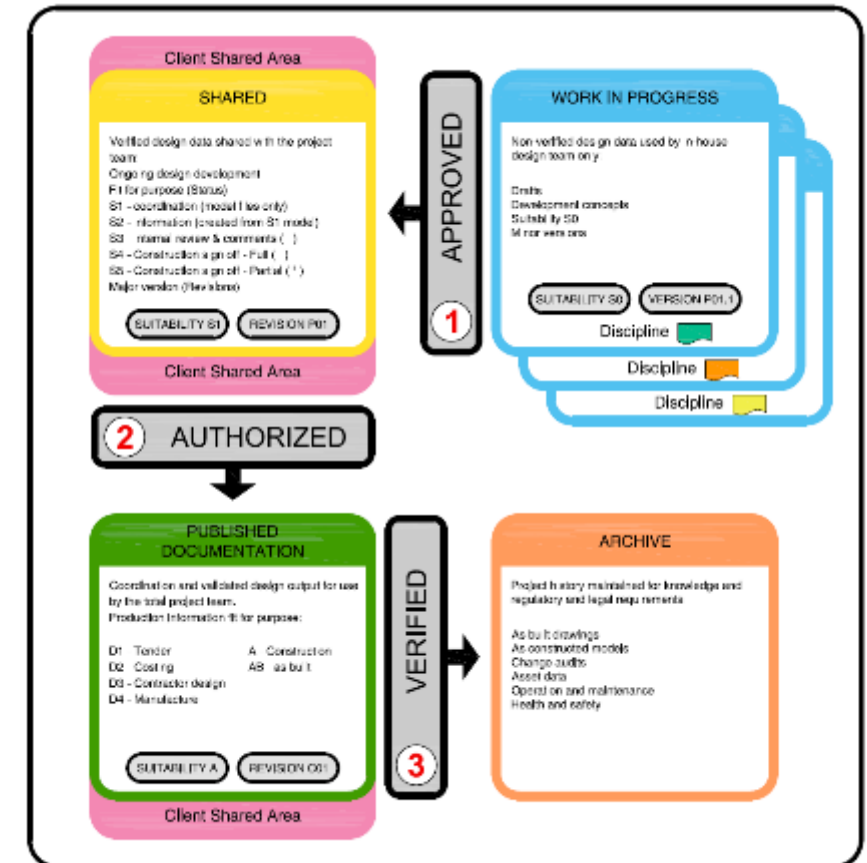
Application

Integrated BIM-based process



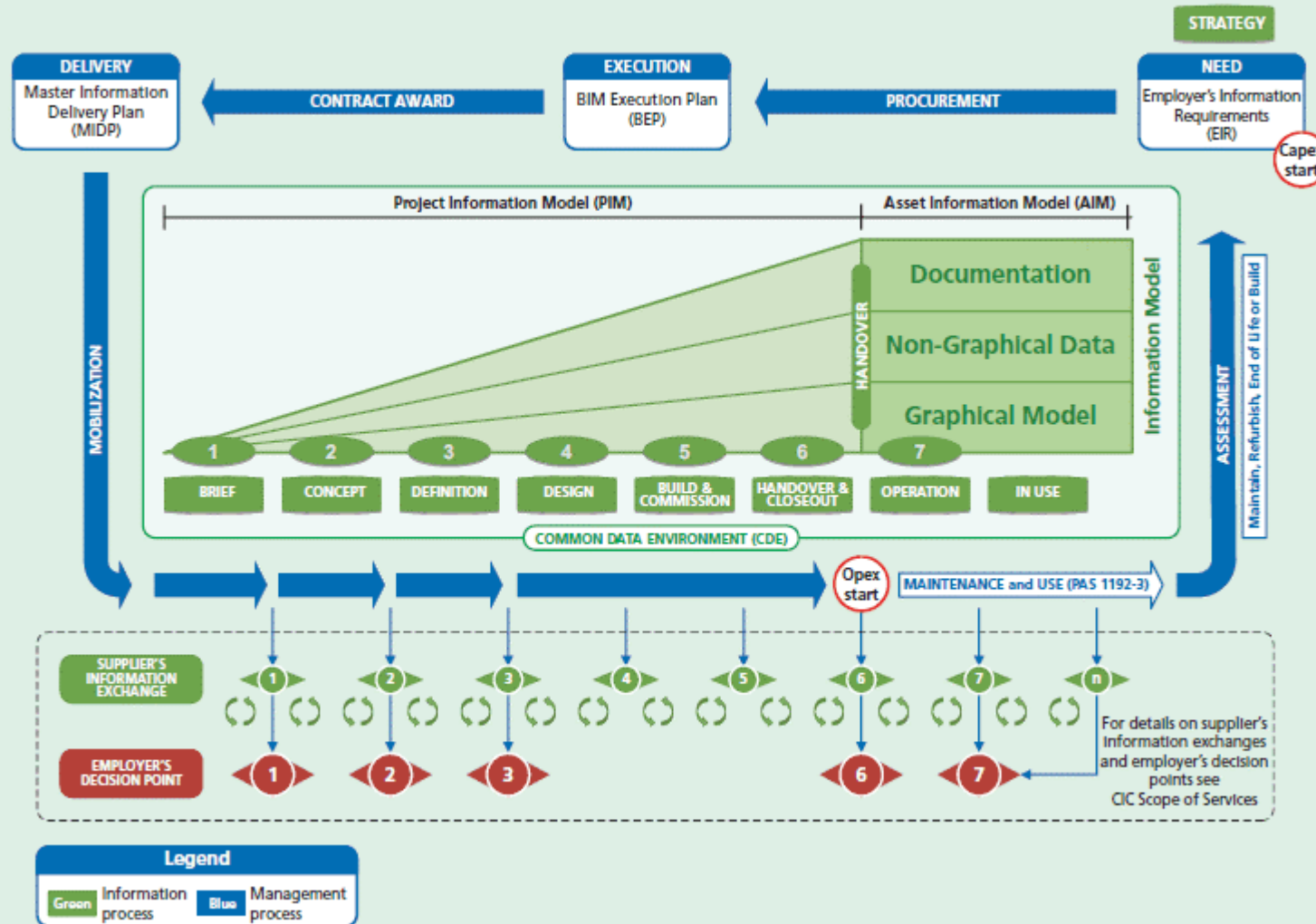
The structured use of a Common Data Environment (CDE) requires strict discipline by all members of a design team in terms of adherence to agreed approaches and procedures, compared with a more traditional approach. The benefits can only be realized with a commitment to operate in a disciplined and consistent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

PAS 1192-2:2013

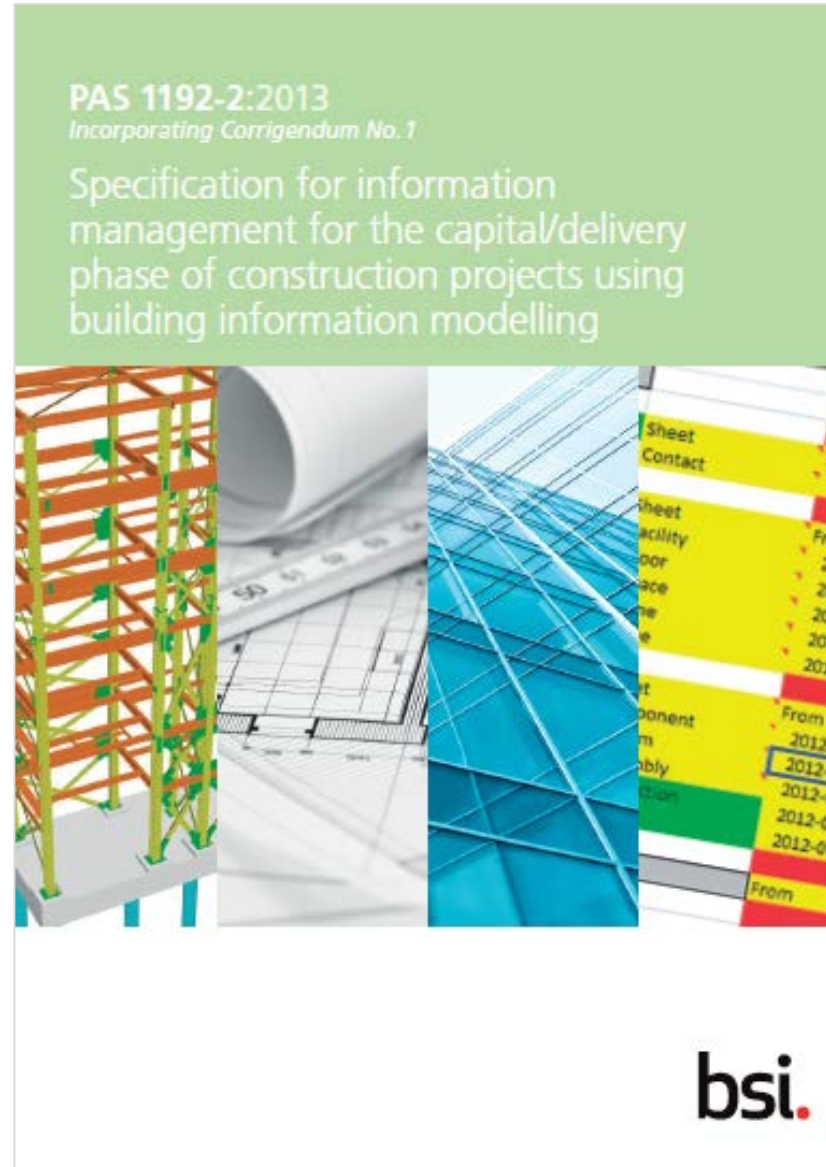
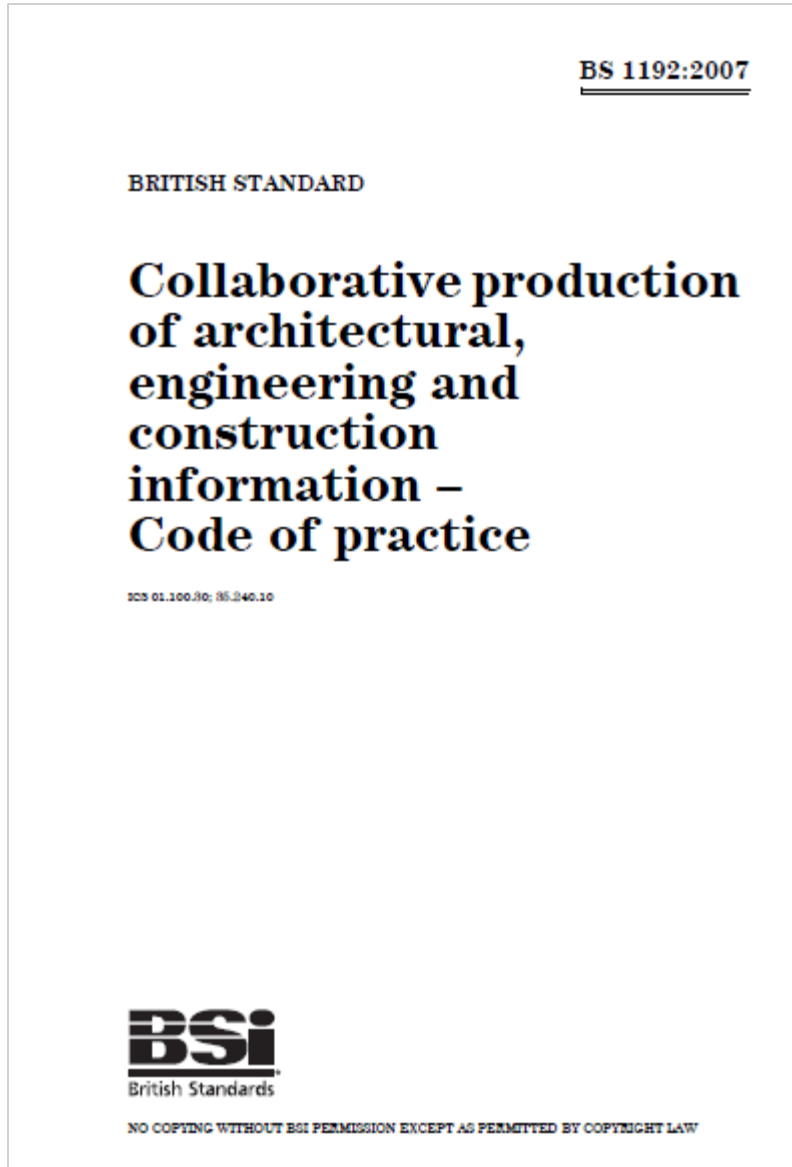


BIM Process Diagram

The information delivery cycle

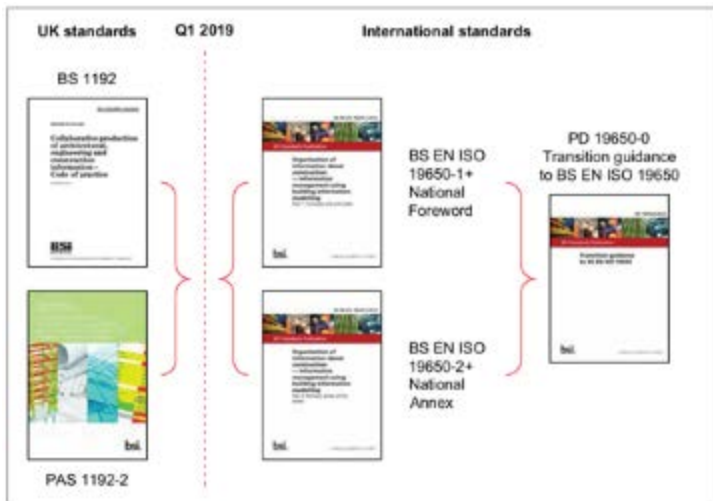


Key Standards



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

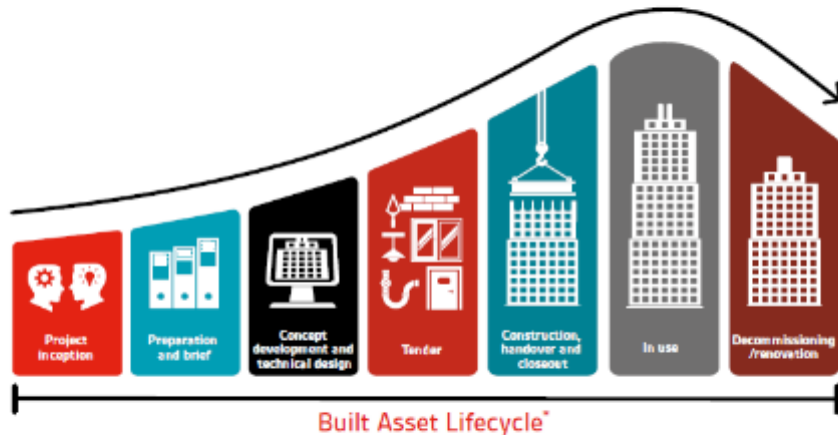
Includes ISO 19650 Standards

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

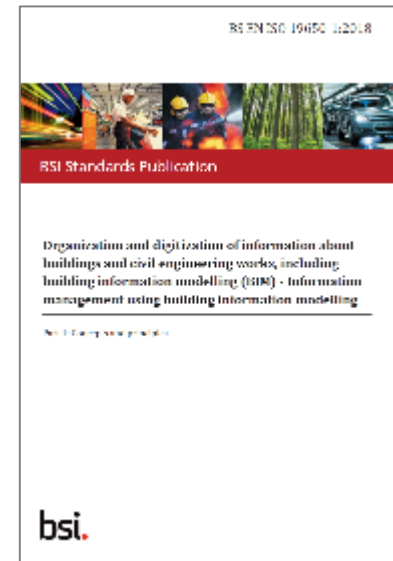
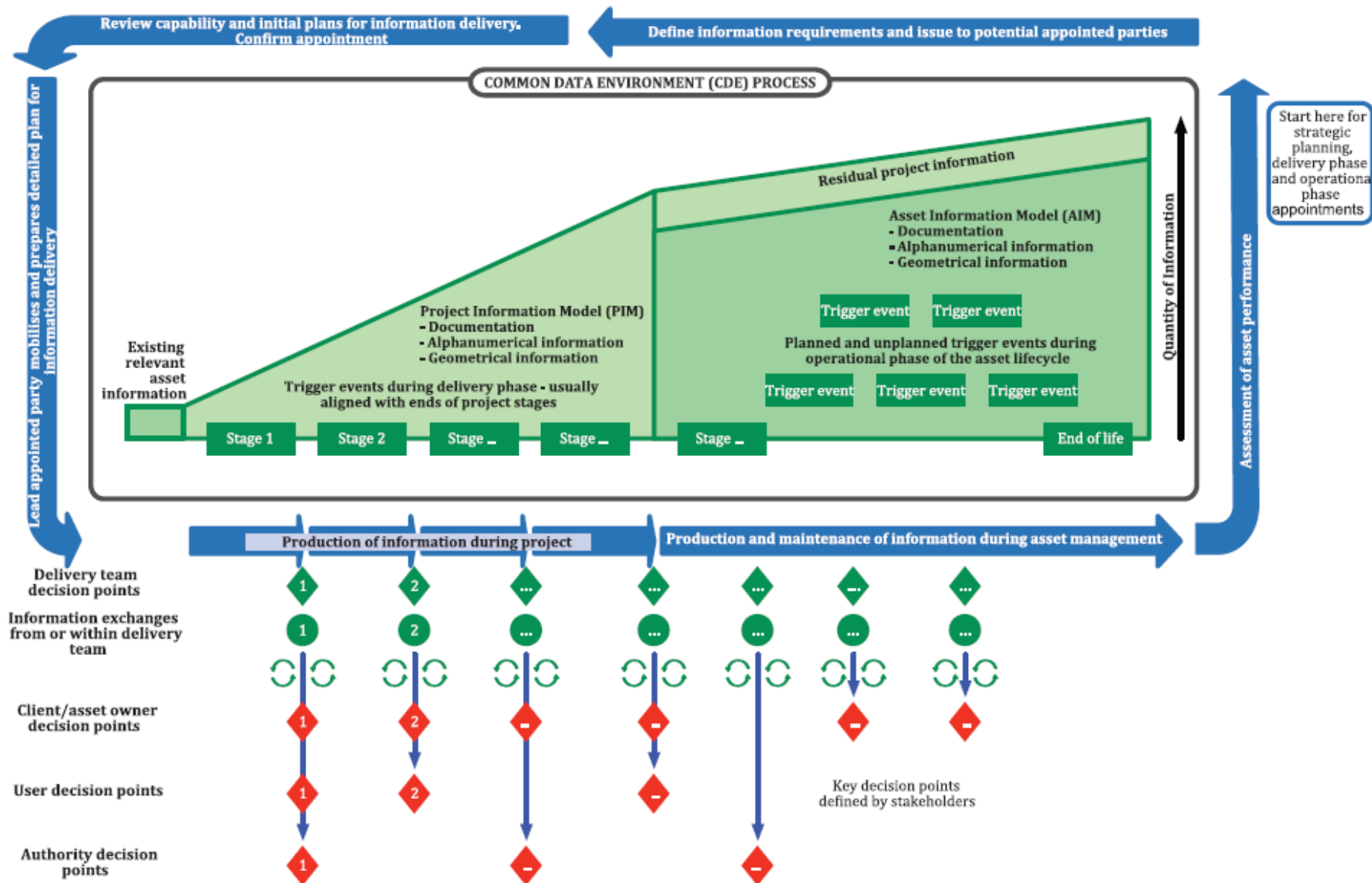
BS EN ISO 19650-1:2018 – Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Concepts and principles. This will supersede BS 1192:2007+A2:2016.

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



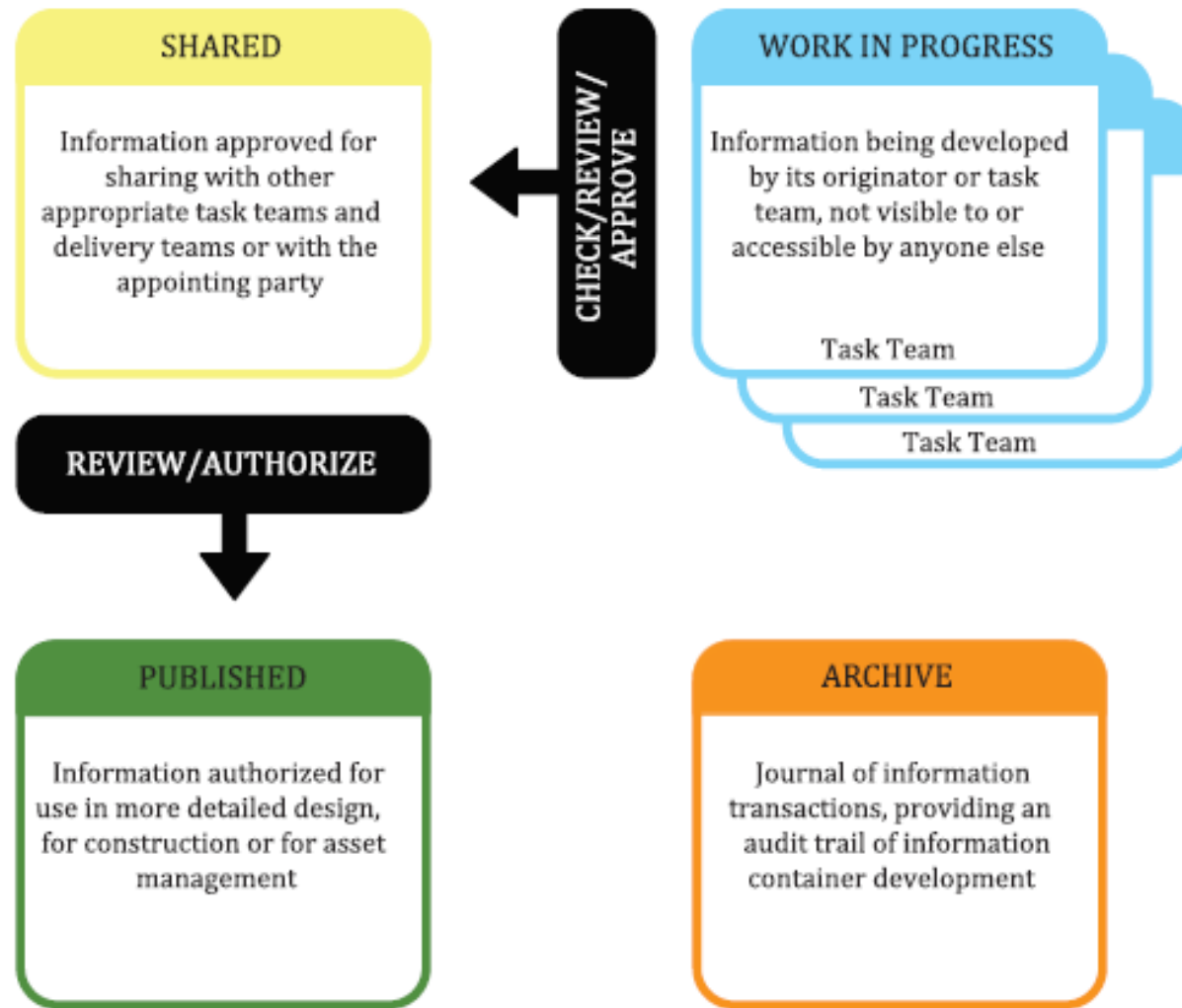


Figure 10 — Common data environment (CDE) concept

Conventions

UNIVERSITY OF WALES TRINITY SAINT DAVID

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

THE CODE	Project	Originator	Zone	Level	Type	Role	Number	Description*	Suitability*	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 GF - 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: AF Animation File CM Combined Model DR 2D Drawing M2 2D model M3 3D model MR Model rendering VS Visualization For Documents: BQ Bill of Quants CA Calculations CO Correspondence CP Cost Plan DB Database FN File Note HS Health & Safety IE Information Exchange MI Minutes / Action Notes	A Architect / Architectural B Building Surveyor C Civil Engineer D Drainage Engineer E Electrical Engineer F Facilities Manager G Geographical Surveyor H Heating & Ventilation Designer I Interior Designer K Client L Landscape Architect M Mechanical Engineer P Public Health Engineer Q Quantity Surveyor S Structural Engineer T Planner W Contractor X Subcontractor Y Specialist Designer Z General	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: A, B, C etc
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.	MS Method Statement PP Presentation PR Programme RD Room Data Sheet RI Request for Information RP Report SA Schedule of Accommodation SH Schedule SN Snagging List SP Specification SU Survey		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, unweildy descriptions as this will affect your ability to file in Windows	Please refer to opposite tabled from BS1192:2007 issue sheet for the appropriate suitability status codes.	
EXAMPLE	4005	UWSTD	XX	ZZ	DR	A	1001	GEO MOD	S1	A
* = Optional add ons within schema that we as UWTSD 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 authored by G Traylor, UWTSD, October 2019. Based on BS 1192:2007 + A2:2016 & BS 1192-2:2013										

Status	Description
Work in Progress	
S0	Initial status or WIP
	Master document index of file identifiers uploaded into the extranet.
Shared (Non-Contractual)	
S1	Suitable for Co-ordination
	The file is available to be „shared“ and used by other disciplines as a background for their information.
S2	Suitable for Information
S3	Suitable for Internal Review & Comment
S4	Suitable for Construction Approval
S5	Suitable for Manufacture
S6	Suitable for PIM Authorization (Information Exchanges 1-3)
S7	Suitable for AIM Authorization (Information Exchange 6)
D1	Suitable for Costing
D2	Suitable for Tender
D3	Suitable for Contractor Design
D4	Suitable for Manufacture/Procurement
AM	As Maintained
Published Documentation (Contractual)	
A	Suitable for Construction
B	Partially signed-off:
	For Construction with minor comments from the Client. All minor comments should be indicated by the insertion of a cloud and a statement of “in abeyance” until the comment is resolved, then resubmitted for full authorization.
AB	As-Built Handover documentation, PDF, native models, COBie etc.

Conventions

4005 _UWTSD _XX _GF_DR _A _0001 _GenA _AB

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

4005 _UWTSD _XX _XX_SP _C _0001 _NBS _A

An NBS Specification suitable for construction, produced by the Civil Engineer

Guidance in a World of Acronyms

1 Bs BIM Strategy													2 Su Surveys and Reports							
3 Fr Framework	4 Cu Culture and behaviour	Strategy Foundations Collaboration Process People Technology Standards Enabling Tools Resources												5 Bt BIM Toolkit	6 Lod Level of detail	7 Loi Level of Information	8 Vi Videos			
9 Co Common methods	10 Po Process	11 As Assessment and need	12 Eir Employers info requirements	13 Cm Communication	14 In Investment	15 Sf Software	16 Cd Capital delivery phase	17 Cl Collaborative business relationships	18 Li Library objects	19 Cs Classification	20 An Analysis tools	21 Ev Events								
22 Pr Procurement tools	23 Fo Forms of procurement	24 Ex Execution	25 Bep BIM execution plan	26 So Soft skills	27 Ch Change process	28 Ha Hardware	29 Op Operational phase	30 Pt Protocol	31 Pe Prequalification questionnaires	32 Cafm Computer-aided Facilities Management	33 Ct Cost tools	34 Fu Forums and user groups								
35 Ca Capability and capacity	36 Di Digital tools	37 De Delivery	38 Midp Master information delivery plan	39 Cp Cooperation	40 Sh Share success	41 Tr Training	42 Fm Facilities management	43 Qu Quality management systems	44 Bsdd BuildingSMART data dictionary	45 Pg Programme tools	46 Ad Administration tools	47 Sc Social media								
		48 St Standardisation and interoperability	49 Ma Maintenance and use	50 Cde Common data environment	51 Ci Champion	52 Av Availability	53 Fi File storage	54 Dg Digital security	55 Ds Design management systems	56 Ifc Industry foundation classes	57 Au Authoring tools	58 Mo Model viewers and checkers	59 Bl Blog posts							
		60 Dpow Digital Plan of Work	61 If Information exchange	62 Sp Support	63 En Engage	64 Ir Infrastructure	65 Br Briefing	66 Am Asset management	67 Idm Information delivery manual	68 Sp Specification tools	69 Fl File sharing and collaboration	70 Bo Books								
Digital Plan of Work stages																				
71 Sr Strategy	72 Bi Brief	73 Df Definition	74 Dn Design	75 Bu Build and commission	76 Hn Handover and closeout	77 Oe Operation	78 Ed End of life													

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

Tools

Drawing, Modelling and Specifications



VECTORWORKS®
A NEMETSCHEK COMPANY



Clash Detection, Virtual Build



Collaboration and CDE Platforms



CAFM and CObie Outputs



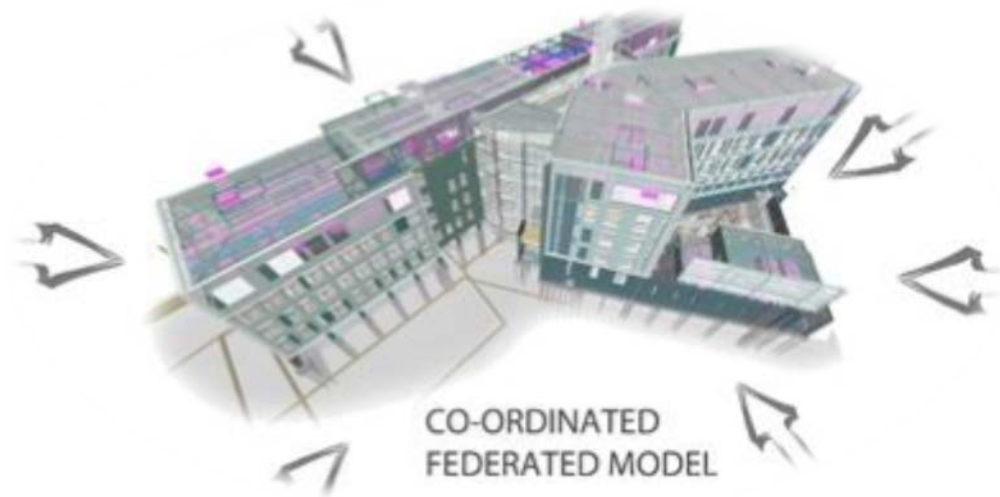
How can we collaborate?

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



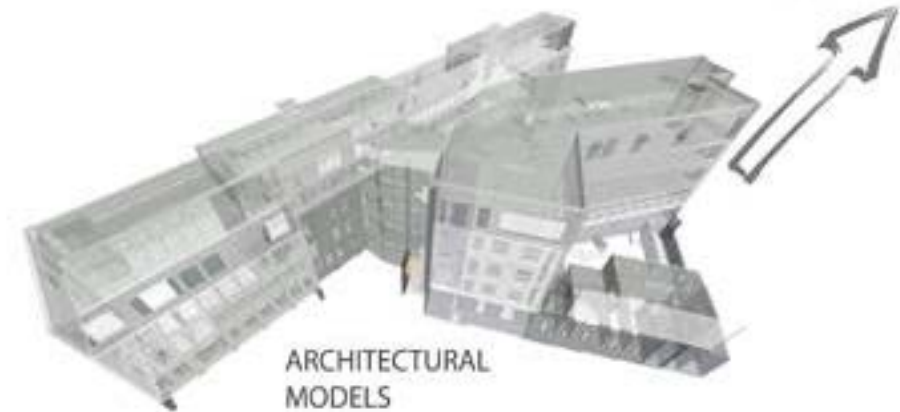
reviztoTM

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



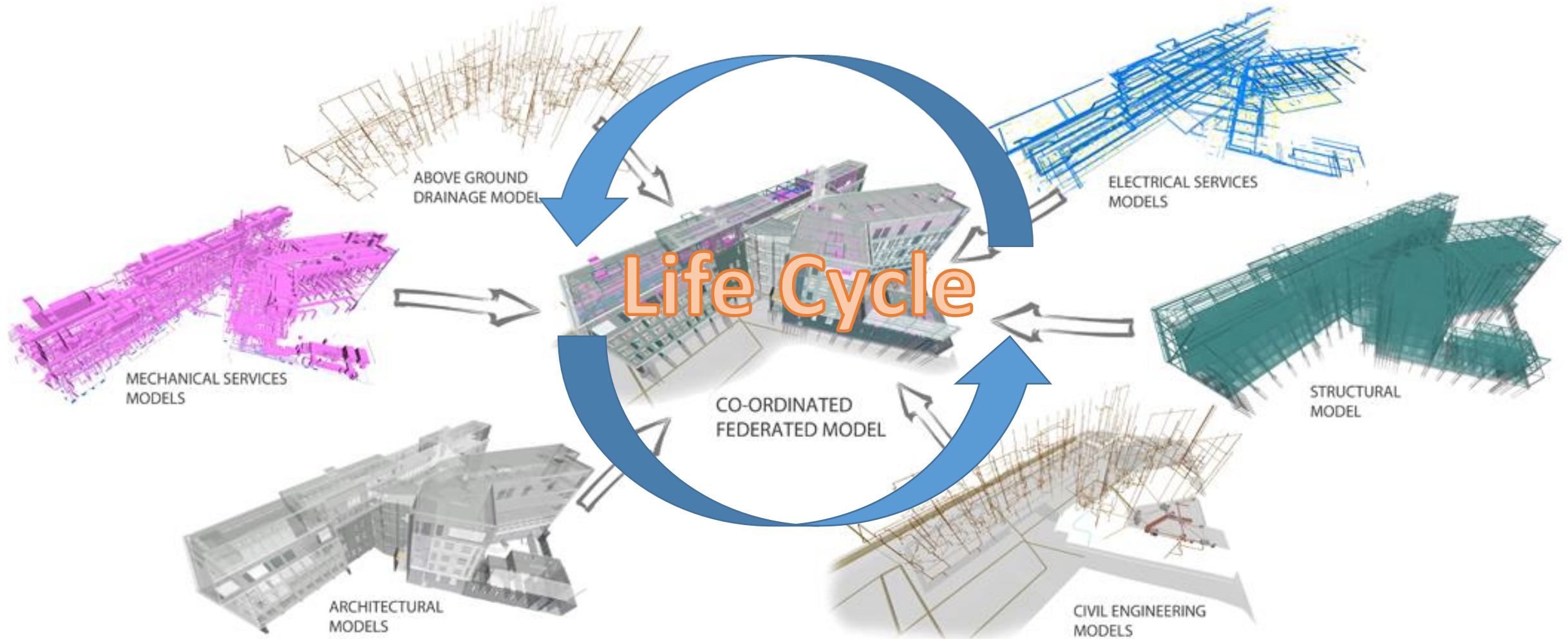
How can we create data rich intelligent models?

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

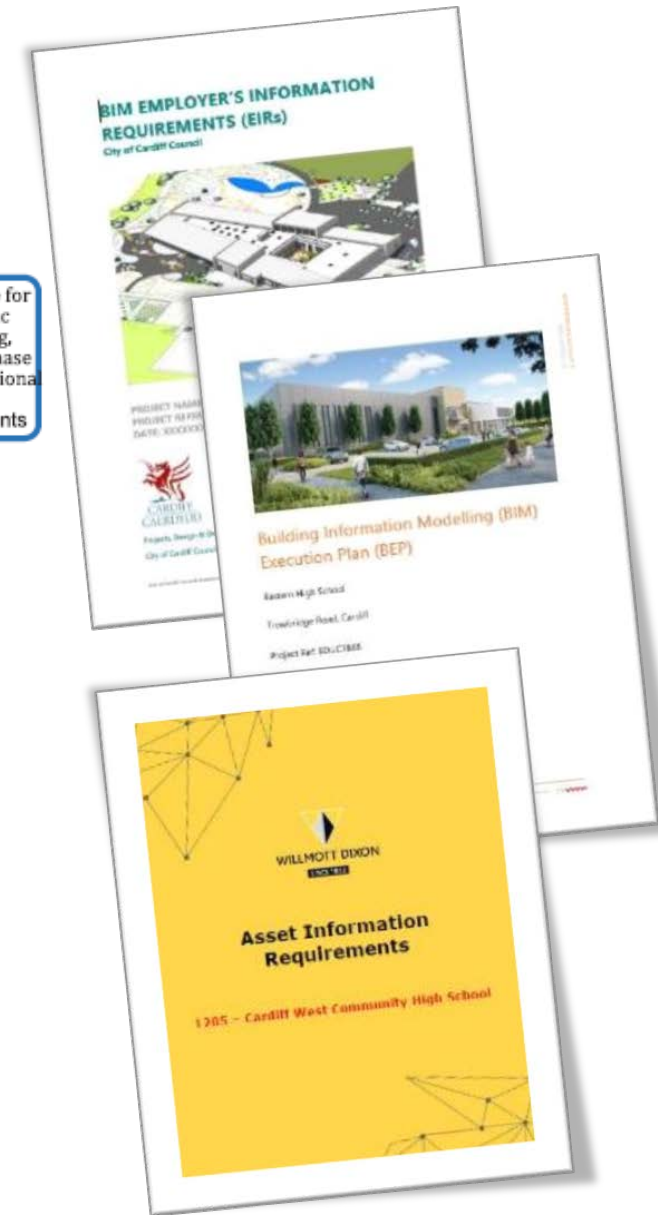
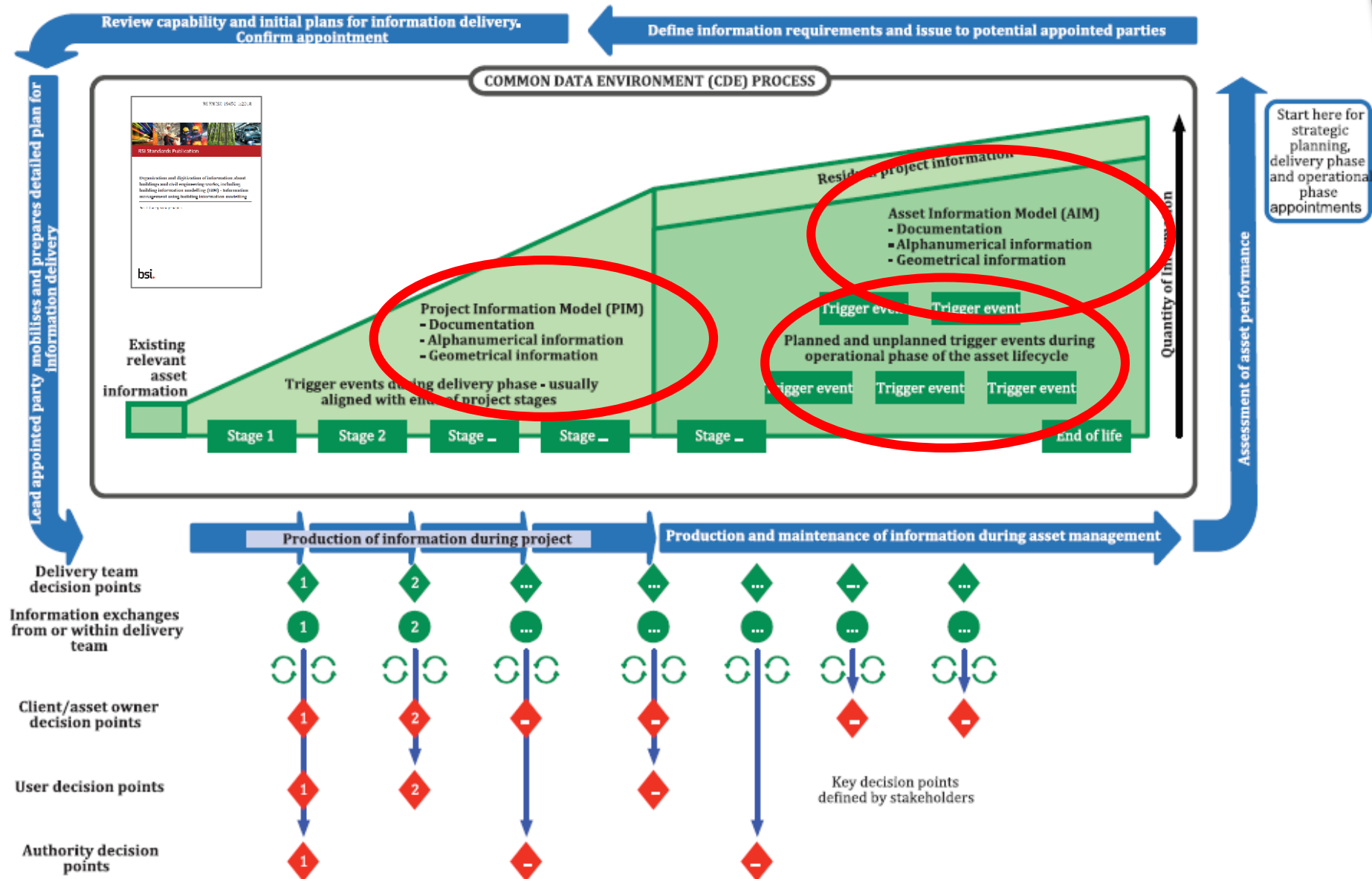
BIM Handover Package

 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?

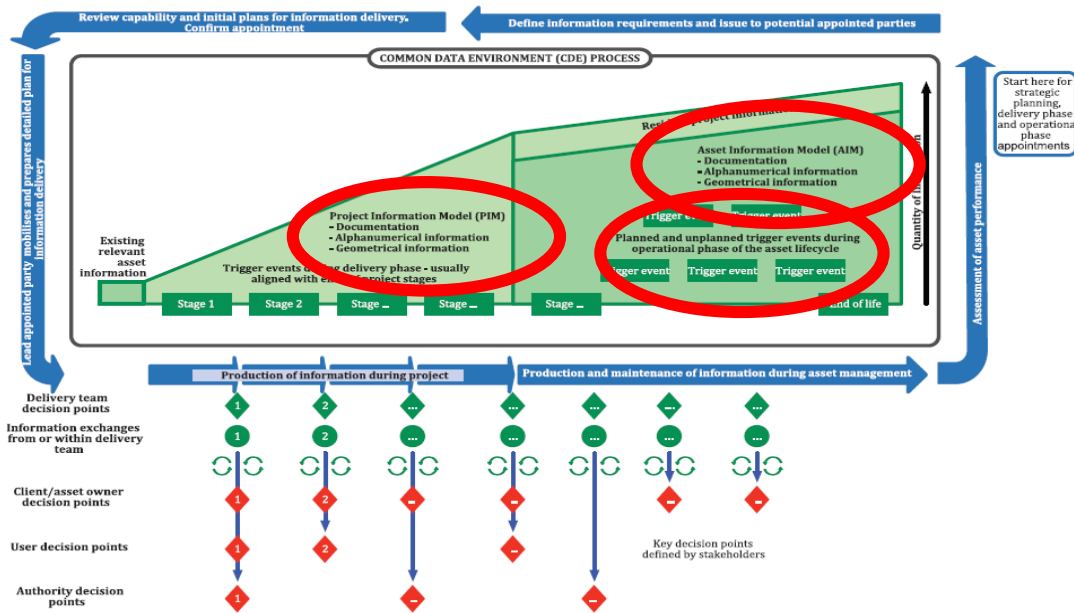
What about existing building stock?

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



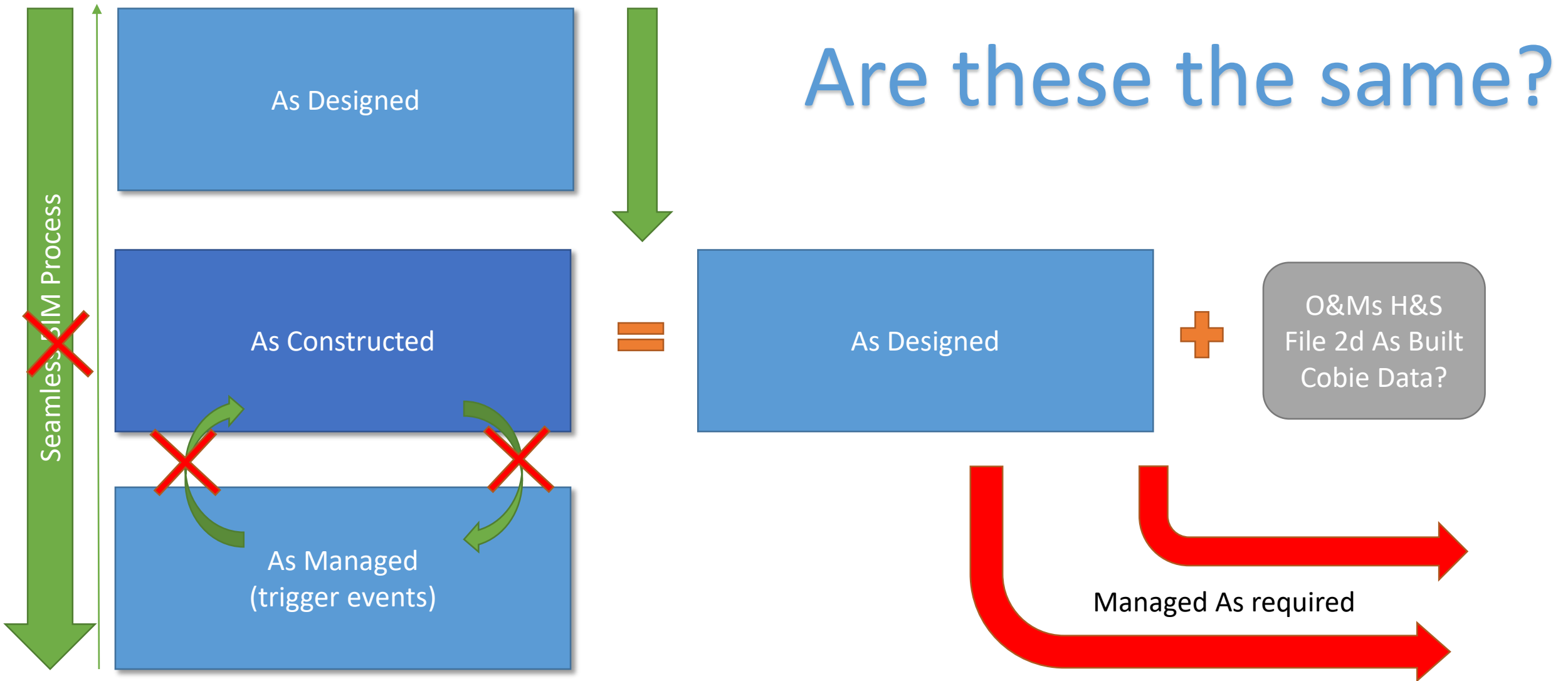
Are these the same?

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/AvEqfg2sIH0>



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	8.1 Intended Building Use Against Actual
5.1 Analyse Utility Invoices And Meter Readings	8.2 Design Performance Predictions Against Actual
5.2 Analyse Metering Strategy	8.3 Benchmark Against Published Datasets
5.3 Conduct Equipment Survey	9 Report
5.4 Analyse Embodied Carbon	9.1 Client, FMs, Users
5.5 Analyse Measurement And Verification Strategy	9.2 Project Team
	9.3 Open Dissemination to Industry

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

How do we evaluate?

Manual Survey & Observations



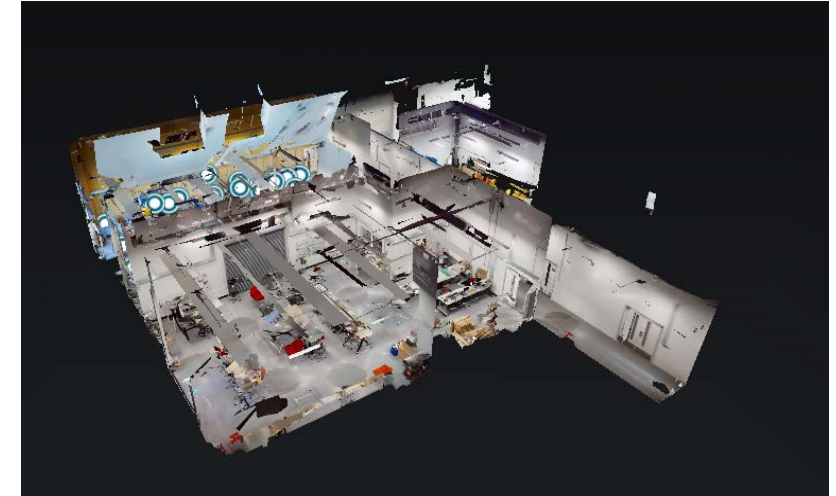
- As built drawings
- Building File / O&M Manuals



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?

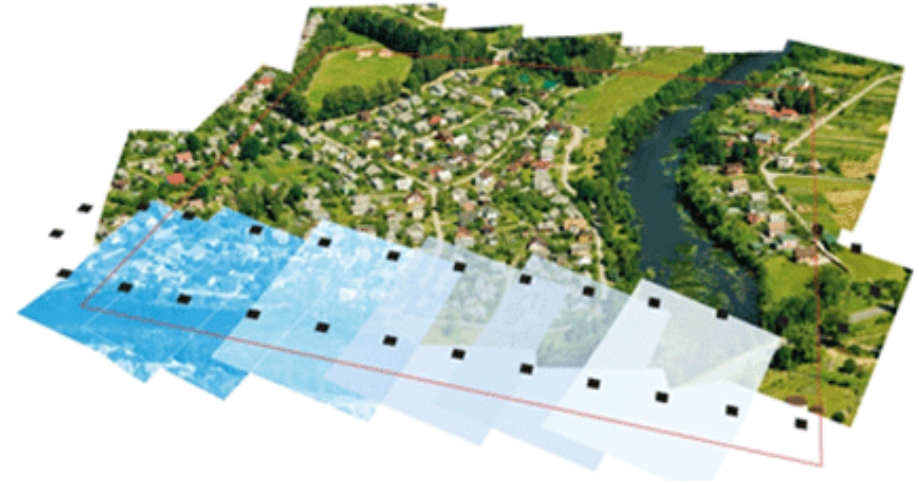
Photogrammetry

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

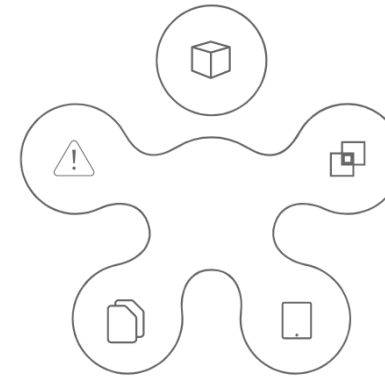
View the entire project by federating all intelligent BIM data including reality capture into a centralized user-friendly location and get all teams in-sync.

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	

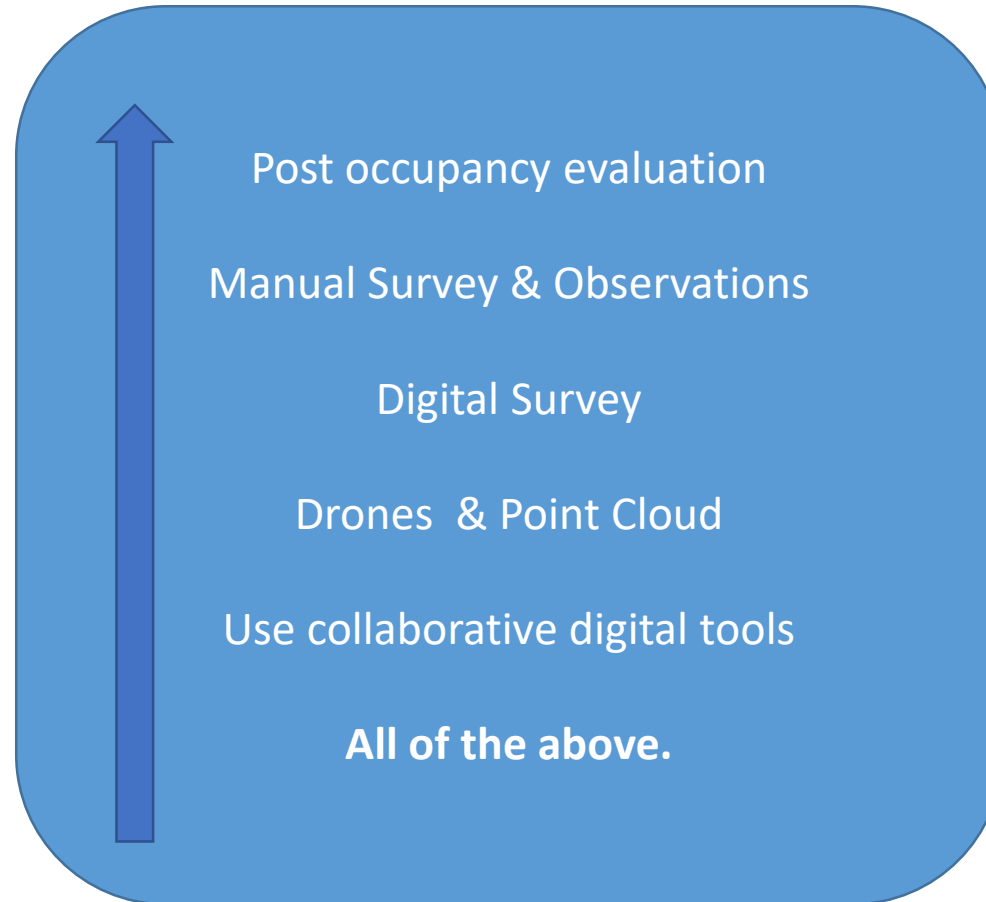
Supported Formats

BCF	DWF
Faro	FBX
IFC	LAS
OBJ	PDF
Solibri	ReCap

Integrations

BIM360
Box
Procore

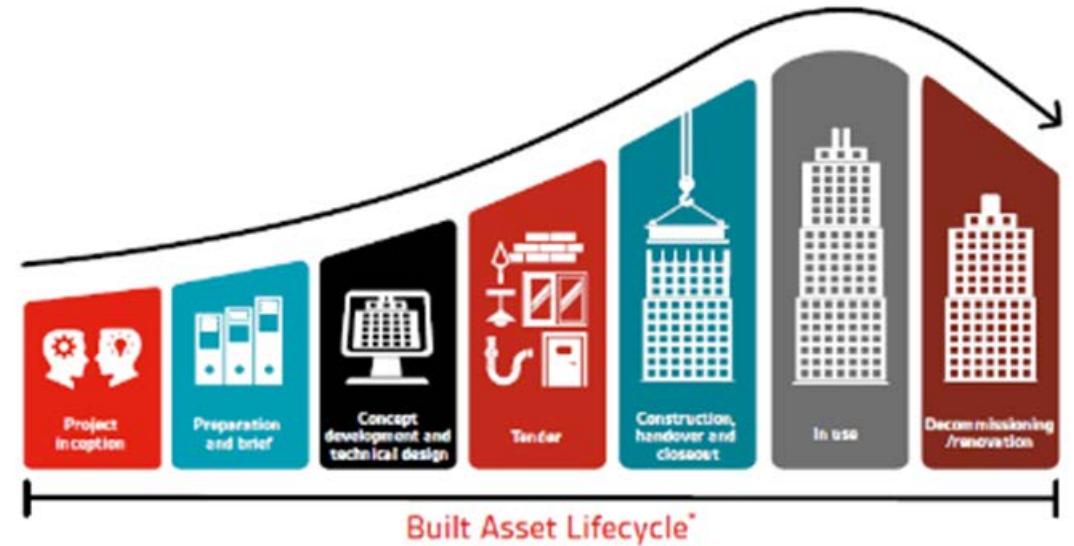
How do we evaluate?



How is this managed?

Life Cycle of the Asset that considers:

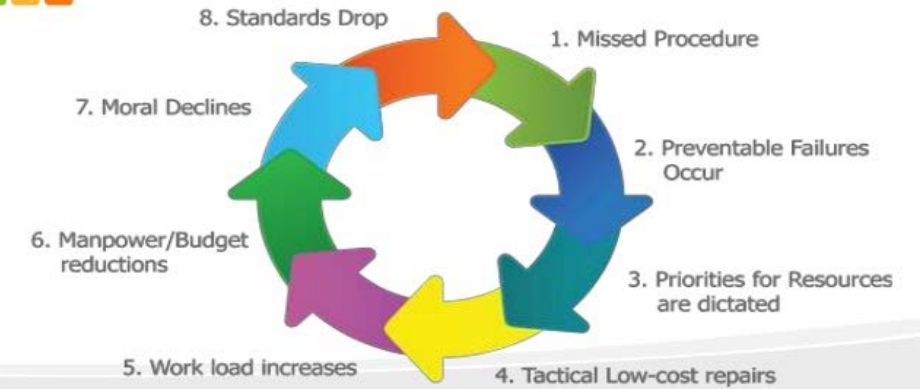
- Management and Controls for Maintenance
- Introduction of Sustainability Measures
- Monitoring Energy Performance
- Health and Safety - Statutory Observations
- Management of Alterations, Adaptations and Refurbishment
- Introduction of New Technologies



How is this managed?



Reactive Maintenance Impact



Proactive
Reactive



Planned 'Preventative' Maintenance and Cyclical Testing



Data Base

How is this managed?



Old School Data Base

Basic CAFM

How is this managed?

The screenshot shows an Excel spreadsheet with the following structure:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Transfer Frequencies														
2	Refresh Formulas	ion	Unit	Partition	Model	Serial Number	QTY	Type	Asset Description	Manufacturer	Vendor	Cost	Install Date	Warranty Start Date	Warranty End Date
3	Calculated Area	Calculated Area	Calculated Area	Calculated Area	Select Model	20 chars (Optional)	Integer	20 chars (Optional)	120 Chars (Optional)	20 chars (Optional)	20 chars (Optional)	999999.99	dd/mm/yyyy	dd/mm/yyyy	dd/mm/yyyy
4															
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40															

The spreadsheet is titled 'QFM Asset Loader' in the bottom-left corner. The status bar at the bottom indicates 'ready' and '100%' zoom.

Cloud Based CAFM

How is this managed?



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Solutions

 tf cloud

 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.



tommywhite 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



View

All Sites

All Buildings

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

Room List

Site

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

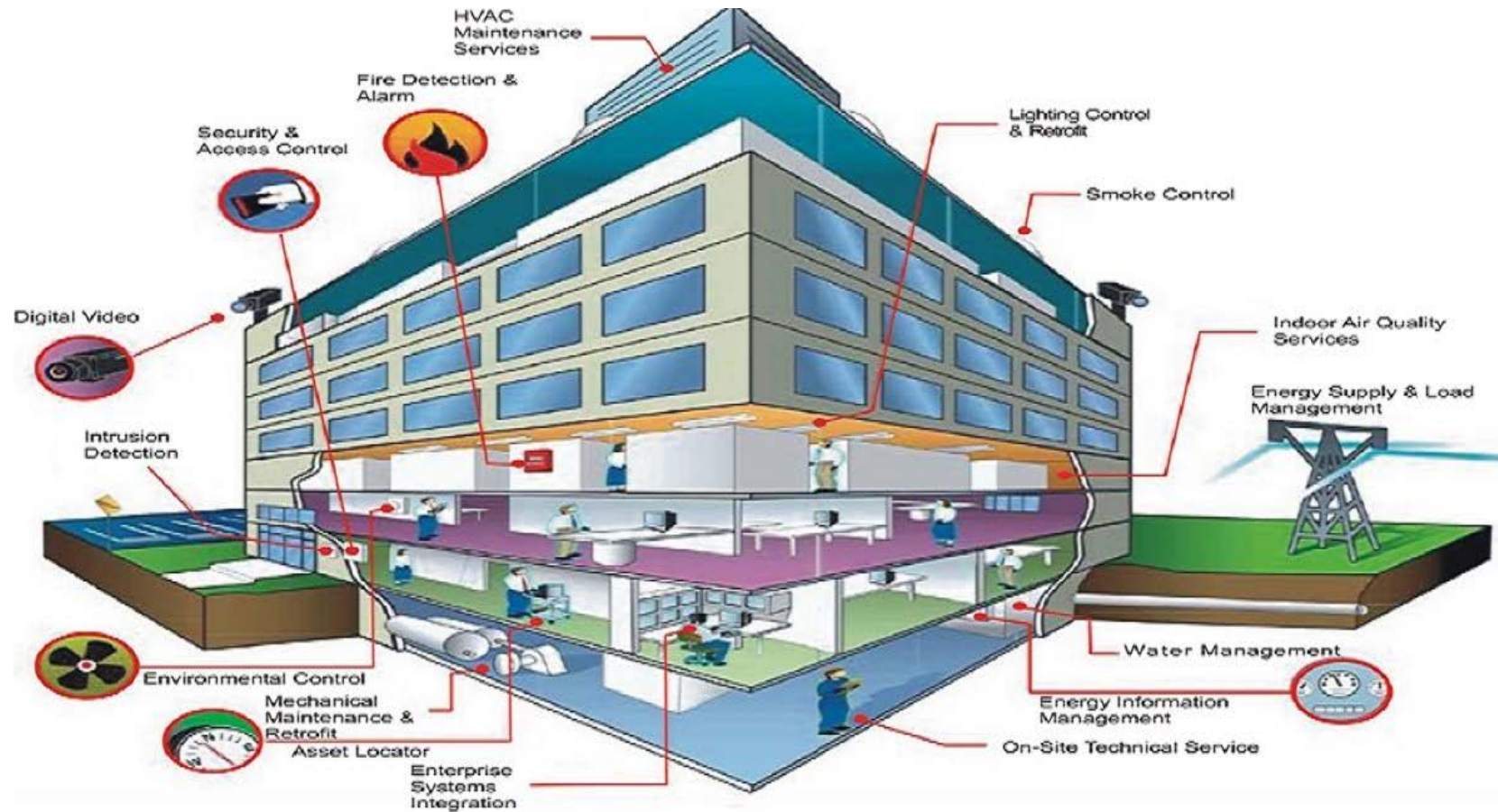
Building

ACBA 7002
CONSTRUCTION
TECHNOLOGY & BIM Level 7


Prifysgol Cymru
University of Wales

Building Management Systems BMS

How is this managed?



How is this managed?



Cobie



1 The accelerating pace of change ...



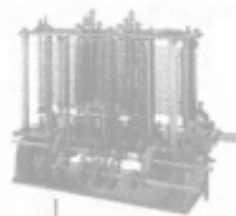
How can we improve?

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?

3 ... will lead to the Singularity



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

COMPUTER RANKINGS
By calculations per second per \$1,000



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



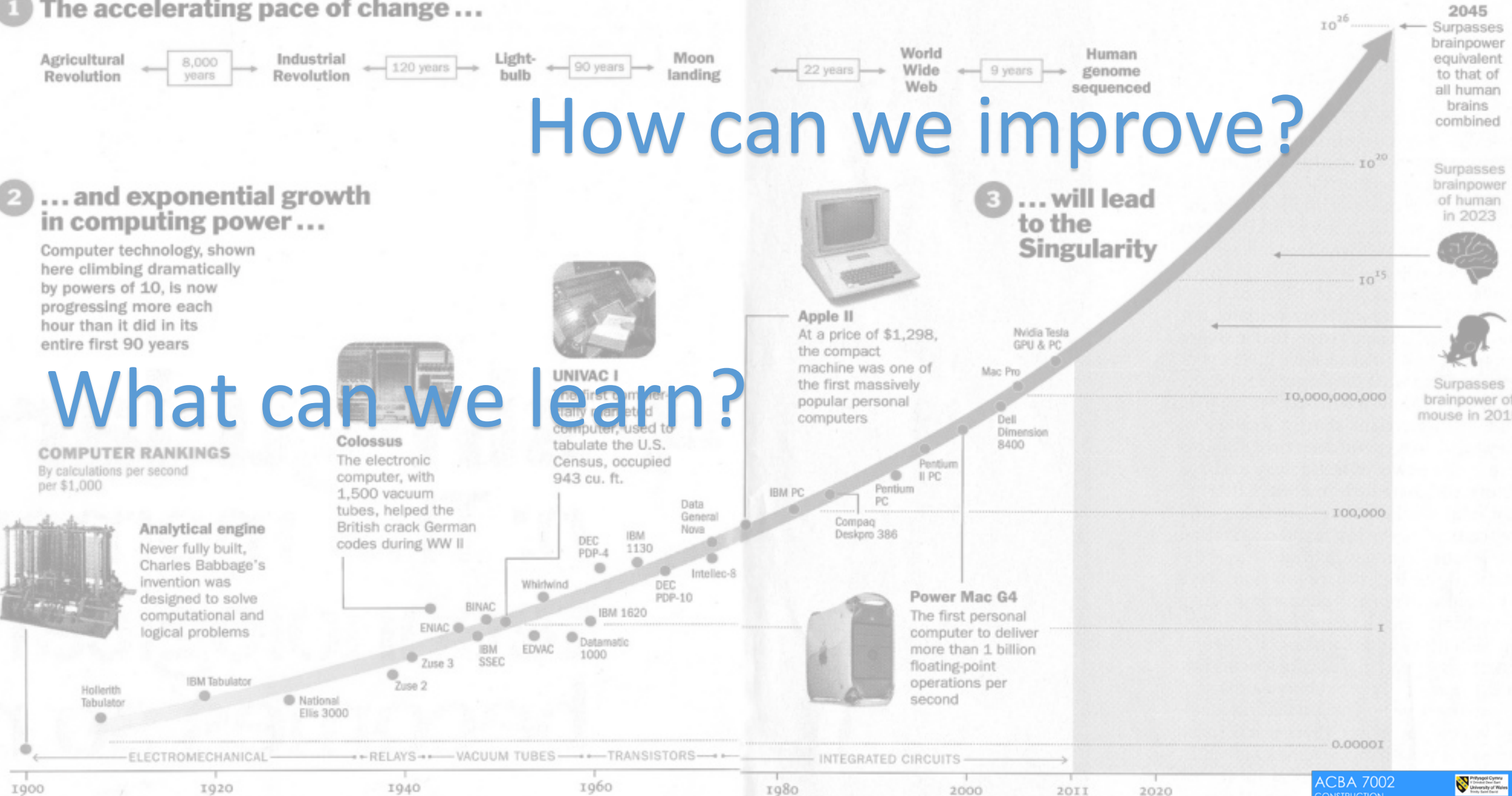
UNIVAC I
The first commercially marketed computer; used to tabulate the U.S. Census, occupied 943 cu. ft.



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



Ensure these the same

Seamless BIM Process

As Designed

As Constructed

Life cycle

As Managed
(trigger events)



Intelligent assets

More efficient management,
maintenance and use of assets

Workflow automation/image
recognition/Trend analysis and
prediction/Natural language processing

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

Use of Digital Technology and Interoperable collaborative platforms





revizto™

<https://youtu.be/dSLZVfrKgRs>

“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

What about existing building stock?

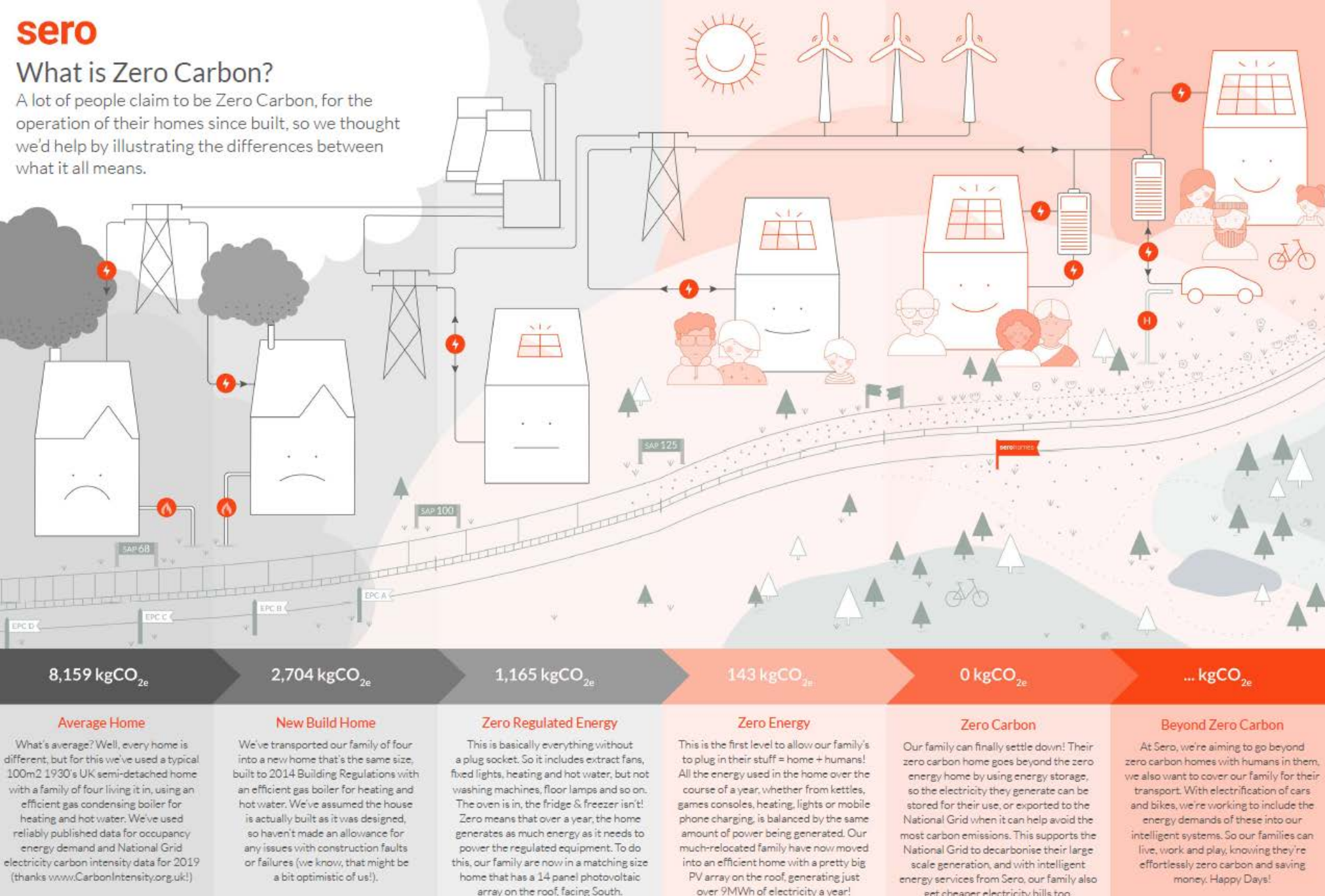
Challenges of Decarbonisation

Speaking at the CN [Decarbonising Construction](https://www.constructionnews.co.uk/sustainability/consultant-urges-delivery-of-mass-retrofit-programme-30-09-2020/) 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/>

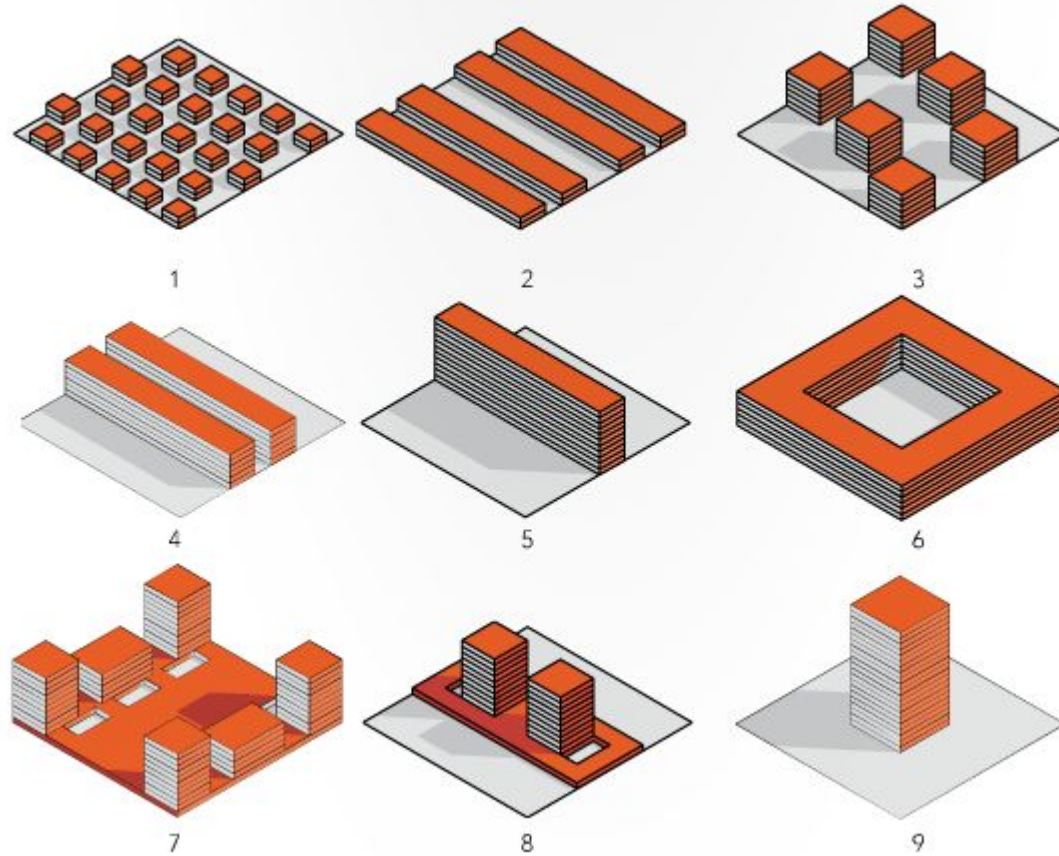




We're happy to discuss our workings if you'd like to get in touch. We might even buy the coffee...

seroenergy.com

Challenges of Building Typologies



Functions of Buildings

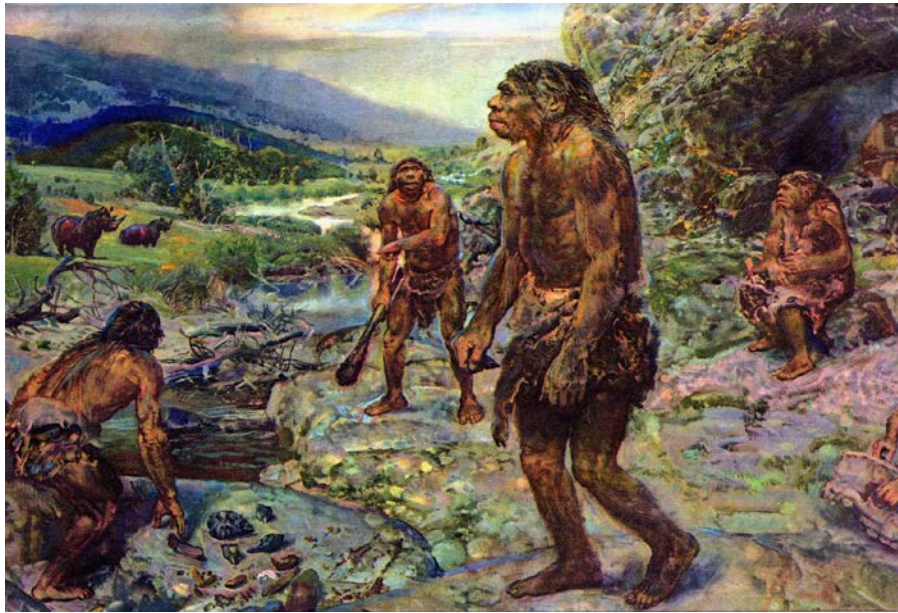
Why do we Build?

The use of buildings as protective structures or enclosures.

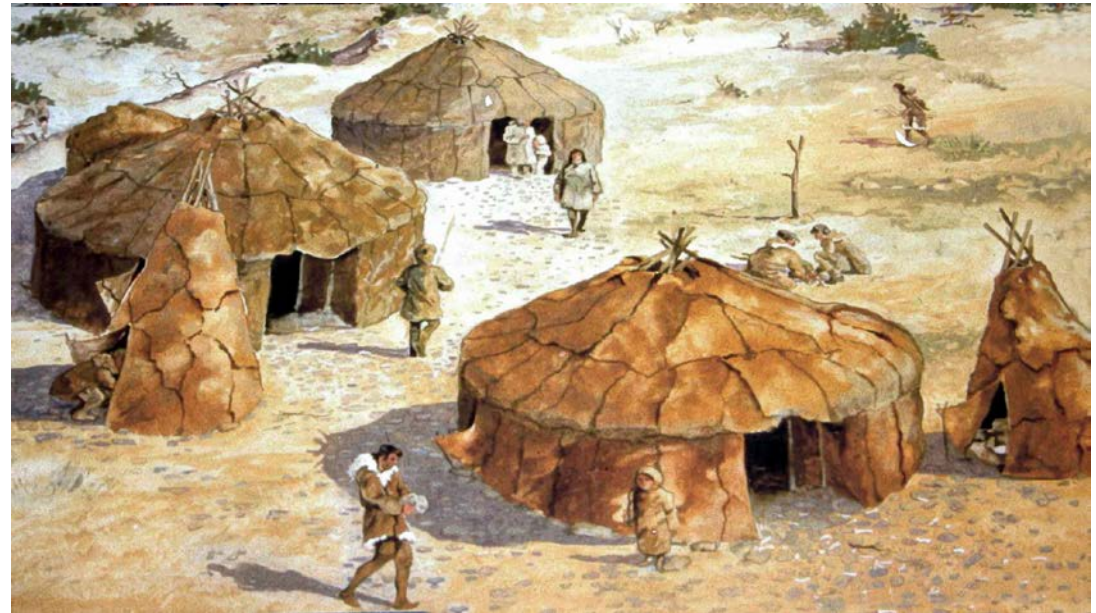
Since fire was first used by primitive people to provide light and heat, the use of energy to aid in environmental moderation has developed internal environments that reduce the effects and extremes in the external climate.



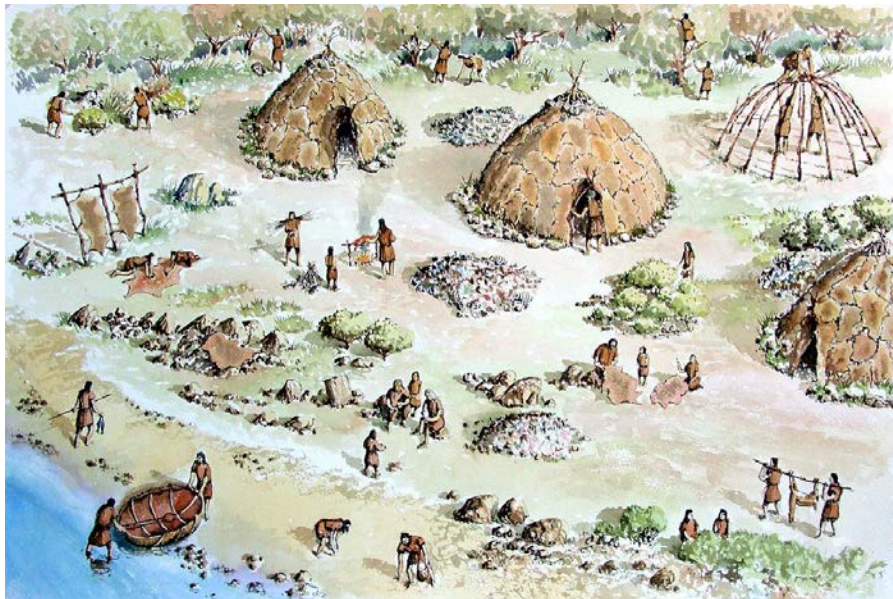
https://i.dailymail.co.uk/i/pix/2015/07/03/14/2A338A5800000578-3148511-image-a-21_1435930837225.jpg



http://4.bp.blogspot.com/-6cWvcEKKHBY/T6CVotA7KyI/AAAAAAAAGTU/ySJec0U92LQ/s1600/the_neanderthal_encampment_by_zdenek_burian_1950.JPG



https://klse.i3investor.com/files/my/blog/img/bl1338_gonnersdorfsettlement.jpg



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

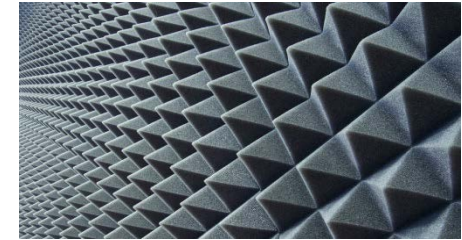
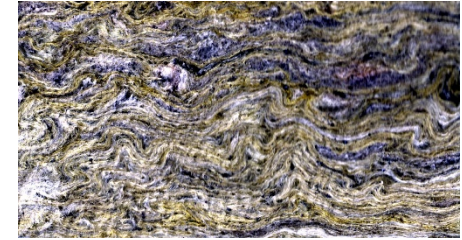


<https://museum.wales/stfagans/buildings/bryneryr/>

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.

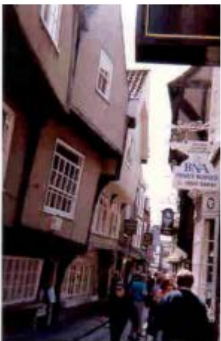


European vernacular buildings

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

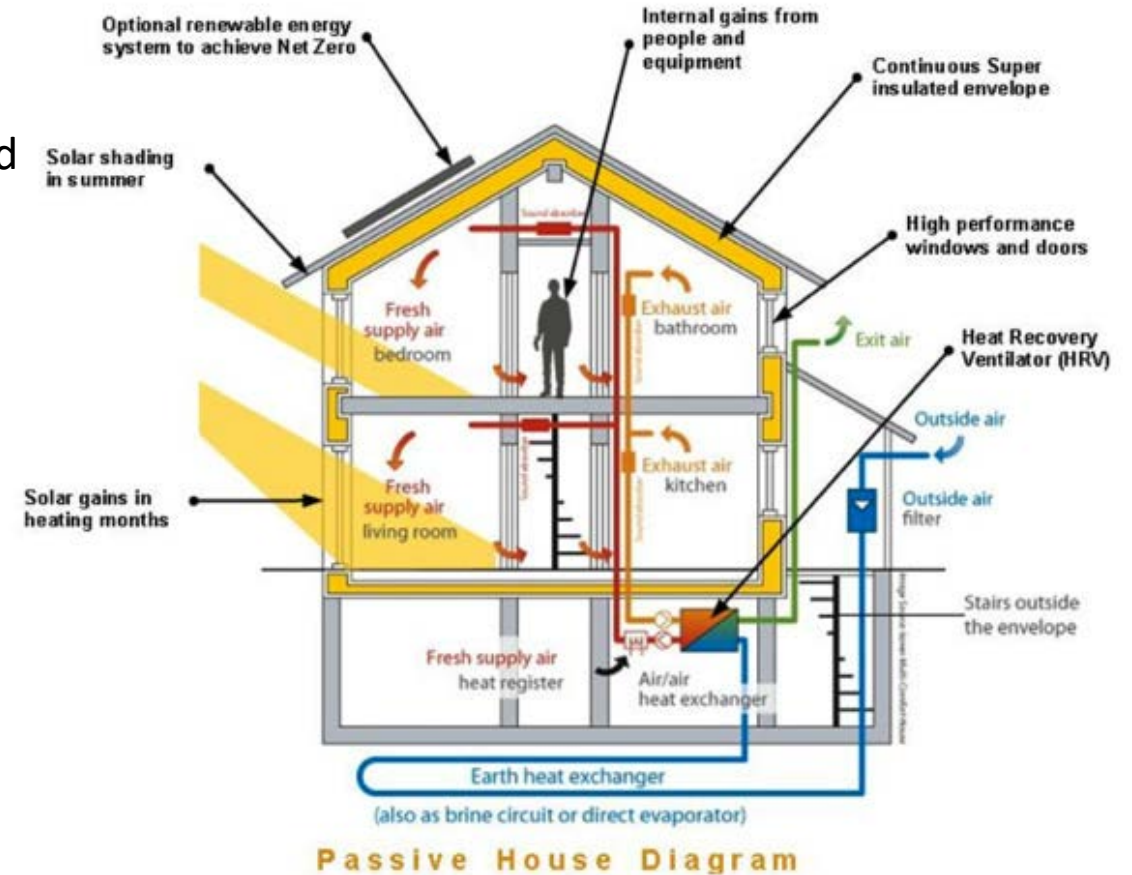
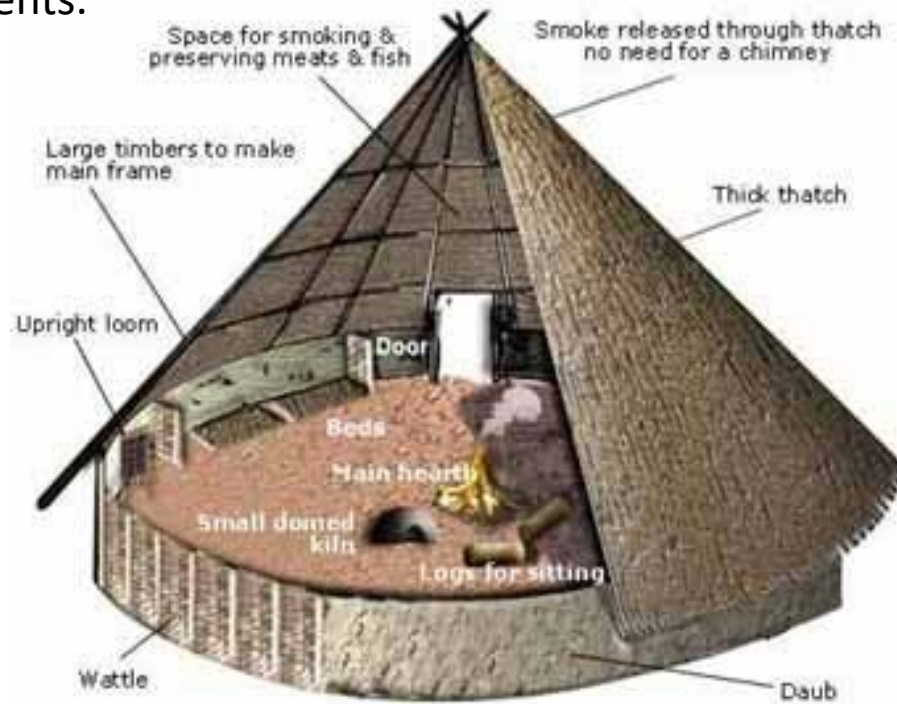
<https://museum.wales/stfagans/thesite/>

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

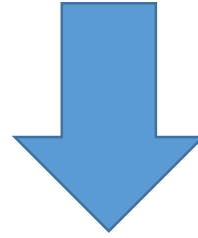
What are the key drivers in providing a building that is suitable for the need?

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

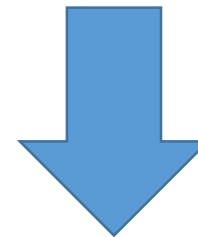


Trigger events?

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.