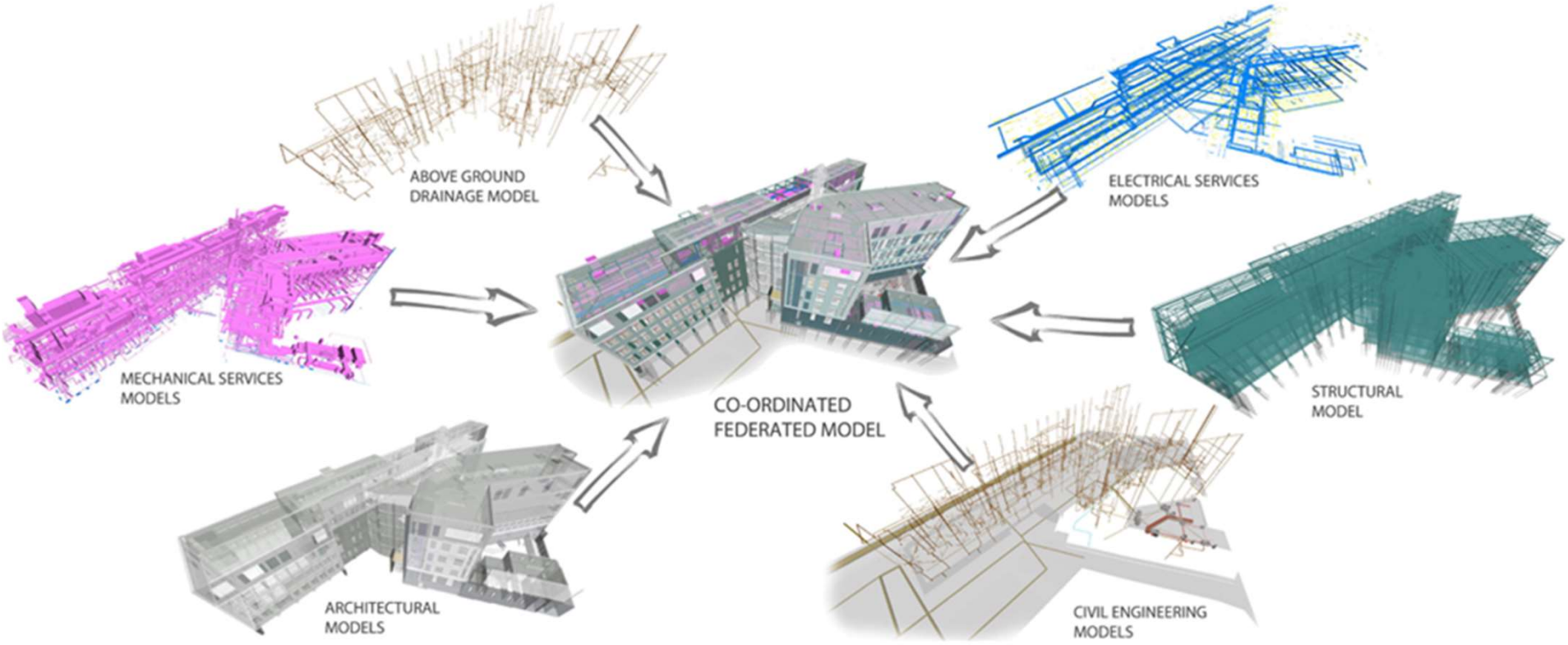
ACBA 4018
DIGITAL TECHNOLOGY & BIM : LEVEL 4

# Working with Digital Technologies & BIM

Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

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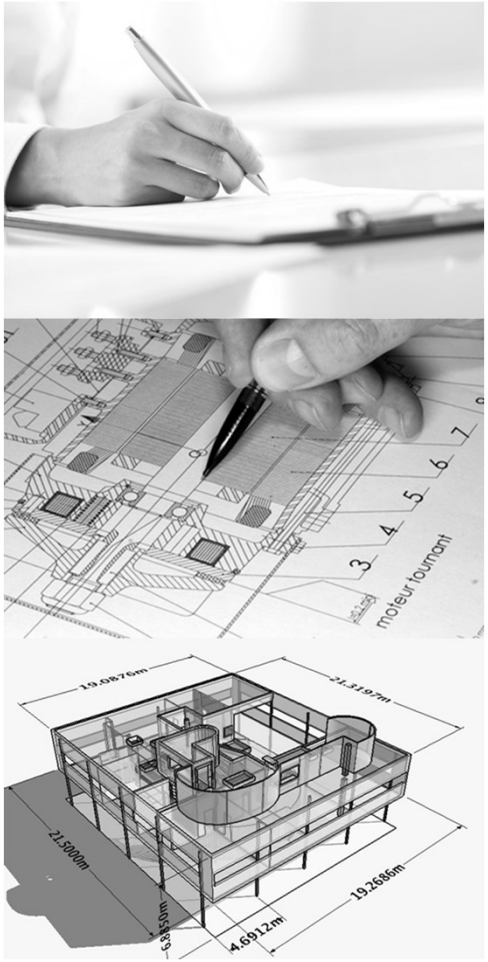
Gavin M Traylor RIBA

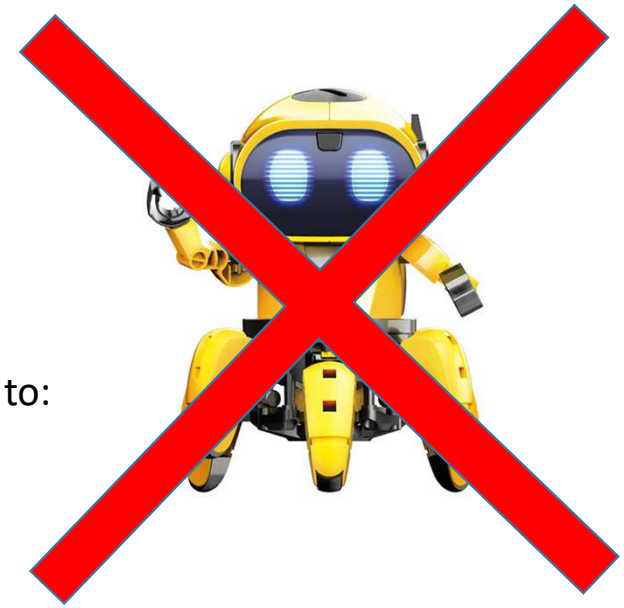
Semester 2:

# Introduction to BIM



What is it all about?

Aim:
To provide learners with the skills needed to produce three-dimensional drawings using industry-standard software and to provide learners with an understanding of the information delivery cycle in Building Information Modelling (BIM).



Learning Outcomes

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

- produce 3D models using industry-standard software applications;
- evaluate different sources of information so as to prepare Building Information Models using industry standard software.

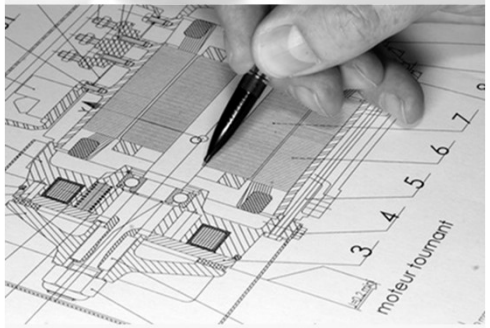
NO BIM ROBOTS

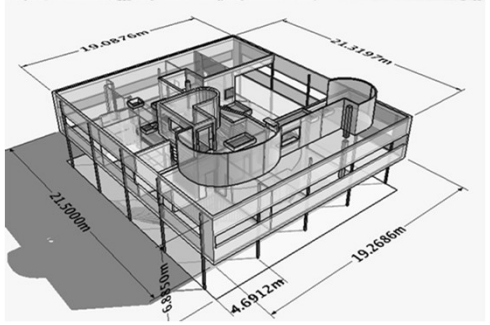
How will it be assessed?

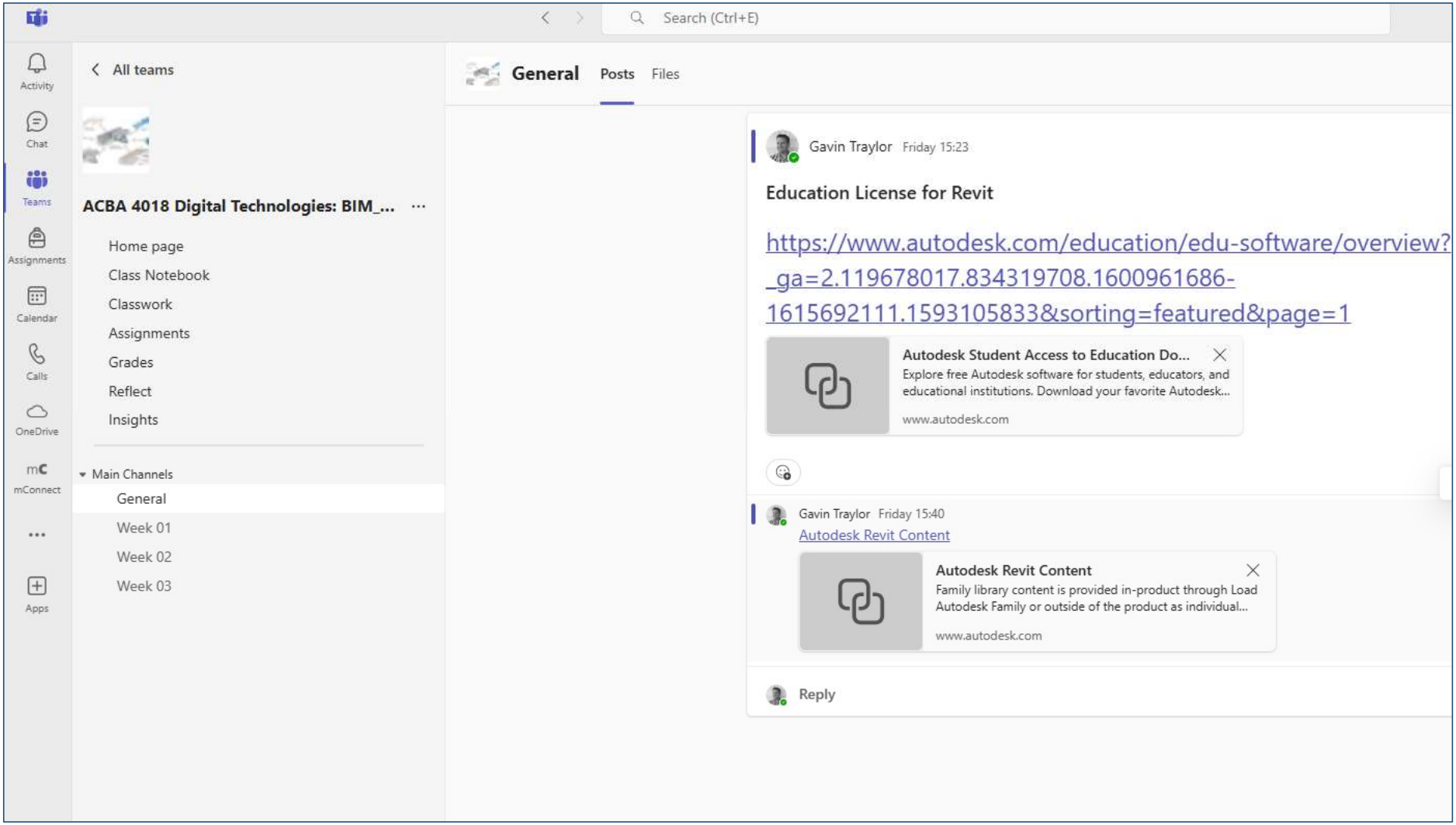
Module Credit 10

24% Scheduled Learning and <u>76% Independent Learning</u>

| Assessment Component 1 | | |
|---|---|---|
| **Mode of Assessment** | **Word Limit** | **Weighting** |
| Portfolio | 2 elements (2,000 words equivalent with drawings) | 100% |

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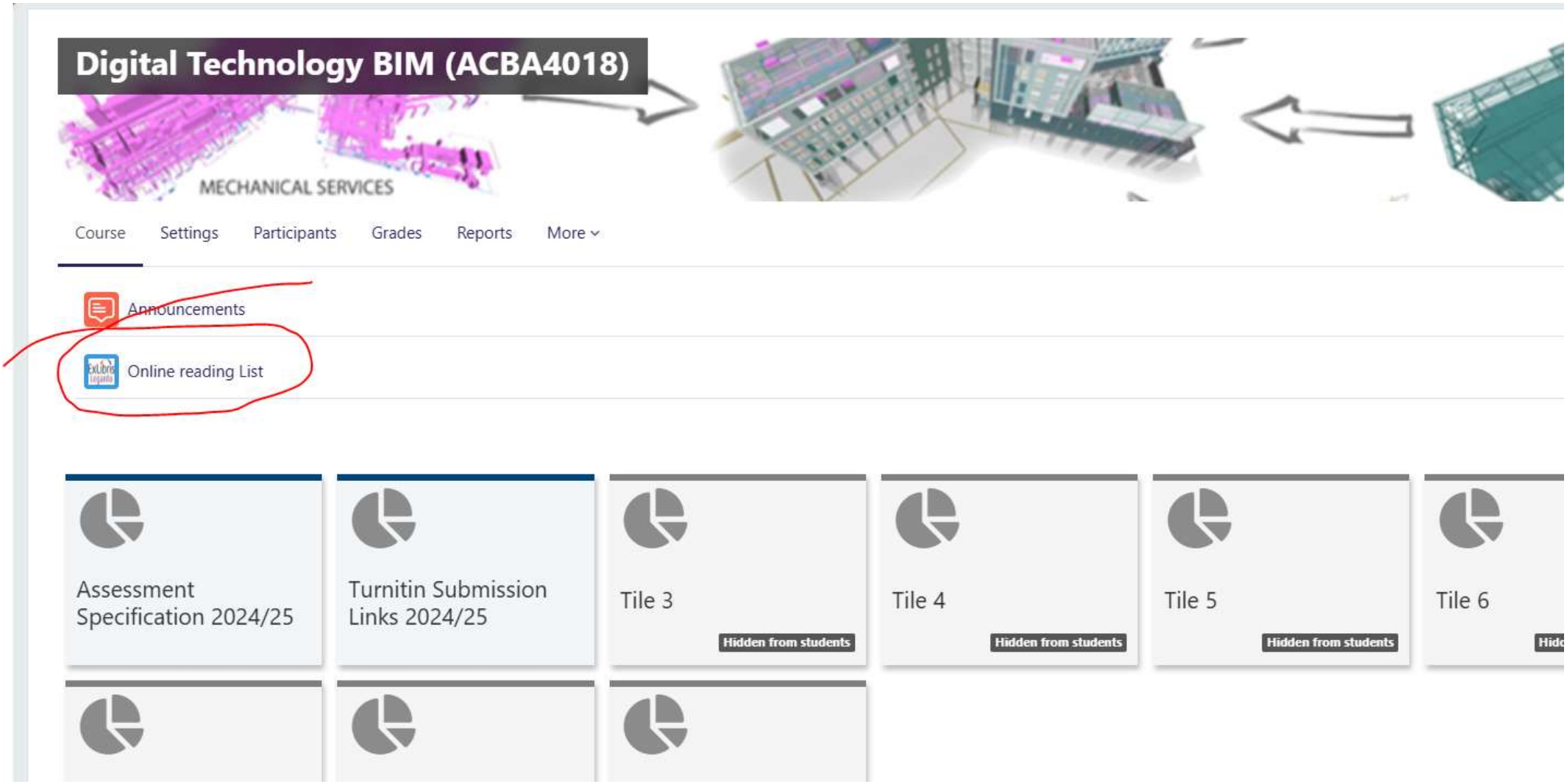
Moodle - Reading List



# Suggested Reading List

Francis Ching (2015) *Architectural Graphics*

BSi (2019) *The Little Book of BIM*

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

Eastman C, Teicholz P, Sacks R and Liston K (2011)
*BIM Handbook: A Guide to BIM for Owners, Managers, Designers, Engineers & Contractors.* Hoboken: John Wiley & Sons Inc.

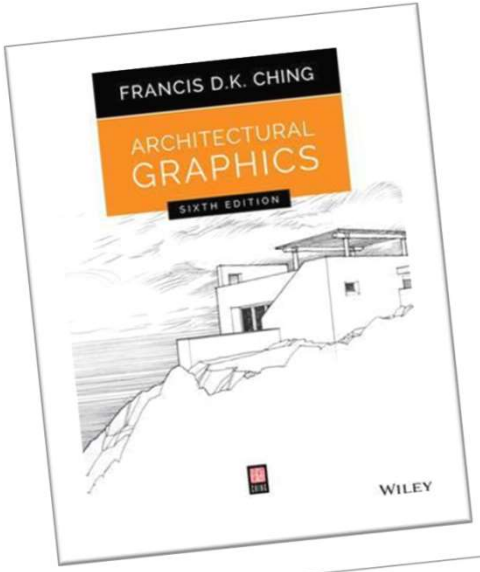
Mordue S Swaddle P and Philp D (2015). *Building Information Modelling for Dummies. Chichester:* John Wiley & Sons Ltd.

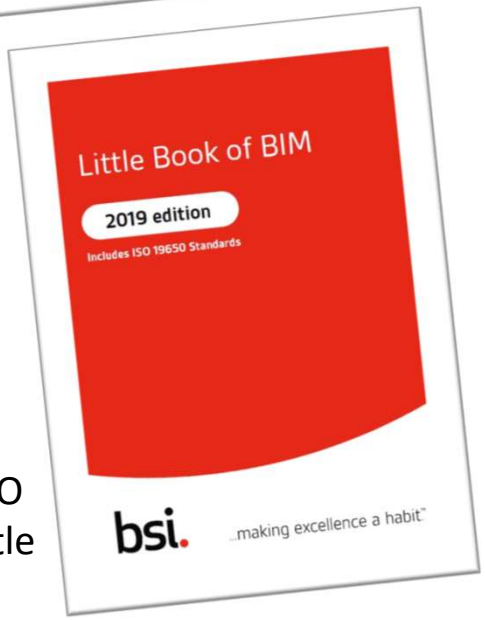
NBS National BIM Library

The BIM HUB: BIM Journal

https://academy.autodesk.com/
Revit Tutorials - Youtube.

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



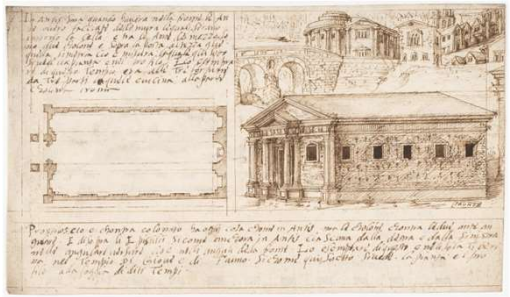



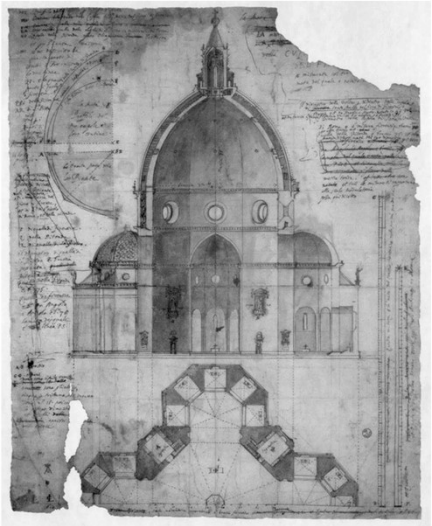

Key BIM Standards, ISO and PAS – refer to 'Little Book of BIM' guide

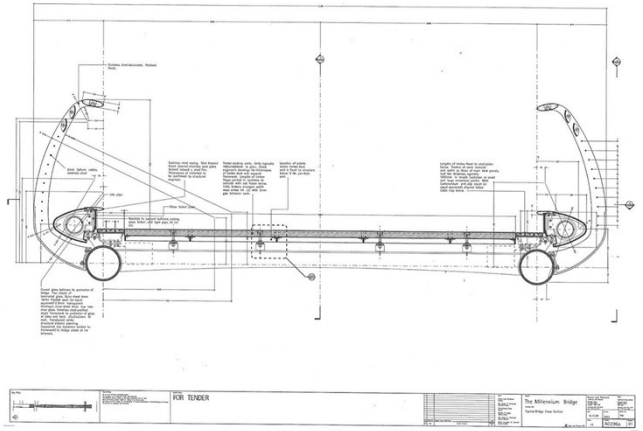
# Why do we draw?

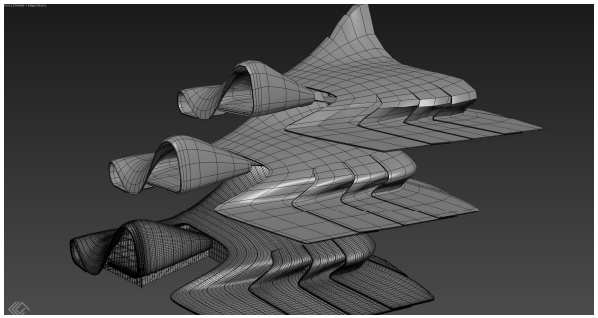
Cave Paintings Argentina
http://4.bp.blogspot.com/-gMAtGbF5JvU/ULzI3O5RigI/AAAAAAAAAIA/MAhtlgmAUmI/s1600/argentina-cave-paintings-111006.jpg

# A picture is worth a thousand words

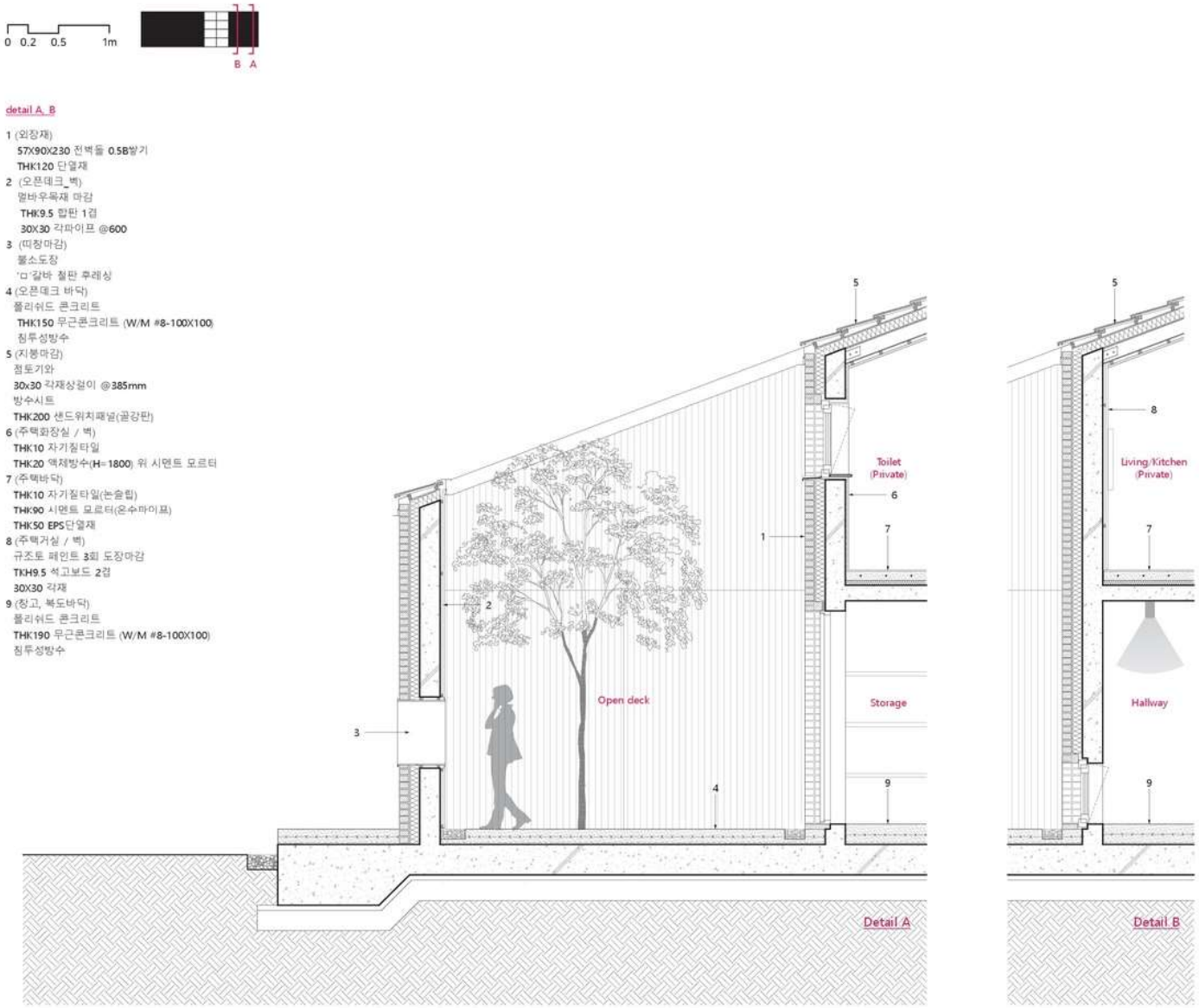






# How do we draw within the Construction Industry?



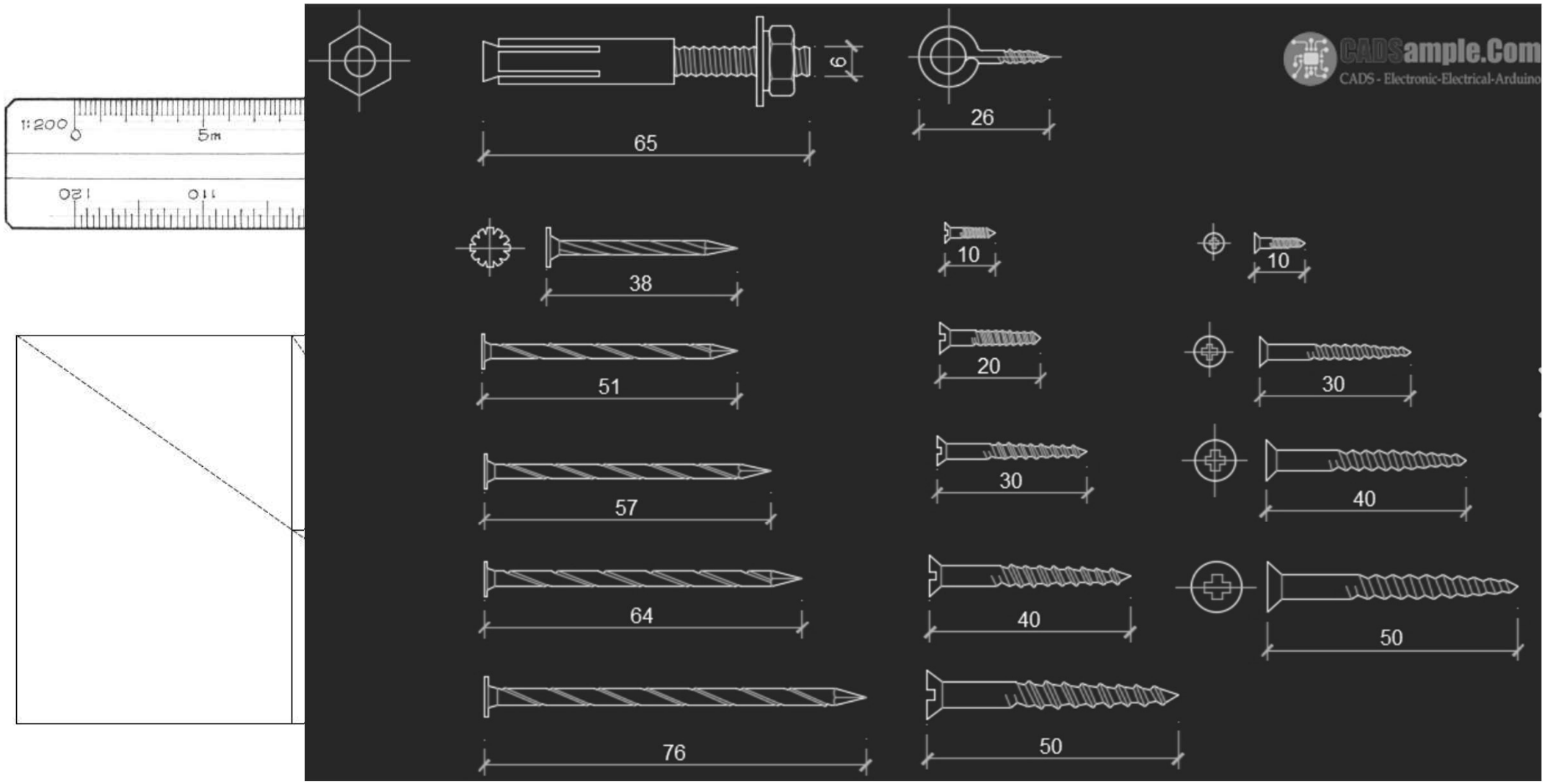

Drawings prepared in the Construction Industry

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

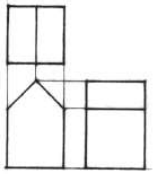


## Conventions

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.

**Projection Systems**

Orthographic Projection

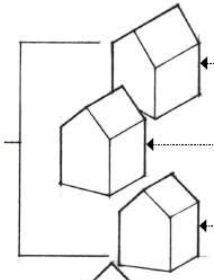


**Pictorial Systems**

**Multiview Drawings**

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

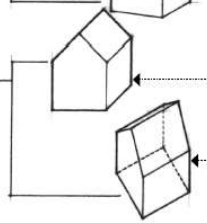
*Axonometric Projection*



**Paraline Drawings**

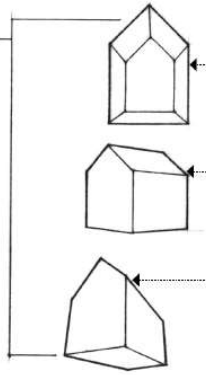
- Isometrics: The three major axes make equal angles with the picture plane.
- Dimetrics: Two of the three major axes make equal angles with the picture plane.
- Trimetrics: All three major axes make different angles with the picture plane.

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

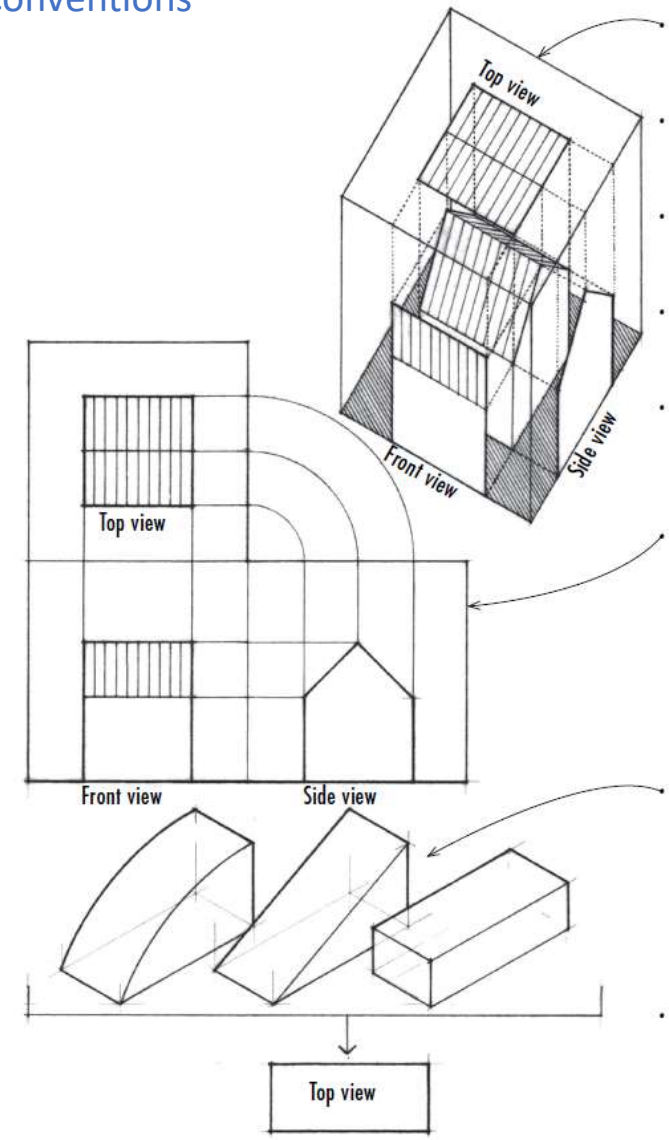
Drawings the can be prepared through orthographic projection to produce WHAT?:

PLANS

SECTIONS

ELEVATIONS

## Conventions



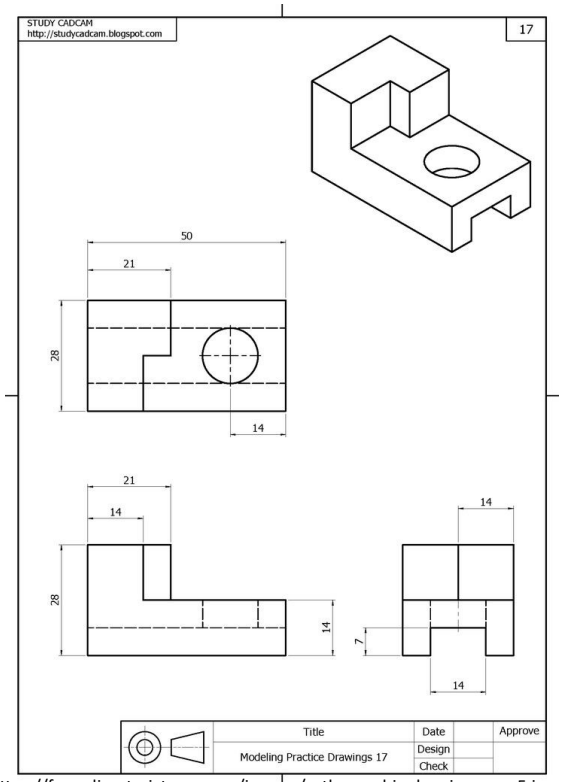

- If we enclose an object within a transparent picture-plane box, we can name the images projected orthographically onto the principal picture planes.
- Top views are orthographic projections cast onto the horizontal picture plane. In architectural drawing, top views are called plans.
- Front and side views are orthographic projections cast onto the vertical picture planes. In architectural drawing, front and side views are called elevations.
- See Chapter 4 for floor plans and sections, which are orthographic projections of cuts made through a building.

- To make it easier to read and interpret how a series of orthographic projections describe a three-dimensional whole, we arrange the views in an orderly and logical fashion.
- The most common layout results when we unfold the transparent picture-plane box into a single plane represented by the drawing surface. The top or plan view revolves upward to a position directly above and vertically aligned with the front or elevation view, while the side view revolves to align horizontally with the front view. The result is a coherent set of related orthographic views.

- Although these three objects have different forms, their top views appear to be identical. Only by looking at related orthographic projections are we able to understand the three-dimensional form of each object. We should therefore study and represent three-dimensional forms and constructions through a series of related orthographic projections.
- The mind must be able to read and assemble a set of multiview drawings to fully understand the nature of the three-dimensional subject.

## Orthographic Projection

CAD Packages can assist us to create multiple view of the same object through projection

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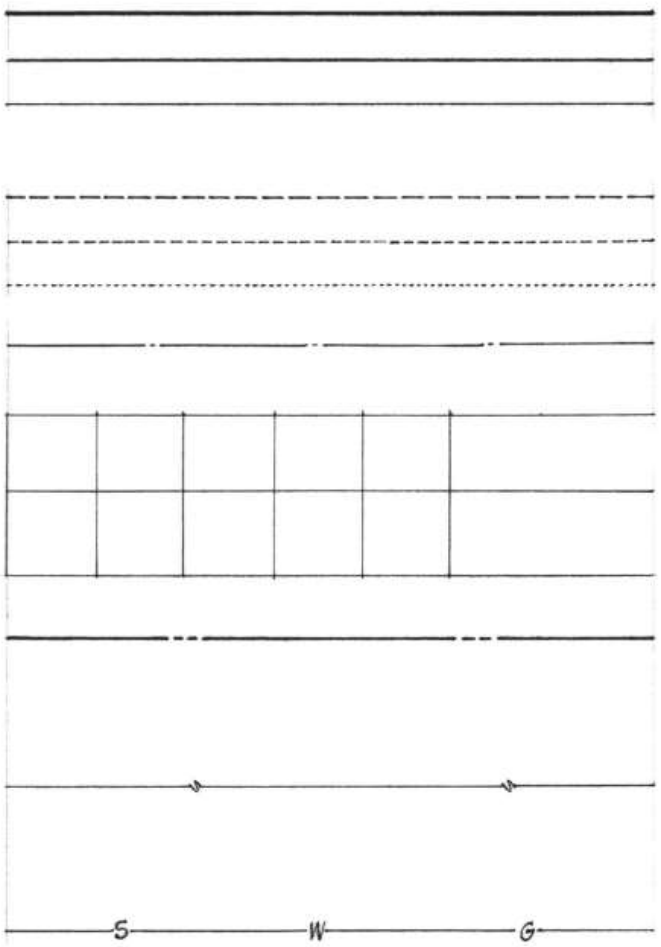
## Conventions - Lines




- Solid lines delineate the form of objects, such as the edge of a plane or the intersection of two planes. The relative weight of a solid line varies according to its role in conveying depth.
- Dashed lines, consisting of short, closely spaced strokes, indicate elements hidden or removed from our view.
- Centerlines, consisting of thin, relatively long segments separated by single dashes or dots, represent the axis of a symmetrical object or composition.
- Grid lines are a rectangular or radial system of light solid lines or centerlines for locating and regulating the elements of a plan.
- Property lines, consisting of relatively long segments separated by two dashes or dots, indicate the legally defined and recorded boundaries of a parcel of land.
- Break lines, consisting of relatively long segments joined by short zigzag strokes, are used to cut off a portion of a drawing.
- Utility lines consist of relatively long segments separated by a letter indicating the type of utility.

Line type conventions assist in the legibility of drawn information. The quality, thickness, scale and type of line can help communicate the importance of the line.

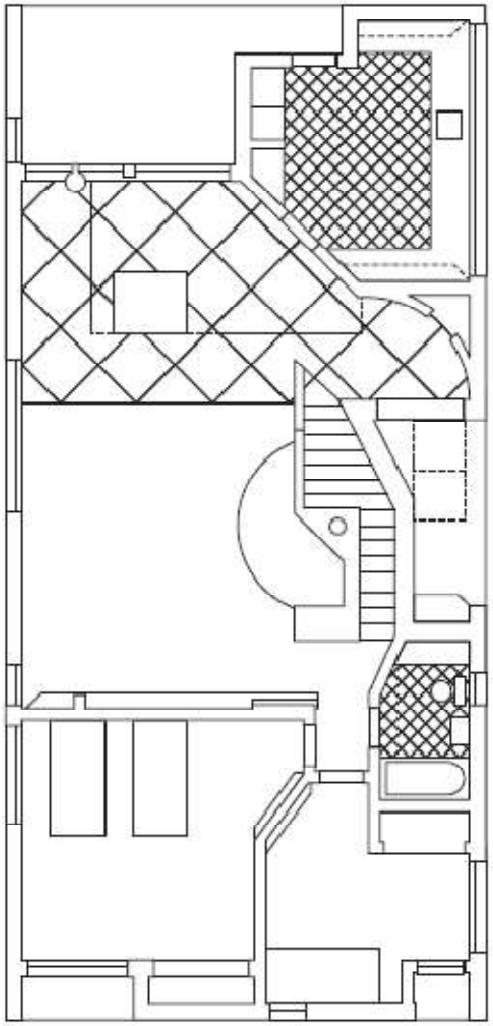
E.G

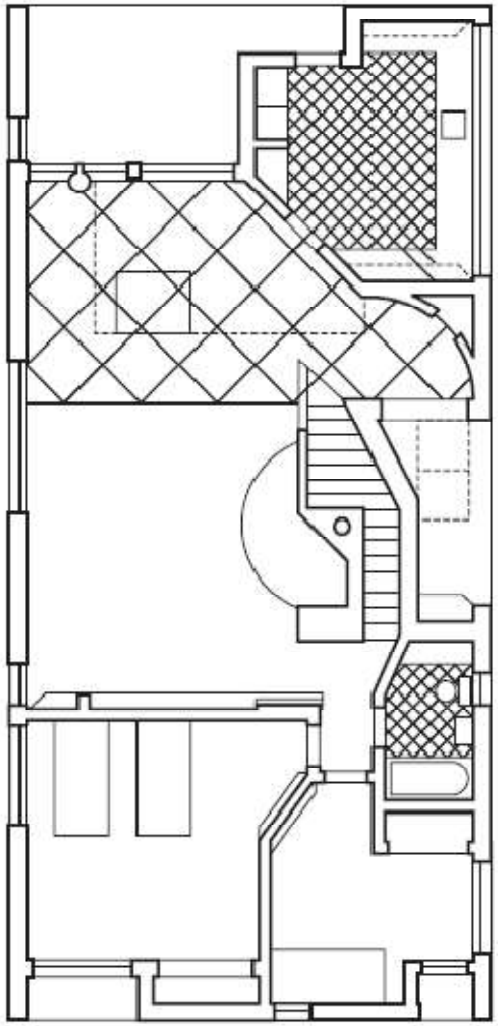
Thick Solid line depicting a section cut.

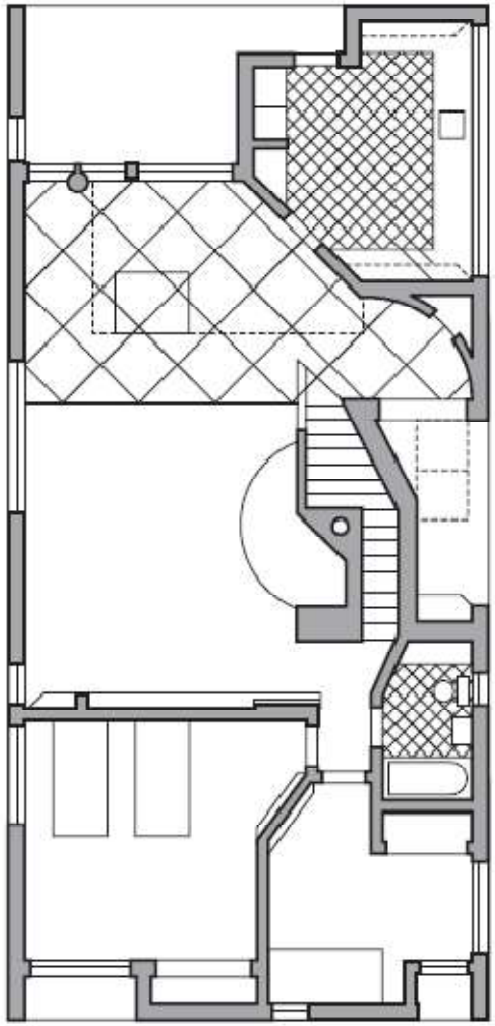
Dashed lines depicting something hidden from view.

Centrelines through steelwork allowing accuracy between column positions.

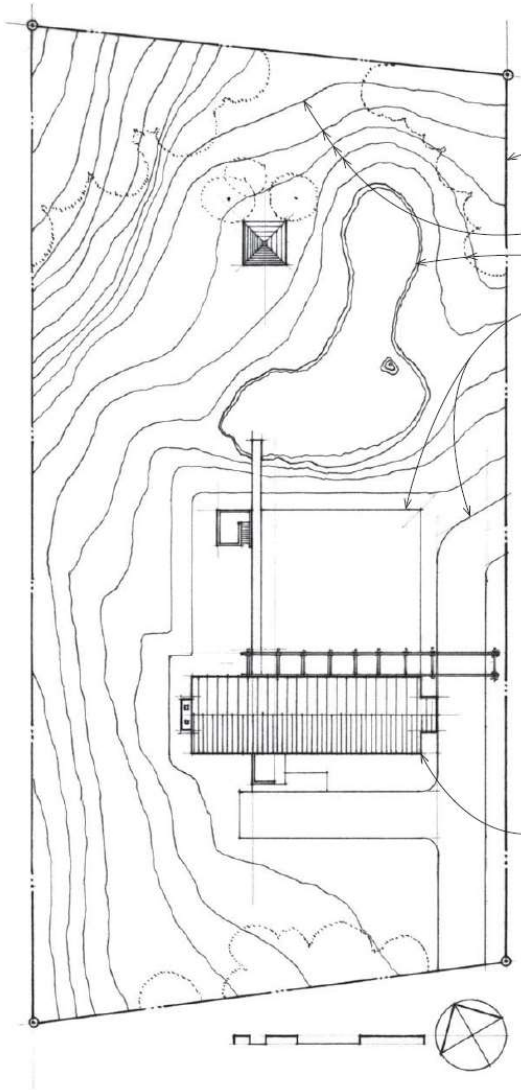
## Conventions - Lines







# Conventions - Plans



A site plan describes the location and orientation of a building or building complex on a plot of land and in relation to its context. Whether this environment is urban or rural, the site plan should describe the following:

- Legally recorded boundaries of the site, indicated by a broken line consisting of relatively long segments separated by two short dashes or dots
- Physical topography of the terrain with contour lines
- Natural site features, such as trees, landscaping, and watercourses
- Existing or proposed site constructions, such as walks, courts, and roadways
- Architectural structures in the immediate setting that impact the proposed building

In addition, a site plan may include:

- Legal constraints, such as zoning setbacks and rights-of-way
- Existing or proposed site utilities
- Pedestrian and vehicular entry points and paths
- Significant environmental forces and features

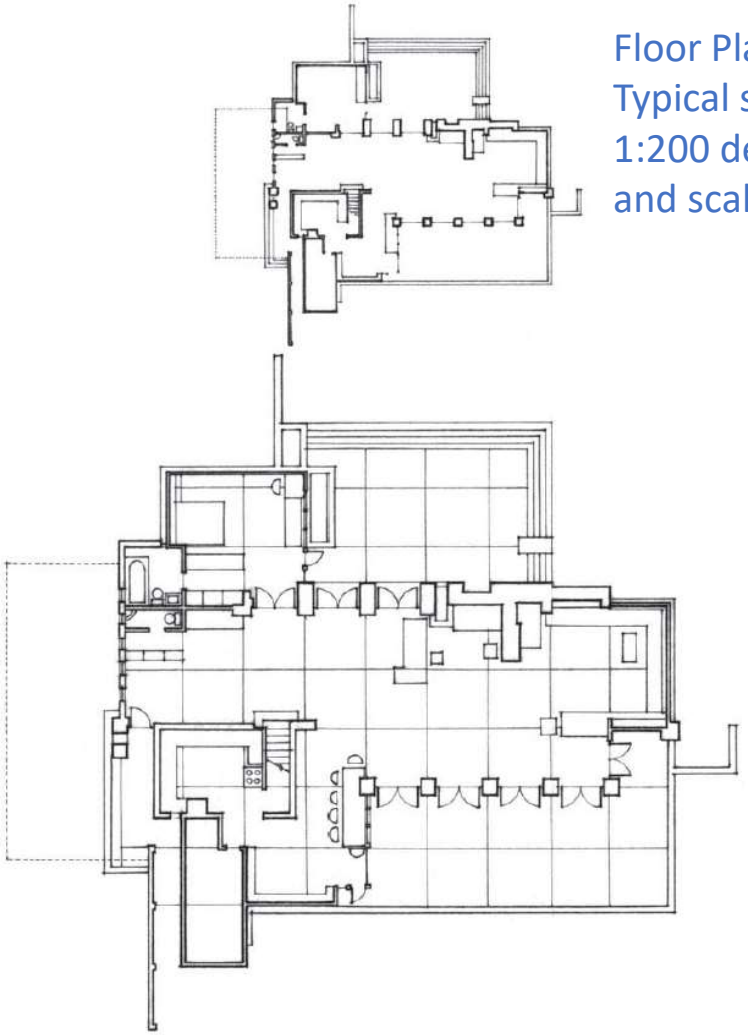
**Roof Plans**

A roof plan is a top view describing the form, massing, and material of a roof or the layout of such rooftop features as skylights, decks, and mechanical housings.

- Roof plans are typically included in the site plan for a proposed building or building complex.

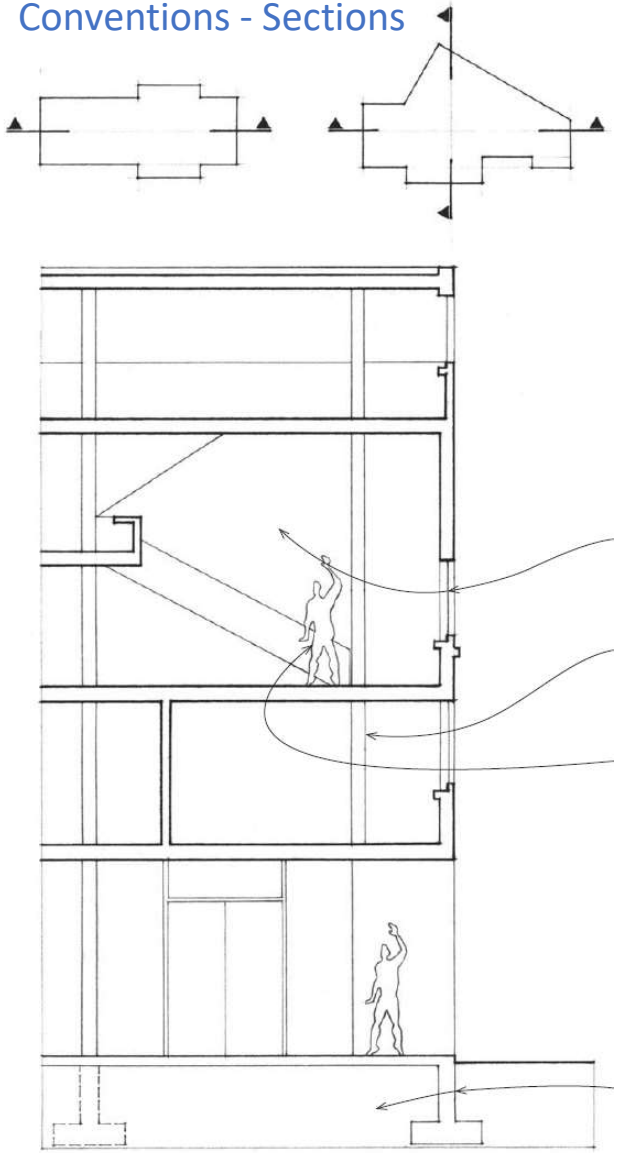
## Site Plans
## Typical scale 1:1250 / 1:500

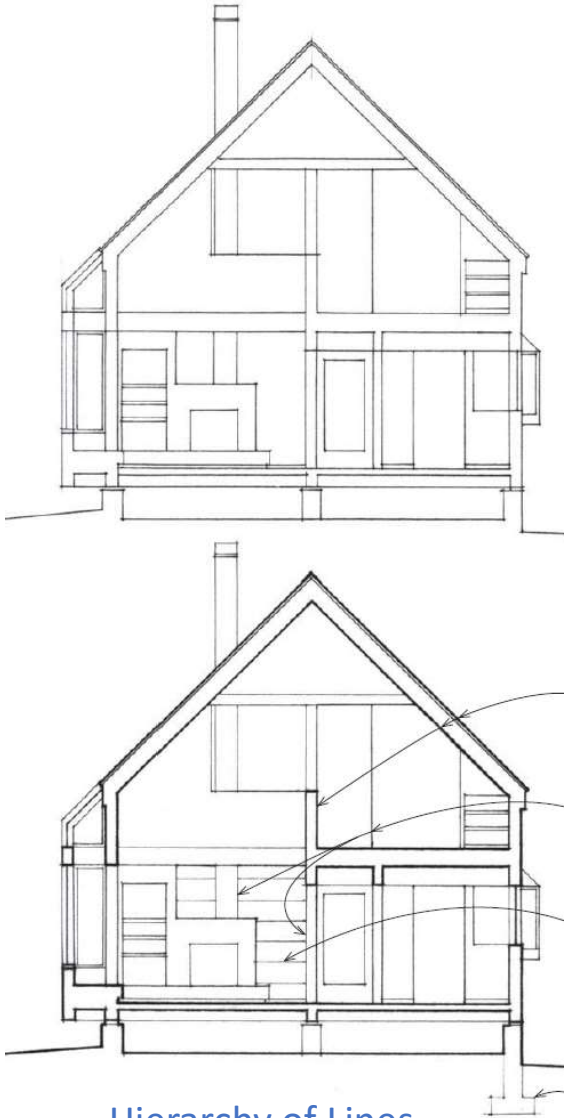
- Graphic scale designates the scale of the site plan and a north arrow indicates the orientation of the site.



## Floor Plans
## Typical scales 1:100 / 1:200 depending on size and scale of the building.

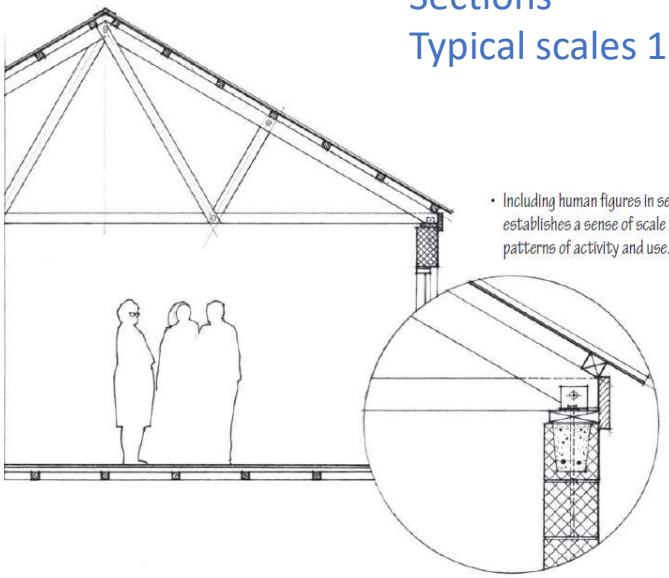
## Conventions - Sections



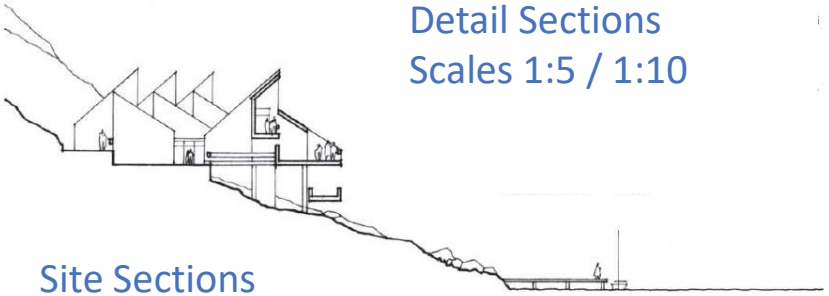


Hierarchy of Lines

## Sections
## Typical scales 1:20 / 1:50

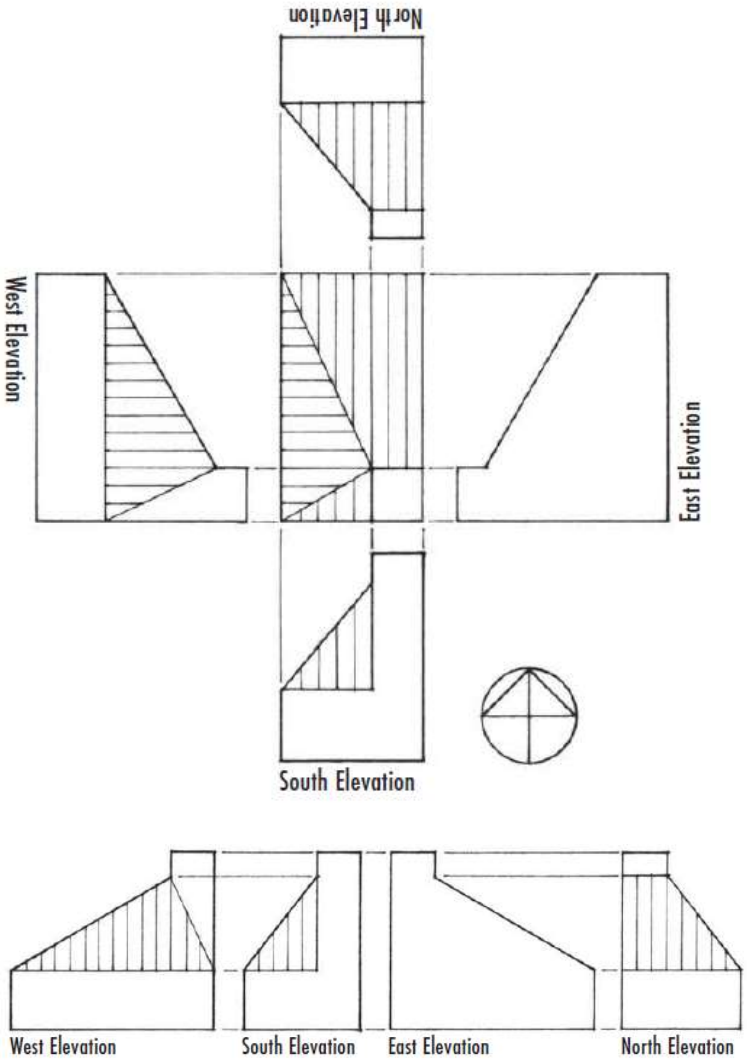



## Detail Sections
## Scales 1:5 / 1:10

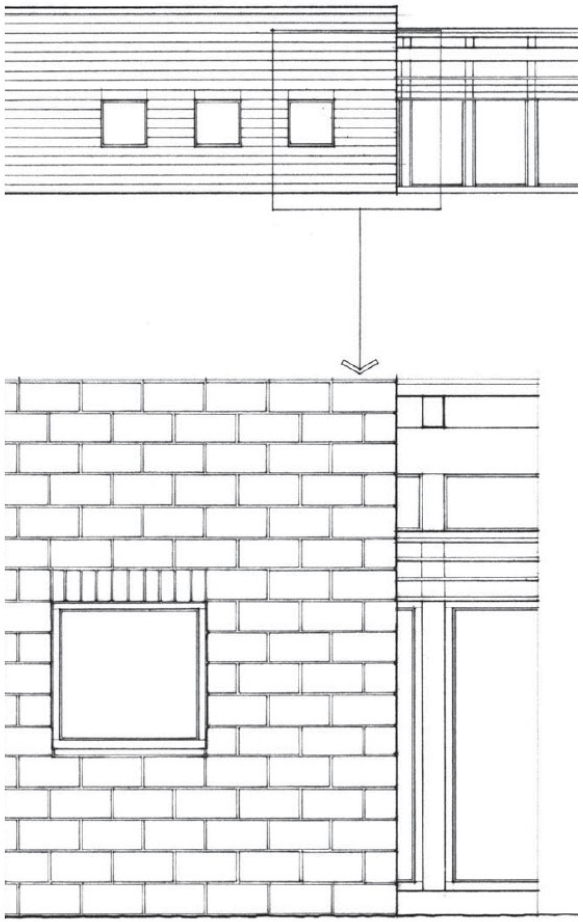


## Site Sections
## Scale 1:200 / 1:500

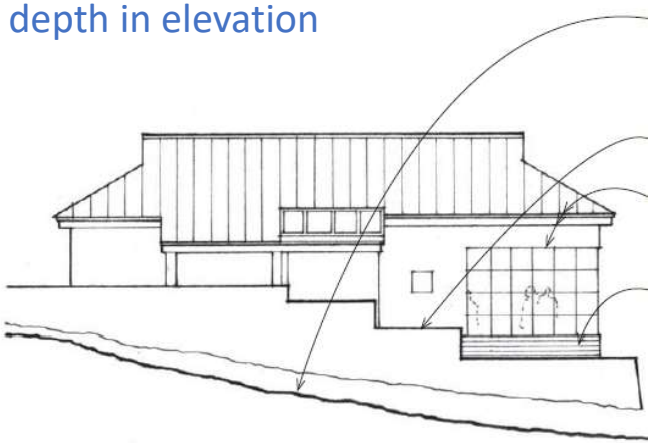
## Conventions - Elevations



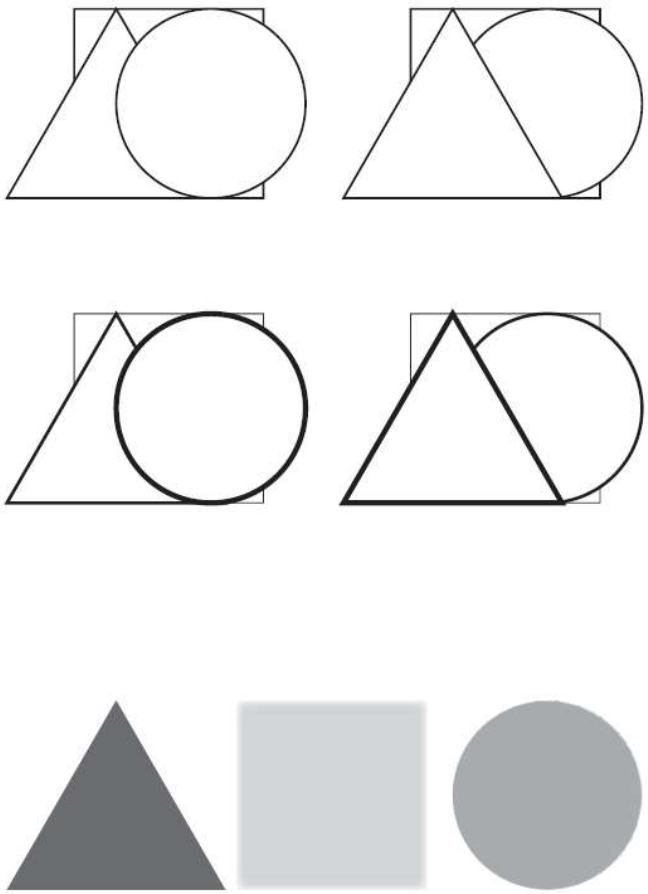

Elevations are normally drawn in a scale relative to the floor plans. 1:100 Further detail can be emphasised at a larger scale. (1:50)



Hierarchy of Lines, showing depth in elevation



# Conventions - Depth



## Spatial Depth Cues

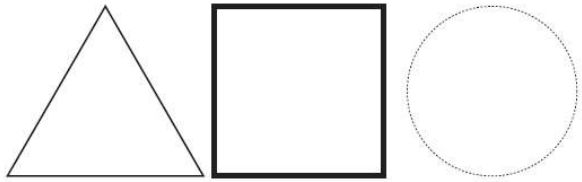
The examples on the previous two pages illustrate the use of varying line weights and detail to convey a sense of spatial depth in the drawing of building elevations. This series of drawings illustrates in a more discrete and abstract way how visual cues can enhance the sense of depth in any orthographic projection.

- Continuity of Outline: We tend to perceive a shape as being in front of another when it has continuity of outline and disrupts the profile of the other shape. Since this visual phenomenon relies on nearer objects overlaying or projecting in front of objects farther away, we often refer to this depth cue simply as overlap.

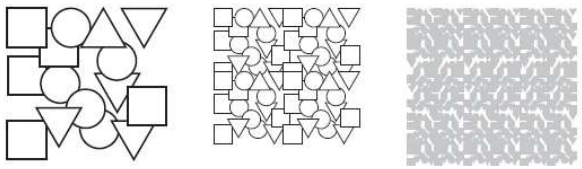
- By itself, overlap tends to create relatively shallow intervals of space. However, we can achieve a greater sense of intervening space and depth if we combine overlap with other depth cues, such as by varying the line weights of a pure-line drawing. Darker and thicker profile or contour lines tend to advance and appear to be in front of lighter and thinner outlines.

- Atmospheric Perspective: A progressive muting of hues, tonal values, and contrast occurs with increasing distance from the observer. Objects seen up close in the foreground of our visual field typically possess more saturated colors and sharply defined contrasts in value. As they move farther away, their colors become lighter in value and more subdued, and their tonal contrasts more diffuse. In the background, we see mainly shapes of grayed tones and muted hues.

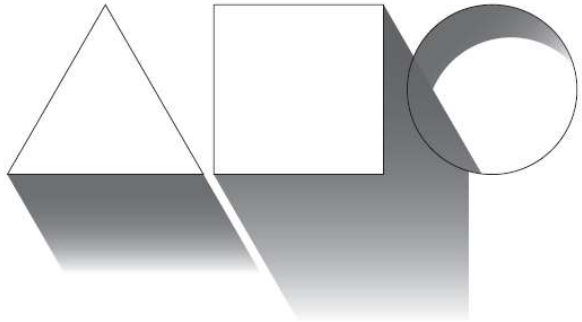
- Perspective of Blur: This depth cue reflects the fact that we normally associate clarity of vision with nearness and blurring of outlines with farness. The graphic equivalent of perspective blur is a diminishing or diffusion of the edges and contours of more distant objects. We can use either a lightly drawn line or a broken or dotted line to delineate these edges of shapes and contours of forms that exist beyond the focus of a drawing.



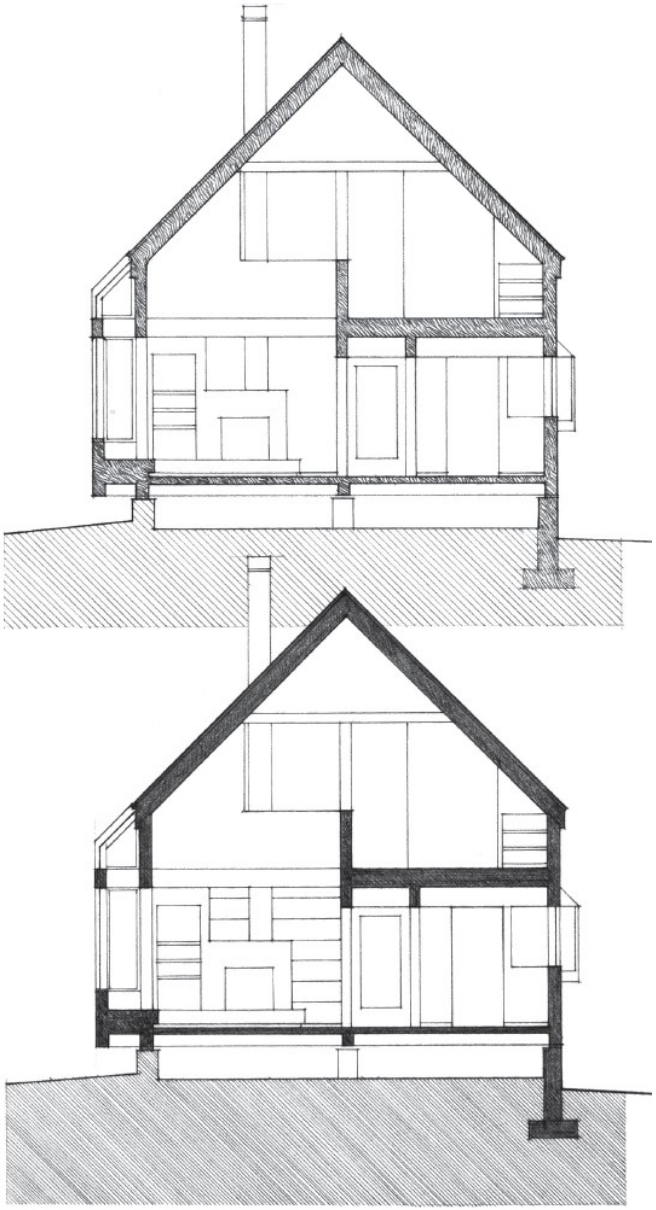
- Texture Perspective: The density of the texture of a surface gradually increases as it recedes into the distance. The graphic technique for depicting the visual phenomenon of texture perspective involves gradually diminishing the size and spacing of the graphic elements used to portray a surface texture or pattern, whether they be dots, lines, or tonal shapes. Proceed from identifying units in the foreground to delineating a textured pattern in the middleground and finally to rendering a tonal value in the background.



- Light and Shade: Any abrupt shift in brightness stimulates the perception of a spatial edge or profile separated from a background surface by some intervening space. This depth cue implies the existence of overlapping shapes and the use of contrasting tonal values in a drawing. See Chapter 7 for more information on the use of tonal values in architectural graphics.



## Conventions - Depth



CAD Packages can assist in demonstrating spatial depth through hatching.

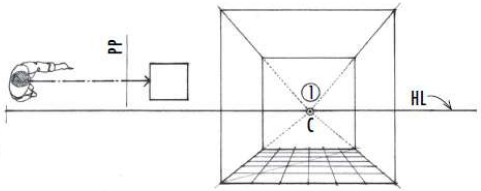
# Other Drawing Types

## TYPES OF PERSPECTIVE

In any rectilinear object, such as a cube, each of the three principal sets of parallel lines has its own vanishing point. Based on these three major sets of lines, there are three types of linear perspective: one-, two-, and three-point perspectives. What distinguishes each type is simply the observer's angle of view relative to the subject. The subject does not change, only our view of it, but the change of view affects how the sets of parallel lines appear to converge in linear perspective.

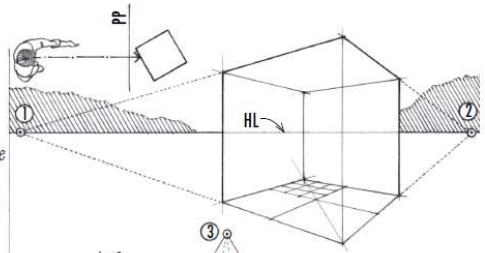
### One-Point Perspective

If we view a cube with our central axis of vision (CAV) perpendicular to one of its faces, all of the cube's vertical lines are parallel with the picture plane (PP) and remain vertical. The horizontal lines that are parallel with PP and perpendicular to CAV also remain horizontal. The lines that are parallel with CAV, however, will appear to converge at the center of vision (C). This is the one point referred to in one-point perspective.



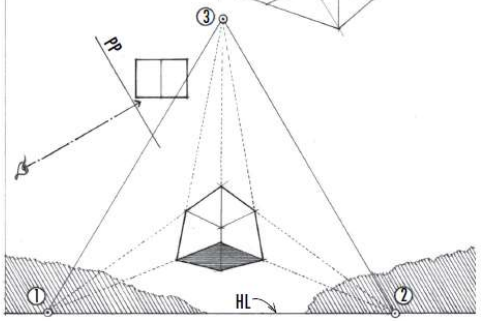

### Two-Point Perspective

If we shift our point of view so that we view the same cube obliquely, but keep our central axis of vision (CAV) horizontal, then the cube's vertical lines will remain vertical. The two sets of horizontal lines, however, are now oblique to the picture plane (PP) and will appear to converge, one set to the left and the other to the right. These are the two points referred to in two-point perspective.

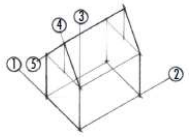



### Three-Point Perspective

If we lift one corner of the cube off the ground plane (GP), or if we tilt our central axis of vision (CAV) to look down or up at the cube, then all three sets of parallel lines will be oblique to the picture plane (PP) and will appear to converge at three different vanishing points. These are the three points referred to in three-point perspective.



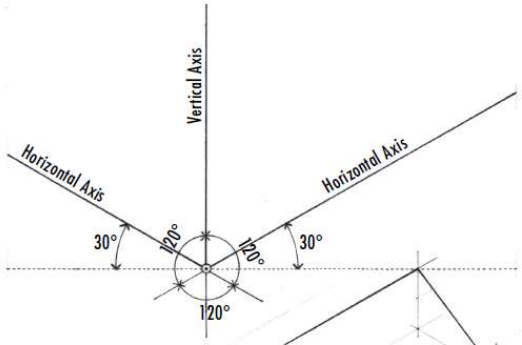

Note that each type of perspective does not imply that there are only one, two, or three vanishing points in a perspective. The actual number of vanishing points will depend on our point of view and how many sets of parallel lines there are in the subject being viewed. For example, if we look at a simple gable-roofed form, we can see that there are potentially five vanishing points, since we have one set of vertical lines, two sets of horizontal lines, and two sets of inclined lines.

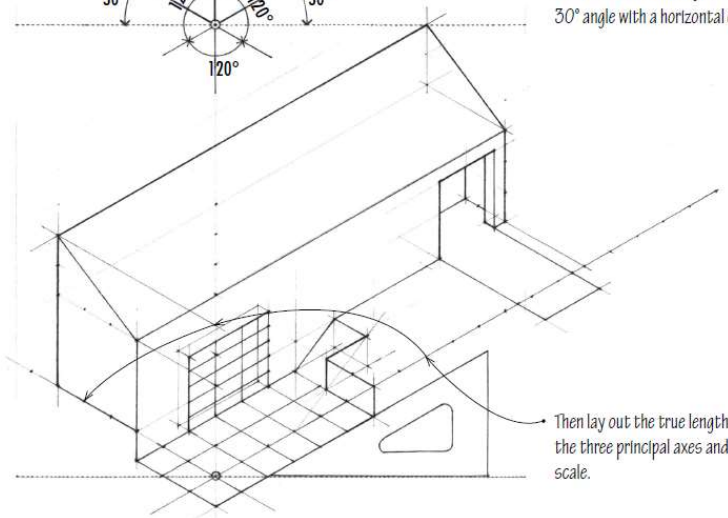



## ISOMETRIC DRAWINGS

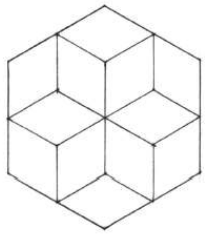
Isometric drawings establish a lower angle of view than plan obliques and give equal emphasis to the three principal sets of planes. They preserve the relative proportions of a subject or scene and are not subject to the distortion inherent in oblique views.

- To construct an isometric drawing, first establish the direction of the three principal axes. Because they are 120° apart on the picture plane, if we draw one axis vertically, the other two axes make a 30° angle with a horizontal on the drawing surface.



- Then lay out the true lengths of all lines parallel to the three principal axes and draw them to the same scale.



- Isometric drawings of forms based on the square can create an optical illusion and be subject to multiple interpretations. This ambiguity results from the alignment of lines in the foreground with those in the background. In such cases, a plan oblique might be a better choice.

CAD packages can assist in preparing views through snap grids and dynamic 3D modelling.

Typical CAD packages

AUTODESK AUTOCAD

VECTORWORKS®
A NEMETSCHEK COMPANY

GRAPHISOFT®
ARCHICAD

Rhinoceros®

AUTODESK CIVIL3D

SketchUp

AUTODESK®
REVIT®

Is this enough?

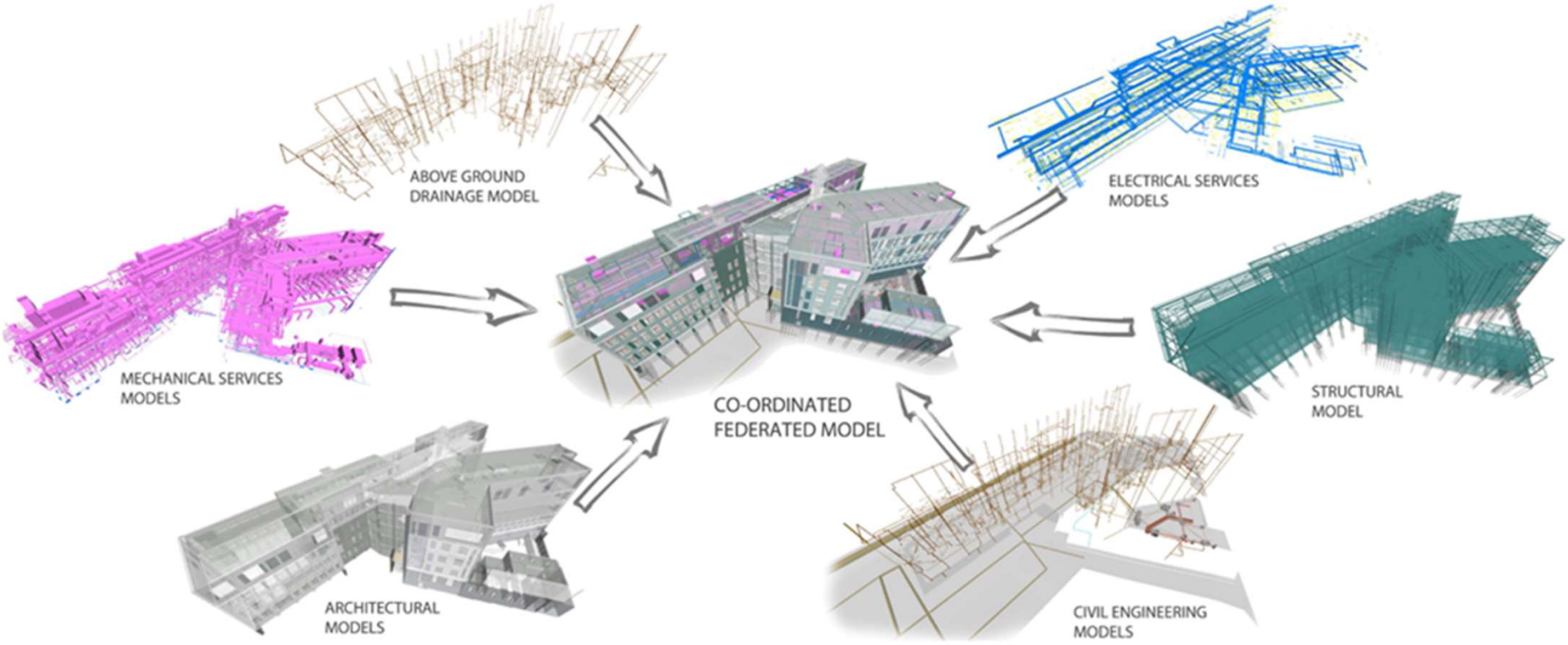
How can we improve the way we communicate?

BIM?

ACBA 4018
DIGITAL TECHNOLOGY & BIM : LEVEL 4

# An Introduction to BIM

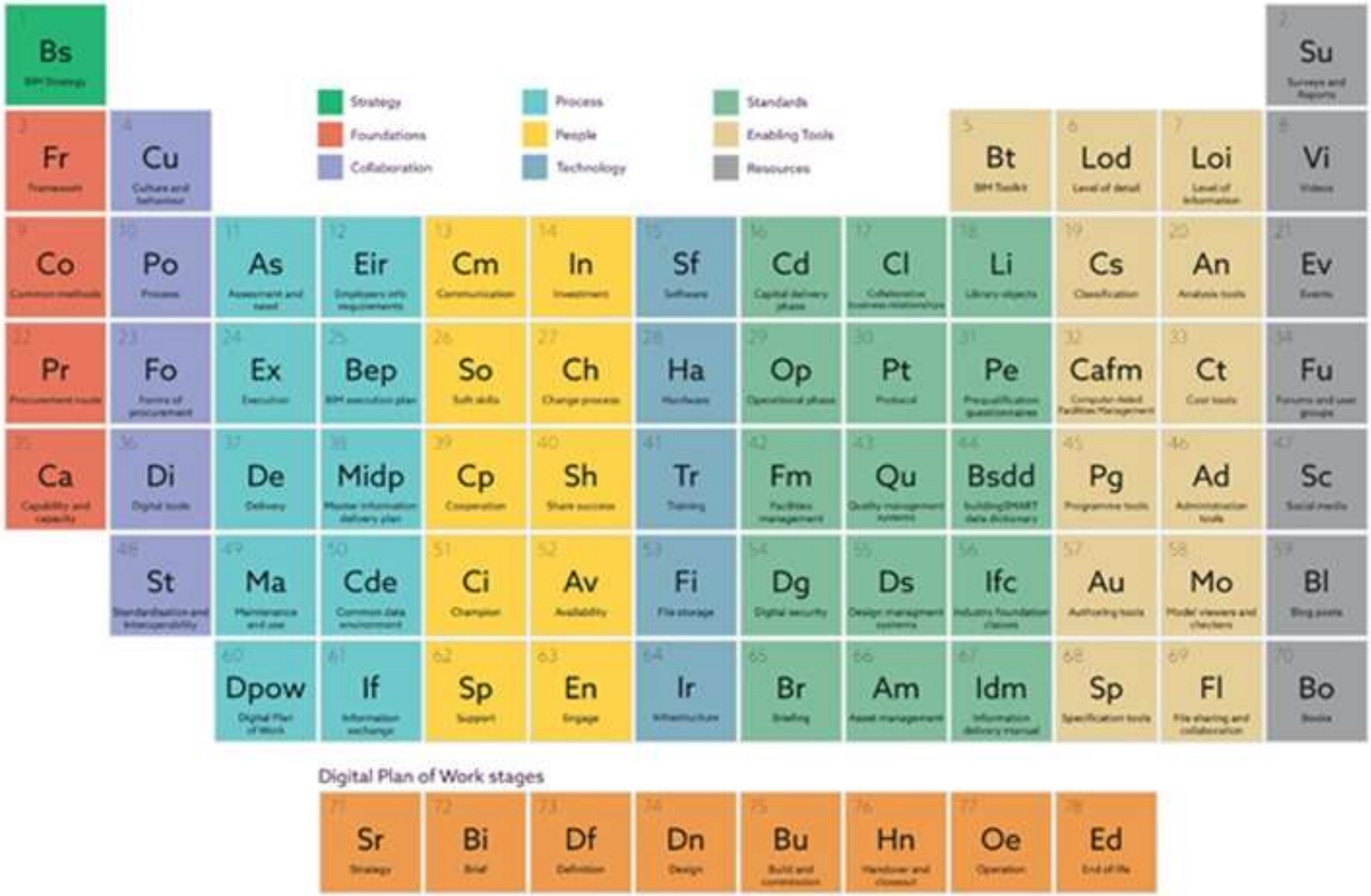
Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David



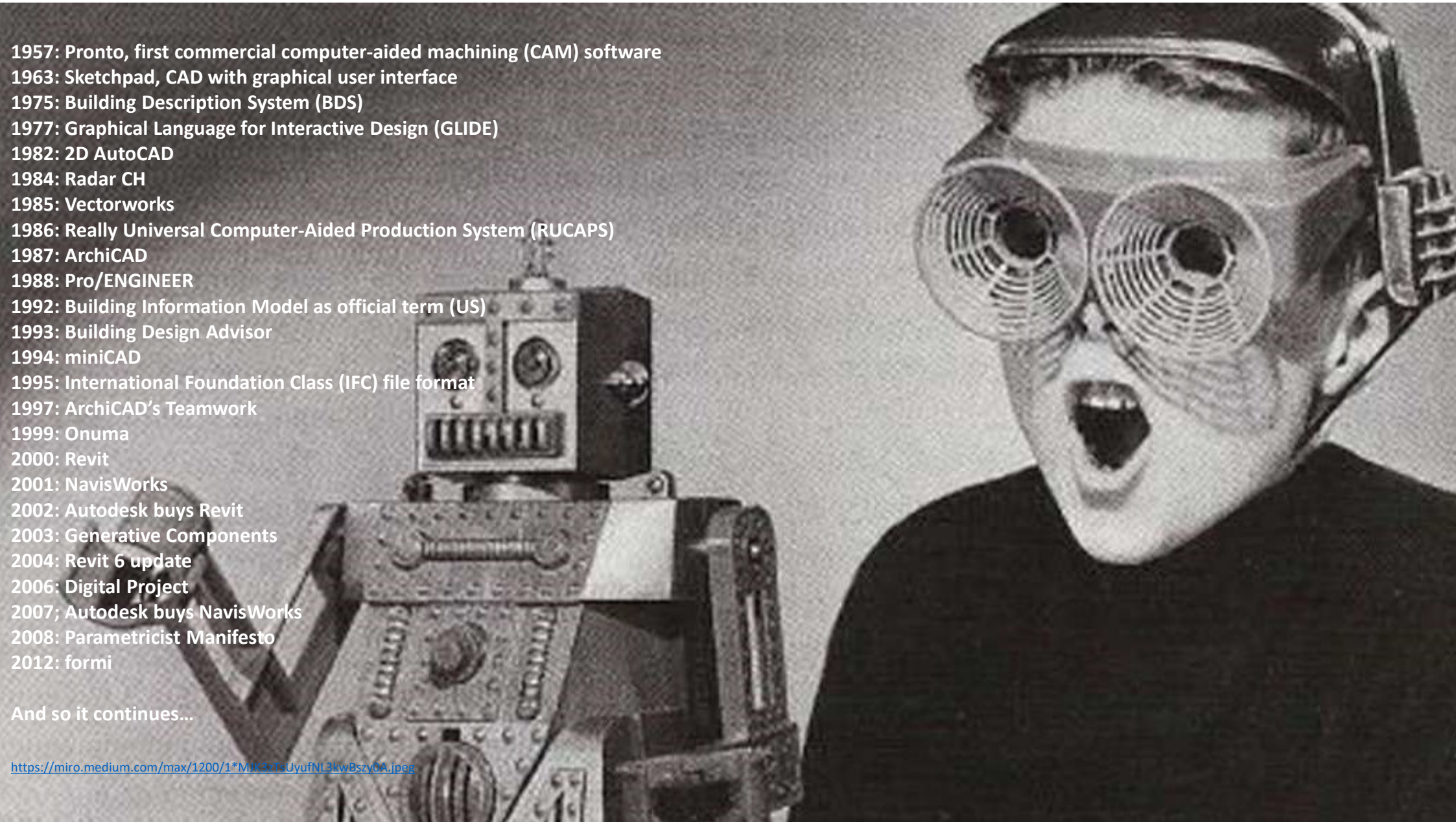

www.onecreativeenvironment.com

# What is your understanding of BIM?

## BIM is a Process NOT Software




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



1957: Pronto, first commercial computer-aided machining (CAM) software
1963: Sketchpad, CAD with graphical user interface
1975: Building Description System (BDS)
1977: Graphical Language for Interactive Design (GLIDE)
1982: 2D AutoCAD
1984: Radar CH
1985: Vectorworks
1986: Really Universal Computer-Aided Production System (RUCAPS)
1987: ArchiCAD
1988: Pro/ENGINEER
1992: Building Information Model as official term (US)
1993: Building Design Advisor
1994: miniCAD
1995: International Foundation Class (IFC) file format
1997: ArchiCAD's Teamwork
1999: Onuma
2000: Revit
2001: NavisWorks
2002: Autodesk buys Revit
2003: Generative Components
2004: Revit 6 update
2006: Digital Project
2007; Autodesk buys NavisWorks
2008: Parametricist Manifesto
2012: formi

And so it continues…

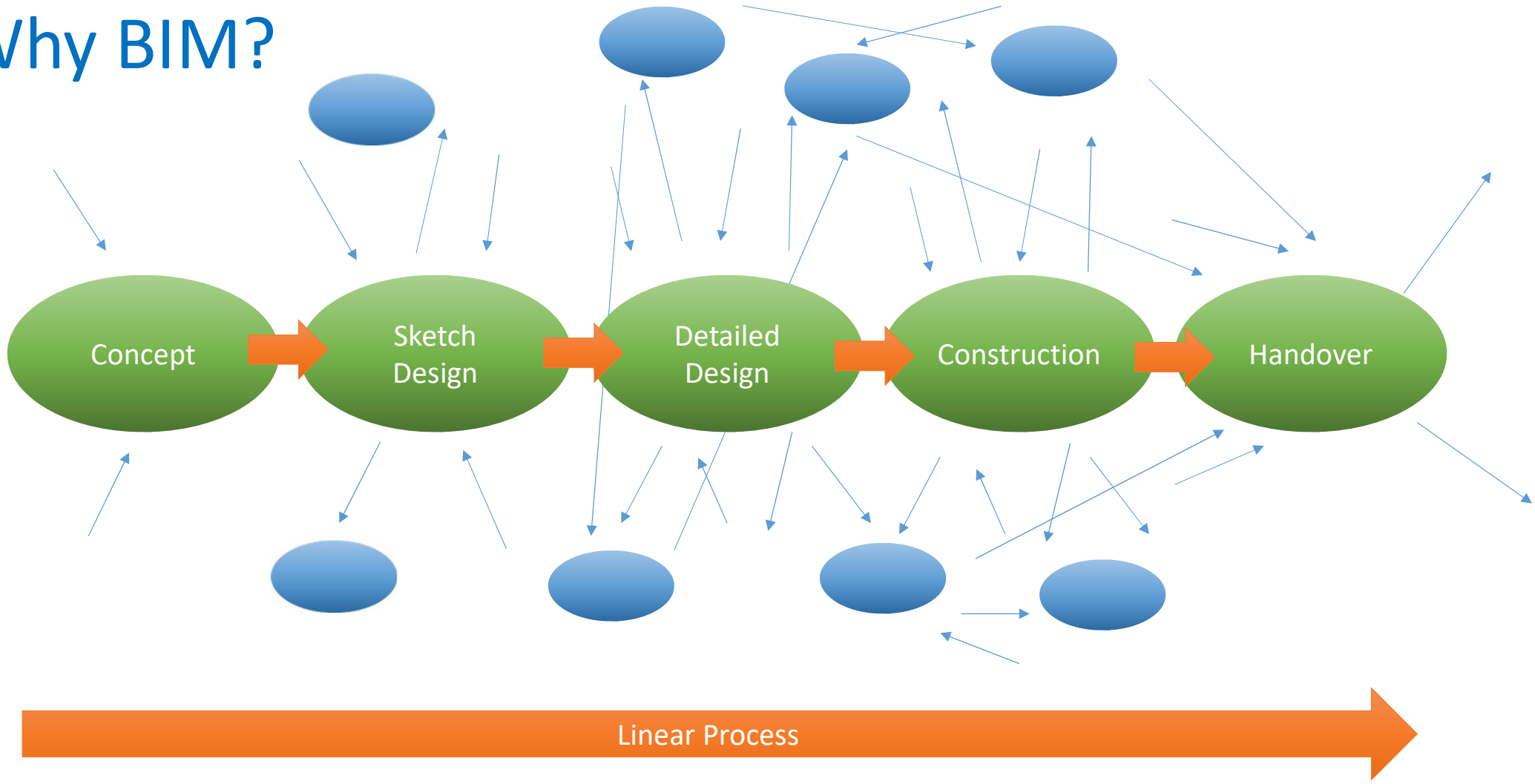
https://miro.medium.com/max/1200/1*MJK3cTsUyufNL3kwBszy0A.jpeg

# Building Information Modelling

What it really means is a PROCESS of…..

# Better Information Management

# Why BIM?

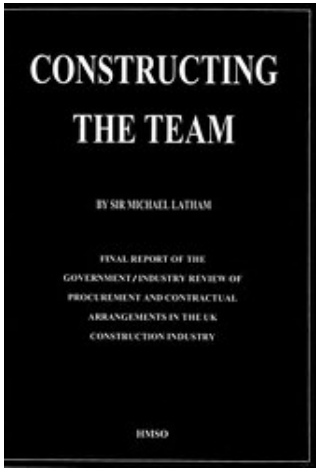

Concept
Sketch Design
Detailed Design
Construction
Handover
Linear Process

# Why BIM?

# Origins in UK

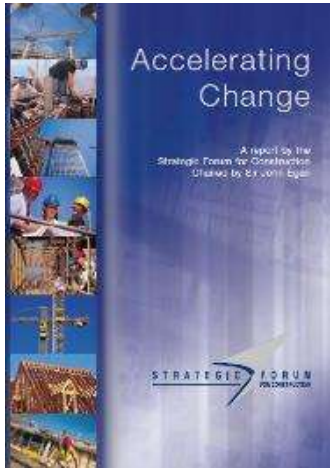
STEP CHANGE

Latham Report



Egan Report

Accelerating Change



Never Waste A Good Crisis

BIS BIM Strategy

Government Construction Strategy

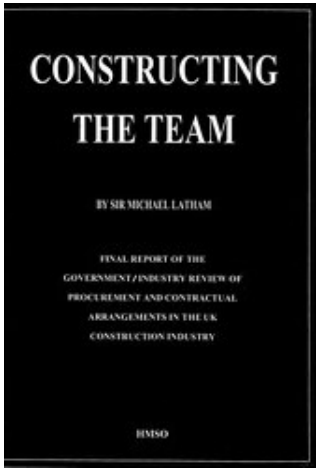
1994 | 1998 | 2002 | 2009 | 2011 | 2011

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

# Origins in UK

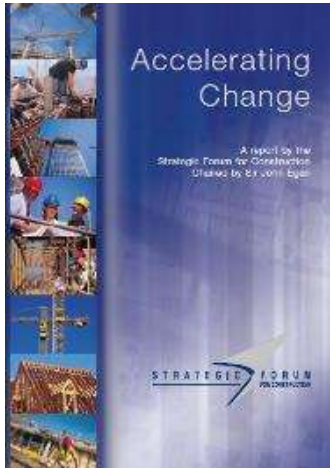
STEP CHANGE

Latham Report



Egan Report

Accelerating Change



Never Waste A Good Crisis

BIS BIM Strategy

Government Construction Strategy

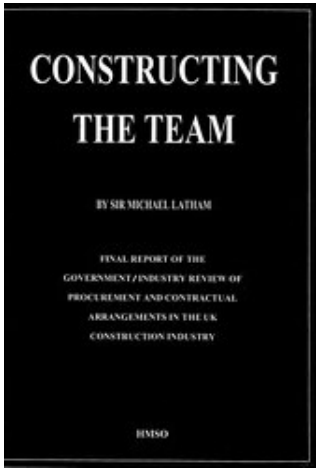
1994 | 1998 | 2002 | 2009 | 2011 | 2011

*Rethinking Construction* through ‘demonstration projects’, and regional ‘cluster groups’ or best practice clubs.

# Origins in UK

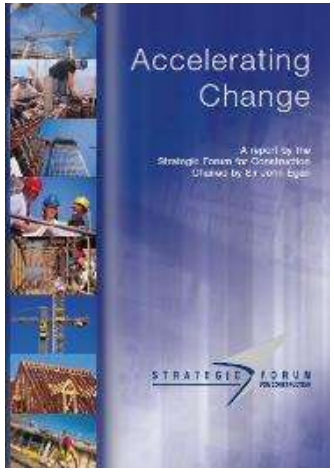
STEP CHANGE

Latham Report



Egan Report

Accelerating Change



Never Waste A Good Crisis

BIS BIM Strategy

Government Construction Strategy

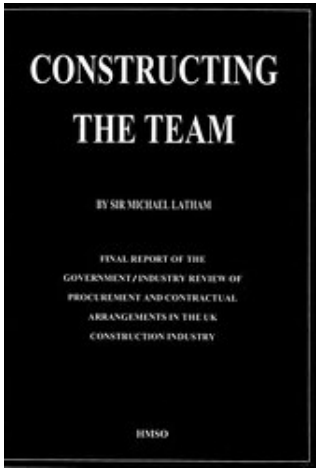
1994 | 1998 | 2002 | 2009 | 2011 | 2011

By the end of 2004 20% of construction projects by value should be undertaken by integrated teams and supply chains; and, 20% of client activity by value should embrace the principles of the Clients' Charter.

# Origins in UK

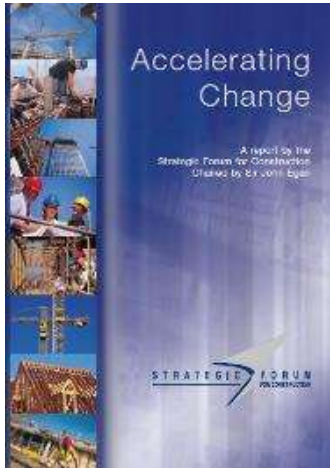
STEP CHANGE

Latham Report



Egan Report

Accelerating Change



Never Waste A Good Crisis

BIS BIM Strategy

Government Construction Strategy

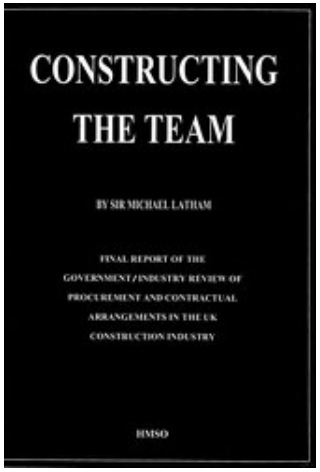
1994 | 1998 | 2002 | 2009 | 2011 | 2011

Wolstenholme stated that some progress had been made against Egan's targets, but that the industry's performance fell considerably short in several categories and that compliance with some of Egan's targets was only accomplished in a superficial manner.

# Origins in UK

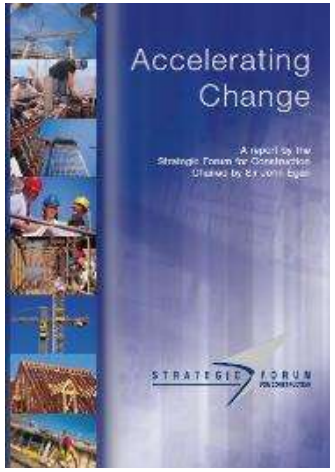
STEP CHANGE

Latham Report



Egan Report

Accelerating Change



Never Waste A Good Crisis

BIS BIM Strategy

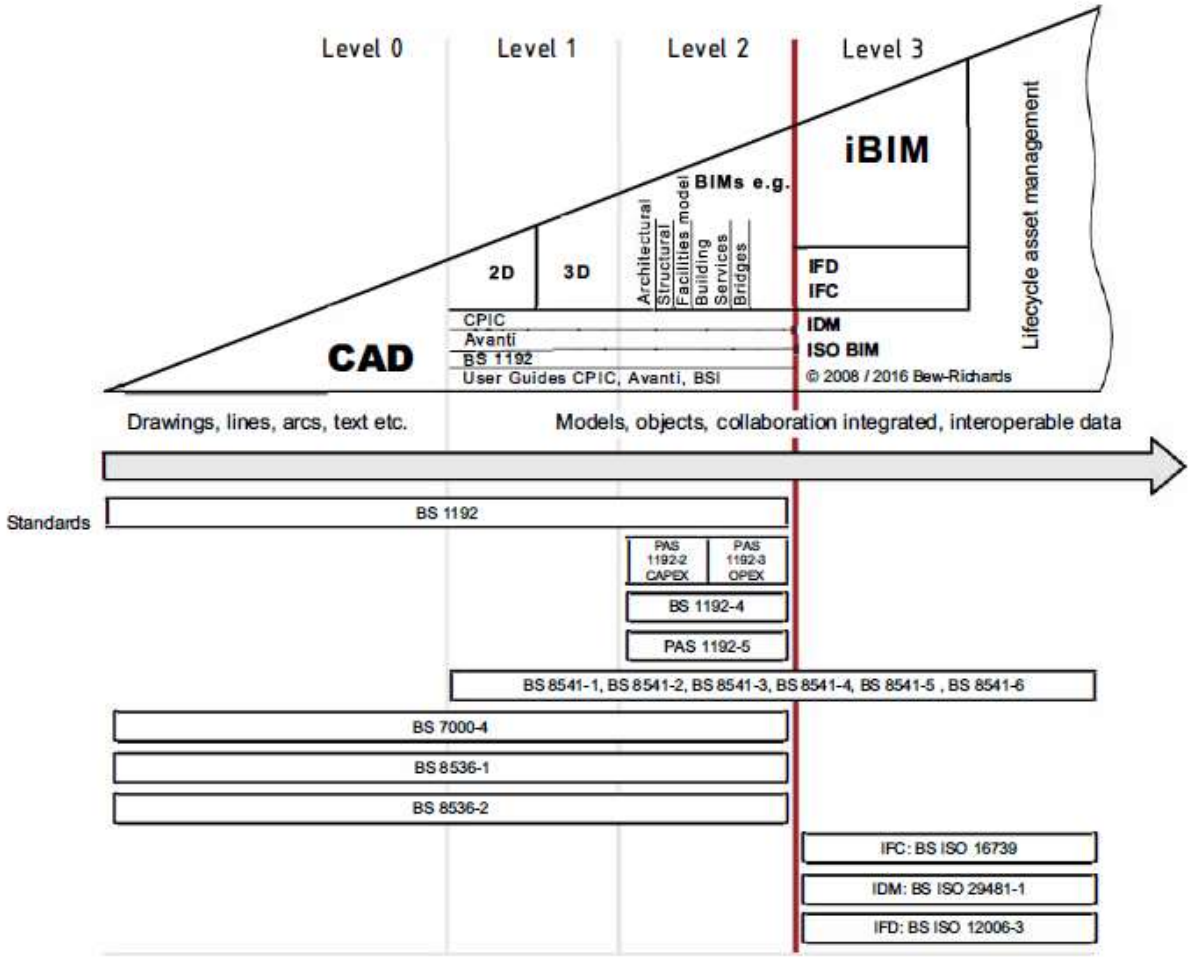
Government Construction Strategy

1994 | 1998 | 2002 | 2009 | 2011 | 2011

The BIM working group looked at the construction and post-occupancy benefits of BIM for use in the UK building and infrastructure markets. Highlighting recommendations of the working group for a strategy to deliver a structured Government/Sector capability to increase BIM take-up over a five year horizon.

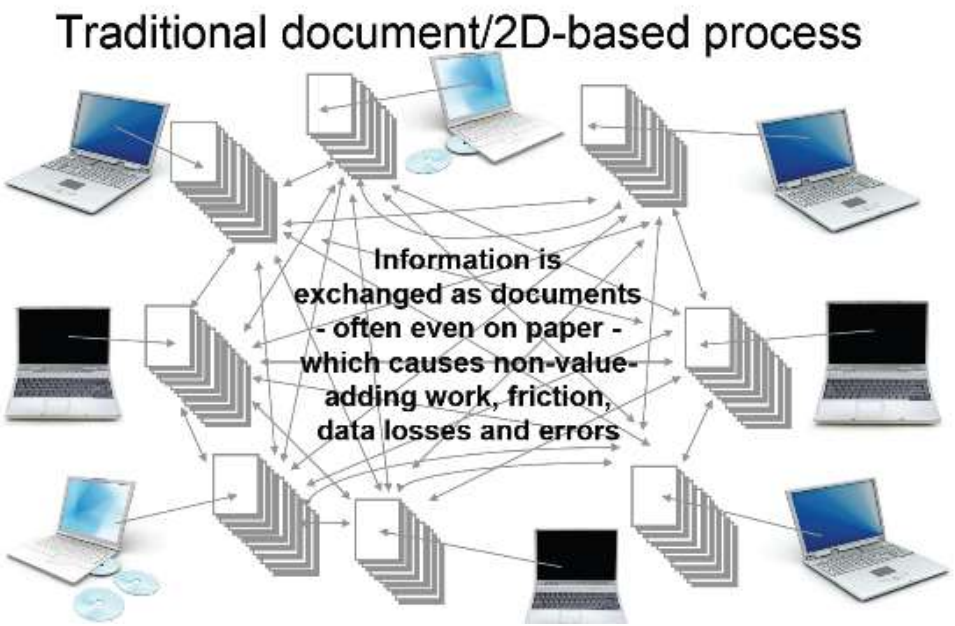
# Maturity

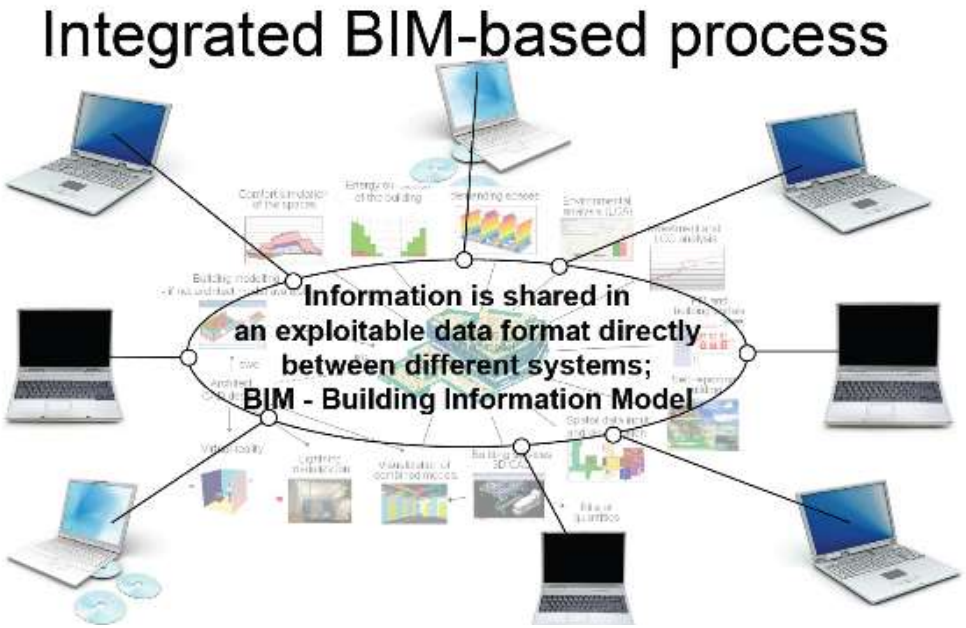
The Construction Strategy aimed at reducing the cost of public sector assets by up to 20% by 2016. To achieve this strategy, the government mandated that construction suppliers tendering for centrally-procured government projects to be working at BIM Level 2.




Bew Richards Wedge

# Benefits

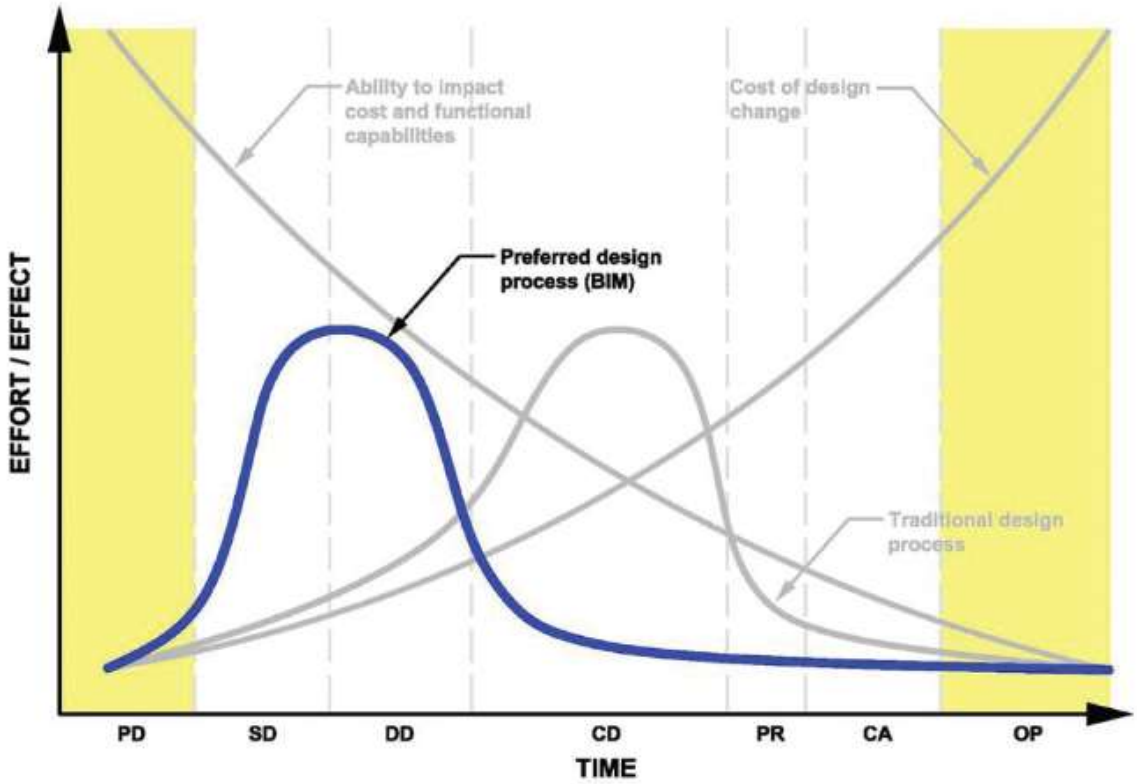


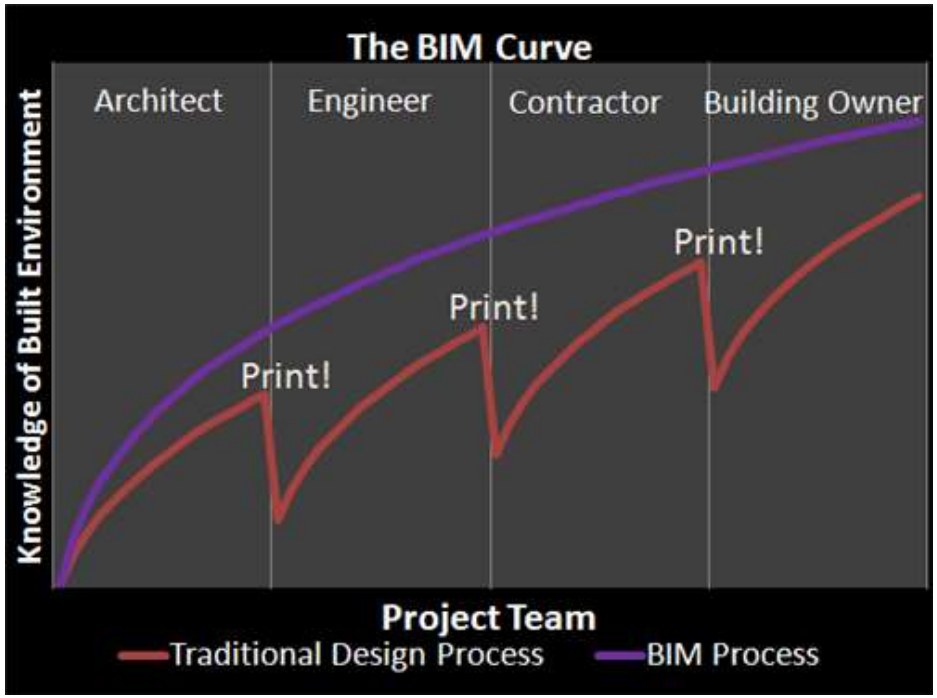




BIM Advanced, CE Wales, 16/01/2013

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

# Change Management

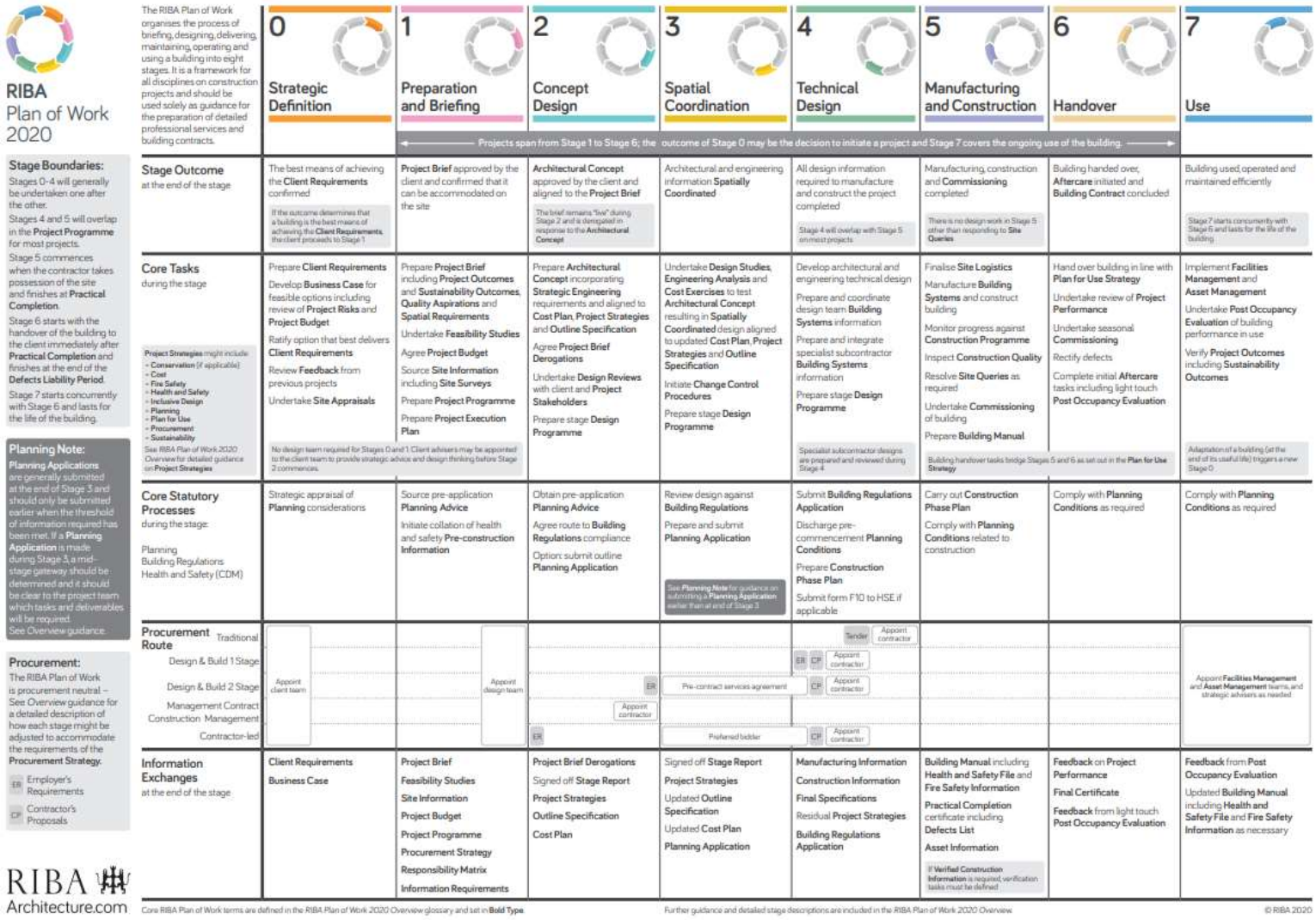


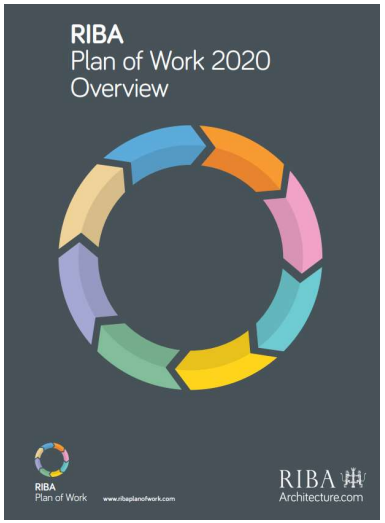




http://www.mastergraphics.com/wordpress/2012/02/

http://inside-the-system.typepad.com/my_weblog/2007/10/

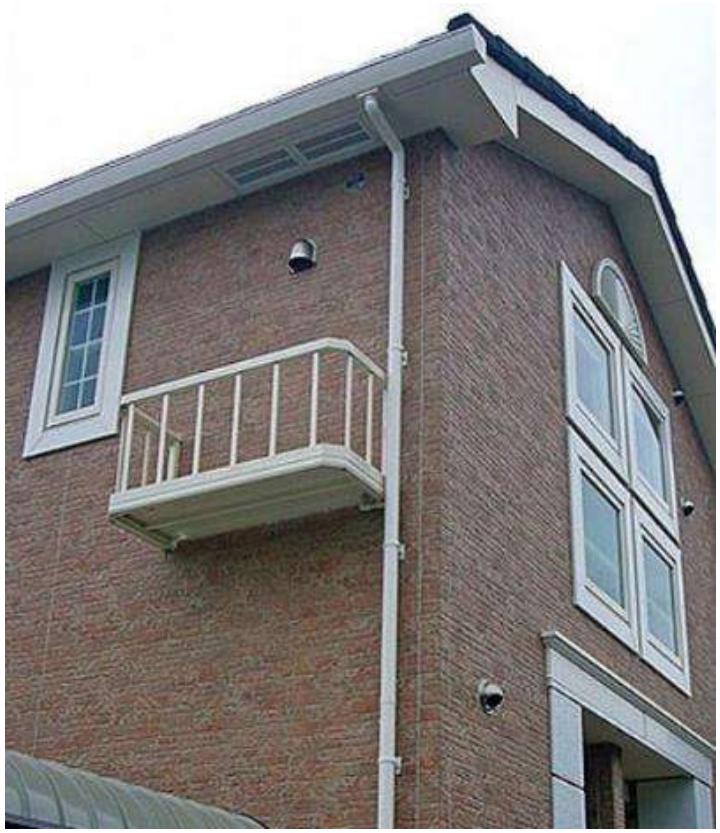
# Change Management




RIBA Plan of Work

# Clash Detection



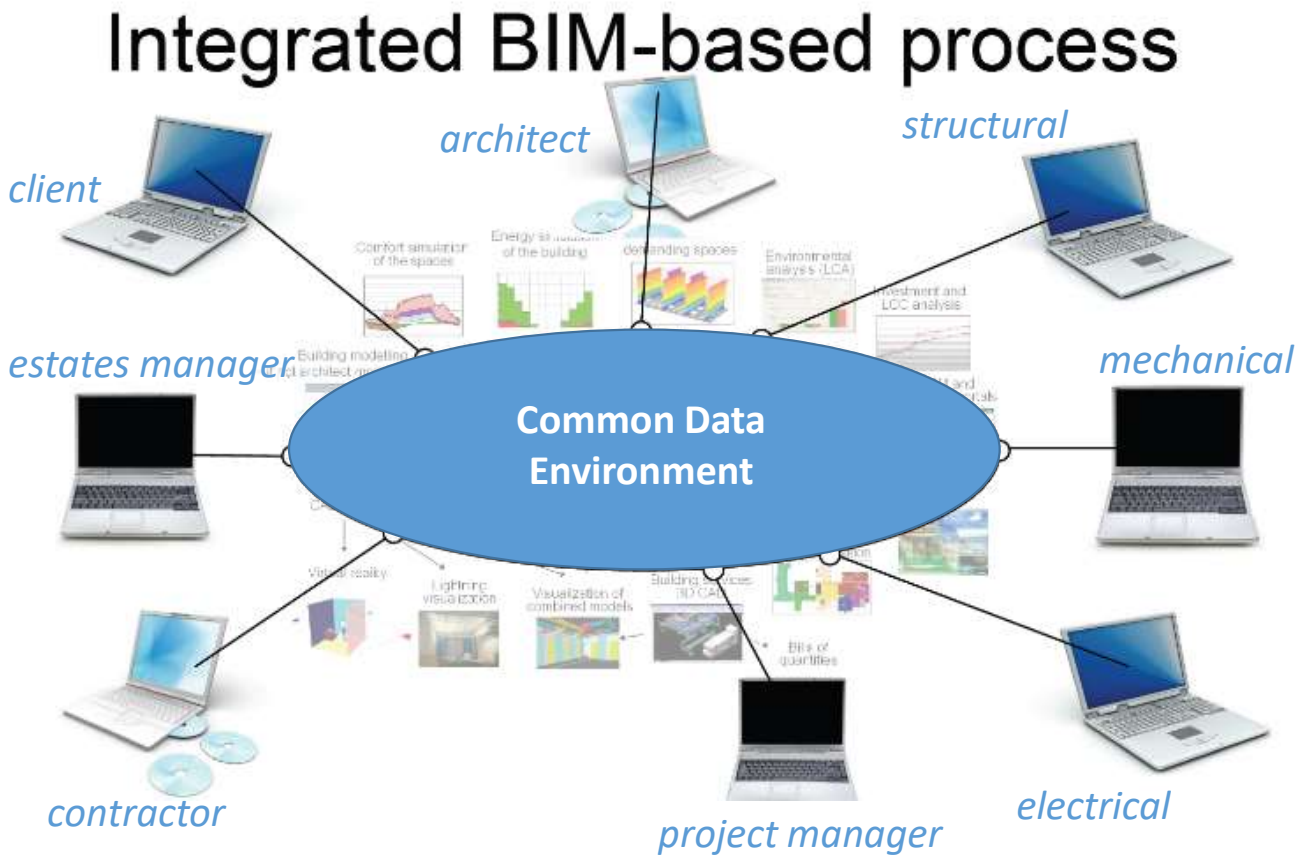
[These construction fails are dangerously funny | Daily Mail Online]

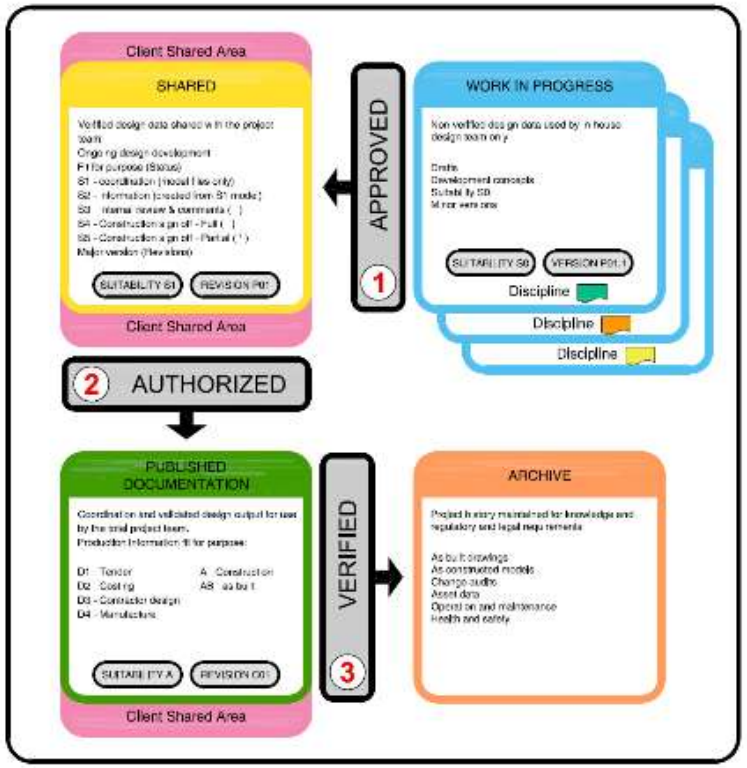
https://blog.miragestudio7.com/construction-mistakes/1443/

# Application

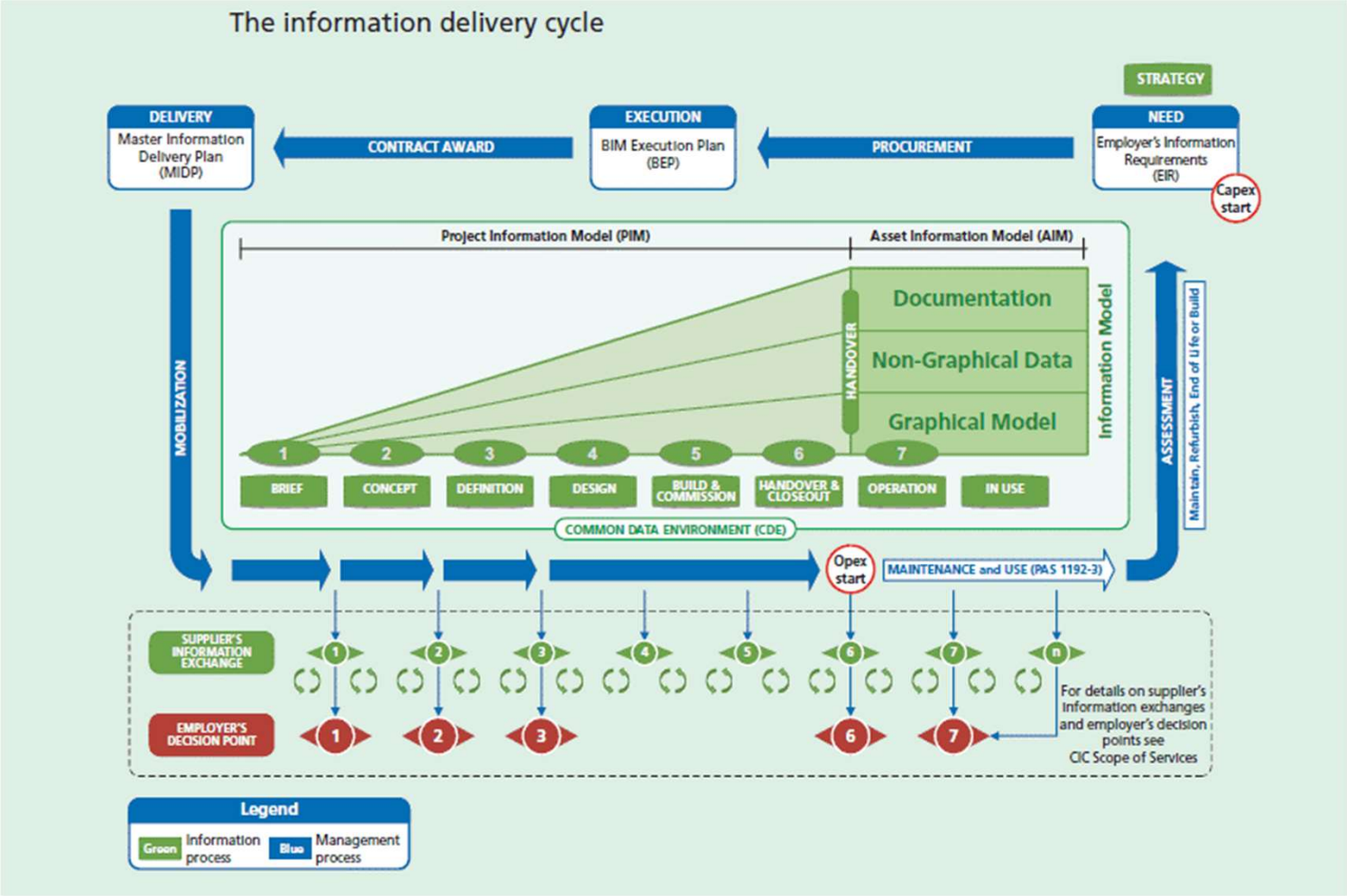
*The structured use of a Common Data Environment (CDE) requires strict discipline by all members of a design team in terms of adherence to agreed approaches and procedures, compared with a more traditional approach. The benefits can only be realized with a commitment to operate in a disciplined and consistent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

***PAS 1192-2:**2013*



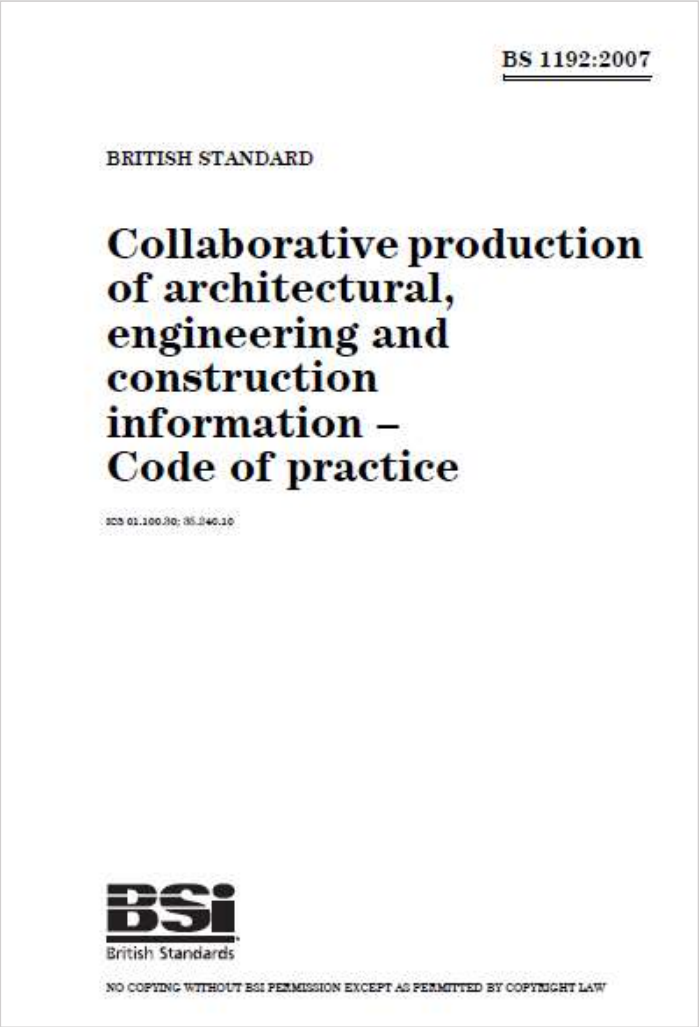



# BIM Process Diagram



***PAS 1192-2:**2013*

# Key Standards



BS 1192:2007

BRITISH STANDARD

**Collaborative production of architectural, engineering and construction information – Code of practice**

ICS 01.100.30; 35.240.10

BSi British Standards

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PAS 1192-2:2013

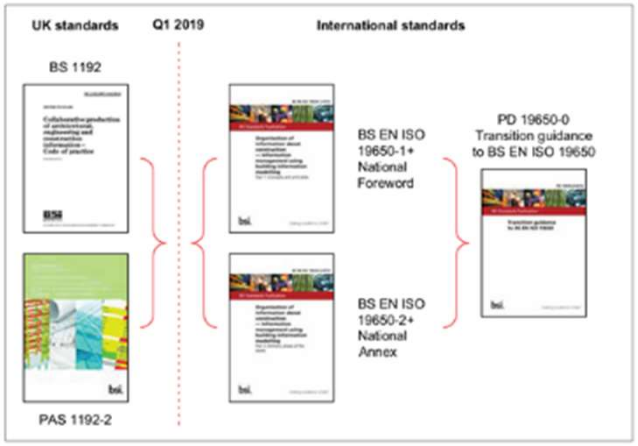
*Incorporating Corrigendum No. 1*

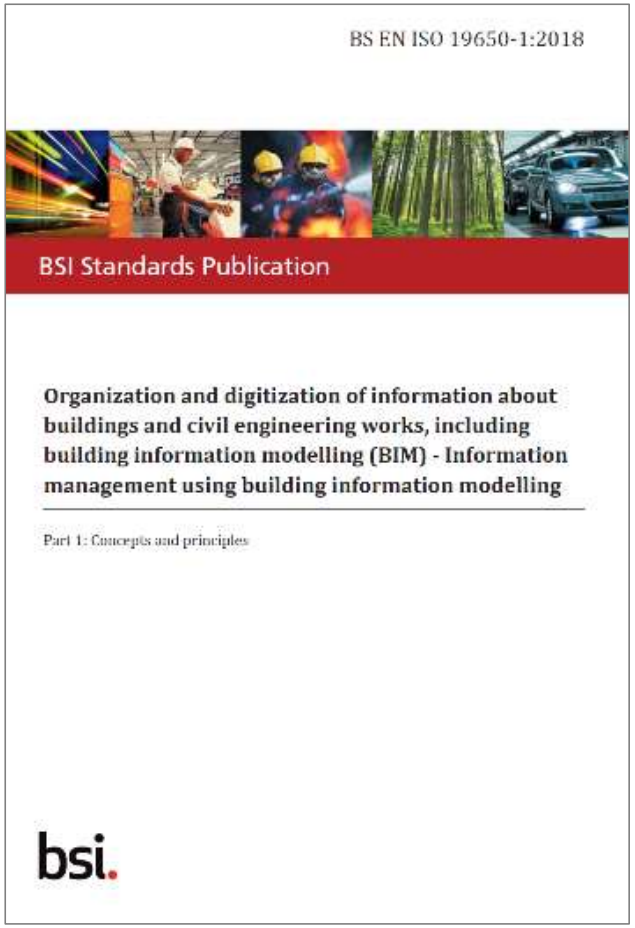
Specification for information management for the capital/delivery phase of construction projects using building information modelling

bsi.

New Guidance came into place January 2019…

# New Standards Q1 2019



# Introducing the new international standard for BIM, ISO 19650

## Embedding digital innovation and accelerating global adoption

bsi.

...making excellence a habit.™

## What does the ISO 19650 suite consist of?

**BS 1192:2007+A2:2016** on principles, and **PAS 1192-2** on the capital delivery phase are superseded by the following standards which are available on the BSI Shop:

- **BS EN ISO 19650-1:** Organization and digitization of information about buildings and civil engineering works, including building information modelling -- Information management using building information modelling: Concepts and principles
- **BS EN ISO 19650-2:** Organization and digitization of information about buildings and civil engineering works, including building information modelling -- Information management using building information modelling: Delivery phase of the assets

Also available on the BSI Shop the following document is published alongside these standards:

- **PD 19650-0 - UK Transition Guidance**, which will along with the UK National Forewords and National Annex aid implementation of the ISO standards in the UK and within the ISO framework

It's anticipated that **PAS 1192-3** and **PAS 1192-5** (the information management of assets and security-minded standards for BIM) will be superseded by the following standards in 2020:

- **BS EN ISO 19650-3** Organization and digitization of information about buildings and civil engineering works, including building information modelling -- Information management using building information modelling – Part 3: Operational phase of assets
- **BS EN ISO 19650-5** Organization and digitization of information about buildings and civil engineering works, including building information modelling -- Information management using building information modelling – Part 5: Security-minded approach to information management

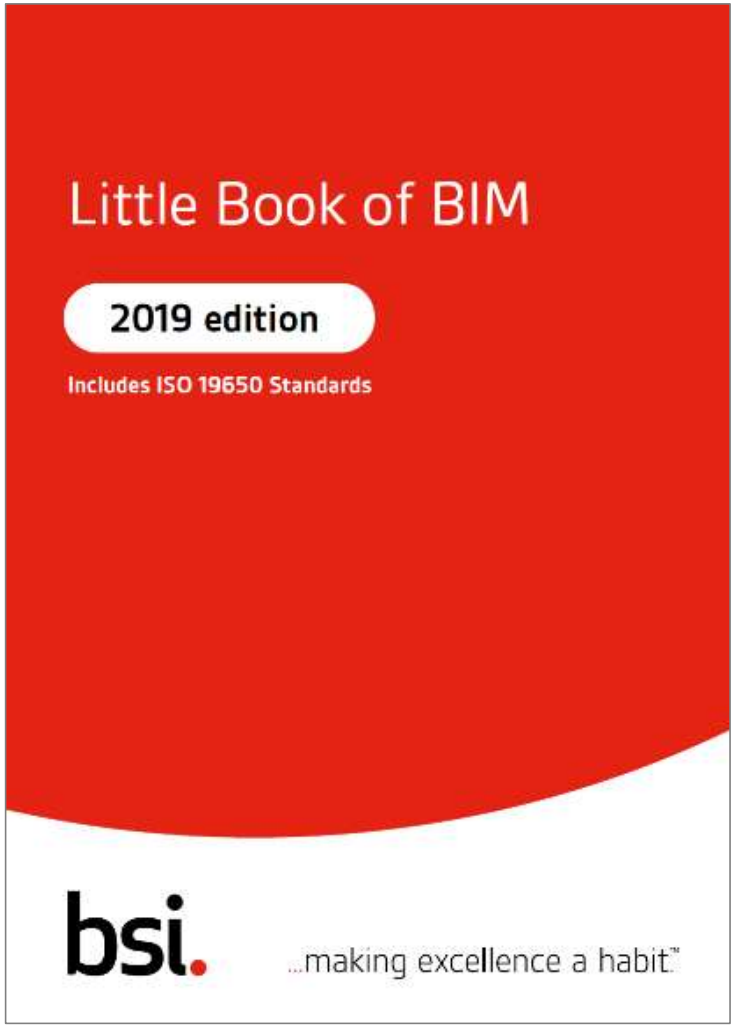
| | UK Standards | | International Standards | |
|---|---|---|---|---|
| 2019 | BS 1192:2007+A2:2016<br>PAS 1192-2 | } | BS EN ISO 19650-1 + National Foreword<br>BS EN ISO 19650-2 + National Annex | } PD 19650-0 + Guide to BS EN ISO 19650 |
| 2020 | PAS 1192-3 | → | BS EN ISO 19650-3 | |
| | PAS 1192-5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

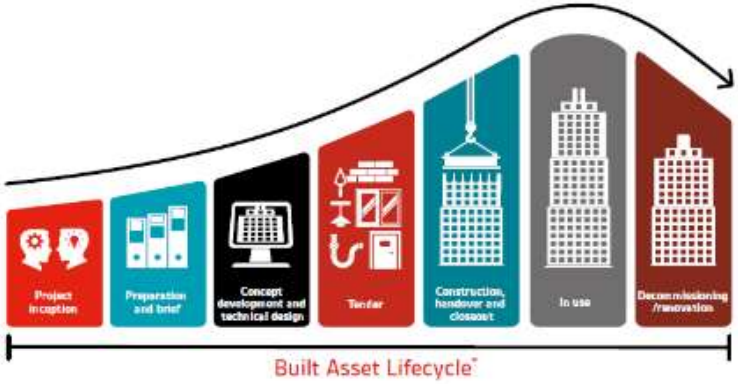
BSI clients currently holding BIM certification or verification, including the BSI Kitemark, will have the opportunity to transition their system to reflect the new ISO. To help you upgrade we will be producing lots of supporting materials and services including webinars, training courses developed by 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.



# 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



# Key Standards for BIM

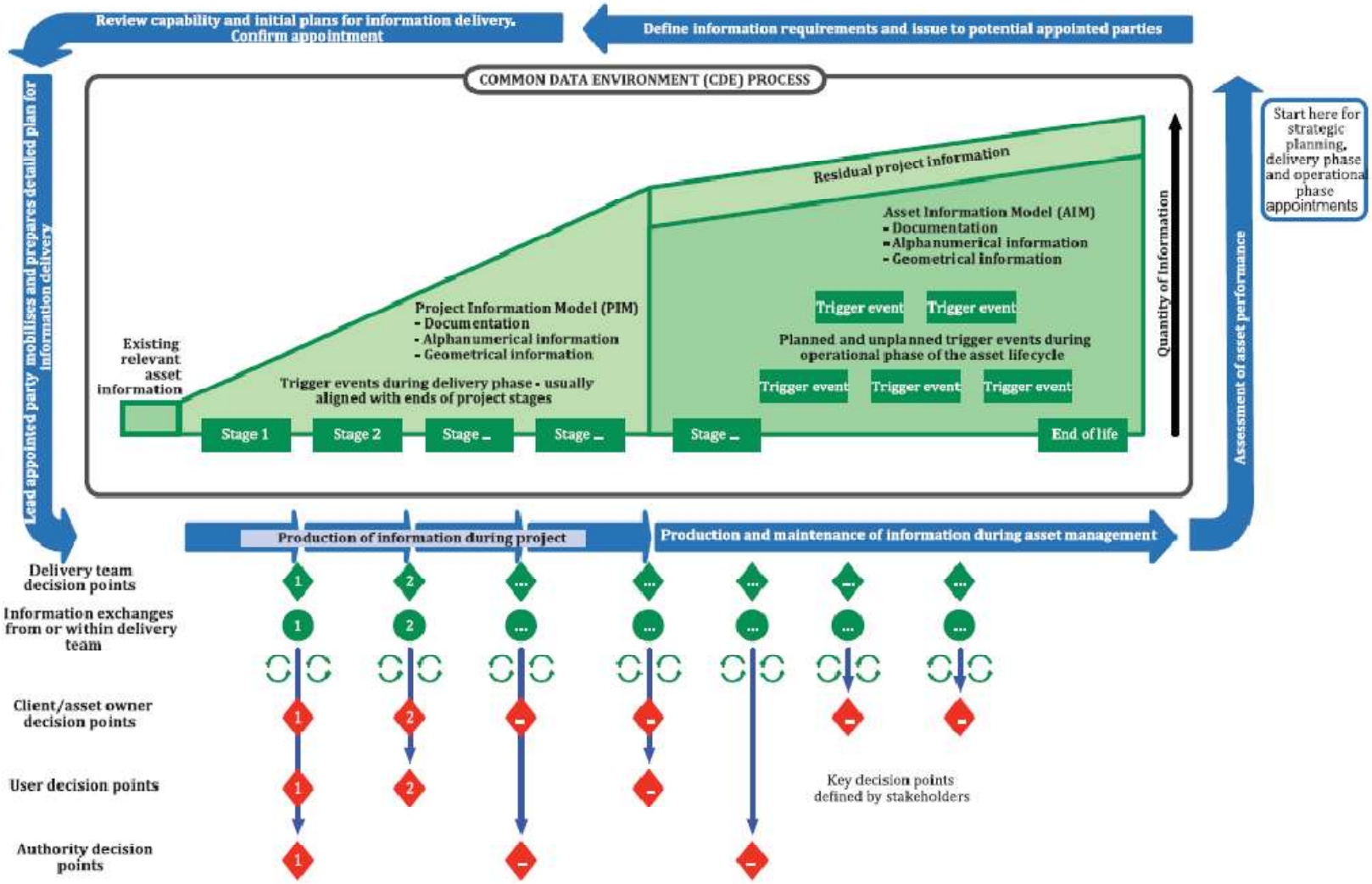
**BS EN ISO 19650-1:2018** – Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Concepts and principles. This will supersede BS 1192:2007+A2:2016.

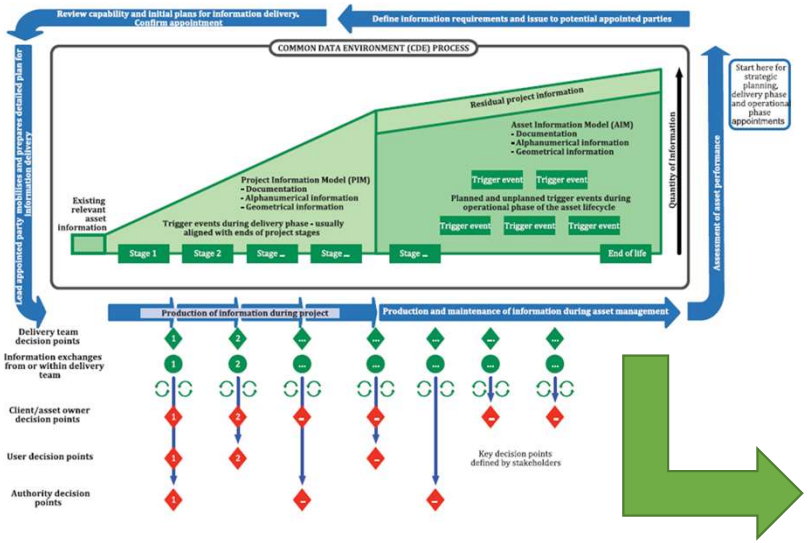
**BS EN ISO 19650-2:2018** – Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Delivery phase of the assets. This will supersede PAS 1192-2:2013.

**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





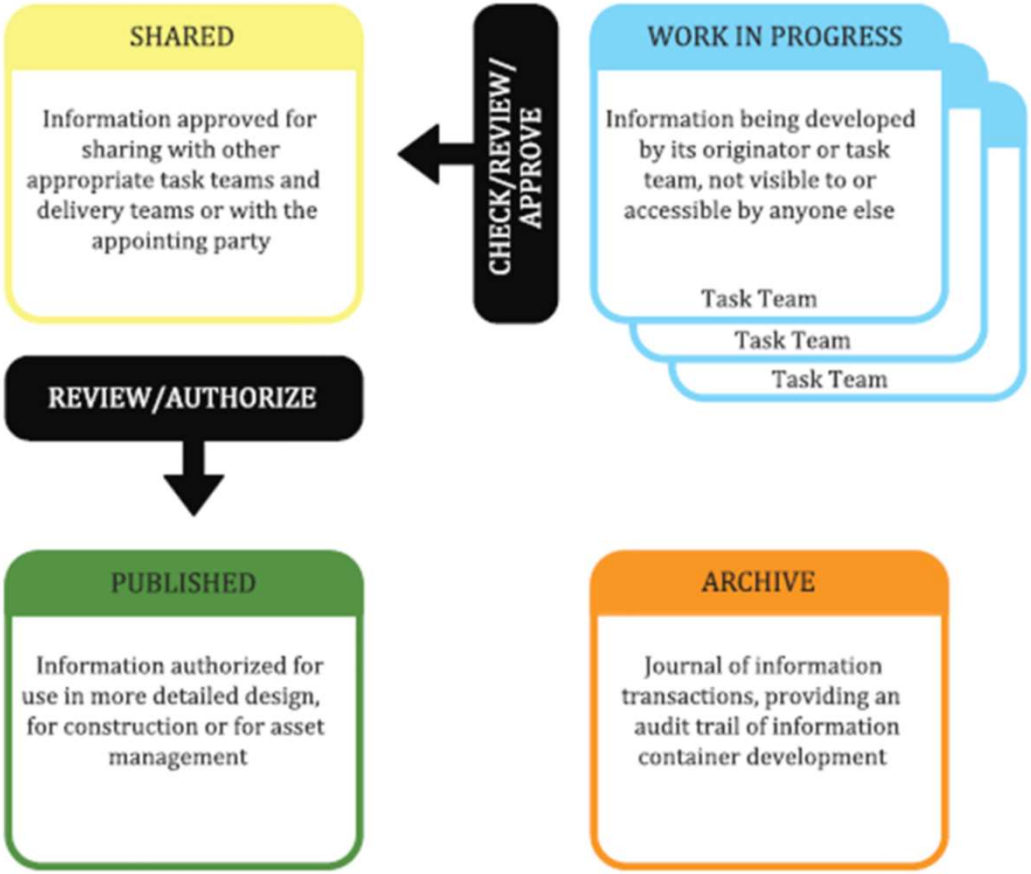




**Figure 10 — Common data environment (CDE) concept**

# Conventions

UNIVERSITY OF WALES TRINITY SAINT DAVID

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

| | | | | aka Zone/Volume/System | Level | Type | Role | | | Suitability* | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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:<br><br>ZZ – Multi Level<br>XX – No Level<br><br>00 - Ground Flr<br>01 – First Flr<br>02 – Second Flr<br>Etc.<br><br>Mezzanines<br>M1<br>M2<br>Etc.<br><br>All levels below ground floor prefix 'B'<br>B1<br>B2<br>Etc. | This is simply the type or form of data eg:<br><br>For Files:<br>D - Drawing<br>G Diagram<br>I Image<br>L List<br>M Model<br>T Textual<br>V Video/Audio | A Architect / Architectural<br>B Building Surveyor<br>C Civil Engineer<br>D DDemolition/Dismantling<br>E Electrical Engineer<br>F Facilities Manager<br>G Ground Engineering<br>H Highways & Transport<br>I Interior Designer<br>K Client<br>L Landscape Architect<br>M Mechanical Engineer O Other<br>P Public Health Engineer<br>Q Quantity Surveyor R Project Mgmt<br>S Structural Engineer<br>T Planner<br>W Water Engineering<br>X non discipline specific<br>Y Topographical<br>Z Multi Discipline | This is a 4 digit code denoting drawing grouping and number.<br><br>It consists of a 1 digit Drawing Group plus the 3 digit individual drawing no:<br>Eg.<br>1001 Where 1 at the beginning is the drawing group and the 3 latter digits are sequencial numbers. | Drawing / Model description ie.<br><br>GAPLAN<br>SITE<br>GEO MOD<br>SECTION<br>SCHEMAT<br>BREEAM<br>FINISHES<br>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.<br><br>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:<br>0 - General<br>1 - Substructure<br>2 - Superstructure<br>3 - Openings<br>4 - Finishes<br>5 - Piped & ducted services<br>6 - Electrical<br>7 - Fixtures & Fittings (Fixed)<br>8 - Loose Furniture<br>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 | | |
| EXAMPLE | 4005 | UWTSD | XX | ZZ | D | 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 ISO19650 1-2

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* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | aka Zone/Volume/System | | Level | | Type | | Role | | | | | Suitability* | | |
| 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 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 segregation. There should be at least one 'zone' per role. EG. Arch Model, Mech Model, Struct Model, etc. | | The level the data refers to:<br><br>ZZ – Multi Level<br>XX – No Level<br><br>00 - Ground Flr<br>01 – First Flr<br>02 – Second Flr<br>Etc.<br><br>Mezzanines<br>M1<br>M2<br>Etc.<br><br>All levels below ground floor prefix 'B'<br>B1<br>B2<br>Etc. | | This is simply the type or form of data eg:<br><br>For Files:<br>D - Drawing<br>G Diagram<br>I Image<br>L List<br>M Model<br>T Textual<br>V Video/Audio | | A Architect / Architectural<br>B Building Surveyor<br>C Civil Engineer<br>D DDemolition/Dismantling<br>E Electrical Engineer<br>F Facilities Manager<br>G Ground Engineering<br>H Highways & Transport<br>I Interior Designer<br>K Client<br>L Landscape Architect<br>M Mechanical Engineer O<br>Other<br>P Public Health Engineer<br>Q Quantity Surveyor R<br>Project Mgmt<br>S Structural Engineer<br>T Planner<br>W Water Engineering<br>X non discipline specific<br>Y Topographical<br>Z Multi Discipline | | This is a 4 digit code denoting drawing grouping and number.<br><br>It consists of a 1 digit Drawing Group plus the 3 digit individual drawing no:<br>Eg.<br>1001 Where 1 at the beginning is the drawing group and the 3 latter digits are sequencial numbers. | | Drawing / Model description ie.<br><br>GAPLAN<br>SITE<br>GEO MOD<br>SECTION<br>SCHEMAT<br>BREEAM<br>FINISHES<br>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.<br><br>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:<br>0 - General<br>1 - Substructure<br>2 - Superstructure<br>3 - Openings<br>4 - Finishes<br>5 - Piped & ducted services<br>6 - Electrical<br>7 - Fixtures & Fittings (Fixed)<br>8 - Loose Furniture<br>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 | - | UWTSD | - | XX | - | ZZ | - | D | - | A | - | 1001 | - | GEO MOD | S1 | - | A |

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

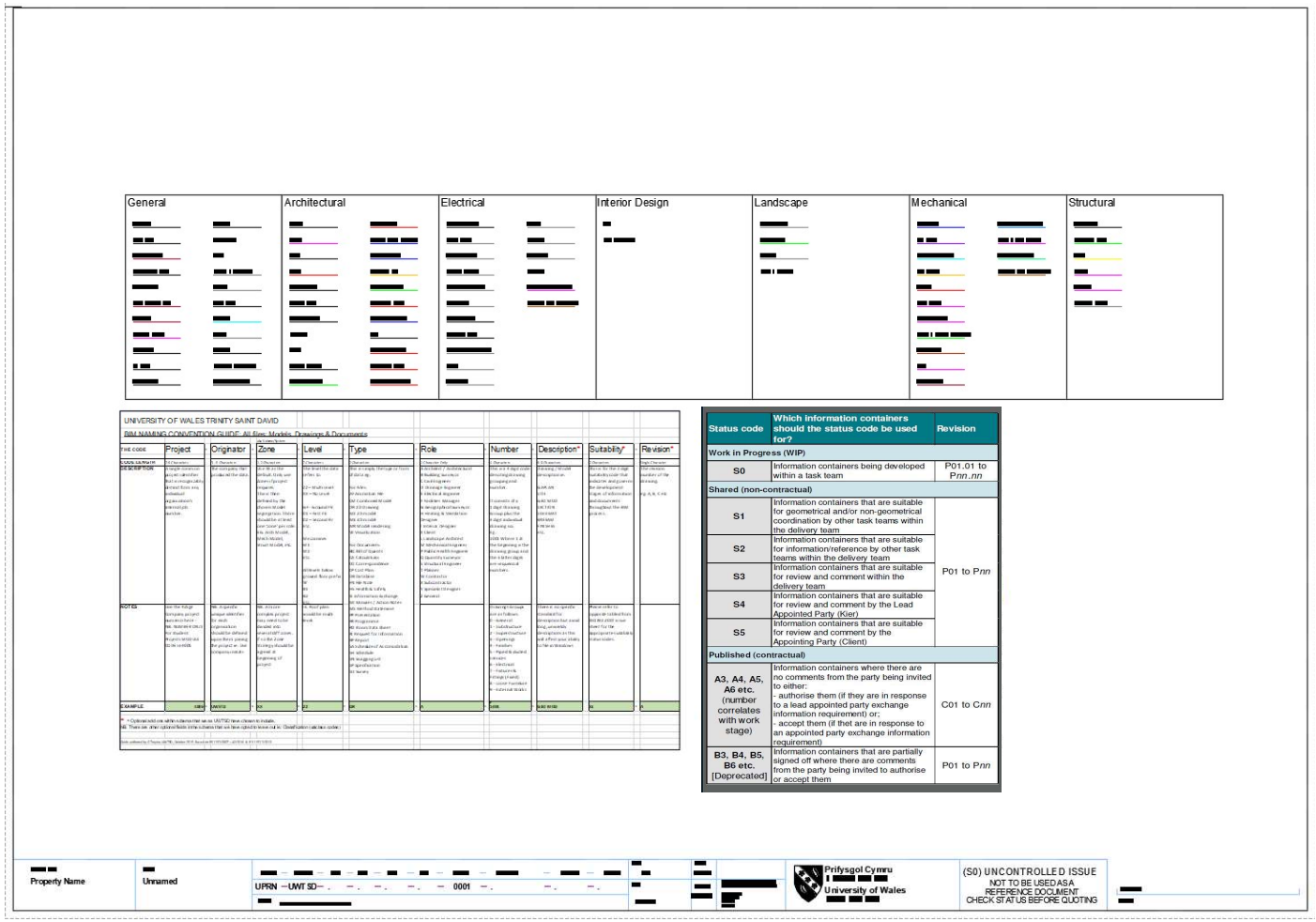
NB. There are other optional fields in the schema that we have opted to leave out ie: Classification (uniclass codes)

(Guide authored by D Treyler, UWTSD, October 2019. Based on ISO19650 1-2

| 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 P*nn.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 P*nn* |
| **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:<br>- authorise them (if they are in response to a lead appointed party exchange information requirement) or;<br>- accept them (if thet are in response to an appointed party exchange information requirement) | C01 to C*nn* |
| **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 P*nn* |

# Conventions: Working in a Common Data Environment CDE

# UWTSD Title Block / Template File CAD




Layering conventions to British Standards. Within AutoCAD

Numbering to Building Information Modelling standards.

# Conventions

4005 _UWTSD _XX _01_D _A _0001 _GenArr _AB

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

4005 _UWTSD _XX _XX_T _QS _0001 _CostPlan

*A Cost Plan suitable for construction, produced by the QS*

# Tools

Drawing, Modelling and Specifications

AUTODESK AUTOCAD

VECTORWORKS A NEMETSCHEK COMPANY

AUTODESK REVIT

GRAPHISOFT ARCHICAD

Bentley Advancing Infrastructure

AUTODESK CIVIL3D

NBS

IFC

SketchUp

Clash Detection, Virtual Build

AUTODESK NAVISWORKS

SOLIBRI A NEMETSCHEK COMPANY

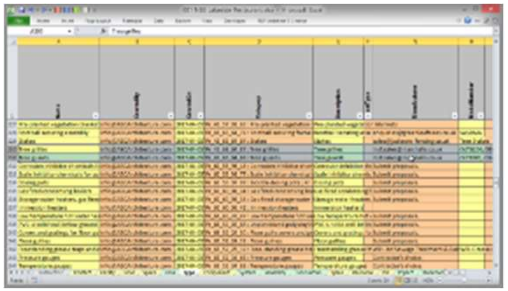
Collaboration and CDE Platforms

revizto

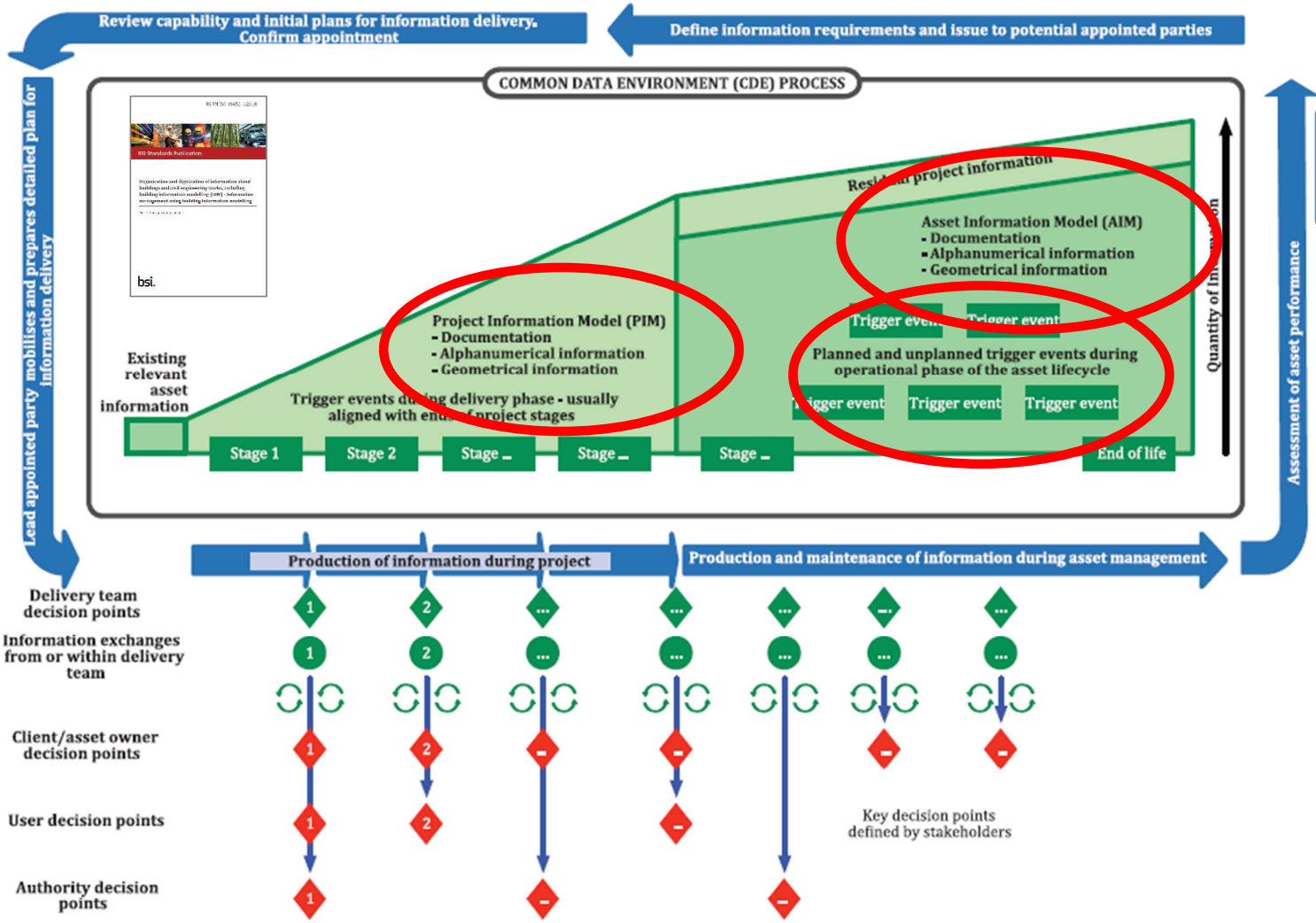
VIEWPOINT A TRIMBLE COMPANY

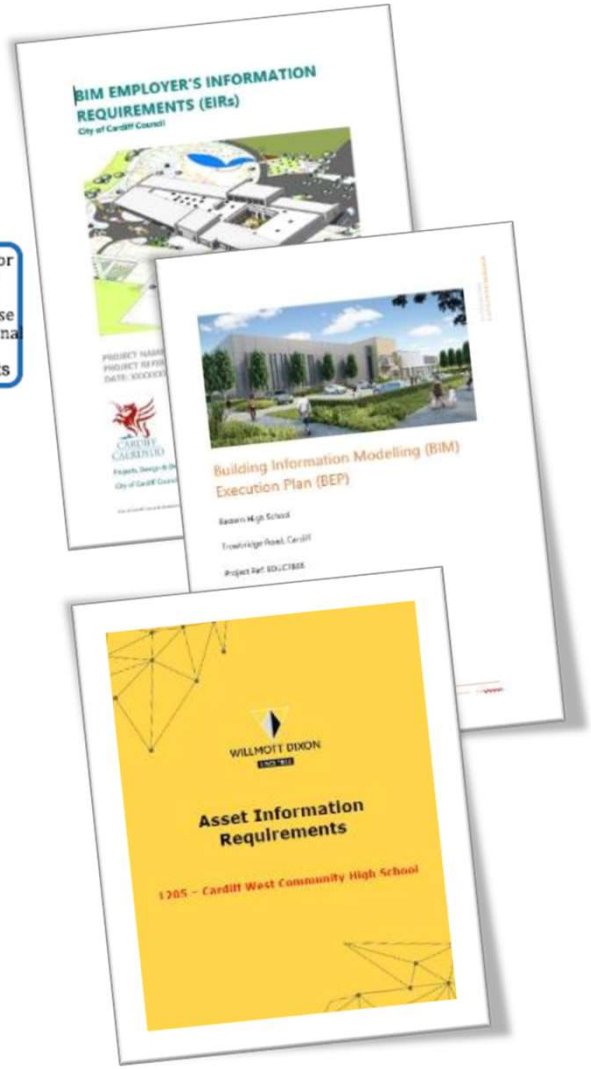
CAFM and CObie Outputs

thetechnologyforge



# BIM Process Diagram



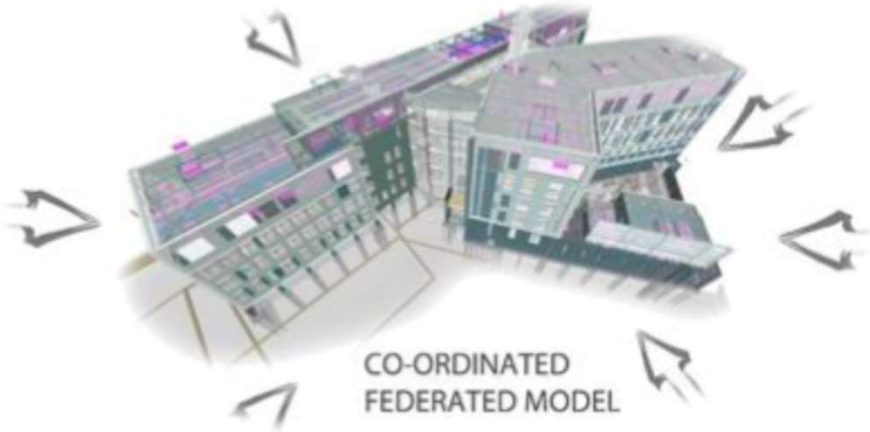



# How can we collaborate?

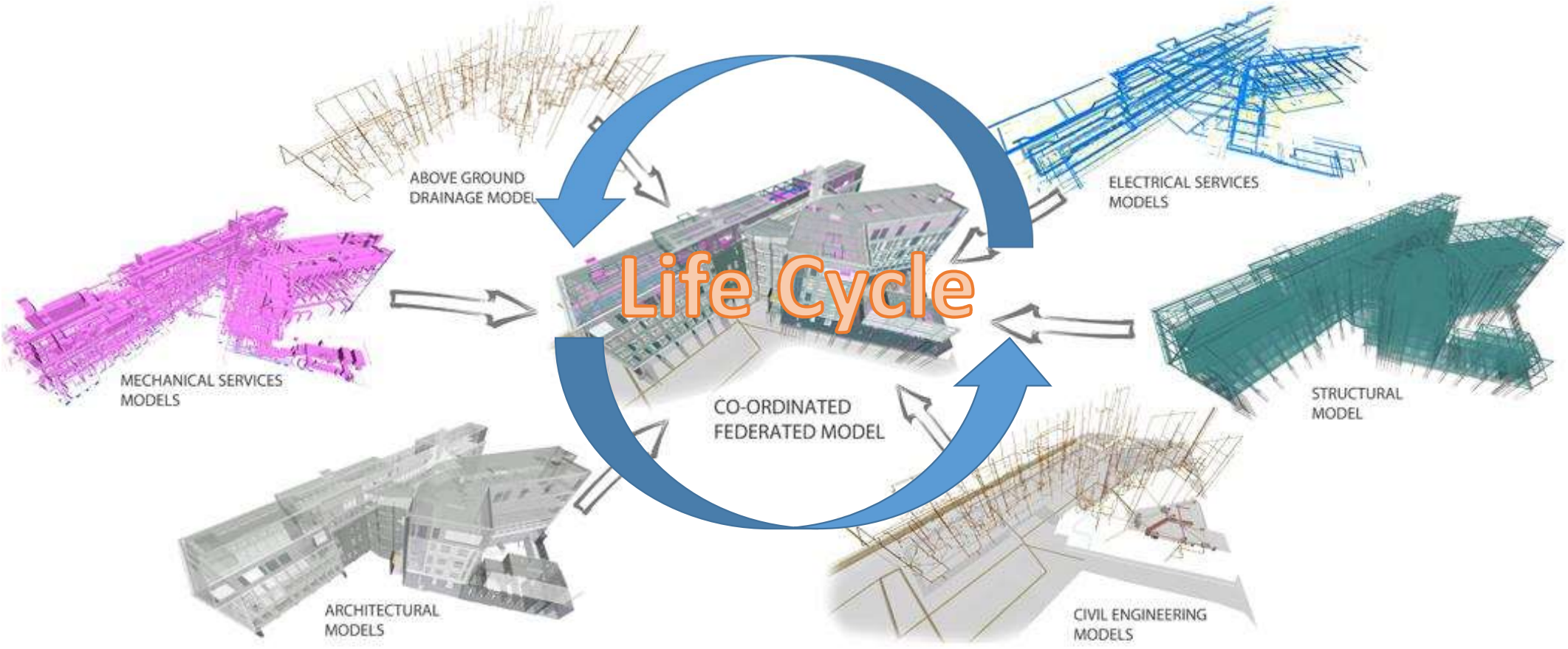
Tools such as Revizto enable a collaborative process using 2D and 3D Modelling with Intelligent Data

revizto™

https://revizto.com/en/
https://youtu.be/UezYNxzlTIA



# Building Information Modelling



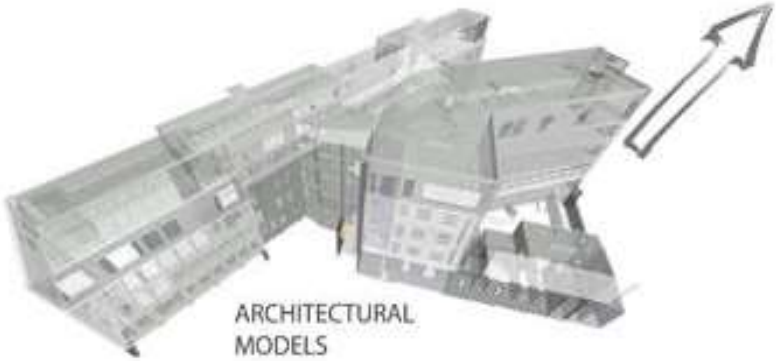

www.onecreativeenvironment.com

# Better Information Management

# 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®




## Remember a Revit Model alone is not BIM

# WHY BIM?

**BIM impacts all sectors of the Construction Industry, and is a key driver for change**

Construction Leadership Council

Leading Transformation Across The Construction Industry

Construction Leadership Council

## Workstreams

### Sector Working Groups

- Local, Social and Commercial
- Housing
- Repair, Maintenance Improvement
- Infrastructure

### Industry initiatives

**Industry Change**

- Net Zero Carbon
- Digital Network
- Manufacturing & Performance
- Building Safety

**People**

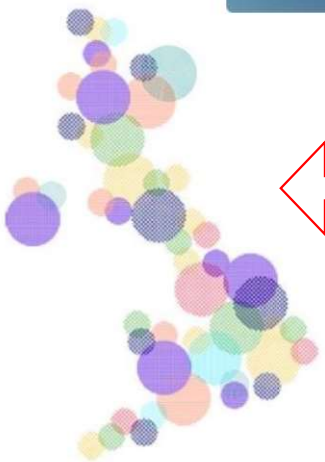
- People & Skills Network
- Health, Safety & Wellbeing

**Commercial**

- Business Models
- Exports & Trade

## Digital Network Industry Initiative

NATIONAL DIGITAL TWIN PROGRAMME



UK BIM FRAMEWORK

Construction Leadership Council

Leading Transformation Across The Construction Industry

cabe

CIOB

ice

RICS

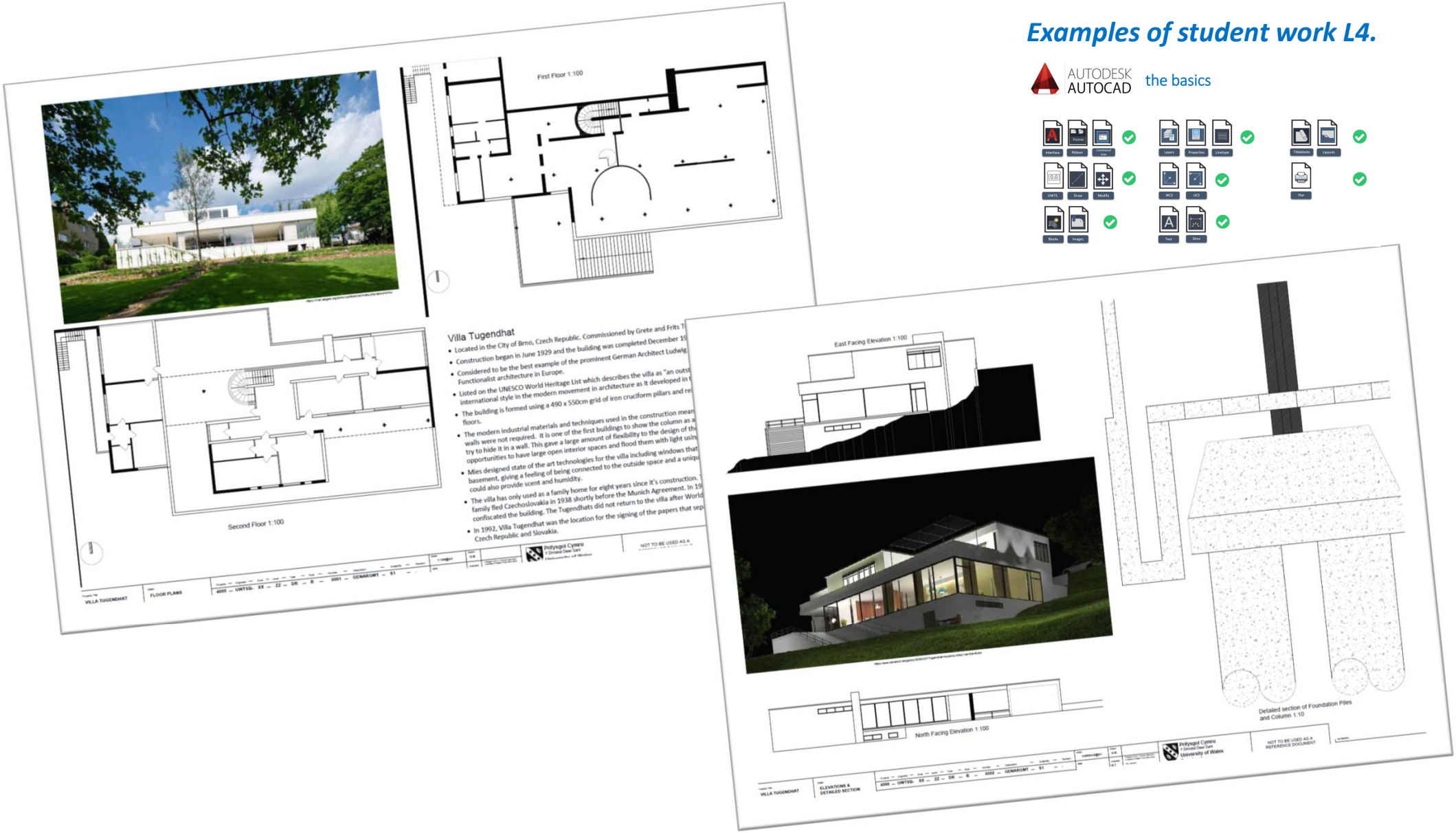
CIAT

**All chartership bodies will have information and guidance on how BIM impacts their profession.**

# *Examples of student work L4.*

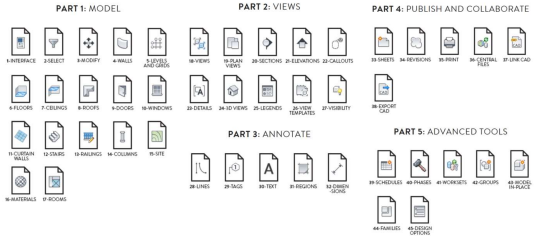
AUTODESK AUTOCAD the basics



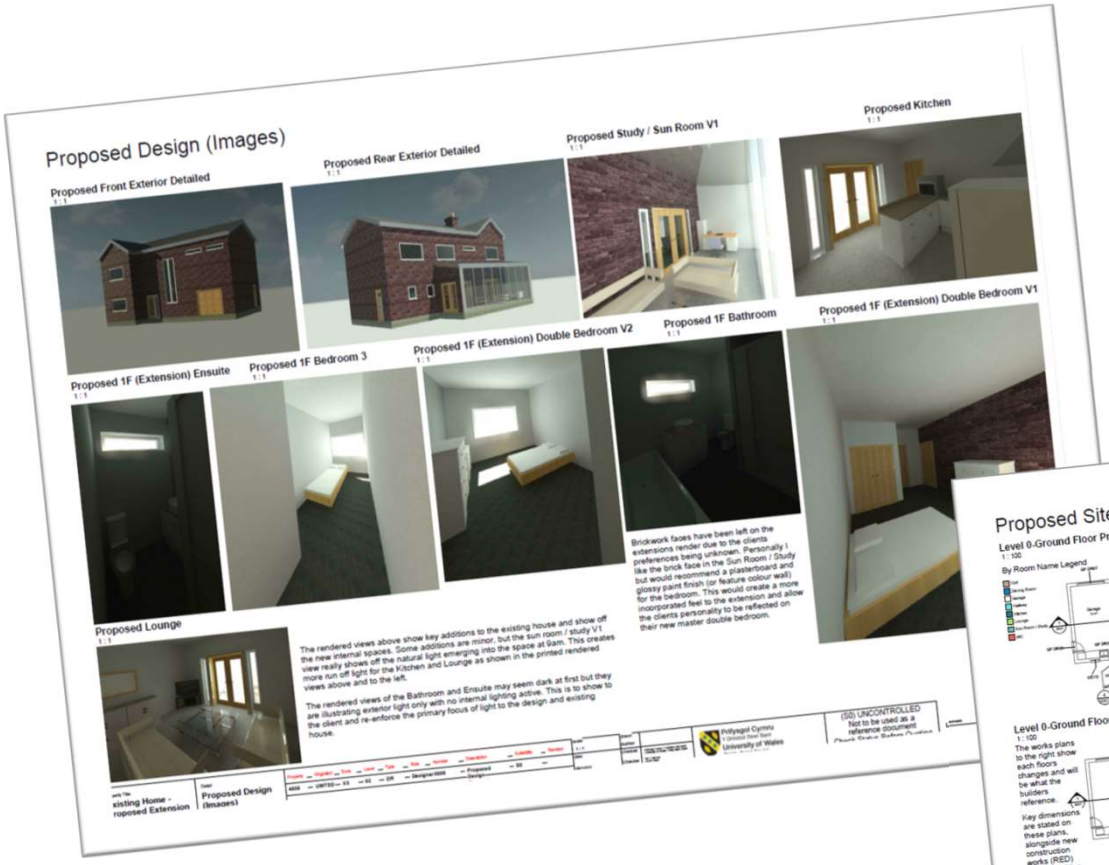



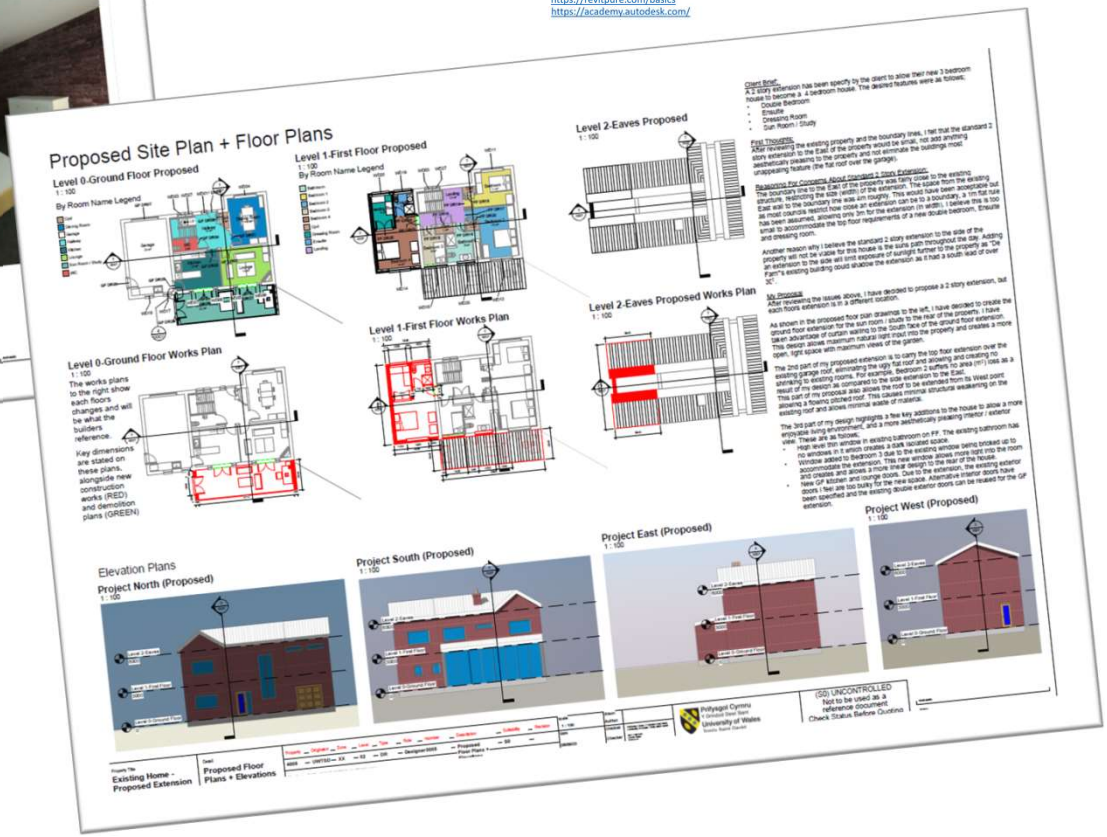
# *Examples of student work L4.*

AUTODESK® REVIT® the basics

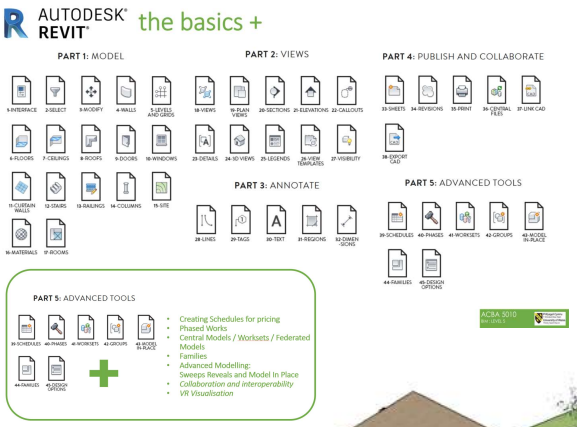



https://revitpure.com/basics
https://academy.autodesk.com/



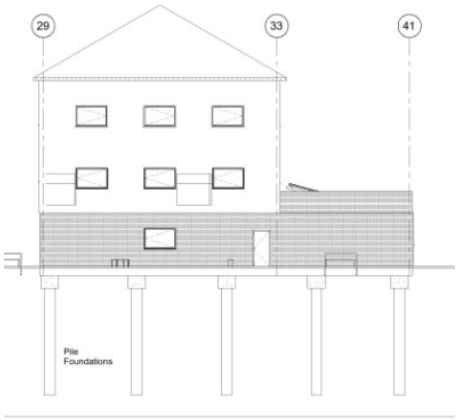
# *Examples of student work L5.*



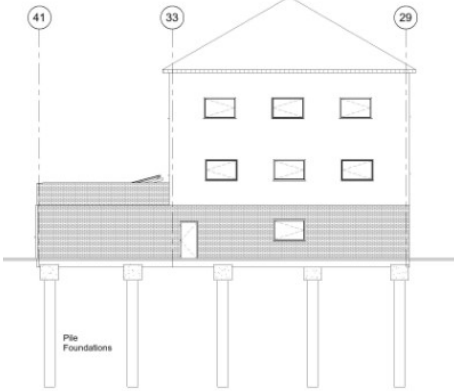
## *Examples of student work L6.*

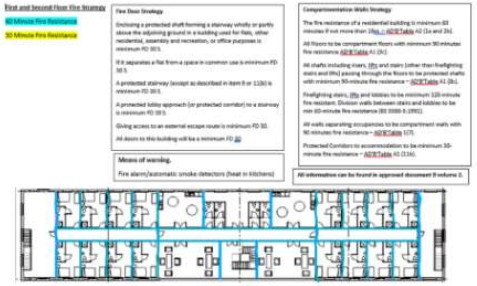
AUTODESK AUTOCAD  AUTODESK REVIT  ENSCAPE™

2 02 - First Floor
1 : 200



1 01 - Ground Floor
1 : 200





* Plus technical documentation in relation to the project

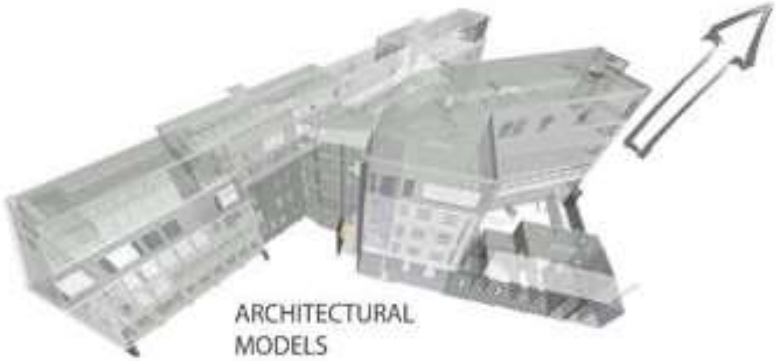
AUTODESK®
REVIT®

https://www.autodesk.com/education/edu-software/overview?_ga=2.119678017.834319708.1600961686-1615692111.1593105833&sorting=featured&page=1

# 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®




## Remember a Revit Model alone is not BIM