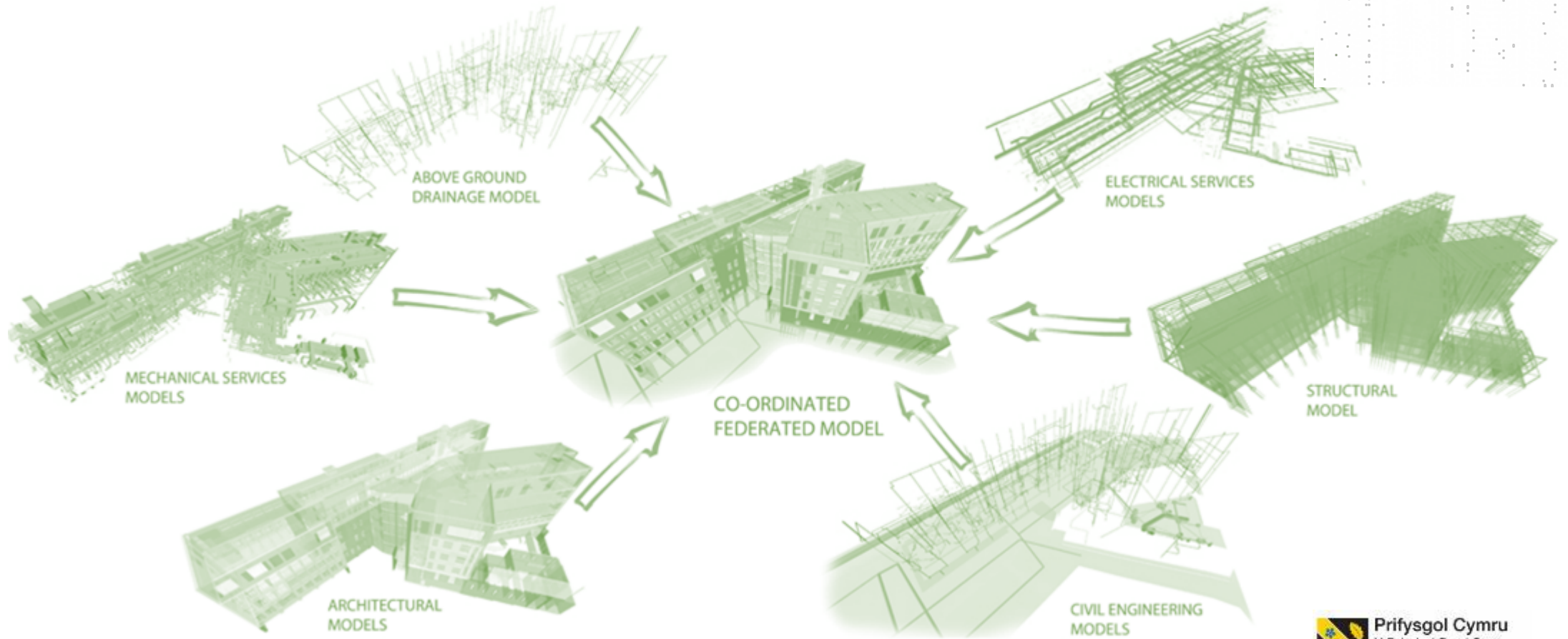


# Building Information Modelling

NEW



[www.onecreativeenvironment.com](http://www.onecreativeenvironment.com)



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

Gavin M Traylor RIBA

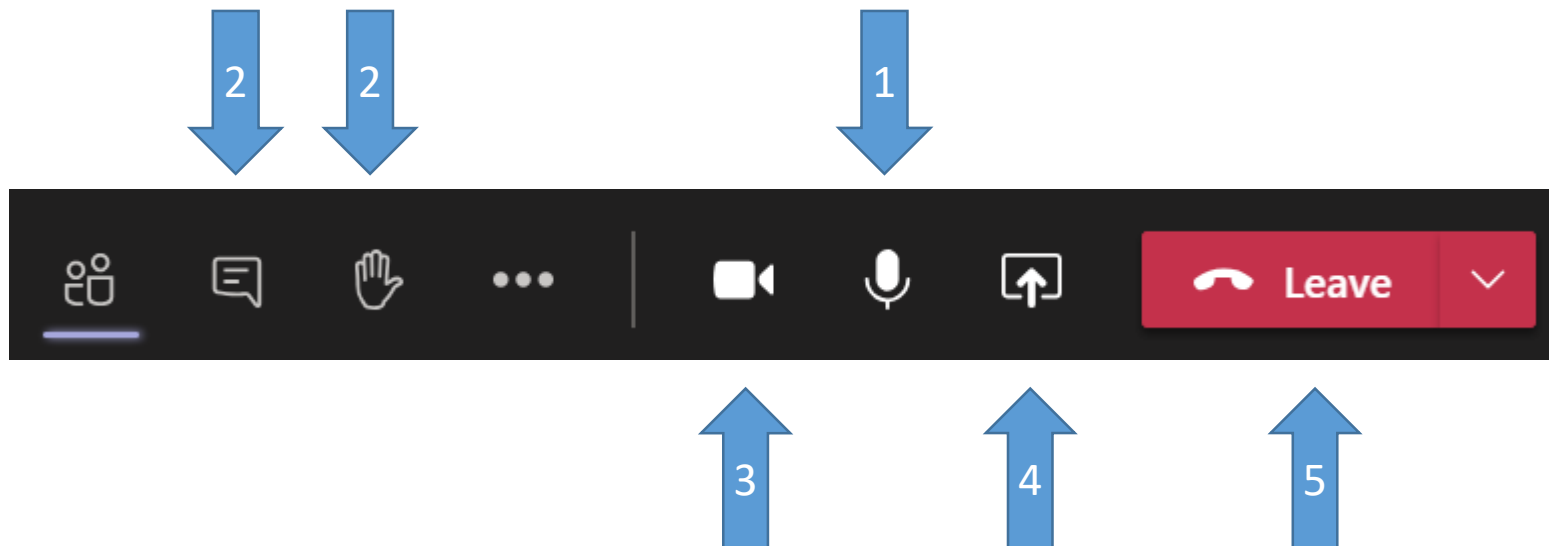
## Week 7:

- BIM and Lifecycle, Challenges and Opportunities
- Collaboration in Revizto.



# MS TEAMS HOUSEKEEPING

1. Mute your Microphone
2. Use Chat to Ask Questions or Put your hand Up
3. If you have a poor connection switch off Camera
4. I may ask you to share your screen.
5. When the lecture ends please hang up



<

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Search



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Activity

Chat

Teams

Assignments

Calendar

Calls

Files

...

Apps

Help

< All teams



ACBA 5010 BIM 2020-2... ⋮

General

Wk 01

Wk 02

Wk 03

Wk 04

Wk 05

Wk 06

Wk 07

Wk 08

Wk 09



General

Posts

Files

Class Notebook

Assignments

1 more ▾

+

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↺

📺

+ New ▾

↑ Upload ▾

↻ Sync

🔗 Copy link

🔒 Open in SharePoint

☰ All Documents

General > Class Materials

|  Name ▾               | Modified ▾ | Modified By ▾ |
|--------------------------------------------------------------------------------------------------------|------------|---------------|
|  Assignments          | January 28 | Gavin Traylor |
|  BIM TitleBlocks      | January 28 | Gavin Traylor |
|  Class Exercises      | January 28 | Gavin Traylor |
|  L4 Revision Videos   | January 12 | Gavin Traylor |
|  Lecture Notes        | January 28 | Gavin Traylor |
|  Sample BIM Documents | February 4 | Gavin Traylor |

# Moodle - Reading List

← → ↺ 🔒 https://moodle.uwtsd.ac.uk/course/view.php?id=8122

Home My Modules Moodle Archives English (en)

## BIM (ACBA5010)

Home > My modules > ACBA5010

Announcements

ExLibris  
Leganto Online Resource List

☐ Open all ☒ Close all

Instructions: Clicking on the section name will show / hide the section.

1



Module

W ACBA5010

2



Assessment Briefs 2020/2021

3



Turnitin Submission Links 2020/21

**BIM (ACBA 5010)**  
DRAFT ACBA5010 (2020-20) 12 items in 2 sections

LISTS LIST SENT NEW SECTION ADD ITEMS +

**Essential reading (8)**  
Material which is an essential part of the course and students are expected to draw on as a core part of their learning. Must be available from the library and should be available online.

**BOOK BIM handbook : a guide to building information modeling for owners, managers designers, engineers, and contractors**  
Eastman, Charles M., 2nd ed., Chichester; Hoboken, N.J. : Wiley , 2011., Total Pages xiv, 626 p. :  
Essential  
Complete Available at Y Fforwm Main Collection : 690.028 BIM

**WEBSITE Little Book of BIM 2020**  
BSI, BSI, 2020  
British Standard Institution - Guide to BIM documentation. Essential for all students  
Essential  
Complete Check availability >

**WEBSITE NBS BIM Library**  
NBS, NBS, NA  
NBS BIM Library of BIM Objects  
Essential  
Sent Check availability >

**BOOK Building information modeling for dummies**  
Mordue, Stefan., Philp, David.; Swaddle, Paul., Chichester, England ; John Wiley & Sons Ltd, 2016., Total Pages 1 online resource (356 p.)  
Essential  
Complete Check availability >

**BOOK BIM and construction management : proven tools, methods, and workflows**  
Gardner, Paul.; Brookfield, Susan; McCall, Peter.; Gardiner, Andrew.; Gardiner, Peter.; 2019. Total Pages 1 online resource (356 p.)

# 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.

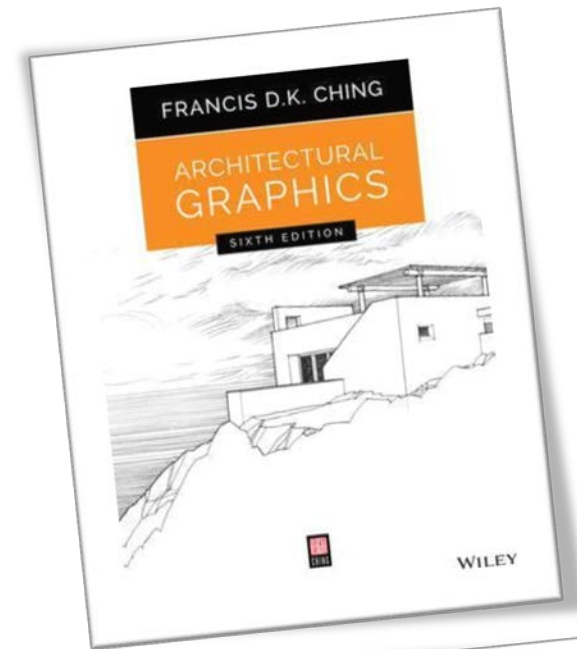
NBS National BIM Library

The BIM HUB: BIM Journal

<https://academy.autodesk.com/>

Revit Tutorials - Youtube.

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

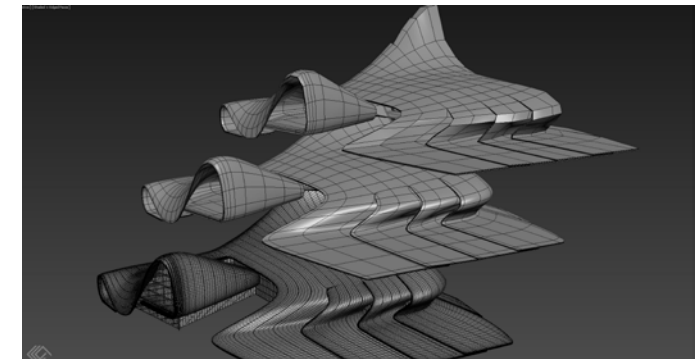
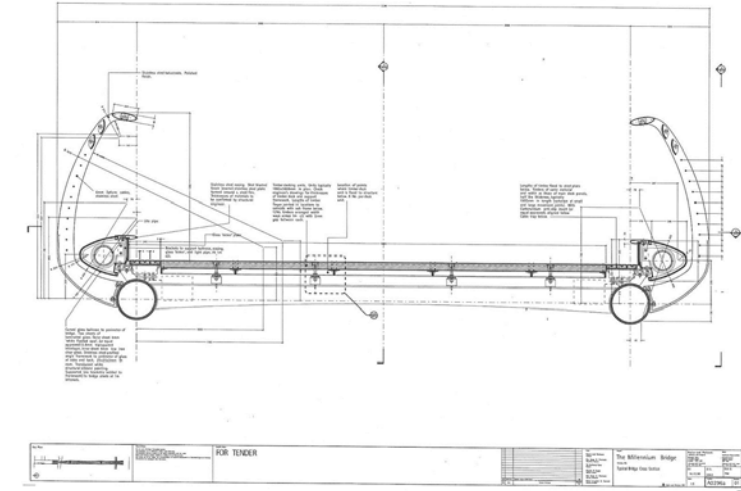
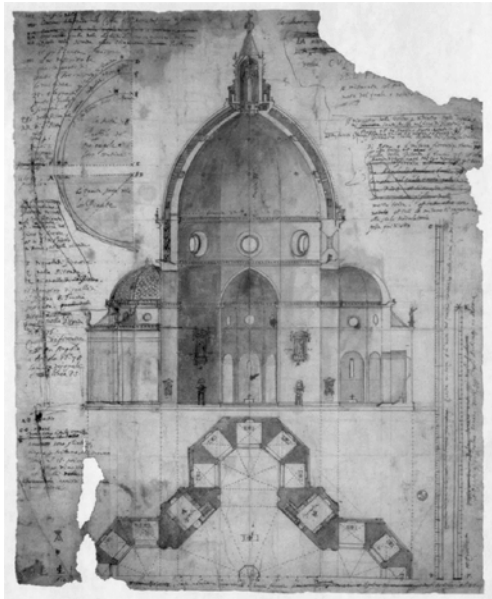
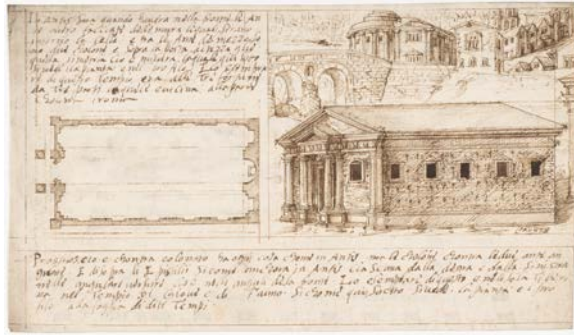


Key BIM Standards, ISO and PAS – refer to 'Little Book of BIM' guide

PREVIOUSLY . . .



# A picture is worth a thousand words



# 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



#### 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.



#### Analytical engine

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

1900

1920

1940

1960

1980

2000

2011

2020

2045

ELECTROMECHANICAL

RELAYS

VACUUM TUBES

TRANSISTORS

INTEGRATED CIRCUITS

## 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

Nvidia Tesla GPU & PC

Mac Pro

Dell Dimension 8400

IBM PC

Pentium II PC

Pentium PC

Compaq Deskpro 386

Intellex-8

DEC PDP-10

Data General Nova

IBM 1130

DEC PDP-4

IBM 1620

Datamatic 1000

EDVAC

IBM SSEC

Zuse 3

Zuse 2

National Ellis 3000

Hollerith Tabulator

$10^{26}$

$10^{20}$

$10^{15}$

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2045  
Surpasses  
brainpower  
equivalent  
to that of  
all human  
brains  
combined

Surpasses  
brainpower  
of human  
in 2023

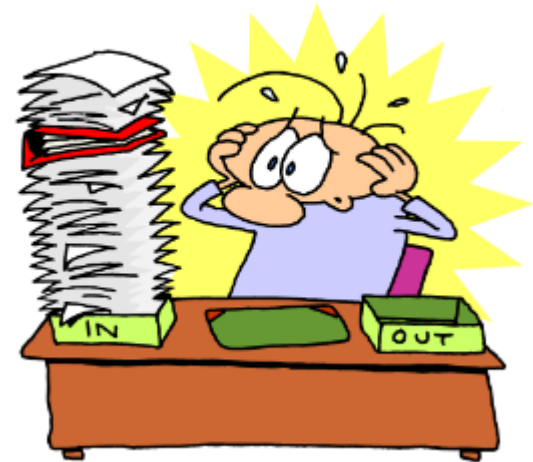


Surpasses  
brainpower of  
mouse in 2015

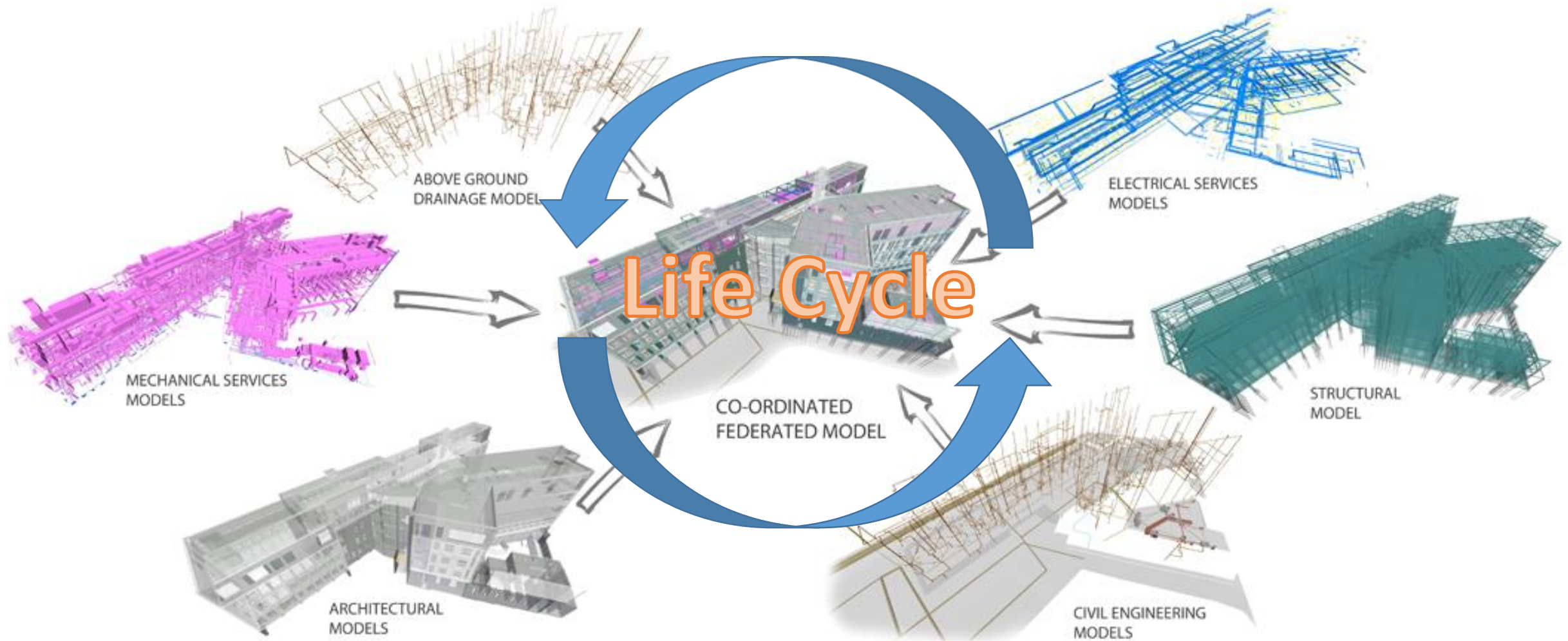
# Building Information Modelling

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

# Better Information Management



# Building Information Modelling

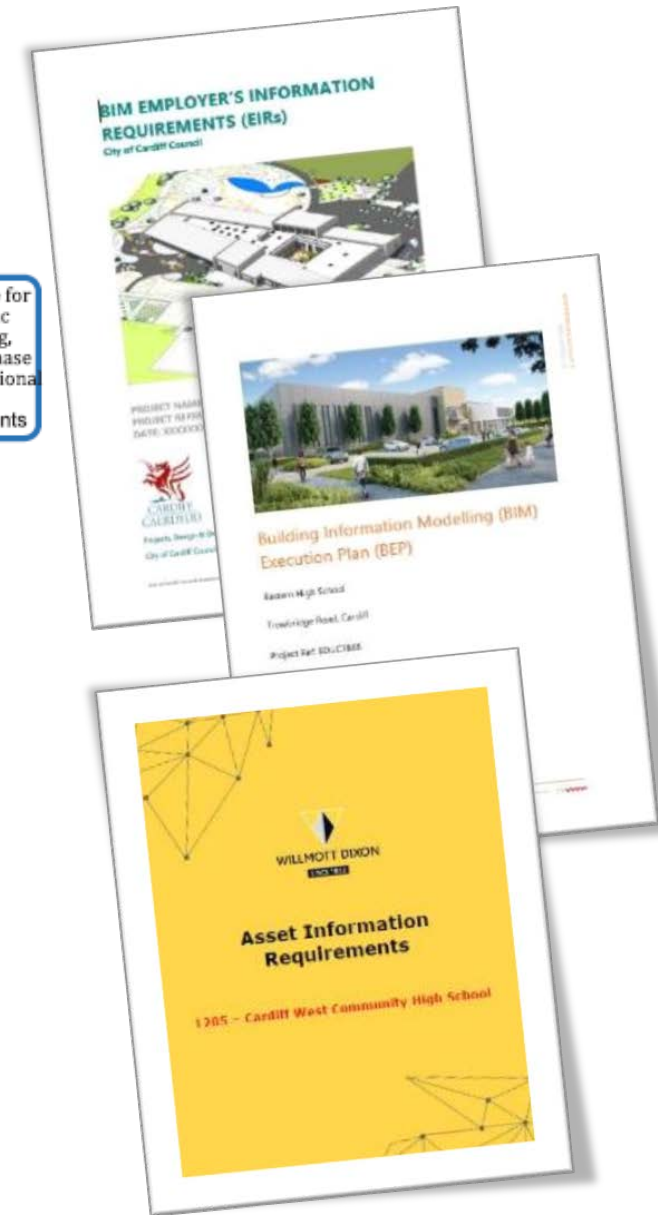
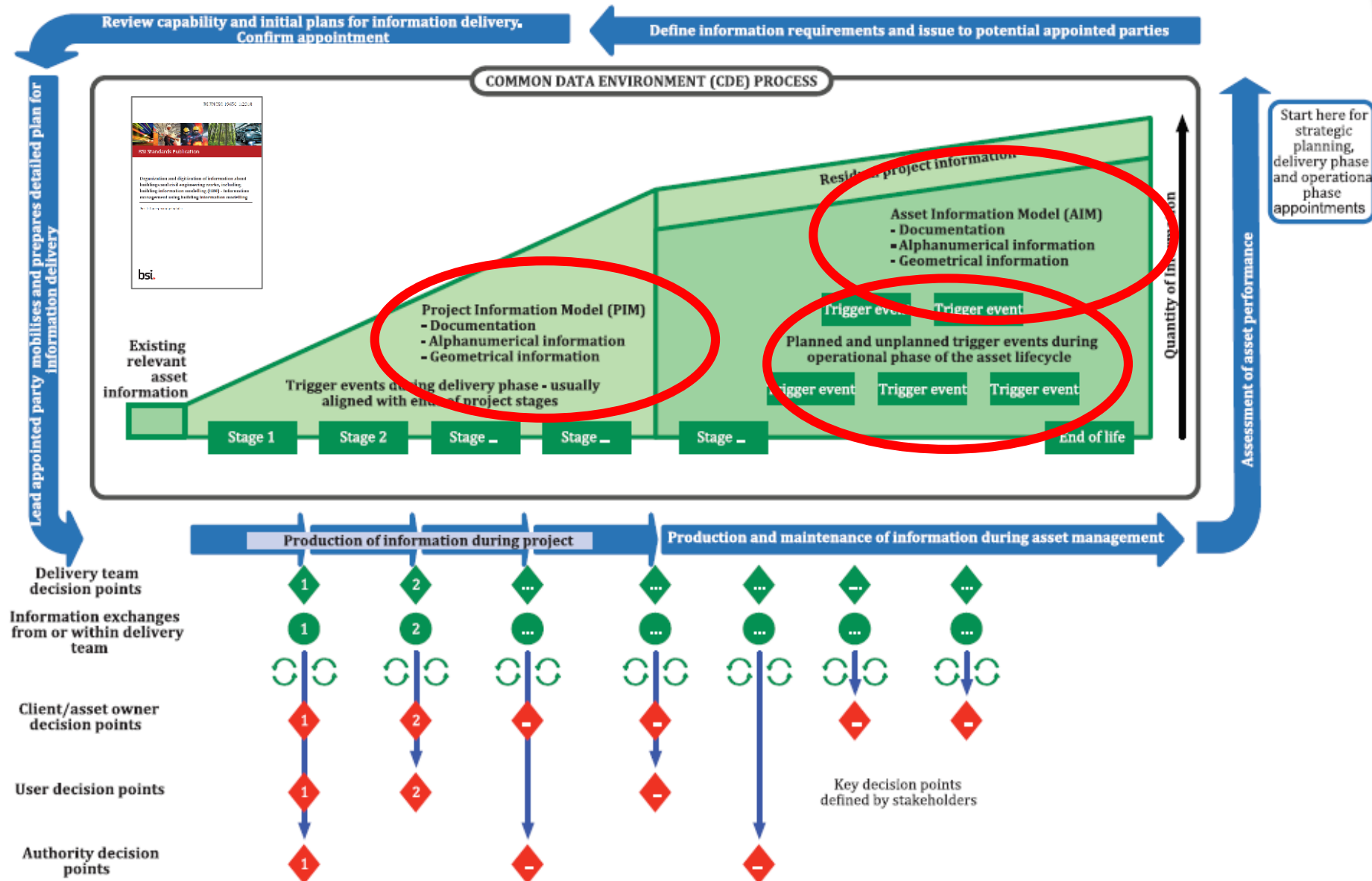


## We must consider building life cycles



<https://image.slidesharecdn.com/presentation-sesmartbuildings-141105051823-conversion-gate01/95/what-is-a-green-building-19-638.jpg?cb=1415234227>

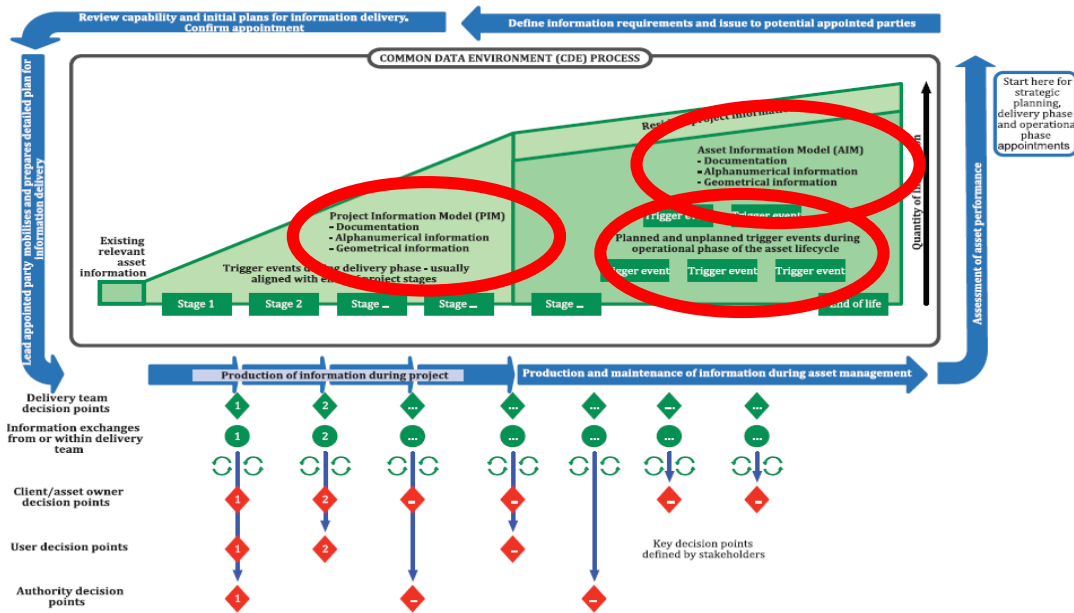
# BIM Process Diagram



✓ ✓  
Design, Construct, *Operate?*  
*and Maintain?*

**One Truth?**

# New Build BIM Project



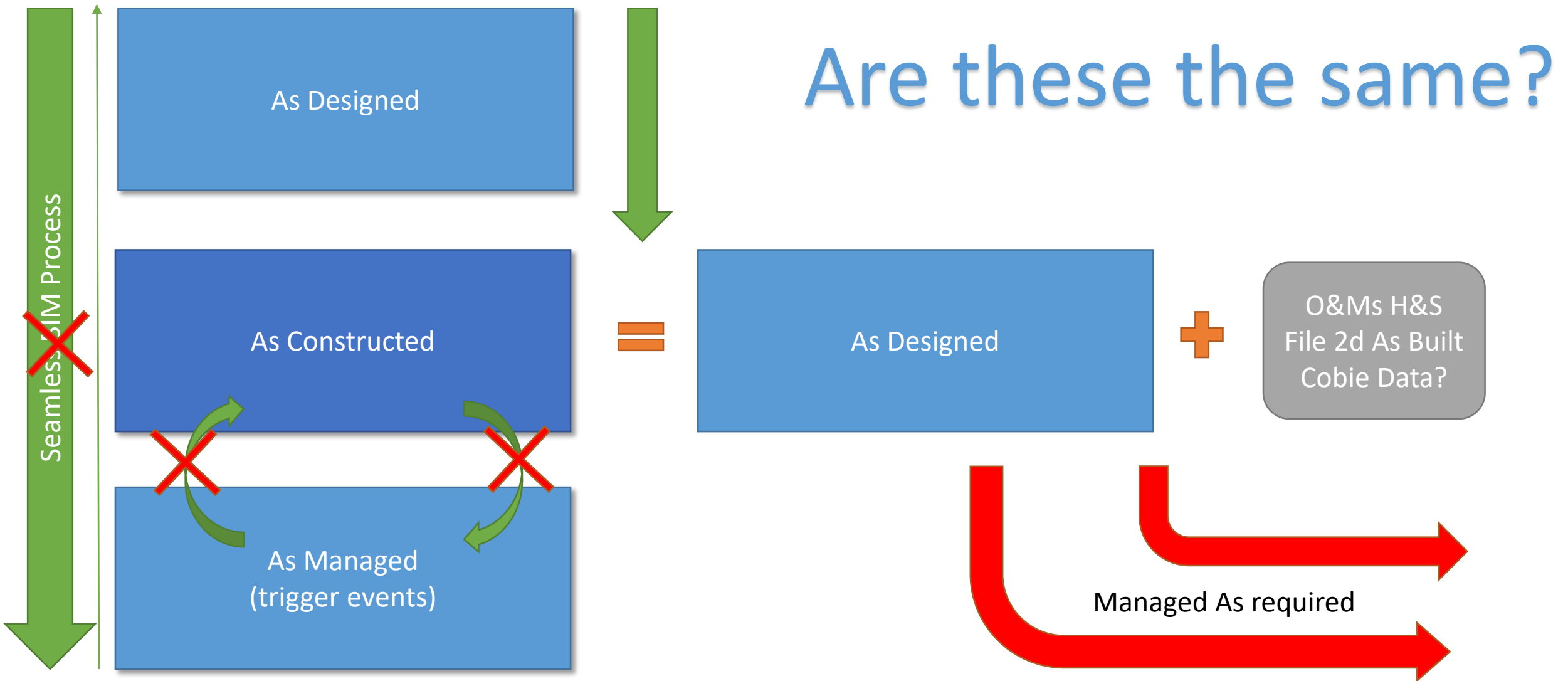
Are these the same?

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>



|                                                   |                                                   |
|---------------------------------------------------|---------------------------------------------------|
| <b>1 Project Delivery</b>                         | <b>6 System Behaviour (FM's Experiences)</b>      |
| 1.1 Discuss Clients Experience                    | 6.1 Analyse Health And Safety Strategy            |
| 1.2 Discuss Project Team Experience               | 6.2 Analyse Ventilation Strategy                  |
| <b>2 Project Outcomes</b>                         | 6.3 Analyse Heating And Cooling Strategy          |
| 2.1 Review Strategic Brief                        | 6.4 Analyse Lighting Strategy                     |
| 2.2 Review Business Case                          | 6.5 Analyse Control Strategy                      |
| 2.3 Review Sustainability Aspirations             | 6.6 Analyse Maintenance Strategy                  |
| <b>3 Building Use/Occupant Behaviour</b>          | <b>7 Environmental Performance</b>                |
| 3.1 Analyse Building Layout                       | 7.1 Measure Light Levels                          |
| 3.2 Examine Building Fabric And Detailing         | 7.2 Measure Thermal Comfort                       |
| 3.3 Analyse Occupants Use of Building And Systems | 7.3 Measure Indoor Air Quality                    |
| 3.4 Analyse Occupation Patterns                   | 7.4 Measure Acoustics                             |
| <b>4 Occupant Feedback</b>                        | 7.5 Measure Air Tightness                         |
| 4.1 Conduct Questionnaires/Surveys                | 7.6 Measure Heat Loss (Thermal Imaging)           |
| 4.2 Conduct Semi Structured Interviews            | <b>8 Comparisons</b>                              |
| <b>5 Energy Use</b>                               | 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                      | <b>9 Report</b>                                   |
| 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



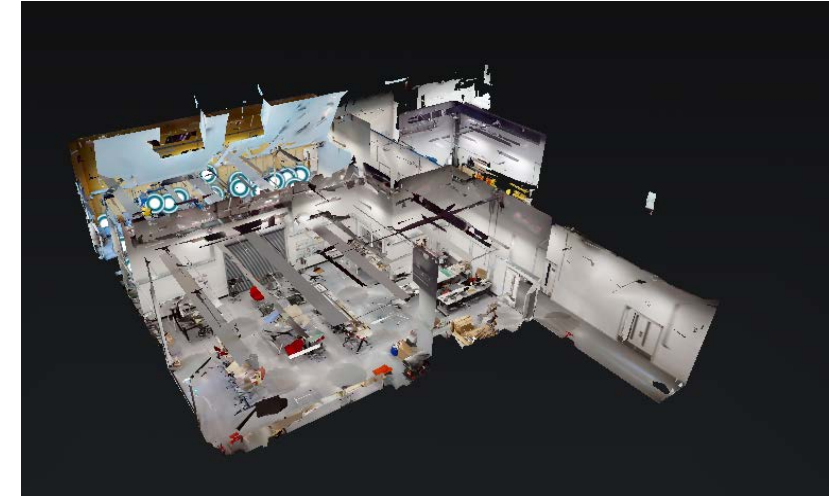
- As built drawings
- Building File / O&M Manuals



# 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?

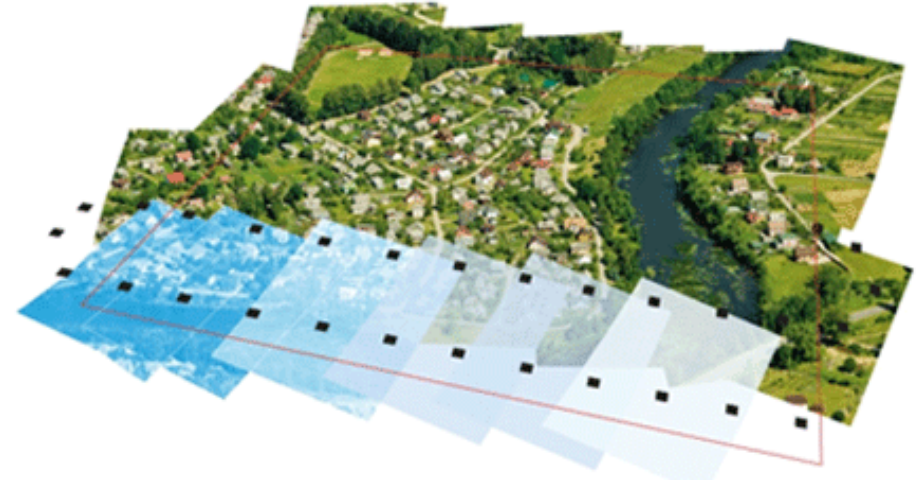
## Photogrammetry

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

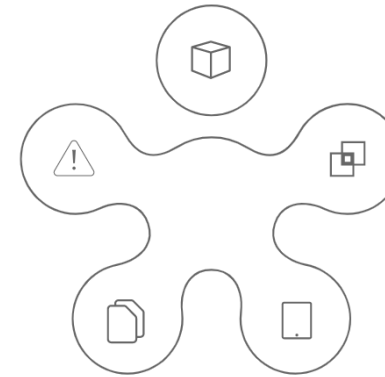
View the entire project by federating all intelligent BIM data including reality capture into a centralized user-friendly location and get all teams in-sync.

### 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   |              |

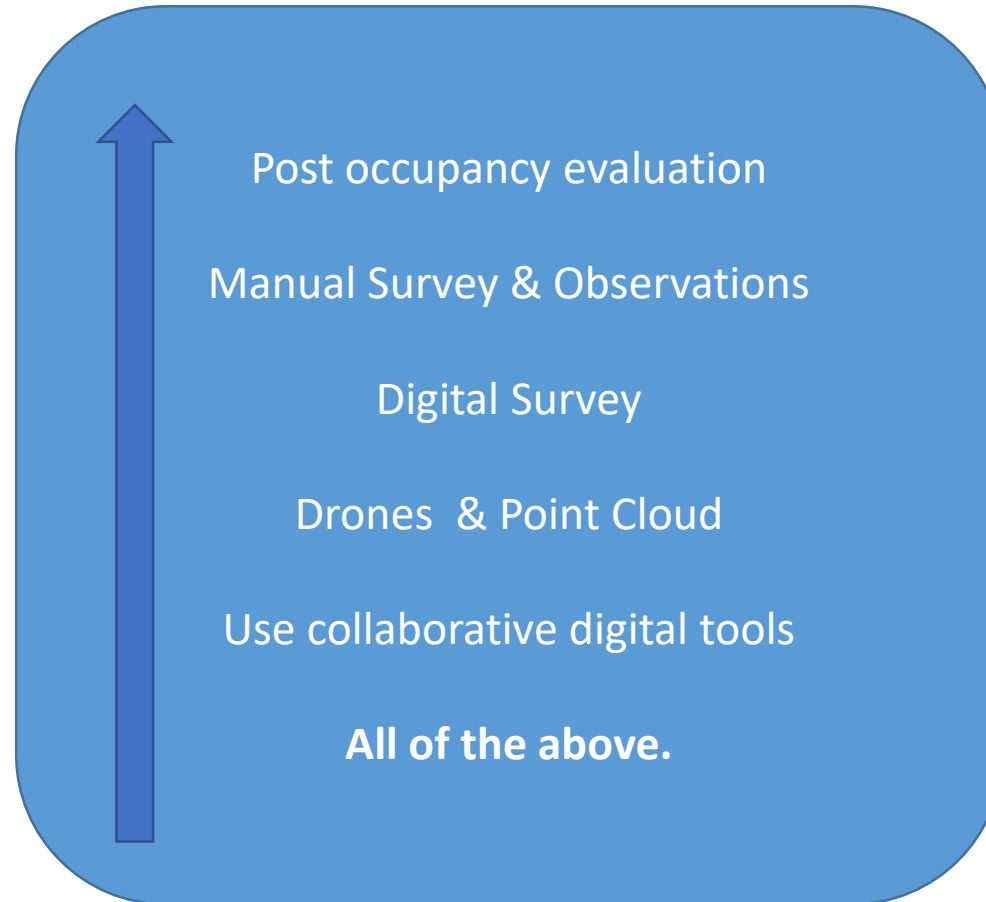
### Supported Formats

|         |       |
|---------|-------|
| BCF     | DWF   |
| Faro    | FBX   |
| IFC     | LAS   |
| OBJ     | PDF   |
| Solibri | ReCap |

### Integrations

|         |
|---------|
| BIM360  |
| Box     |
| Procore |

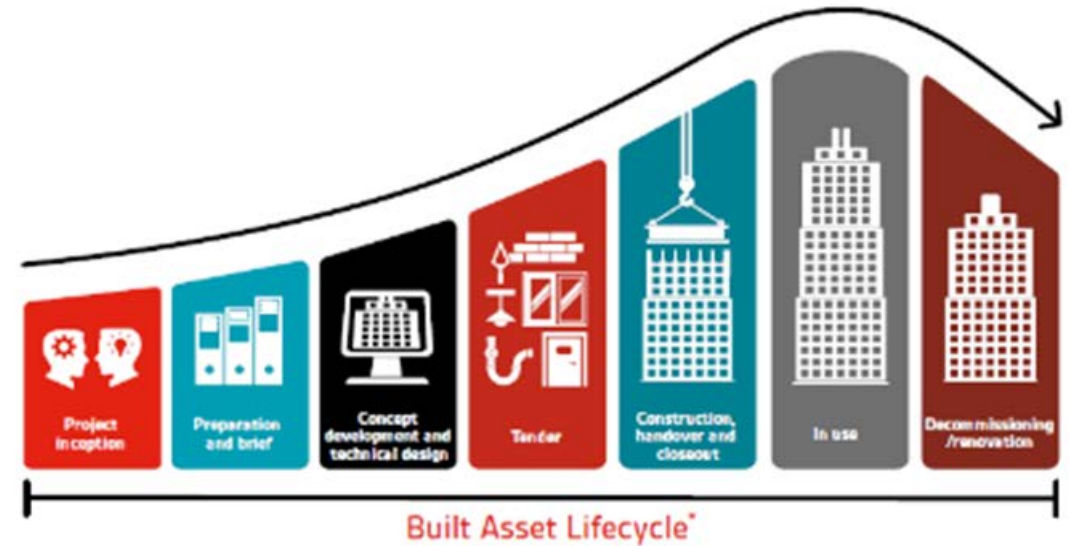
# How do we evaluate?



# How is this managed?

## Life Cycle of the Asset that considers:

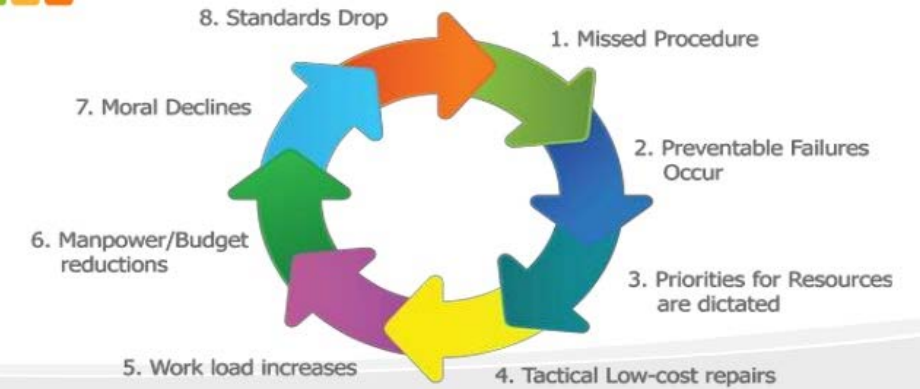
- Management and Controls for Maintenance
- Introduction of Sustainability Measures
- Monitoring Energy Performance
- Health and Safety - Statutory Observations
- Management of Alterations, Adaptations and Refurbishment
- Introduction of New Technologies



# 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?

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

CutCopyFormat PainterClipboard

Calibri10A<sup>+</sup>A<sup>-</sup>B**I**U

General

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InsertDelete Format

AutoSumFillClear

Sort & Find & FilterSelect

V18

|    | A                    | B               | C               | D               | E            | F                   | G       | H                   | I                    | J                   | K                   | L         | M            | N                   | O                 |
|----|----------------------|-----------------|-----------------|-----------------|--------------|---------------------|---------|---------------------|----------------------|---------------------|---------------------|-----------|--------------|---------------------|-------------------|
| 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        |
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| 33 |                      |                 |                 |                 |              |                     |         |                     |                      |                     |                     |           |              |                     |                   |
| 34 |                      |                 |                 |                 |              |                     |         |                     |                      |                     |                     |           |              |                     |                   |
| 35 |                      |                 |                 |                 |              |                     |         |                     |                      |                     |                     |           |              |                     |                   |
| 36 |                      |                 |                 |                 |              |                     |         |                     |                      |                     |                     |           |              |                     |                   |
| 37 |                      |                 |                 |                 |              |                     |         |                     |                      |                     |                     |           |              |                     |                   |
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| 39 |                      |                 |                 |                 |              |                     |         |                     |                      |                     |                     |           |              |                     |                   |
| 40 |                      |                 |                 |                 |              |                     |         |                     |                      |                     |                     |           |              |                     |                   |

QFM Asset Loader

ready

100%

# Cloud Based CAFM

# How is this managed?

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

## 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.

**tf-cloud** 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

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

### Room List

Site

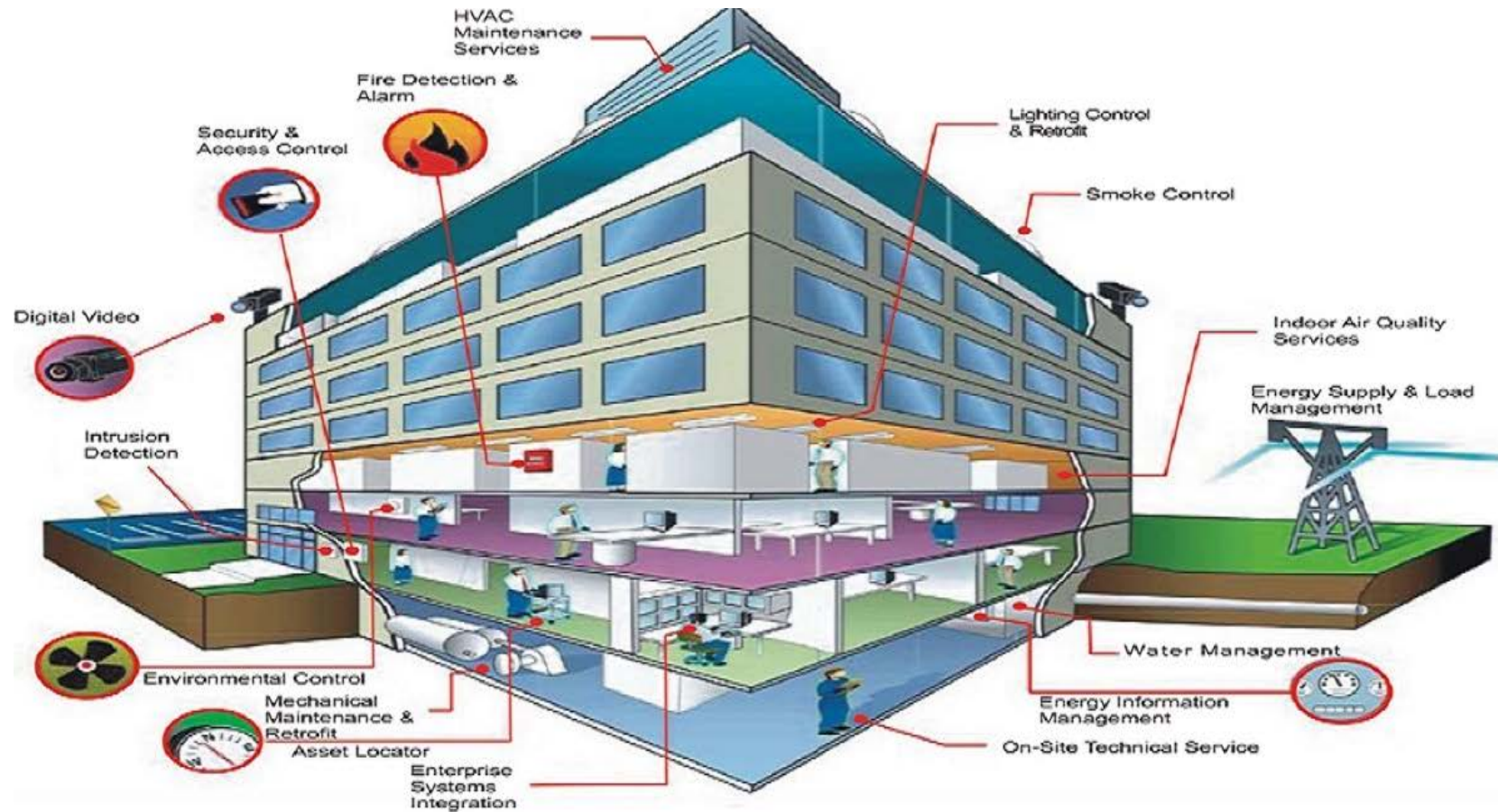
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| [-]  | Edit Del | 10001     | Marshall's Mill |         | 12/3791 |

Building



# Building Management Systems BMS

# How is this managed?



# How is this managed?



# Cobie



# 1 The accelerating pace of change ...



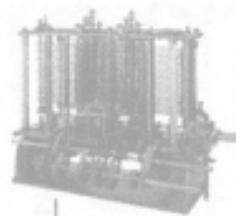
## How can we improve?

# 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



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



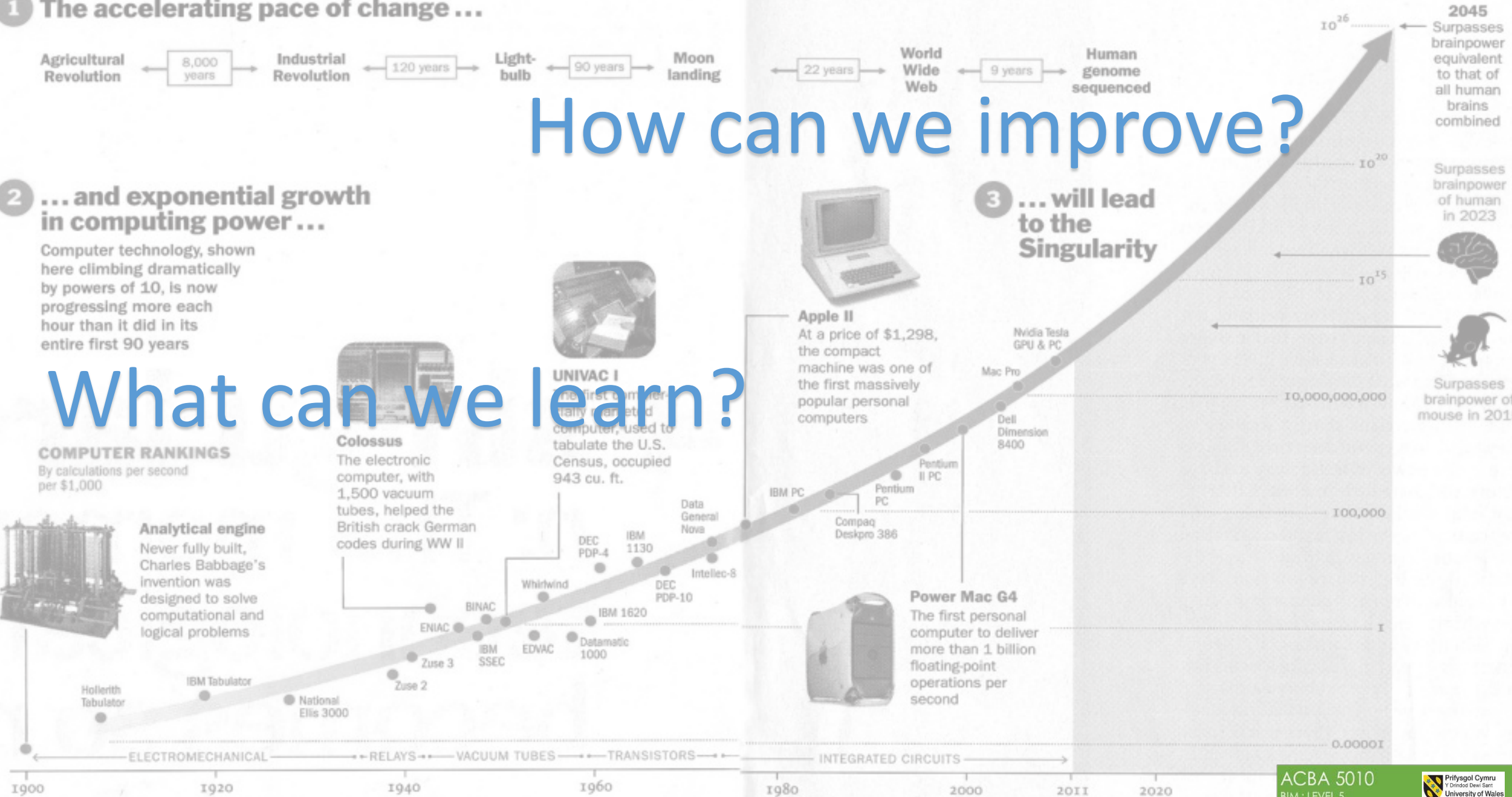
**UNIVAC I**  
The first commercially marketed computer, used to tabulate the U.S. Census, occupied 943 cu. ft.



**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.**

# What about existing building stock?

# Challenges of Decarbonisation

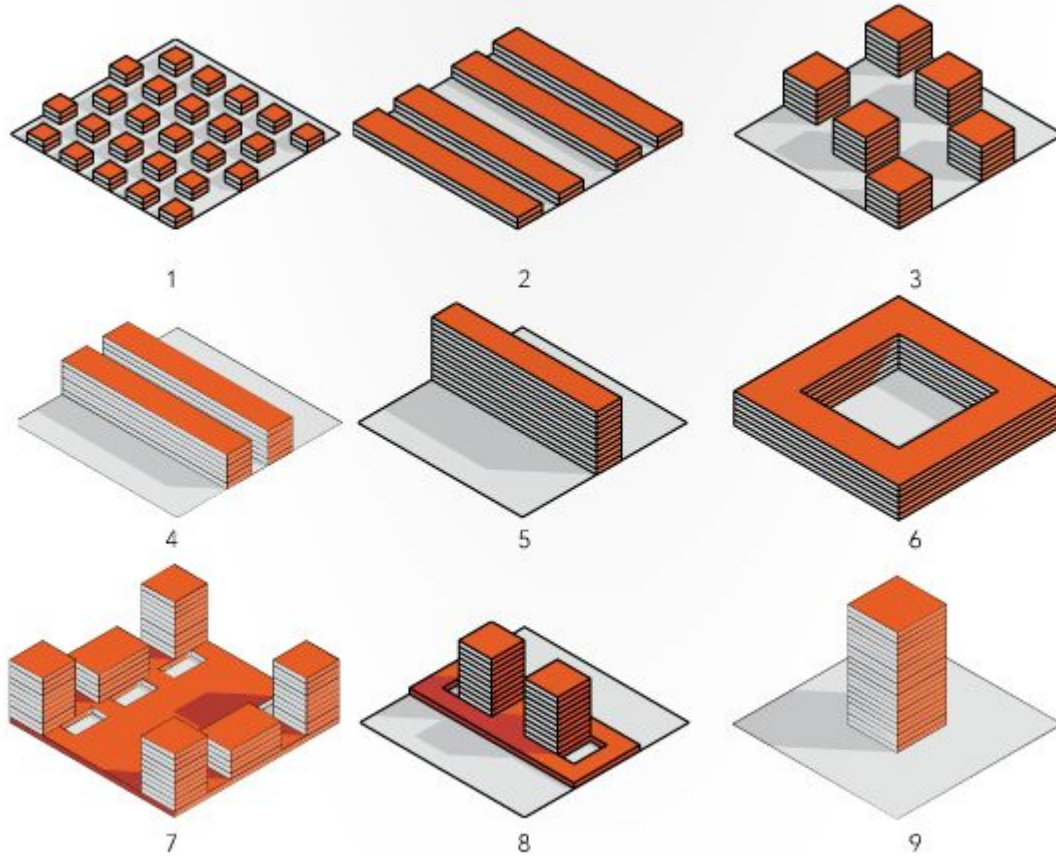
Speaking at the CN [Decarbonising Construction](https://www.constructionnews.co.uk/sustainability/consultant-urges-delivery-of-mass-retrofit-programme-30-09-2020/) conference, Sonal Jain warned viewers that the UK Government's target of a net-zero carbon economy by 2050 is at risk because 80 per cent 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/>



# 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.

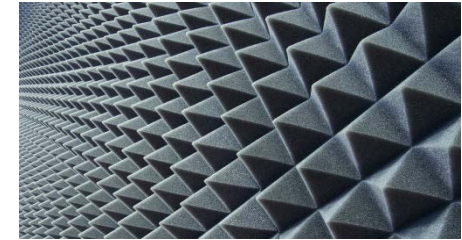
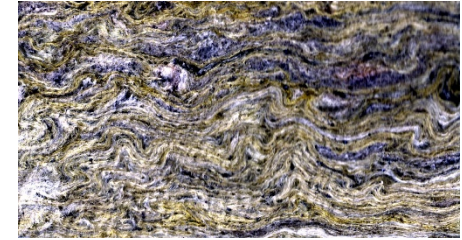


[https://i.dailymail.co.uk/i/pix/2015/07/03/14/2A338A5800000578-3148511-image-a-21\\_1435930837225.jpg](https://i.dailymail.co.uk/i/pix/2015/07/03/14/2A338A5800000578-3148511-image-a-21_1435930837225.jpg)

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.



## Performance Requirements of the Building Fabric

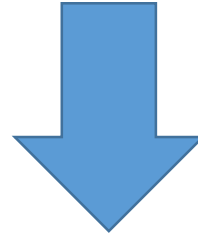
What are the key drivers in providing a building that is suitable for the need?

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

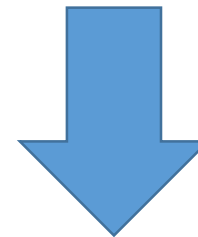


# Trigger events?

Flexibility to change to changing needs



How Buildings Learn



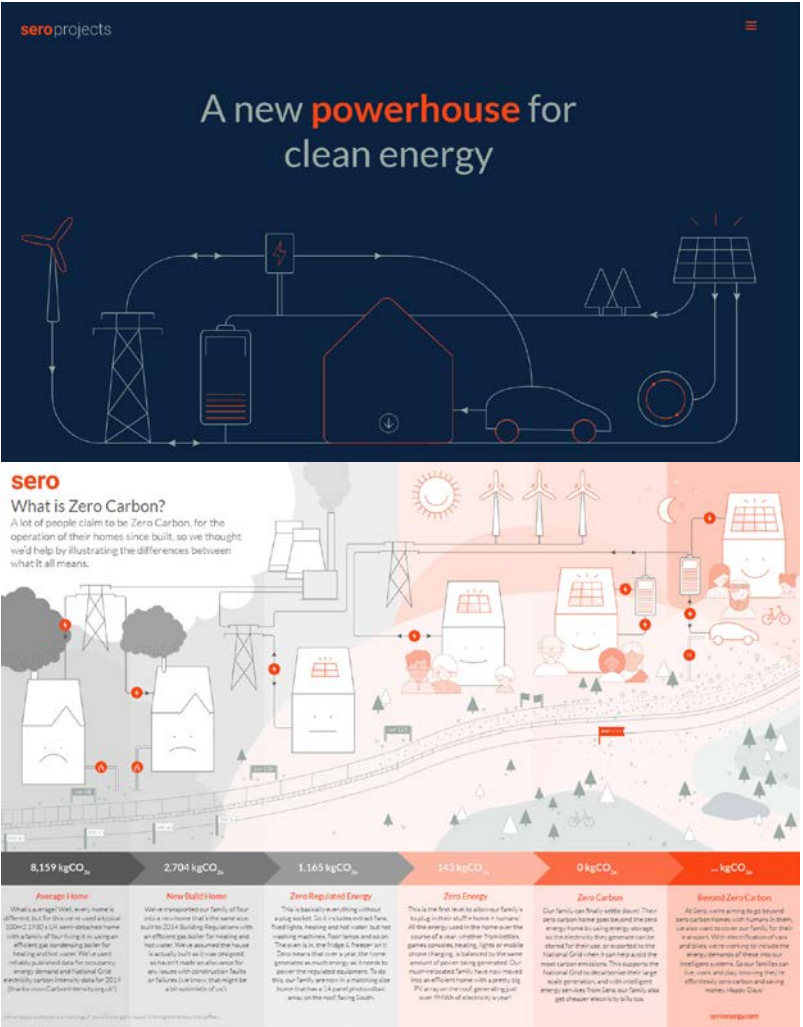
How Digital Technologies can Assist

# Challenges and Opportunities

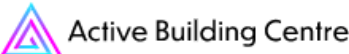


# New Technology (Early Adopters – Driving Change)

<https://www.seroprojects.com/>



<https://www.activebuildingcentre.com/>



## OUR CHALLENGE

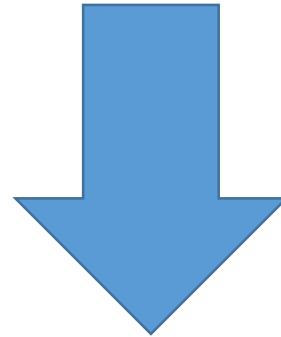
The UK Government is committing to ambitious targets for the UK to reach net zero carbon emissions by 2050.

Funded through the Transforming Construction Challenge, the Active Building Centre seeks to transform the way the UK designs, constructs and operates buildings.

Active Buildings have the potential to substantially reduce both the operational costs of buildings and their demand on the UK energy infrastructure.

ACBA 5010  
BIM : LEVEL 5

There is a limited time to upgrade the existing building stock, and delivering net-zero will require deep retrofits of these buildings.



Can BIM help us evaluate our Building Stock?

# Use of Digital Technology and Interoperable collaborative platforms

# 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





**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



# 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

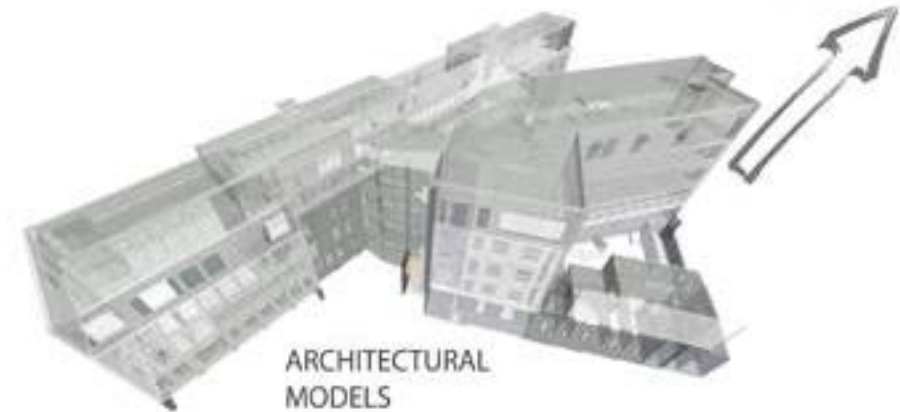
Workflow automation/image  
recognition/Trend analysis and  
prediction/Natural language processing

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



# How can we create data rich intelligent models?

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

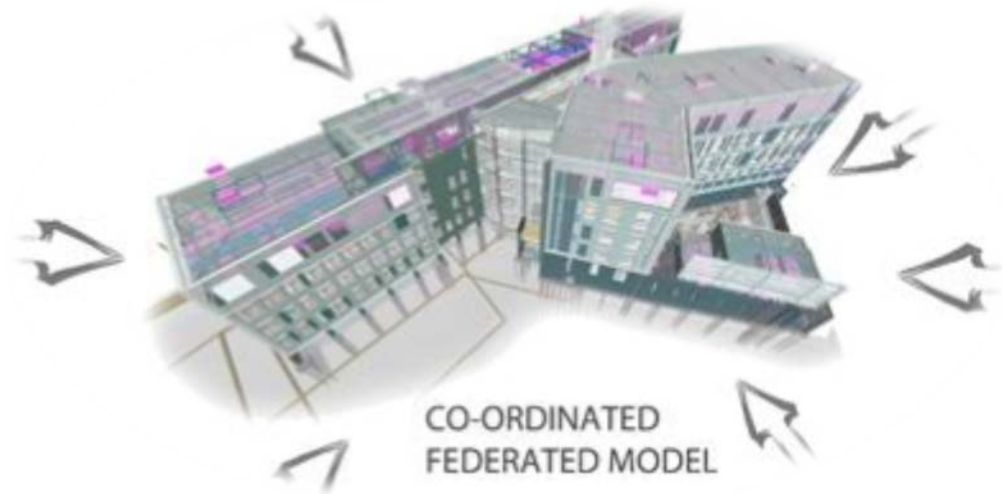


Remember a Revit Model alone is not BIM

# Collaboration

## How can we collaborate?

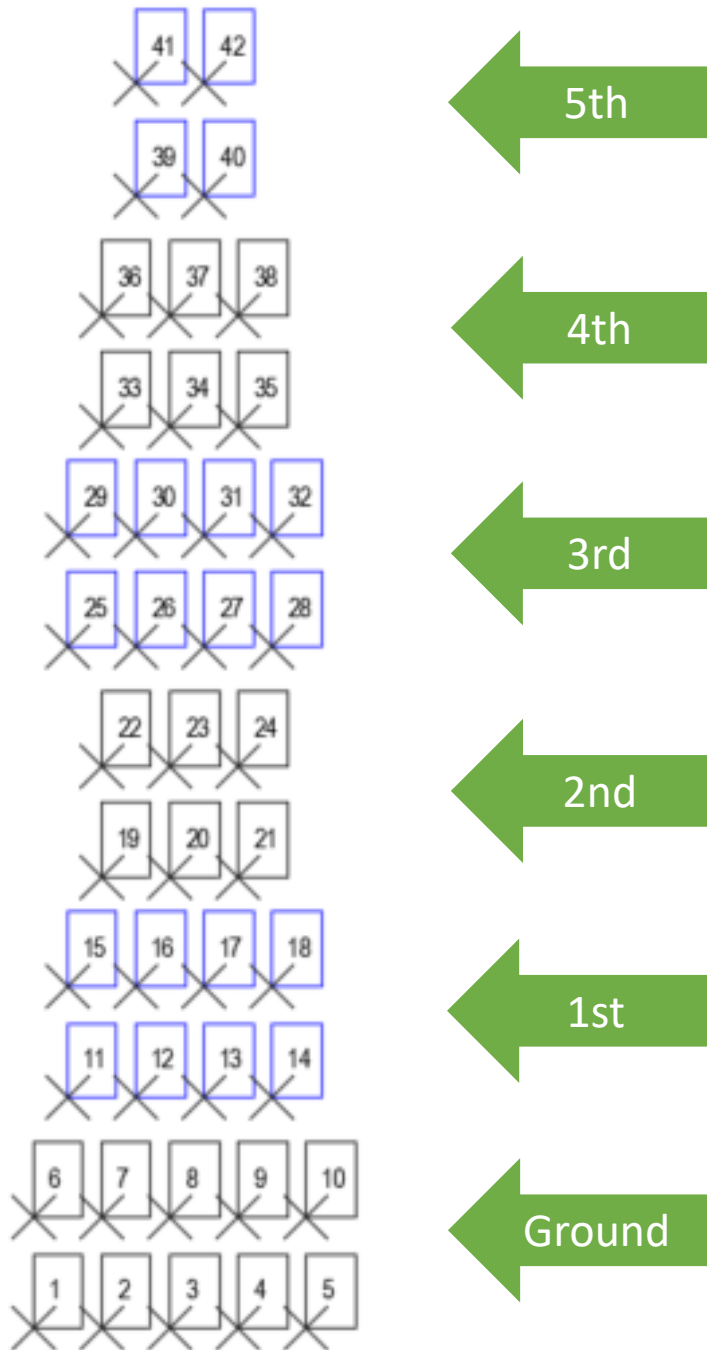
Tools such as Revizto enable a collaborative process using  
2D and 3D Modelling with Intelligent Data



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

<https://youtu.be/OnG3-0NqLr4>

# Collaboration Exercise



| Number | Name                  |                 | Northings | Eastings | Level        | Level Height (above 0) |
|--------|-----------------------|-----------------|-----------|----------|--------------|------------------------|
| 1      | Gavin                 | Traylor         | 0         | 0        | Ground Floor | 0                      |
| 2      | TOBIAS                | ADAMSON         | 0         | 11000    | Ground Floor | 0                      |
| 3      | RHYS                  | BOLTON          | 0         | 22000    | Ground Floor | 0                      |
| 4      | OWEN STEPHEN          | BROWN           | 0         | 33000    | Ground Floor | 0                      |
| 5      | NATHAN ALEXANDER      | CAMERON         | 0         | 44000    | Ground Floor | 0                      |
| 6      | MORGAN LLOYD          | DAVIES          | 18000     | 0        | Ground Floor | 0                      |
| 7      | STEFFAN               | DAVIS           | 18000     | 11000    | Ground Floor | 0                      |
| 8      | EMILIE                | DRISCOLL        | 18000     | 22000    | Ground Floor | 0                      |
| 9      | CAMERON NIAL          | EVANS           | 18000     | 33000    | Ground Floor | 0                      |
| 10     | TEIFION               | EVANS           | 18000     | 44000    | Ground Floor | 0                      |
| 11     | CAI                   | GIBBONS         | 0         | 5500     | First Floor  | 3000                   |
| 12     | SAMUEL JAMES          | GRIFFITHS       | 0         | 16500    | First Floor  | 3000                   |
| 13     | ADAM                  | HASSAN          | 0         | 27500    | First Floor  | 3000                   |
| 14     | DAVID ANDREW          | WHITECROSS      | 0         | 38500    | First Floor  | 3000                   |
| 15     | AL DAVID              | IKETE           | 18000     | 5500     | First Floor  | 3000                   |
| 16     | BENJAMIN JOSEPH       | KNEESHAW        | 18000     | 16500    | First Floor  | 3000                   |
| 17     | JACK RICHARD          | LLEWELLYN       | 18000     | 27500    | First Floor  | 3000                   |
| 18     | RHYS JAMES            | MATHIAS         | 18000     | 38500    | First Floor  | 3000                   |
| 19     | DYLAN MARK PRESTON    | MATTHEWS        | 0         | 11000    | 2nd Floor    | 6000                   |
| 20     | CHRISTOPHER MARK      | MCINTOSH        | 0         | 22000    | 2nd Floor    | 6000                   |
| 21     | ELLIS                 | MOORE           | 0         | 33000    | 2nd Floor    | 6000                   |
| 22     | SOPHIE CHERYL ANN     | MORGAN          | 18000     | 11000    | 2nd Floor    | 6000                   |
| 23     | RICHARD               | MURRAY          | 18000     | 22000    | 2nd Floor    | 6000                   |
| 24     | RHYDIAN JOHN          | PREECE          | 18000     | 33000    | 2nd Floor    | 6000                   |
| 25     | STEFFAN               | PRYCE-GRIFFITHS | 0         | 5500     | 3rd Floor    | 9000                   |
| 26     | MERLIN MEURIG RHYS    | RATNER          | 0         | 16500    | 3rd Floor    | 9000                   |
| 27     | BRETT OMRI            | THOMAS          | 0         | 27500    | 3rd Floor    | 9000                   |
| 28     | JACOB                 | THOMAS          | 0         | 38500    | 3rd Floor    | 9000                   |
| 29     | JONATHAN ANDREW       | TRIGGS          | 18000     | 5500     | 3rd Floor    | 9000                   |
| 30     | SIAN MARIE            | WALKEY          | 0         | 16500    | 3rd Floor    | 9000                   |
| 31     | RHYS                  | WHITEMAN        | 0         | 27500    | 3rd Floor    | 9000                   |
| 32     | ELIS ARON             | WILLIAMS        | 18000     | 38500    | 3rd Floor    | 9000                   |
| 33     | ANTHONY THOMAS        | WILLIAMS-LLOYD  | 0         | 11000    | 4th Floor    | 12000                  |
| 34     | TIMOTHY OWEN GUEST    | REES            | 0         | 22000    | 4th Floor    | 12000                  |
| 35     | CHELBIE ELIZABETH ANN | JONES           | 0         | 33000    | 4th Floor    | 12000                  |
| 36     | OLIVER RHYS           | HEARNE          | 18000     | 11000    | 4th Floor    | 12000                  |
| 37     | LUKAS MARK            | MOLNAR RIIS     | 18000     | 22000    | 4th Floor    | 12000                  |
| 38     | DANIEL                | LEWIS-EDWARDS   | 18000     | 33000    | 4th Floor    | 12000                  |
| 39     | CIERAN                | STEPHENS        | 0         | 16500    | 5th Floor    | 15000                  |
| 40     | NEIL ALAN             | GADD            | 0         | 27500    | 5th Floor    | 15000                  |
| 41     | CHRISTOPHER JACK      | REES            | 0         | 16500    | 5th Floor    | 15000                  |
| 42     | STEVEN ASHLEY         | COX             | 0         | 27500    | 5th Floor    | 15000                  |

# Collaboration Exercise

Create a new project from the Architectural Template.

Design a unit with the external dimensions of 8m x 12m.

Your unit must be position to the correct Project Base Point and located on the appropriate Level. NB your project base point should remain at 0 elevation. (Refer to table for Northings and Eastings)

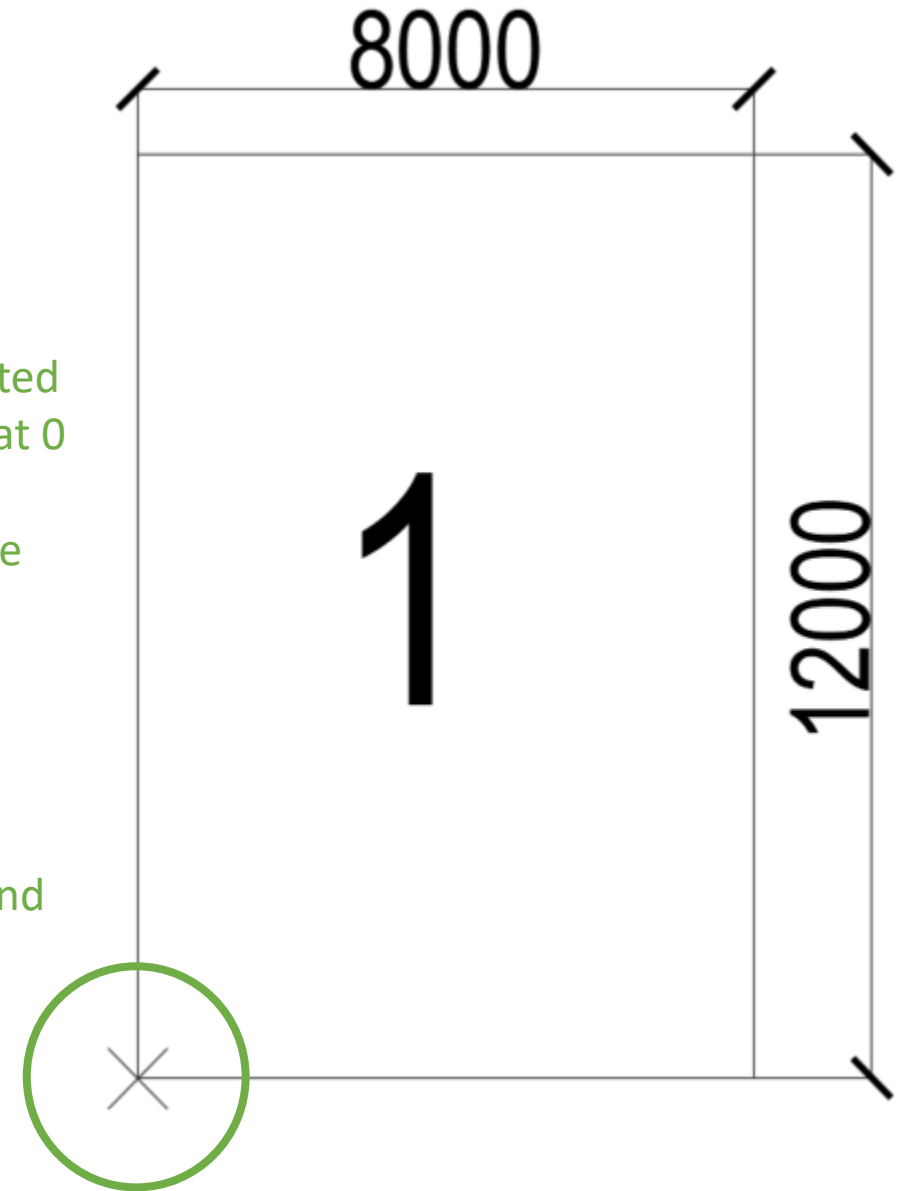
Note there are six storeys in this building so make sure you are on the right level.

Wall types / windows / doors / internal arrangement is up to you. A generic 200mm floor and 200mm flat roof should be used.

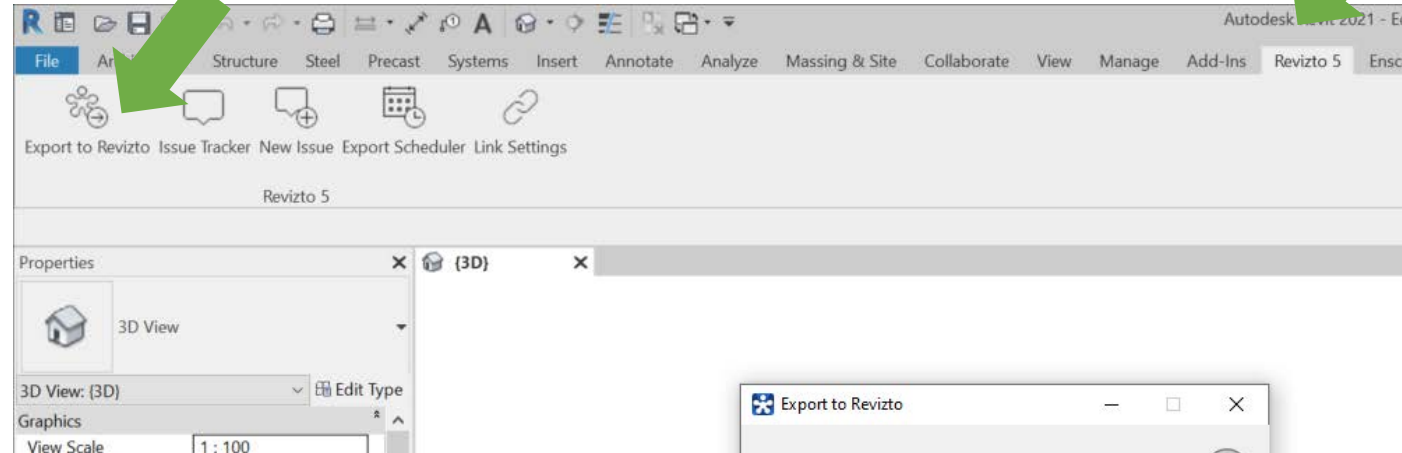
Create a Sheet using the UWTSD Title Block showing the floor plan and section at 1:50 scale.

Create a standard 3D View.

Save your project (add your name to the title)



# Collaboration Exercise



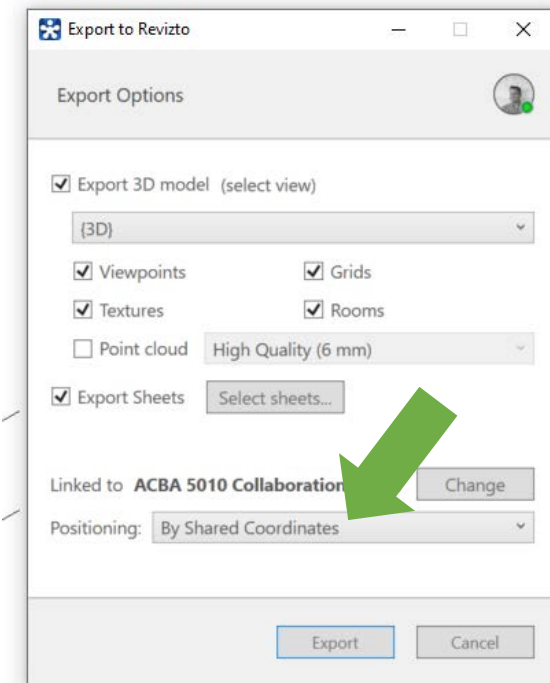
Exporting your Project to Revizto.

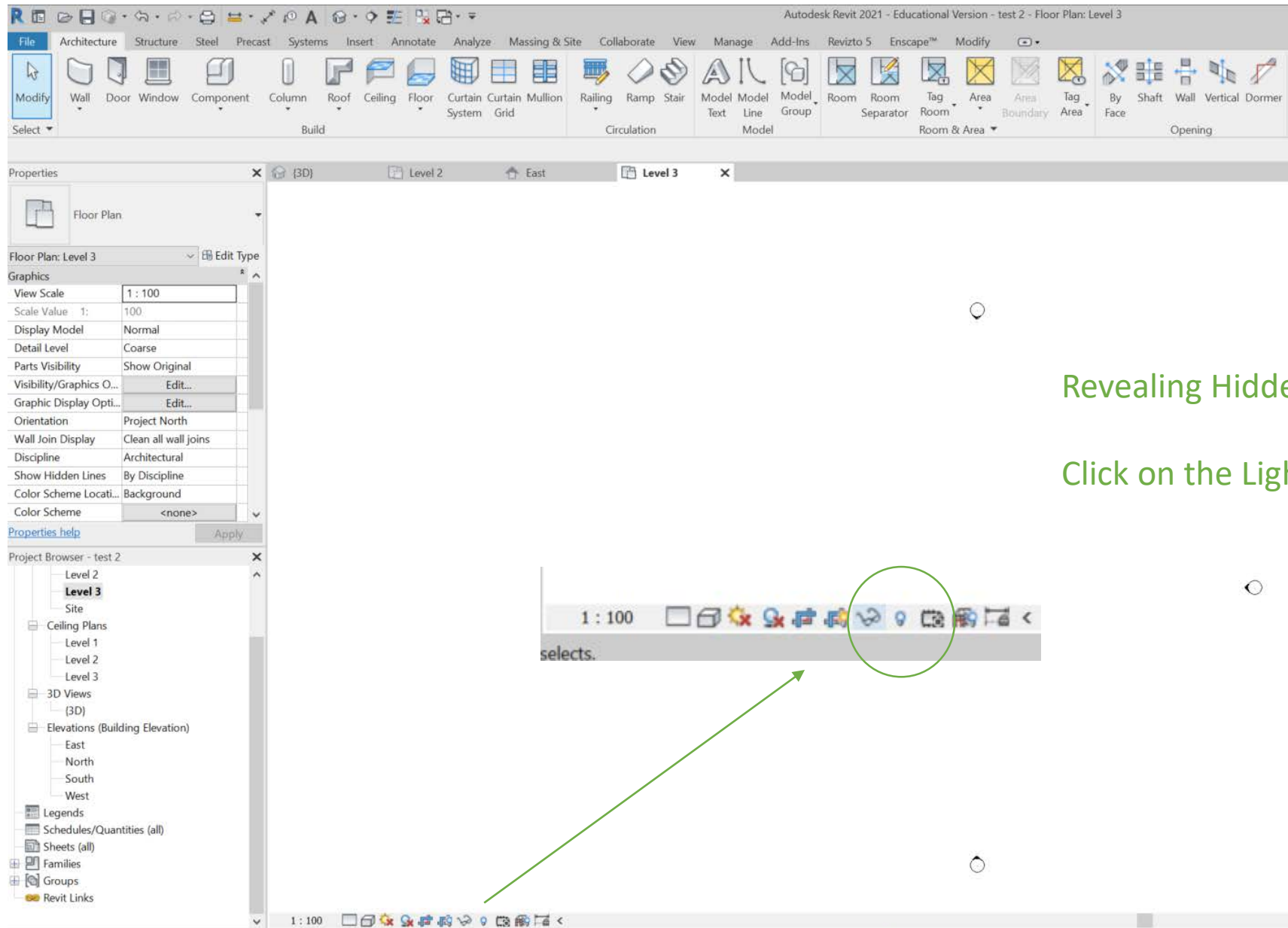
Open your 3D view.

From the Revizto Plug in Menu Select EXPORT TO REVIZTO

Append to an existing Model 'ACBA 5010 Collaboration Class Exercise'

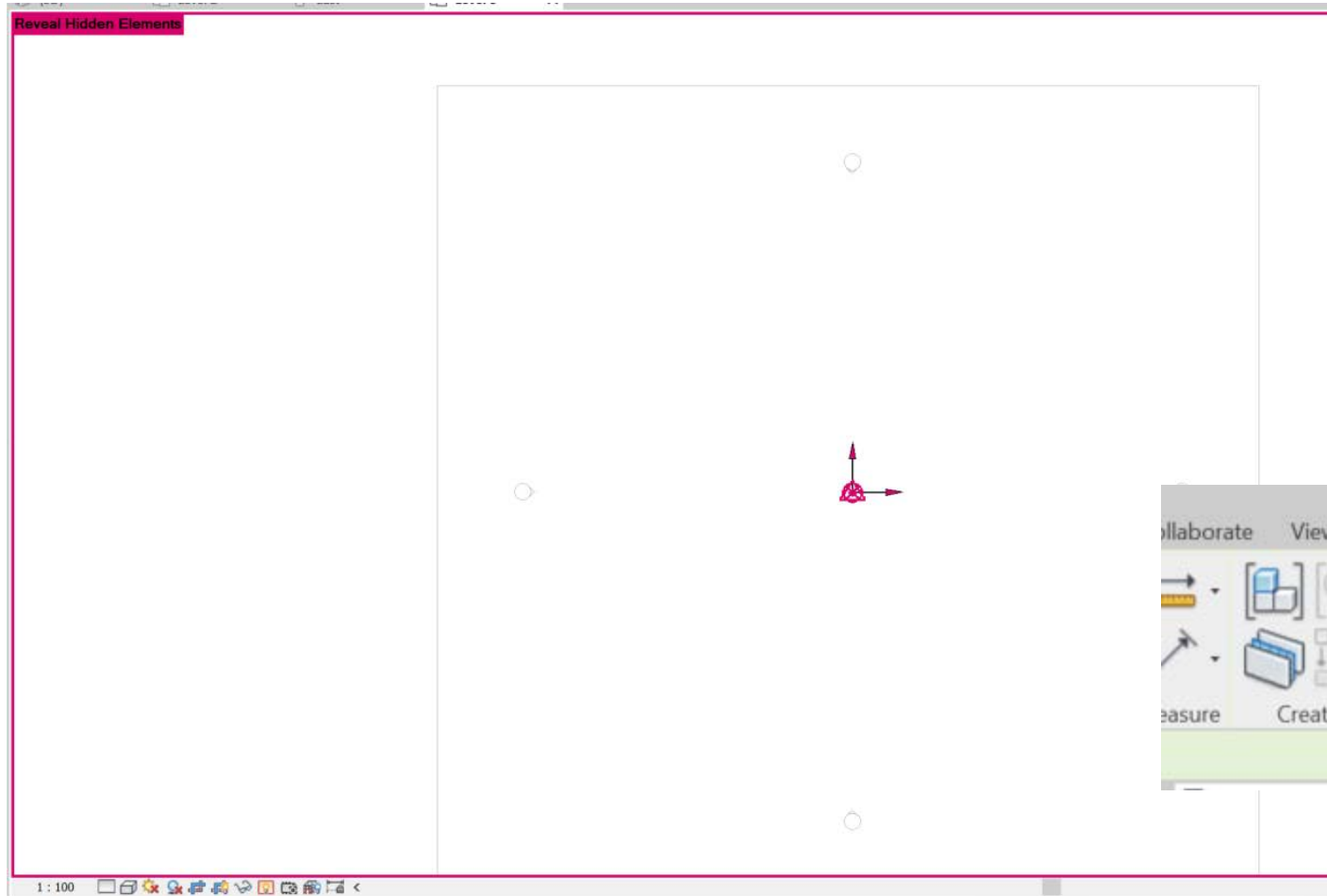
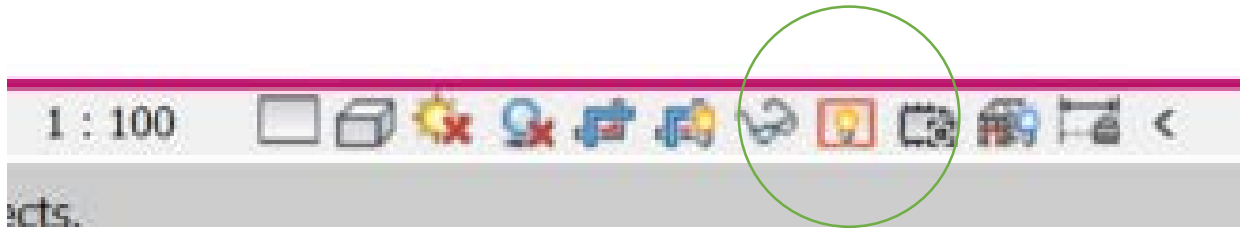
NB: Make sure the Positioning Settings are Set to 'Shared Coordinates'





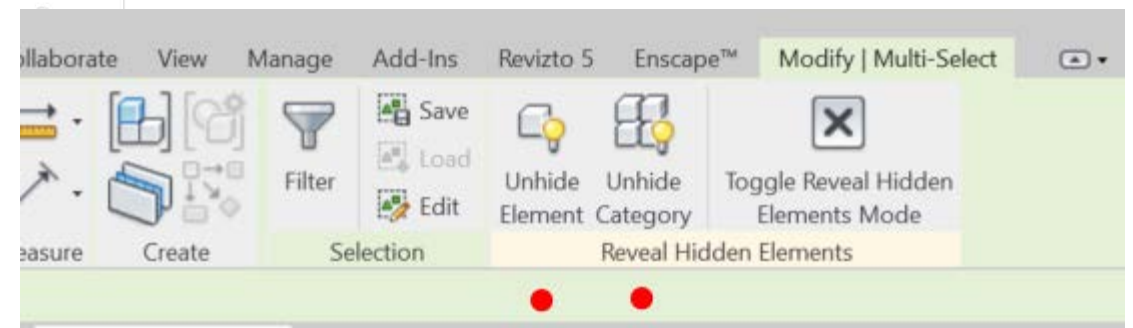
Revealing Hidden Items and Objects in Revit.

Click on the Lightbulb to activate the Reveal View.



Reveal Mode, shows hidden elements in the view, including the Project Base Point and Survey Point.

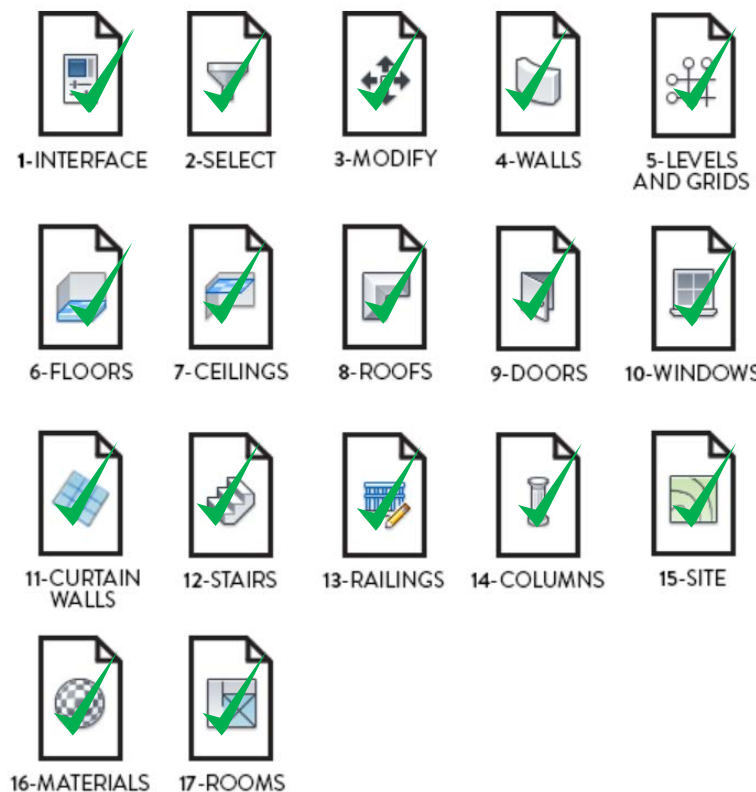
Unhide Elements (on the Ribbon) to Reveal and Click the Lightbulb to return to the normal view.



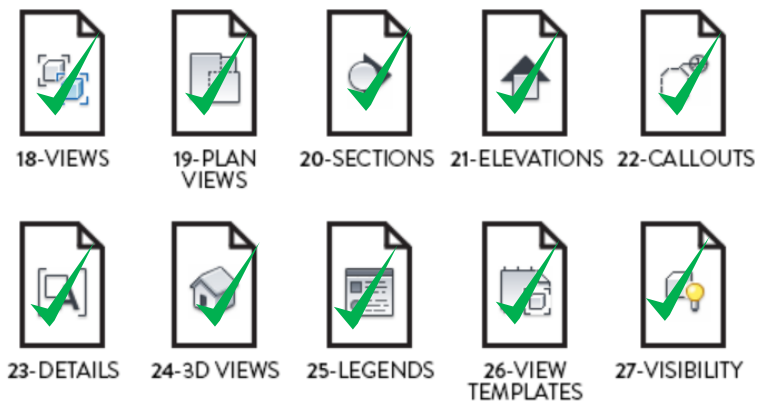


# AUTODESK® REVIT® the basics

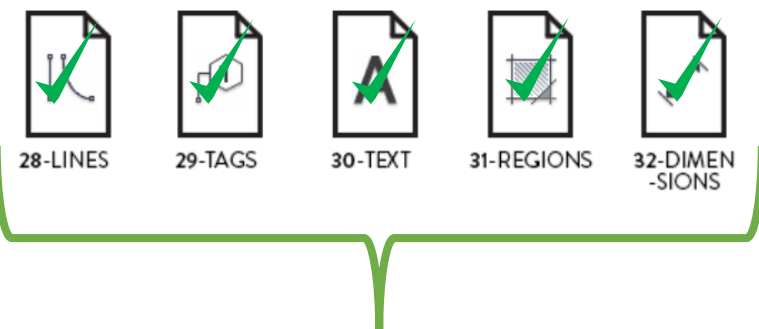
## PART 1: MODEL



## PART 2: VIEWS

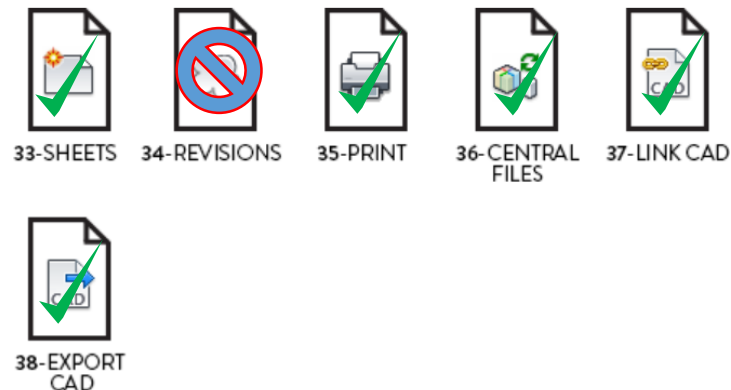


## PART 3: ANNOTATE

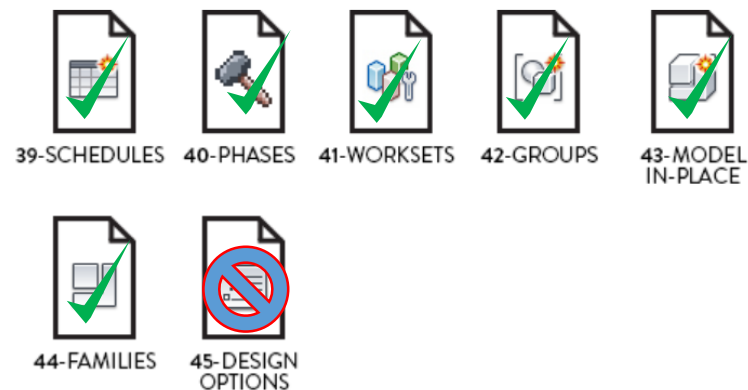


Covered in notes:

## PART 4: PUBLISH AND COLLABORATE



## PART 5: ADVANCED TOOLS



<https://revitpure.com/basics>

<https://academy.autodesk.com/>

# the basics: plus

## PART 5: ADVANCED TOOLS



- Creating Schedules for pricing
- Phased Works
- Central Models / Worksets / Federated Models
- Families
- Advanced Modelling: Sweeps Reveals and Model In Place
- *Collaboration and interoperability*
- *VR Visualisation*



# Exercise 5

## PHASING:

2 storey Office block refurbishment and extension.

Remove existing WC from ground and first floor to creating work open plans office space. New WCs and Kitchen /breakout facilities on both floors of the extension.

3 new offices access corridor and conference room to south elevation with conference room.

Set up your levels in Elevation view.

Distance between levels of 3500mm

**Set up Phasing (existing proposed and works plans)**

Set up Grids

## Assumptions:

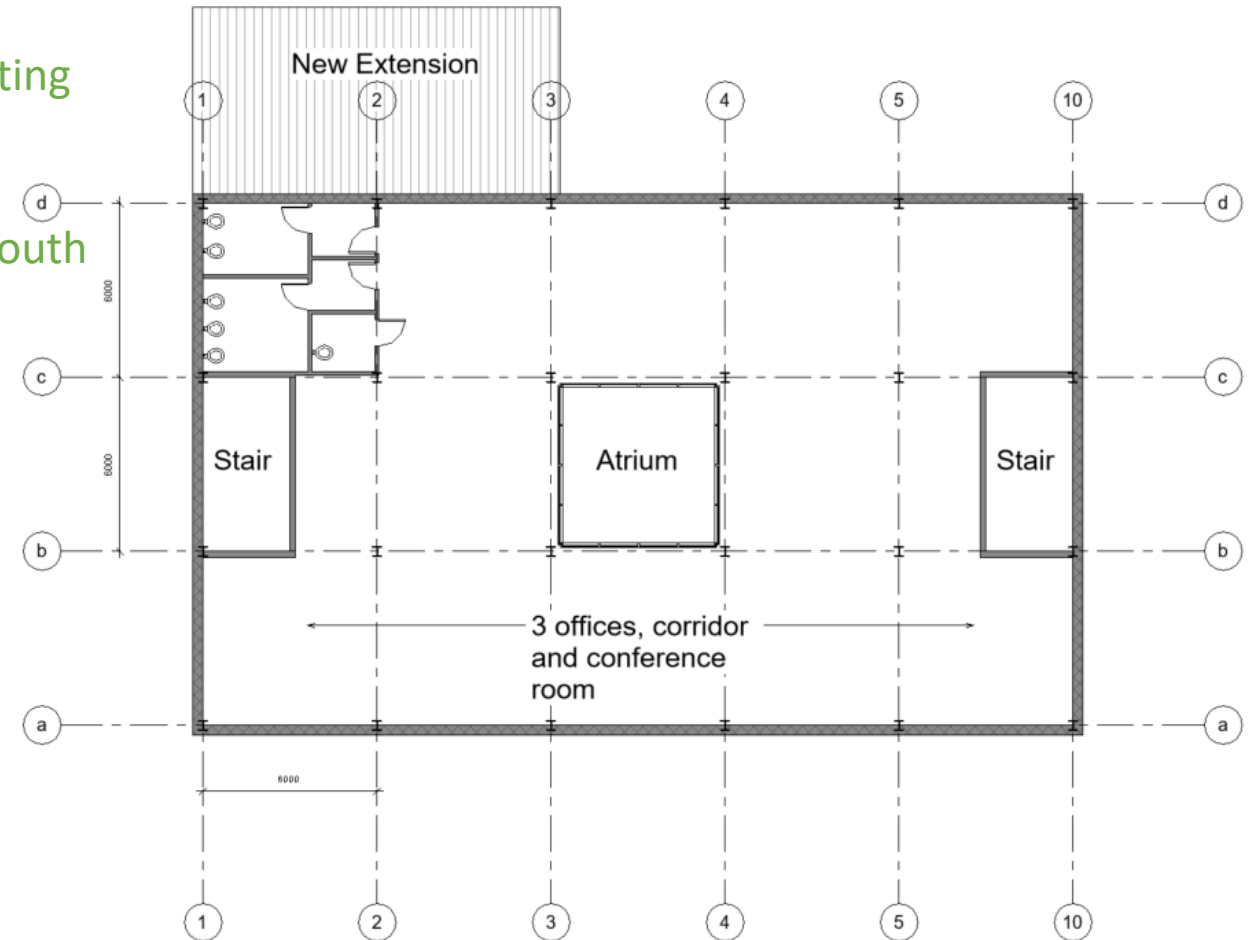
External walls your choice.

Flat roof. External Windows distributed evenly per bay.

Framed structure with columns at 6m centres

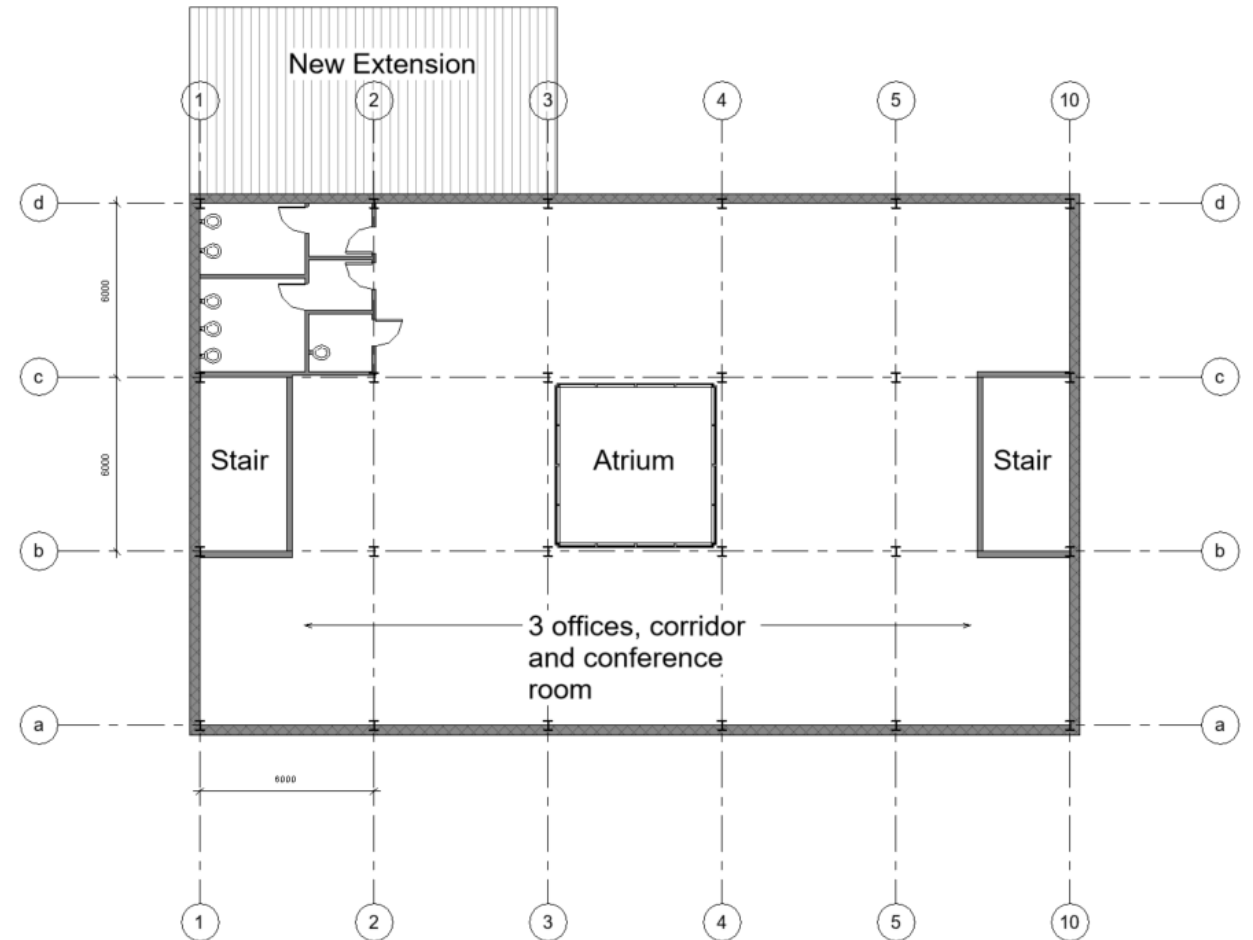
Staircase at either end with central glazed atrium.

Apply, room names, legends, grids. create plans, section and elevation views. 3D views existing and proposed



# Exercise 5 cont...

- ADD SHEETS
- ADD GROUPS
- ADD A DOOR SCHEDULE
- ADD A MULTI CATEGORY SCHEDULE

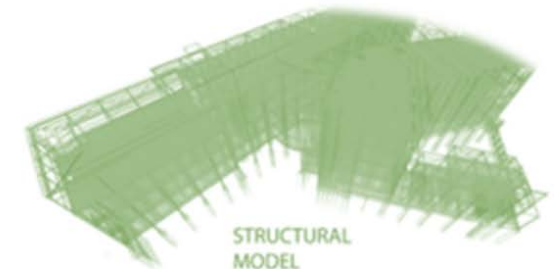
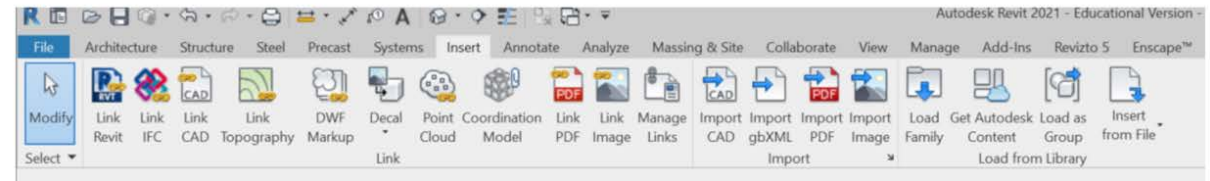
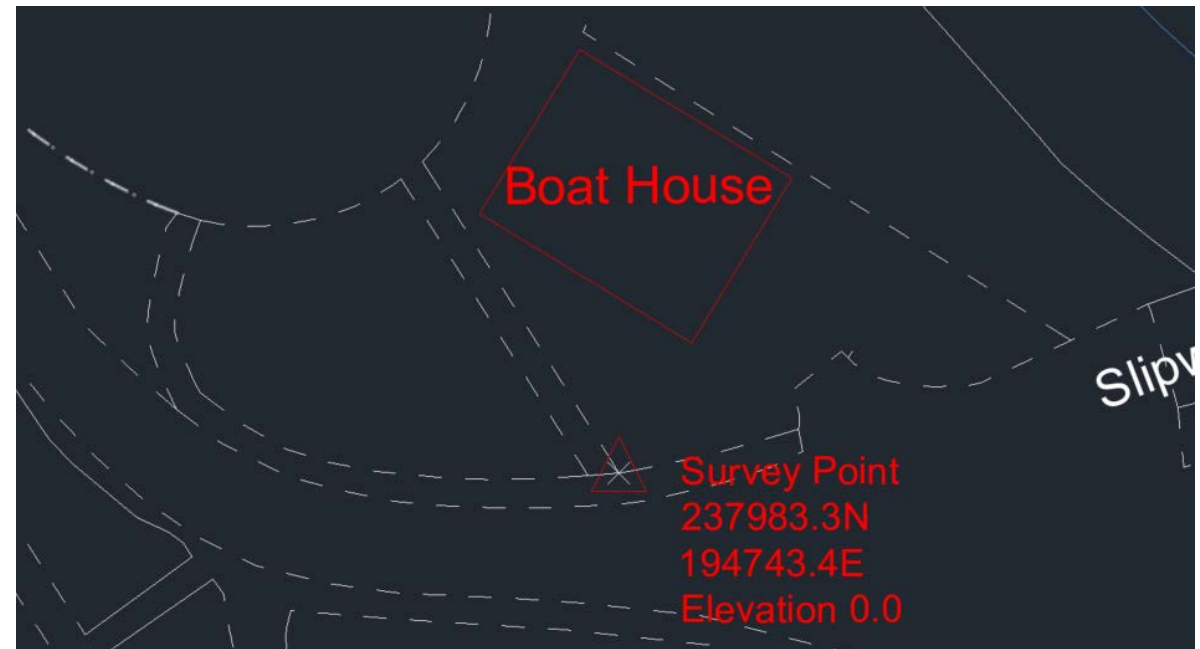
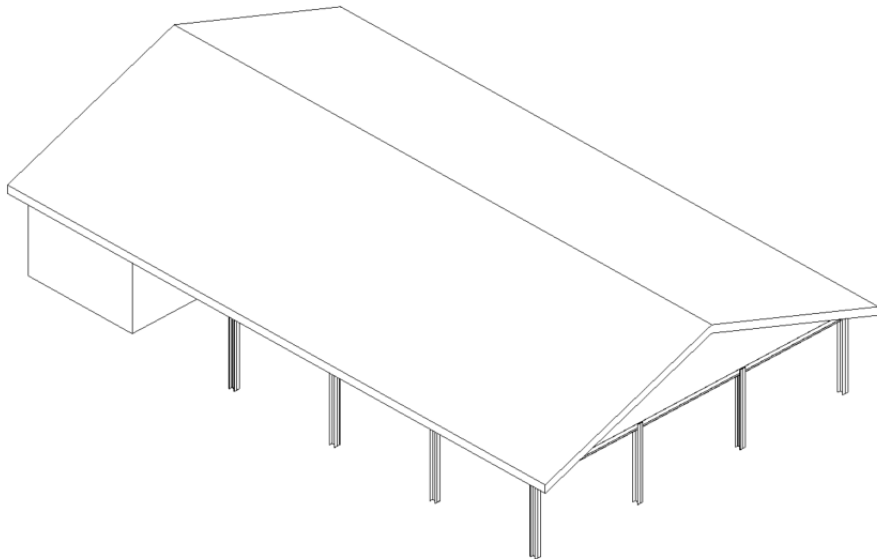


# Exercise 7

Boathouse revisited. (for some)

Create Architectural and Structural Models

Download the OSMAP from Teams and use the survey points given.



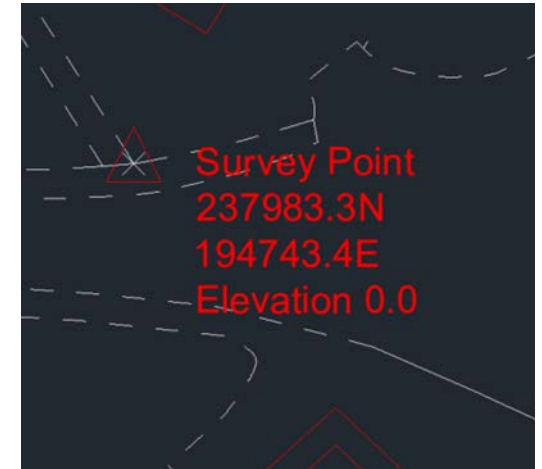
### Architectural Model

- Start a new project in REVIT – ‘architectural metric template’
  - Set up levels
  - Set up Project Base Point and Survey Point to the given coordinates
  - Insert OSMAP in site view
  - Unpin OSMAP and relocate to the Project Base Point and Survey Point
  - Set up project north
  - Load Splash Page Titleblock
  - Load UWTSD Titleblock
- SAVE file (with appropriate naming) and Close

### Structural Model

- Start a new project in Revit – ‘structural metric template’
  - Set up levels
  - Insert Revit Link file (above), by ‘internal origin to internal origin’
  - Relocate Project Base Point and Survey Point to the to match those of the Linked File
  - Load Splash Page Titleblock
  - Load UWTSD Titleblock
- SAVE File (with appropriate naming) and Close

\*Reopen the Architectural model and Insert Revit Link by  
‘Project base point to Project base point’



**NOW START DRAWING**