Digital Twins

Wednesday 23rd September

The CitA Virtual Summit: **Changing the way we work**

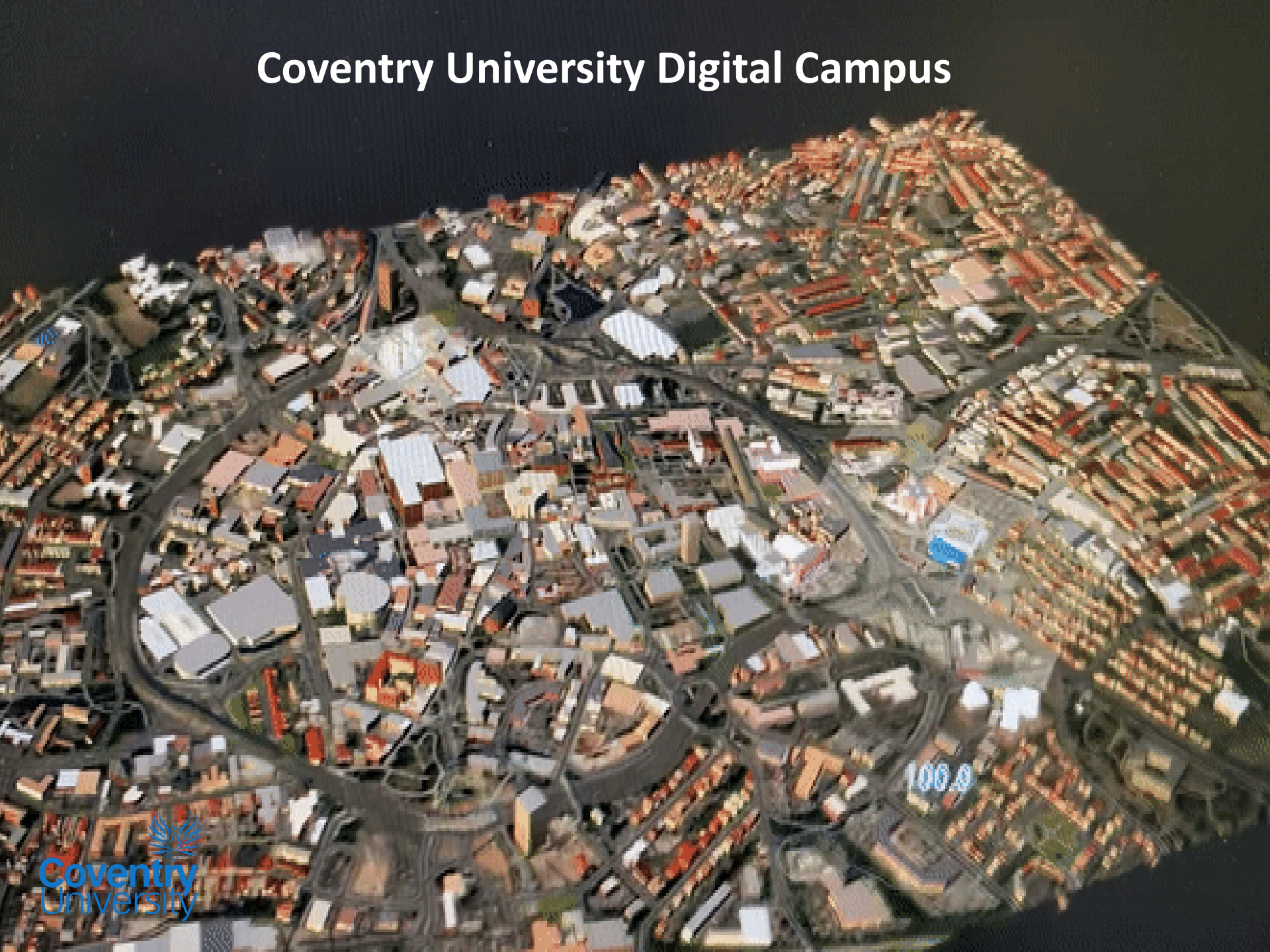
Digitising Coventry University Estates

The Road to Digital Twins

Hadeel Saadoon – BIM Manager
Estates Digital Services – Coventry University
Twitter : @hadeelsafaa @BIM4Estates

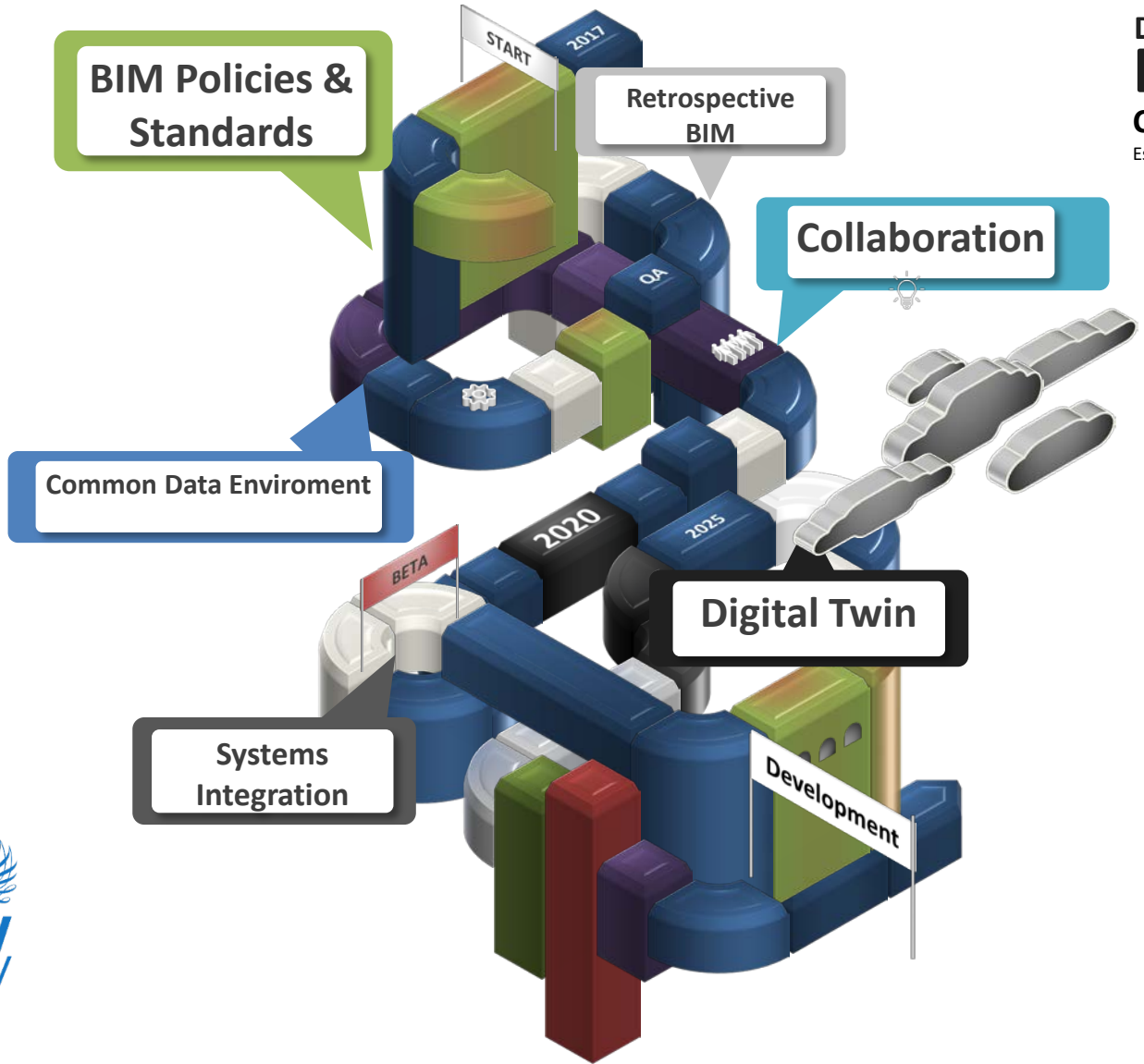
Coventry University City Campus

Coventry University Digital Campus



Digitising Coventry University Estates

The Road to Digital Twins



Digital
Estates
Coventry University
Estates Digital Journey

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Digital Twins

The Gemini Principles2 define a digital twin as "a realistic digital representation of assets, processes or systems in the built or natural environment".

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Added value estates wide
Better Information Management

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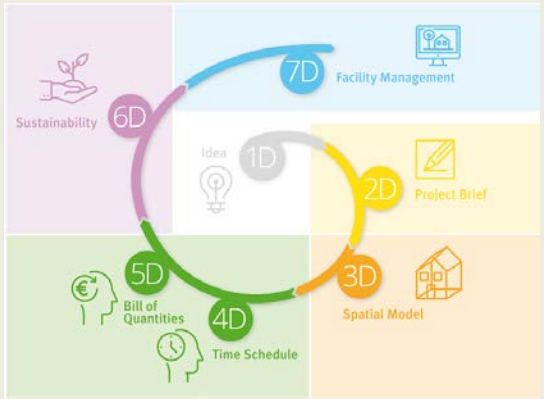
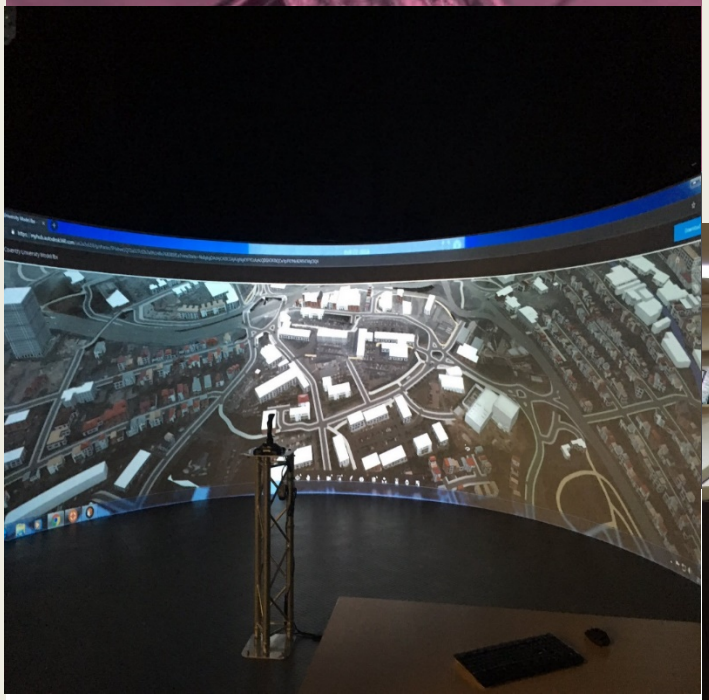
GOING DIGITAL

DIGITAL ARCHIVE





PHYSICAL ARCHIVE

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Digitising Coventry University Estates

Reviewing Existing Estates Infrastructure

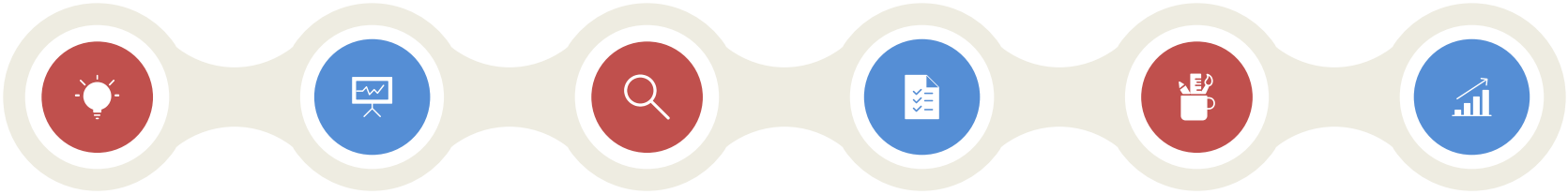
Information Requirements
Asset Requirements
Adopting BIM Standards

Site Surveys
Drawing Updates
Reviewing Archived Data
Physical to Digital

Health and Safety
Soft Landings
Design Guide
Contracts

Common Data Environment
CAD to BIM
Better Information Management

Asset Management
Building Services
Systems Integration
Digital Campus



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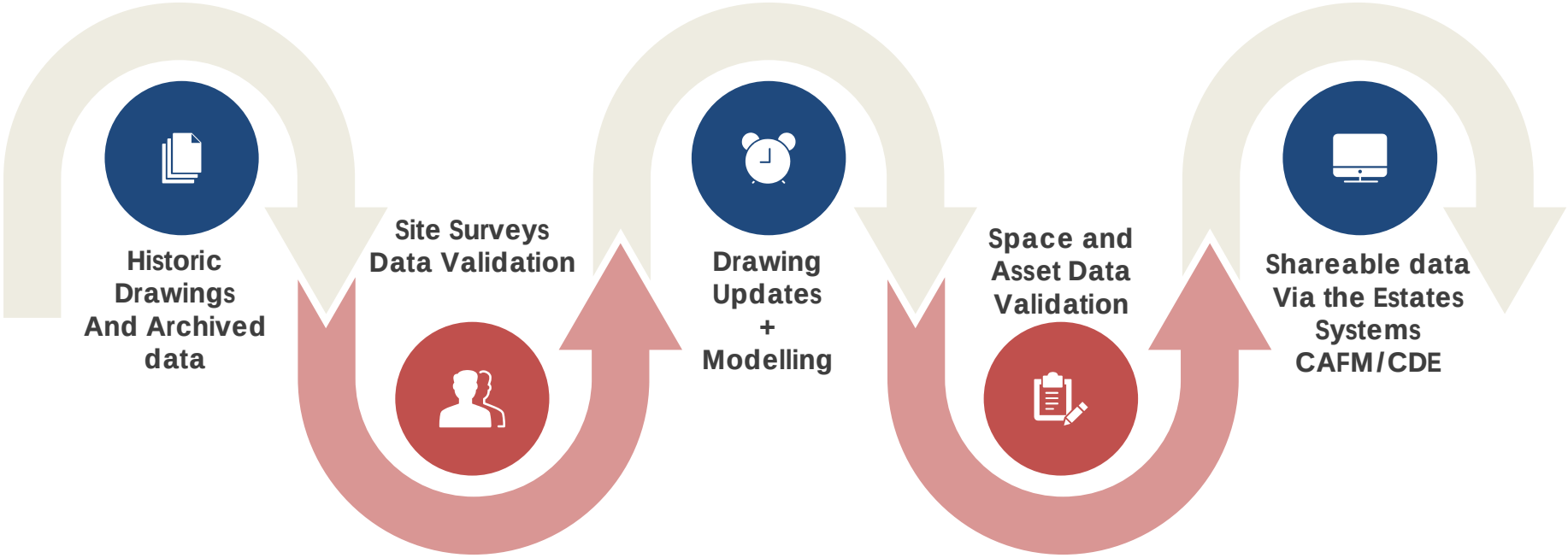
Process and Development



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Challenges – Coventry University

Systems

Management

Return on Investment

Audit trail

Cost Savings

Legal Compliance Resources

Engagement

Risk and Safety Management

Data

Better Customer Service

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Complex Estates

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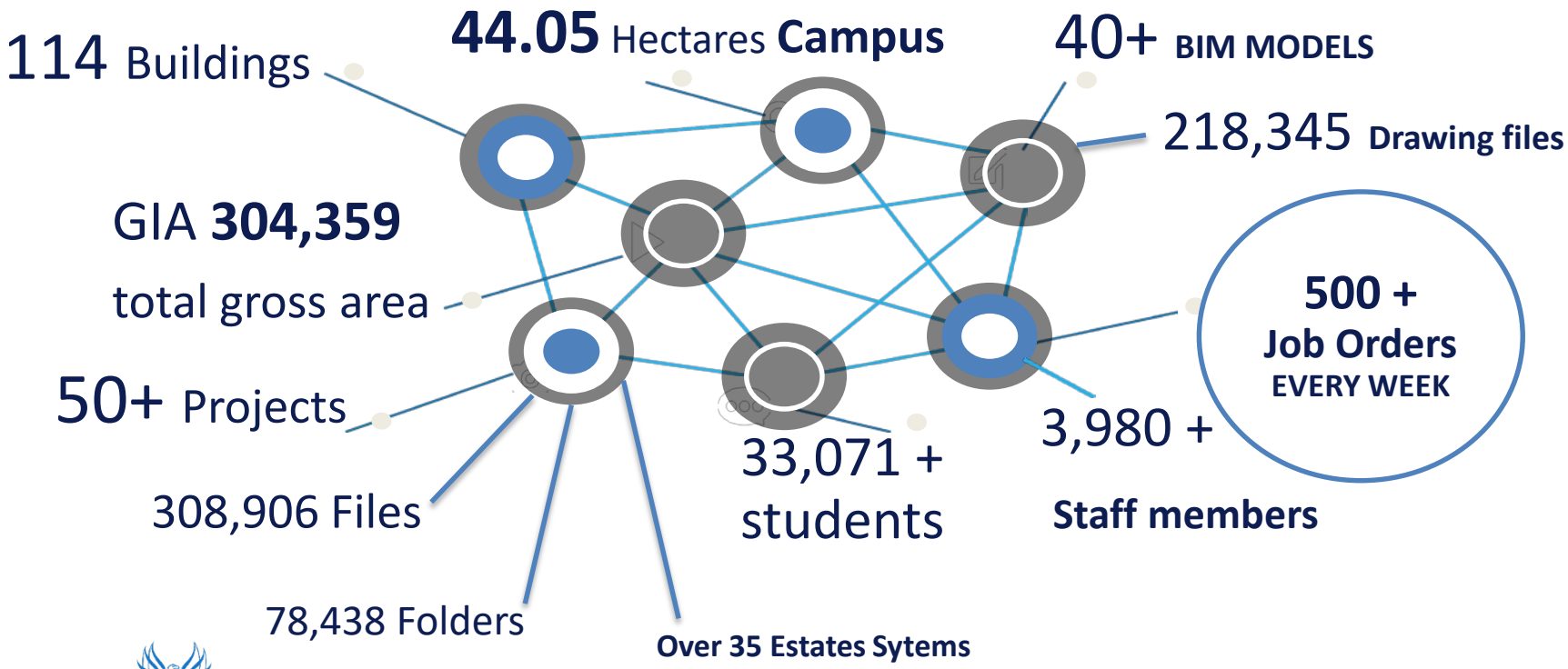
Campuses in Coventry, London and Scarborough



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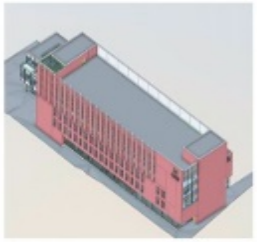
Backlog of Data

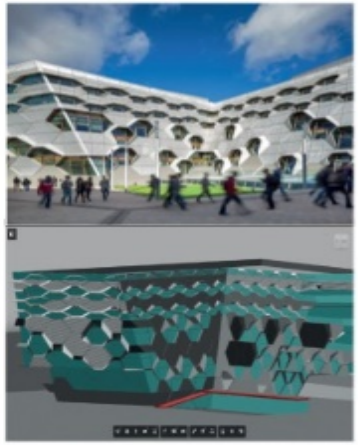
- Building Drawings not aligning to actual as built.
- Room Numbers not matching the data in our CAFM or our drawings.
- Operations and Maintenance manuals not indexed.
- Inconsistency of room numbers formats across buildings.
- Assets added to spaces that didn't exist.
- Project Information not handed over in correct formats.
- Multiple systems throughout Estates hosting inconsistent data.



SHB-AG

Godiva Place

Bishop Gate – Student Accommodation



Engineering and Computing Building

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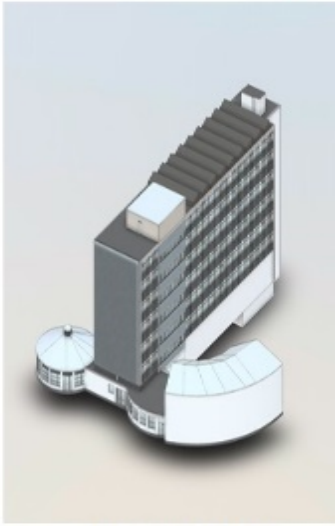
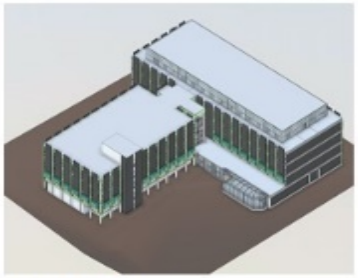
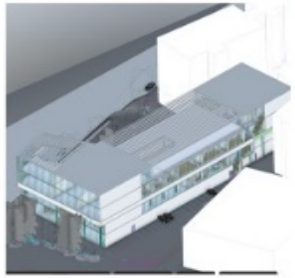


George Elliot BIM Model



Richard Crossman



Sir John Laing BIM Model

Simulation Centre

Capturing Existing Estates

3D Point Cloud Surveys – Refurbishment Projects
Basic Laser Scanning – Retrospective Modelling

Retrospective Modelling of Existing Buildings

The Sports Centre

The Student Centre

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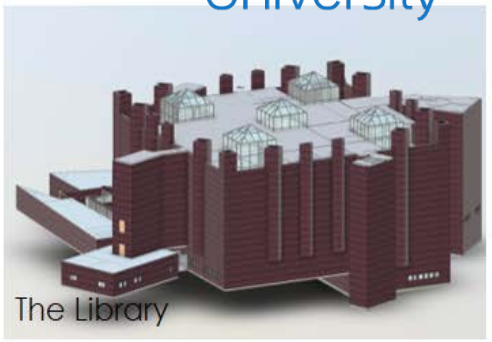

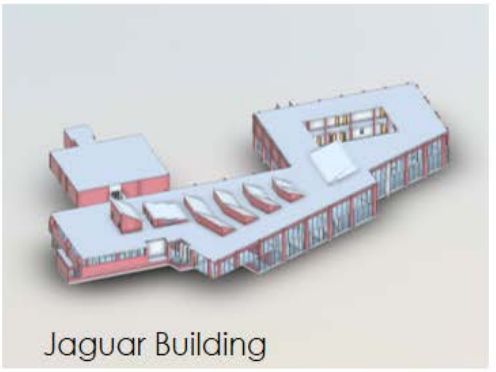

Digital Twins

The Gemini Principles2 define a digital twin as "a realistic digital representation of assets, processes or systems in the built or natural environment".

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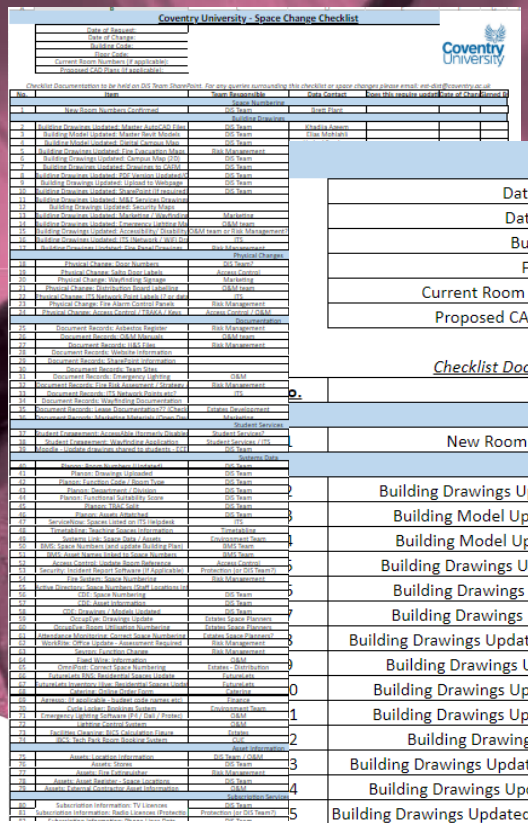
Space Interoperability

Openness



Coventry University - Space Change Checklist

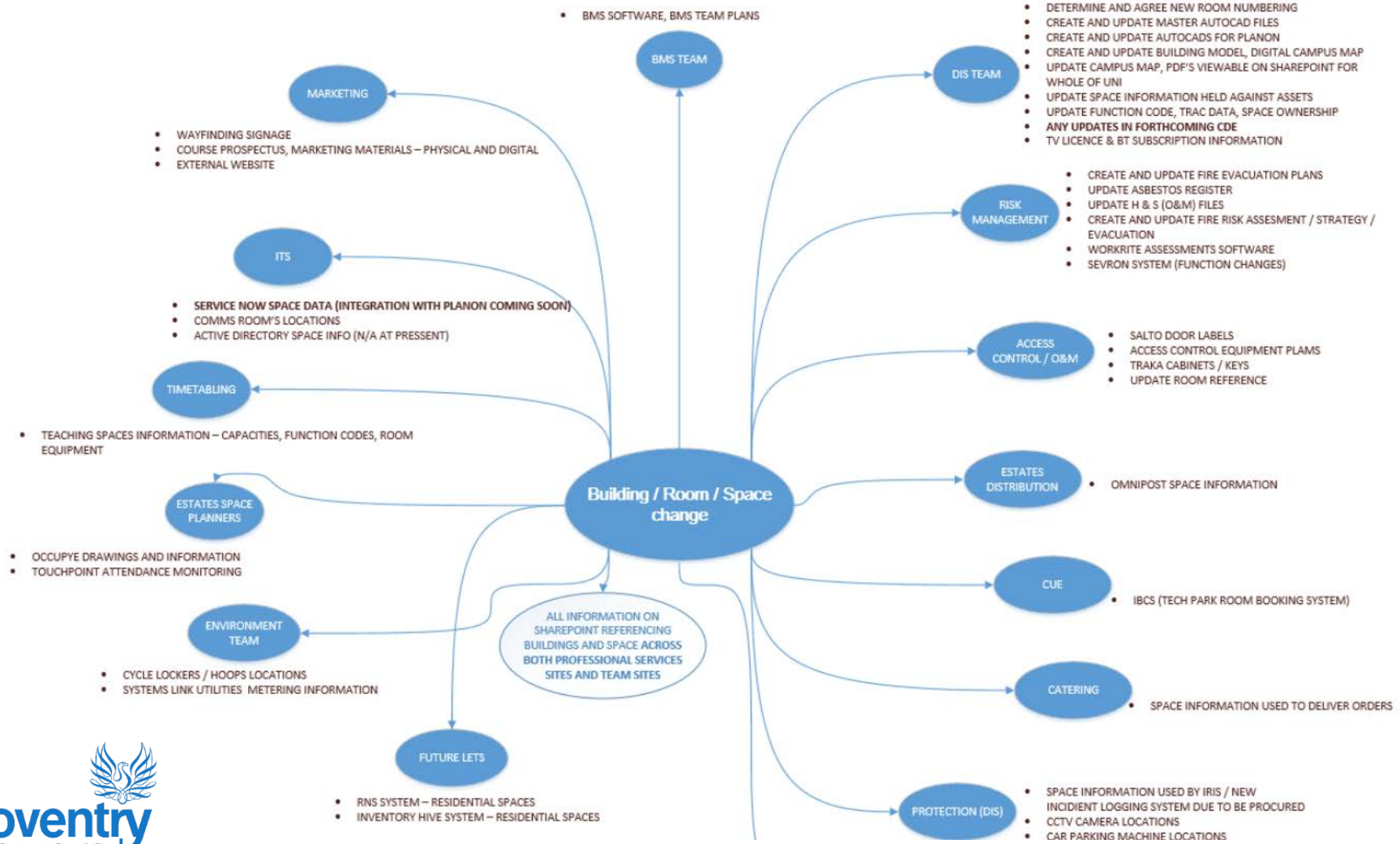
Date of Request:	
Date of Change:	
Building Code:	
Floor Code:	
Current Room Numbers (if applicable):	
Proposed CAD Plans (if applicable):	

Checklist Documentation to be held on DIS Team SharePoint. For any queries surrounding this checklist or space changes please email: est-dist@coventry.ac.uk

No.	Item	Team Responsible	Data Contact	Does this require updating?	Date of Change	Signed By
		Space Numbering				
1	New Room Numbers Confirmed	DIS Team	Brett Plant			
		Building Drawings				
2	Building Drawings Updated: Master AutoCAD Files	DIS Team	Khadija Azeem			
3	Building Model Updated: Master Revit Models	DIS Team	Elias Mohlahli			
4	Building Model Updated: Digital Campus Map	DIS Team	Hadeel Saadoon			
5	Building Drawings Updated: Fire Evacuation Maps	Risk Management	Andy Jackson			
6	Building Drawings Updated: Campus Map (2D)	DIS Team	Paul Clarke			
7	Building Drawings Updated: Drawings to CAFM	DIS Team	Paul Clarke			
8	Building Drawings Updated: PDF Version Updated/Created	DIS Team	Elias Mohlahli			
9	Building Drawings Updated: Upload to Webpage	DIS Team	Elias Mohlahli			
10	Building Drawings Updated: SharePoint (If required)	DIS Team	Elias Mohlahli			
11	Building Drawings Updated: M&E Services Drawings					
12	Building Drawings Updated: Security Maps					
13	Building Drawings Updated: Marketing / Wayfinding Maps	Marketing				
14	Building Drawings Updated: Emergency Lighting Map	O&M team	Christiano Landgraf			
15	Building Drawings Updated: Accessibility/ Disability Access Drav	O&M team or Risk Management?	Christiano Landgraf			
16	Building Drawings Updated: ITS (Network / WiFi Drawings)	ITS	Terry Watson?			
17	Building Drawings Updated: Fire Panel Drawings	Risk Management	Andy Jackson			
		Physical Changes				
18	Physical Change: Door Numbers	DIS Team?	Brett Plant			
19	Physical Change: Salto Door Labels	Access Control	Chris Davis			
20	Physical Change: Wayfinding Signage	Marketing	?			
21	Physical Change: Distribution Board Labelling	O&M team	Neil Williams			
22	Physical Change: ITS Network Point Labels (? or data)	ITS	Terry Watson?			
23	Physical Change: Fire Alarm Control Panels	Risk Management	Andy Jackson			
24	Physical Change: Access Control / PODS / Keys	Access Control / O&M				
		Documentation				
25	Document Records: Asbestos Register	Risk Management				
26	Document Records: O&M Manuals	O&M team				
27	Document Records: U&E Files	Risk Management				
28	Document Records: Website Information					
29	Document Records: SharePoint Information					
30	Document Records: Team Sites					
31	Document Records: Emergency Lighting	O&M				
32	Document Records: Fire Risk Assessment / Strategy	Risk Management				
33	Document Records: ITS Network Points as-is?	ITS				
34	Document Records: Wayfinding Documentation					
35	Document Records: Future Developments? (? Year)	Estates Development				
36	Document Records: Marketing Materials (Open Day)	Marketing				
		Student Services				
37	Student Engagement: Accessible (Remotely Disable	Student Services?				
38	Student Engagement: Wayfinding Application	Student Services / ITS				
39	Moodle - Update drawings shared to students - Sch	DIS Team				
		Systems Data				
40	Planon - Room Numbers Updated	DIS Team				
41	Planon: Drawings Uploaded	DIS Team				
42	Planon: Function Code / Room Type	DIS Team				
43	Planon: Department / Division	DIS Team				
44	Planon: Functional Suitability Score	DIS Team				
45	Planon: TRAC Data	DIS Team				
46	Planon: Assets Attached	DIS Team				
47	ServiceNow: Spaces Listed on ITS Helpdesk	ITS				
48	Timetabling: Teaching Spaces Information	Timetabling				
49	Systems Link: Space Data / Assets	Environment Team				
50	BMS: Space Numbers (and update Building Plan)	BMS Team				
51	BMS: Asset Names linked to Space Numbers	BMS Team				
52	Access Control: Update Room Reference	Access Control				
53	Security: Incident Report Software (if Applicable)	Protection (or DIS Team?)				
54	Fire System: Space Numbering	Risk Management				
55	Active Directory: Space Numbers (Staff Locations in	DIS Team				
56	CDF: Space Numbering	DIS Team				
57	CDF: Asset Information	DIS Team				
58	IDM: Drawings / Models Updated	DIS Team				
59	OccupEye: Drawings Update	Estates Space Planners				
60	OccupEye: Room Utilisation Numbering	Estates Space Planners				
61	Attendance Monitoring: Correct Space Numbering	Estates Space Planners?				
62	WorkRite: Office Update - Assessment Required	Risk Management				
63	Session: Function Change	Risk Management				
64	Fixed Wire: Information	O&M				
65	OmniPoint: Correct Space Numbering	Estates - Distribution				
66	Futurelabs BMS: Residential Spaces Update	Futurelabs				
67	FutureLabs Inventory: (Eve, Residential Spaces (Node	Futurelabs				
68	Catering: Ordering Equipment	Catering				
69	Retrosoc: (If applicable - Student node names etc)	Finance				
70	Code Locker: Update Spaces	Equipment Team				
71	Emergency Lighting Software (PH / Dali / Protec)	O&M				
72	Lighting Control System	O&M				
73	Facilities Cleaning: BICS Calculation Figure	Estates				
74	IBCS: Tech Park Room Booking System	DIS				
		Asset Information				
75	Assets: Location Information	IMS Team / O&M				
76	Assets: Stores	DIS Team				
77	Assets: Fire Extinguisher	Risk Management				
78	Assets: Asset Register - Space Locations	IMS Team				
79	Assets: External Contractor Asset Information	O&M				
		Subscription Services				
80	Subscription Information: TV Licences	DIS Team				
81	Subscription Information: Radio Licences (Protectio	Protection (or DIS Team?)				

Systems Interoperability

Coventry University – Complex Estates Systems



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Digital workflows

On Site – Off Site Quality Control

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Digital workflows

On Site Data Validation and Quality Control

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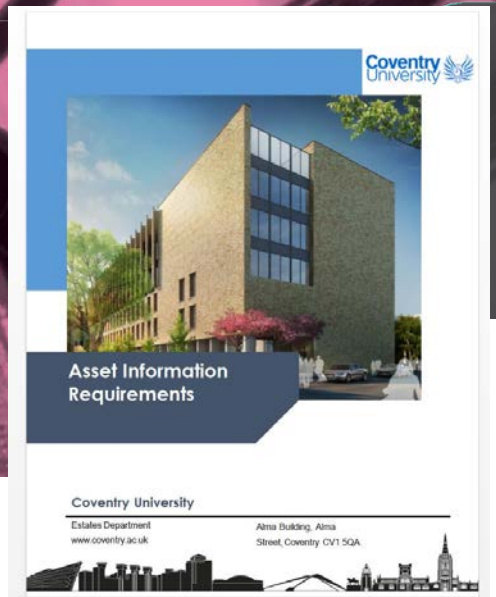
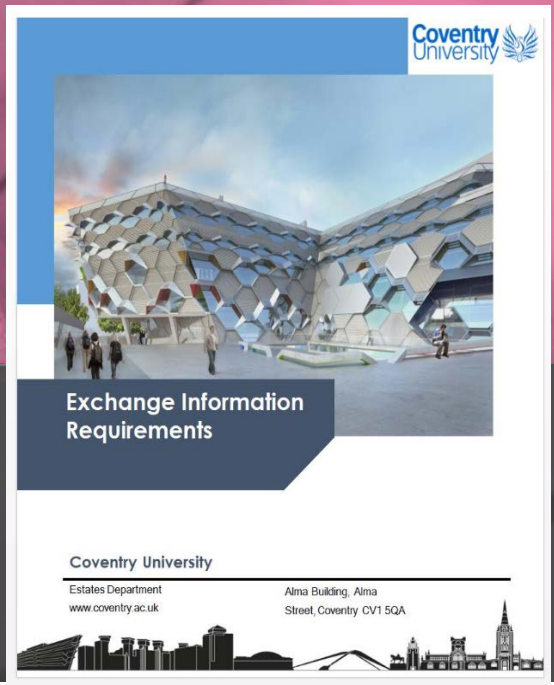
DATA GOVERNANCE AND SECURITY

ASSET INFORMATION MANAGEMENT





BUILDING INFORMATION MANAGEMENT

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Digital Twins

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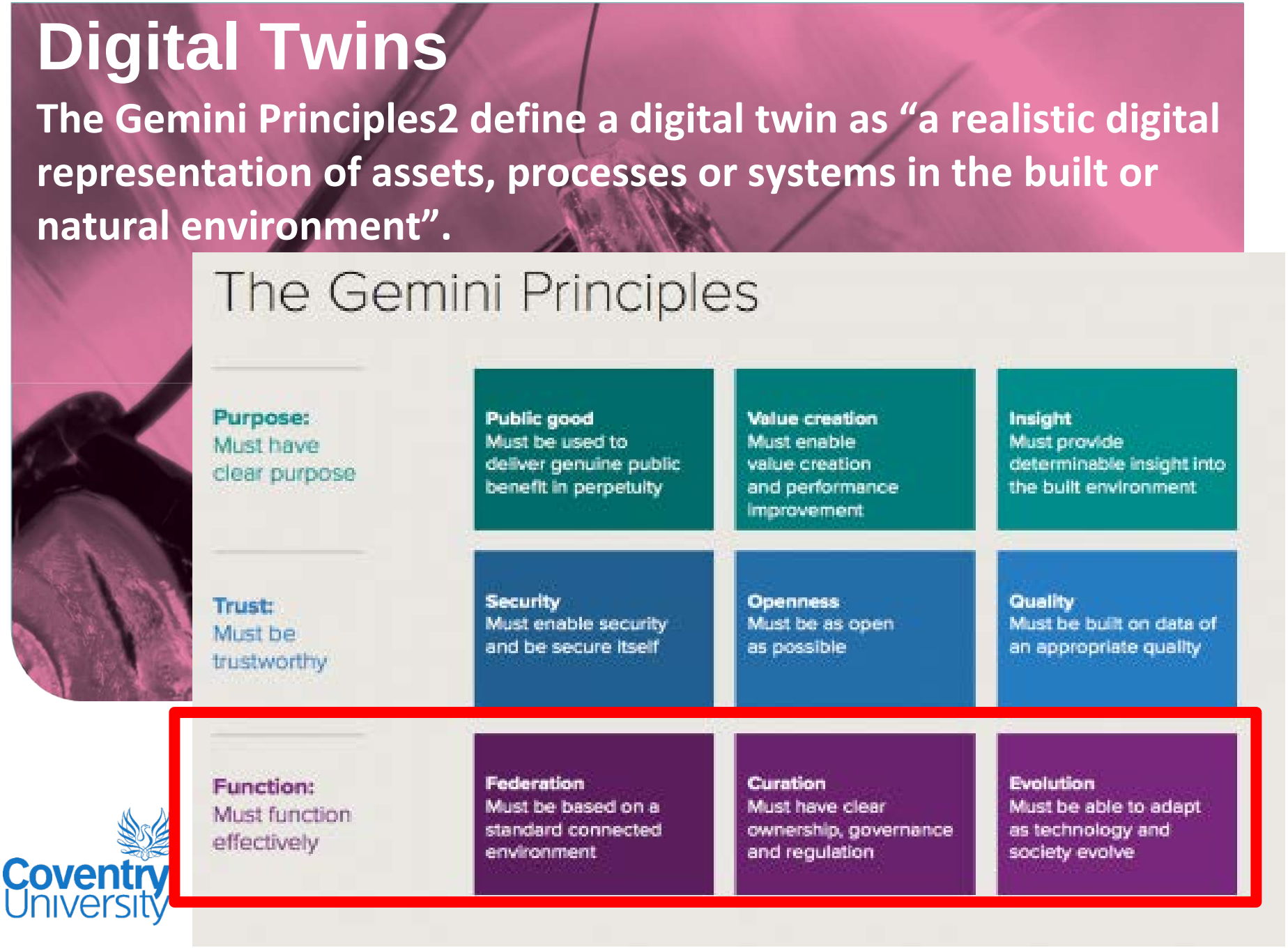

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Field-Based Integration
Unified data sets – Mapping Systems Assets

Asset Register format requirments and data mapping for COBie/Planon PEET imports

PLANON FIELD NAME	Comments	limitations/Example	COBie equivlant
Code (CU Estates Internal)			
COBie Unique Identifier			COBie Component ExtIdentifier
Description (Name)	Free text	255 characters	COBie Component Name
Long Description	Free text	100 Characters	COBie Component Description Plus statement on Equipment Type (e.g. Lifts could be Hydraulic, Tra MRL)
Manufacturer/Make	Free text	255 Characters	COBie Type Manufacturer
Model	Free text	30 Characters	COBie Type Model Number
Type			
Size			
System			
Sub-System	Please indicate whether it is primary, secondary or tertiary		
Serial Number	(Where applicable)		COBie Componate Serial Number
Condition	Assessment of the condition of the asset. A = Excellent Condition no signs of defects B = Good Condition minor signs of defects C = Poor Condition major signs of defects D = Extremely Poor Condition and showing signs of immanent failure NA = Not Applicable		Add a field in Revit before creating COBie
Replacement Priority	Internal codes by CU Estates		
Asset Classification (Uniclass 2015)	Unicalss 2015 asset classification- Please ensure you are using an up to date Uniclass code from the NBS website.		COBie Type Category
Technical Classification (SFG20)	Use SG20 Code for the asset	Example 43-06 for Photovoltics	Add a field in Revit before creating COBie
Asset Groups (NRM3)	Use the NRM code that matches SFG20 code in the provided mapping		
Property	Should be the Building short code	Such as AG for Alison Ginger	COBie Facility Site Name (Or site name depending how it was named
Floor	Should be the floor code		COBie Space Floor Name
Space Refrence (Room/Location)	Should be the space code - Important to be exact or it won't link the asset to the space	Such as ML-02-31	COBie Component Space
Serving	Indicate the area that it serves where applicable		

Asset Register instructions | Data Gathering SheetAsset Reg. | Maintainable Assets List (MAL) | NRM to SFG20 mapping | Data Change | Faculty Assets | Sheet1

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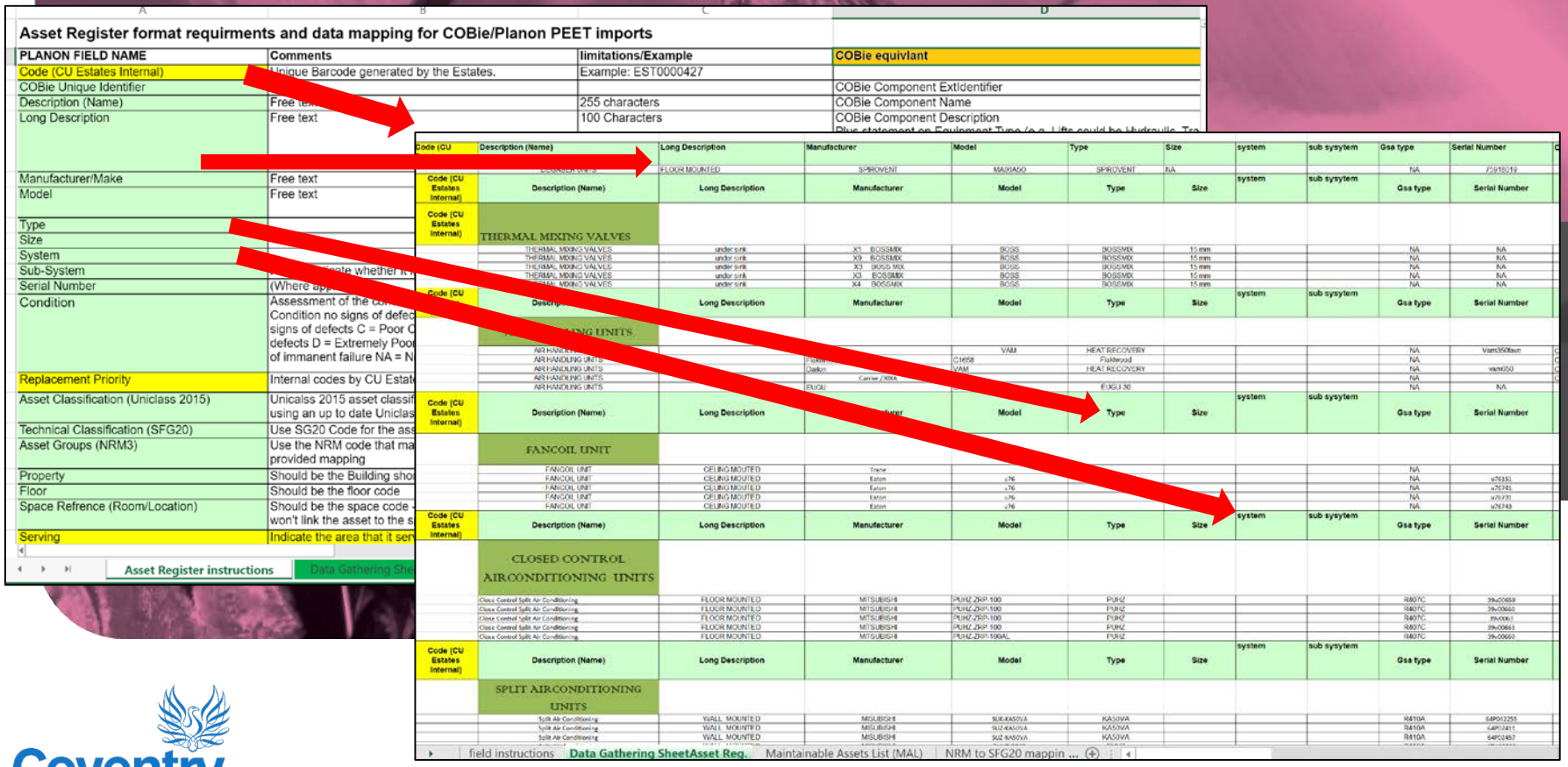
Unified data sets –Existing Building Assets



Asset Register format requirments and data mapping for COBie/Planon PEET imports

PLANON FIELD NAME	Comments	limitations/Example	COBie equivlant
Code (CU Estates Internal)	Unique Barcode generated by the Estates.	Example: EST0000427	
COBie Unique Identifier			COBie Component ExtIdentifier
Description (Name)	Free text	255 characters	COBie Component Name
Long Description	Free text	100 Characters	COBie Component Description
Manufacturer/Make	Free text		
Model	Free text		
Type			
Size			
System			
Sub-System			
Serial Number	(Where app		
Condition	Assessment of the bu Condition no signs of defec signs of defects C = Poor C defects D = Extremely Poo of immanent failure NA = N		
Replacement Priority	Internal codes by CU Estat		
Asset Classification (Uniclass 2015)	Unicalss 2015 asset classif using an up to date Uniclas		
Technical Classification (SFG20)	Use SG20 Code for the ass		
Asset Groups (NRM3)	Use the NRM code that ma provided mapping		
Property	Should be the Building sho		
Floor	Should be the floor code		
Space Refrence (Room/Location)	Should be the space code won't link the asset to the s		
Serving	Indicate the area that it ser		

Asset Register instructions | Data Gathering She

Code (CU Estates Internal)	Description (Name)	Long Description	Manufacturer	Model	Type	Size	system	sub sysytem	Gsa type	Serial Number
		FLOOR MOUNTED	SPROVENT	MA90ASO	SPROVENT	NA			NA	
Code (CU Estates Internal)	Description (Name)	Long Description	Manufacturer	Model	Type	Size	system	sub sysytem	Gsa type	Serial Number
	THERMAL MIXING VALVES									
	THERMAL MIXING VALVES	under sink	X1 BOSSMIX	BOSS	BOSSMIX	15 mm			NA	NA
	THERMAL MIXING VALVES	under sink	X9 BOSSMIX	BOSS	BOSSMIX	15 mm			NA	NA
	THERMAL MIXING VALVES	under sink	X3 BOSS MIX	BOSS	BOSSMIX	15 mm			NA	NA
	THERMAL MIXING VALVES	under sink	X3 BOSSMIX	BOSS	BOSSMIX	15 mm			NA	NA
	THERMAL MIXING VALVES	under sink	X4 BOSSMIX	BOSS	BOSSMIX	15 mm			NA	NA
Code (CU	Descrip	Long Description	Manufacturer	Model	Type	Size	system	sub sysytem	Gsa type	Serial Number
	NG UNITS									
	AIR HANDLING UNITS			VAM	HEAT RECOVERY				NA	Vam350ave
	AIR HANDLING UNITS			C1658	Fiskwood				NA	
	AIR HANDLING UNITS		Daikin	VAM	HEAT RECOVERY				NA	vam650
	AIR HANDLING UNITS		Carrier / KMA						NA	
	AIR HANDLING UNITS		EUGU		EUGU 30				NA	NA
Code (CU Estates Internal)	Description (Name)	Long Description	Manufacturer	Model	Type	Size	system	sub sysytem	Gsa type	Serial Number
	FANCOIL UNIT									
	FANCOIL UNIT	CEILING MOUNTED	Trane						NA	
	FANCOIL UNIT	CEILING MOUNTED	Eaton	u76					NA	u76351
	FANCOIL UNIT	CEILING MOUNTED	Eaton	u76					NA	u76741
	FANCOIL UNIT	CEILING MOUNTED	Eaton	u76					NA	u76731
	FANCOIL UNIT	CEILING MOUNTED	Eaton	u76					NA	u76743
Code (CU Estates Internal)	Description (Name)	Long Description	Manufacturer	Model	Type	Size	system	sub sysytem	Gsa type	Serial Number
	CLOSED CONTROL AIRCONDITIONING UNITS									
	Close Control Split Air Conditioning	FLOOR MOUNTED	MITSUBISHI	PUHZ-ZKP-100	PUHZ				R407C	39x00659
	Close Control Split Air Conditioning	FLOOR MOUNTED	MITSUBISHI	PUHZ-ZKP-100	PUHZ				R407C	39x00660
	Close Control Split Air Conditioning	FLOOR MOUNTED	MITSUBISHI	PUHZ-ZKP-100	PUHZ				R407C	39x00661
	Close Control Split Air Conditioning	FLOOR MOUNTED	MITSUBISHI	PUHZ-ZKP-100	PUHZ				R407C	39x00663
	Close Control Split Air Conditioning	FLOOR MOUNTED	MITSUBISHI	PUHZ-ZKP-100AL	PUHZ				R407C	39x00660
Code (CU Estates Internal)	Description (Name)	Long Description	Manufacturer	Model	Type	Size	system	sub sysytem	Gsa type	Serial Number
	SPLIT AIRCONDITIONING UNITS									
	Split Air Conditioning	WALL MOUNTED	MISUBISHI	SUZ-KA50VA	KA50VA				R410A	64P03255
	Split Air Conditioning	WALL MOUNTED	MISUBISHI	SUZ-KA50VA	KA50VA				R410A	64P03411
	Split Air Conditioning	WALL MOUNTED	MISUBISHI	SUZ-KA50VA	KA50VA				R410A	64P02457

field instructions | Data Gathering SheetAsset Reg. | Maintainable Assets List (MAL) | NRM to SFG20 mappin ...

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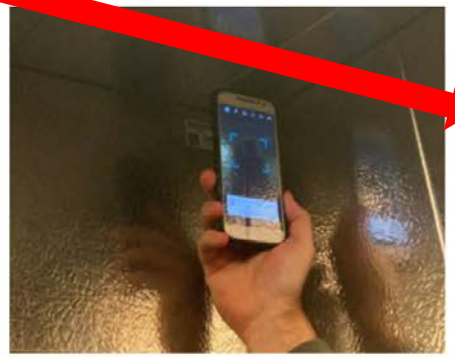
Unified data sets –Labelling Assets

Asset Register format requirments and data mapping for COBie/Planon PEET imports

PLANON FIELD NAME	Comments	limitations/Example	COBie equivlant
Code (CU Estates Internal)	Unique Barcode generated by the Estates.	Example: EST0000427	
COBie Unique Identifier			COBie Component ExtIdentifier
Description (Name)	Free text	255 characters	COBie Component Name
Long Description	Free text	100 Characters	COBie Component Description Plus statement on Equipment Type (e.g. Lifts could be Hydraulic, Tra MRL)
Manufacturer/Make			
Model			
Type			
Size			
System			
Sub-System			
Serial Number			
Condition			
Replacement Priority			
Asset Classification (Uniclass 20			
Technical Classification (SFG20)			
Asset Groups (NRM3)			
Property			
Floor			
Space Refrence (Room/Location			
Serving			

Asset Regist



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Unified data sets – Maintainable Assets & SFG20

	A	B
1	SFG20 - Maintainable Assets List	Do we maint in this at CU Es
2	Specialist Services	Y/N
3	Access Equipment and Lifts	
4	Access Equipment	
5	81-01 : Cable and Track/Rail Based Safety Systems	Y
6	81-02 : Connectors	
7	81-03 : Energy Absorbing Lanyards	Y
8	81-04 : Eyebolts used for Personal Fall Protection	Y
9	81-05 : Mobile Man Anchors	Y
10	81-06 : Retractable Fall Arrester	
11	81-07 : Rope Climbing/Abseiling/Steeplejack - Connectors	
12	81-08 : Rope Climbing/Abseiling/Steeplejack - Eyebolts used for Personal Fall Protection	Y
13	81-09 : Rope Climbing/Abseiling/Steeplejack - Personal Suspension and Access Systems	Y
14	81-10 : Fixed Access Ladders and Stairs	Y
15	Lifts	
16	82-01 : Vertical Platform Lifts	y
17	82-02 : Escalators And Moving Walkways	n/a
18	82-03 : Hydraulic Lifts	y
19	82-04 : Inclined Platform Lift and Stair Riser	y
20	82-05 : Traction Lifts	y
21	82-06 : Escalators and Moving Walkways - Thorough Examinations	n/a
22	82-07 : Goods and Passenger Lifts - Thorough Examinations	y
23	82-08 : Lifts - Electrical Periodic Examination	y
24	84-55 : Rack and Pinion Goods Only Hoists - Permanent Installations	n/a
25	84-59 : Construction Hoists - Temporary Installations	n/a
26	Building Fabric	
27	23-17 : Fire Doors	Y
28	88-01 : Ancillary Buildings and Other Structures	
29	88-02 : Automatic Ticket Gates and Barriers	
30	88-03 : Boundary Vegetation and Landscaping	
31	88-04 : Building Inspections	Y

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Unified data sets – CDE, IFC and Project Assets

Asset Register format requirments and da

PLANON FIELD NAME	Comment
Code (CU Estates Internal)	Unique Ba
COBie Unique Identifier	
Description (Name)	
Long Description	Free
Manufacturer/Make	Fre
Model	Free te
Type	
Size	
System	
Sub-System	Please ind
Serial Number	(Where ap
Condition	Assessme Condition signs of de defects D of immane
Replacement Priority	Internal co
Asset Classification (Uniclass 2015)	Unicalss 2 using an u
Technical Classification (SFG20)	Use SG20
Asset Groups (NRM3)	Use the NI provided n
Property	Should be
Floor	Should be
Space Refrence (Room/Location)	Should be won't link t
Serving	Indicate th

Asset Register instructions

PLANON ASSET REGISTER TEMPLATE

Edit

View in Plan of Work

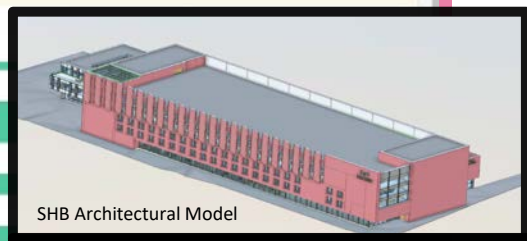
GLIDERBIM

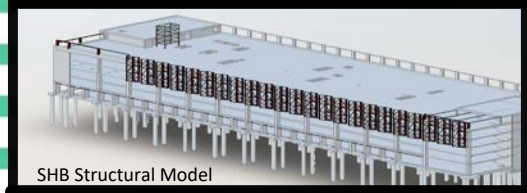
No property in this type will match an identifier property name in the Coventry University Estates discipline. You will need to manually link newly imported objects to this deliverable/instances of this type. If possible, you should add one of these property names: AssetNumber

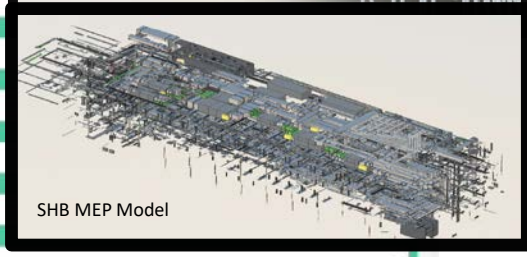
Click a property name to edit aliases and validation rules

Test Phase 1

Code (CU Estates Internal)	CoventryUniversityEstates
COBie Unique Identifier	CoventryUniversityEstates
Description (Name)	CoventryUniversityEstates
Long Description	CoventryUniversityEstates
Manufacturer/Make	CoventryUniversityEstates
Model	CoventryUniversityEstates
Type	CoventryUniversityEstates
Size	CoventryUniversityEstates
System	CoventryUniversityEstates
Sub-System	CoventryUniversityEstates
Serial Number	CoventryUniversityEstates
Condition	CoventryUniversityEstates
Replacement Priority	CoventryUniversityEstates


SHB Architectural Model


SHB Structural Model


SHB MEP Model

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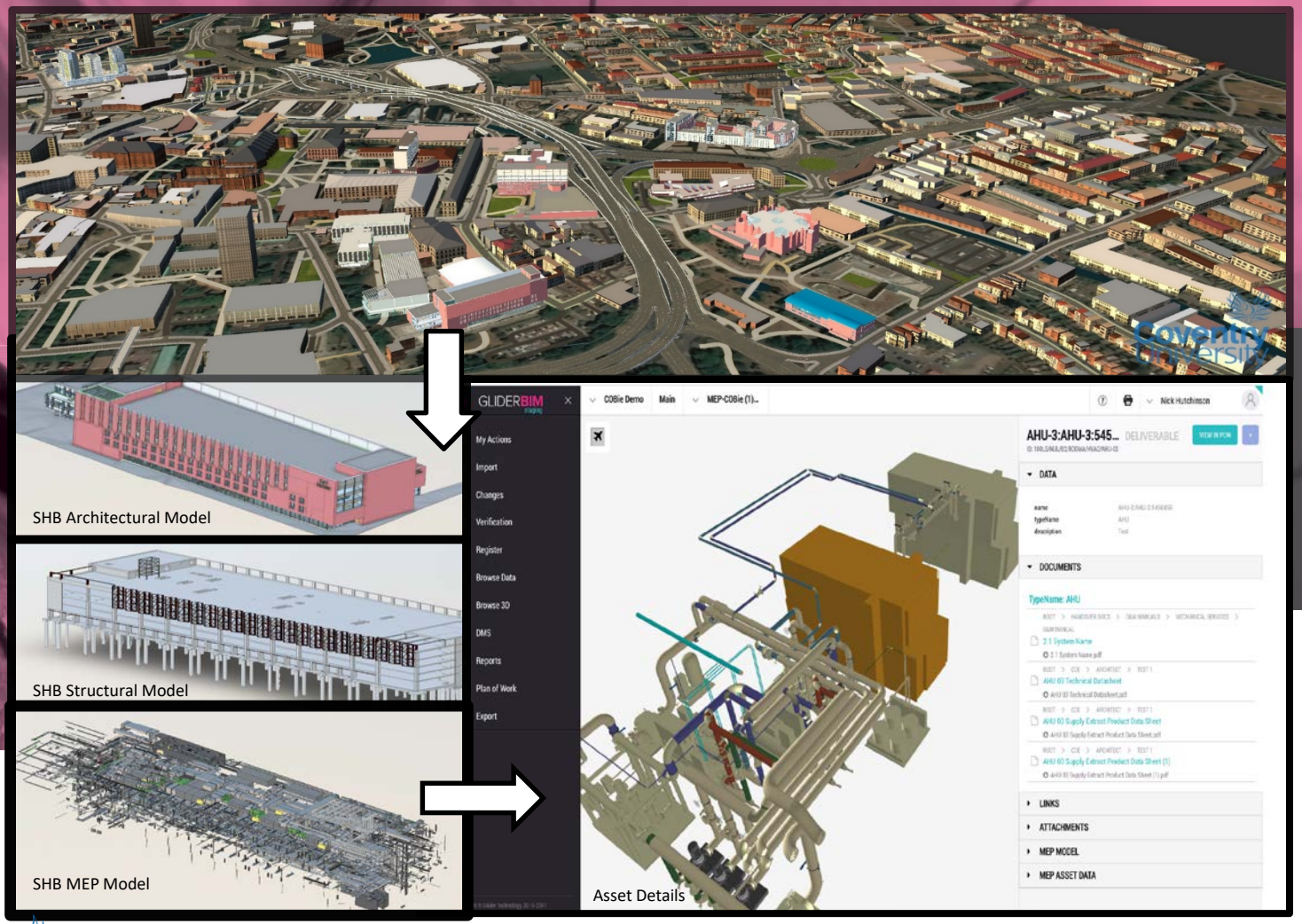
CU ESTATES DIGITAL TWIN



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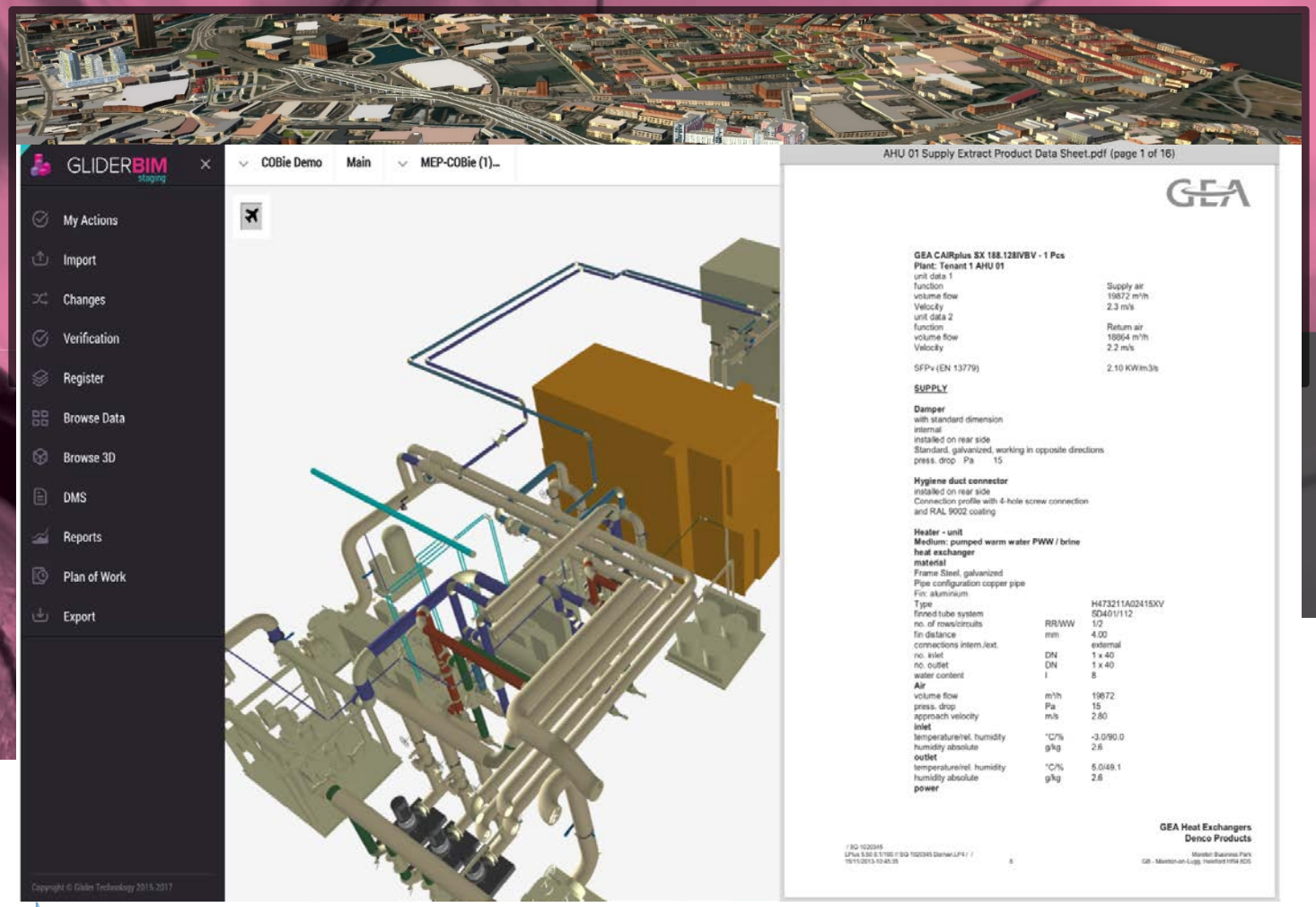
CU ESTATES DIGITAL TWIN



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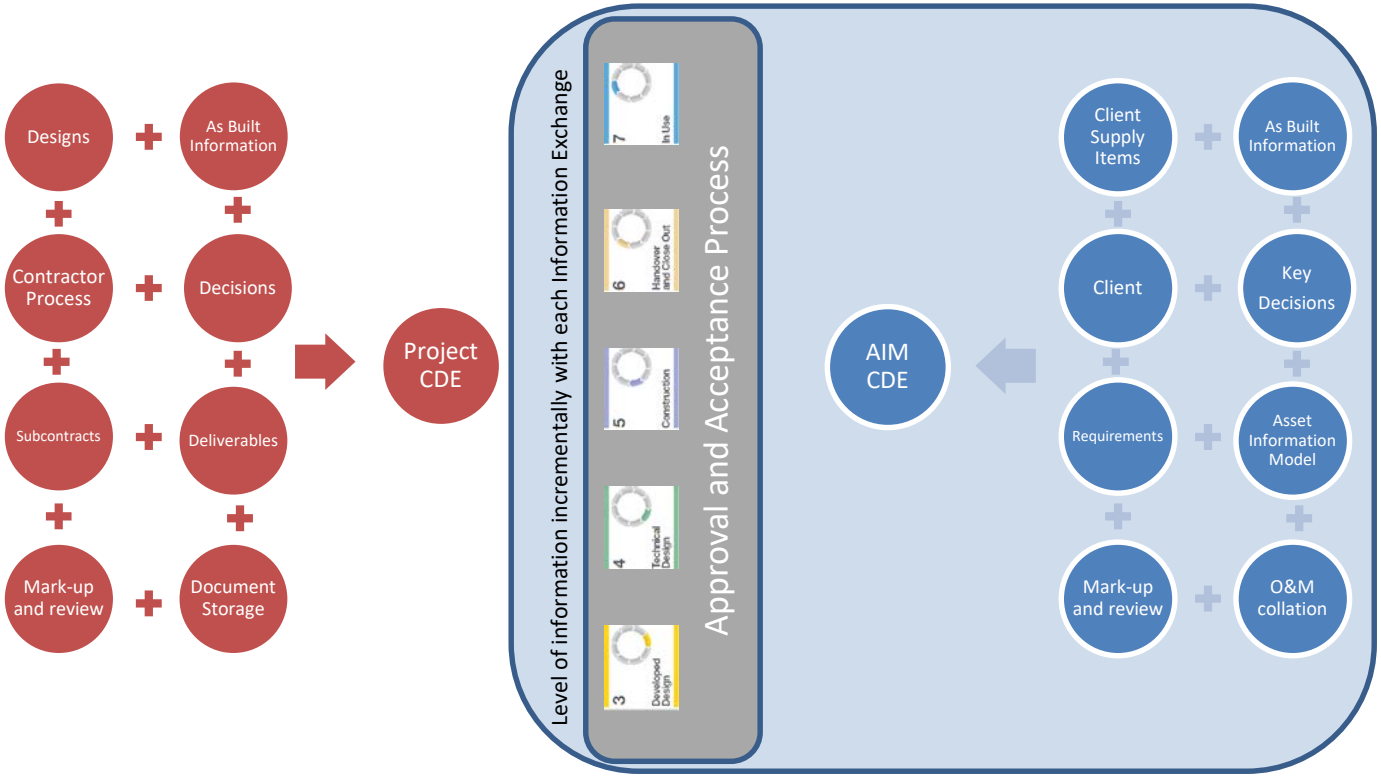
Common Data Environment for Projects & for AIM



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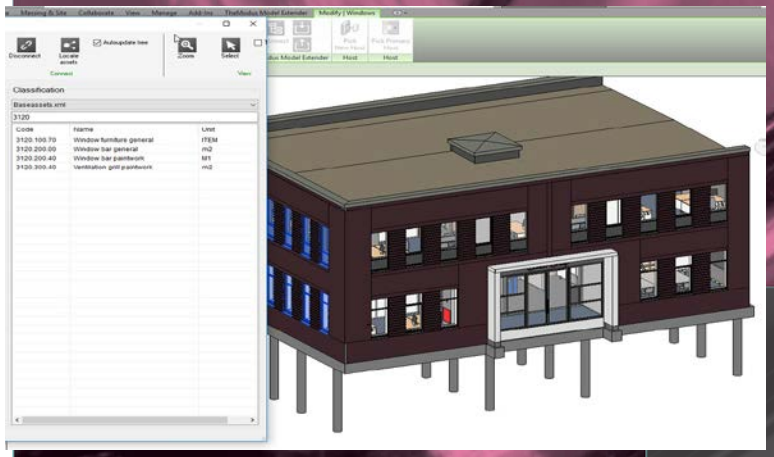
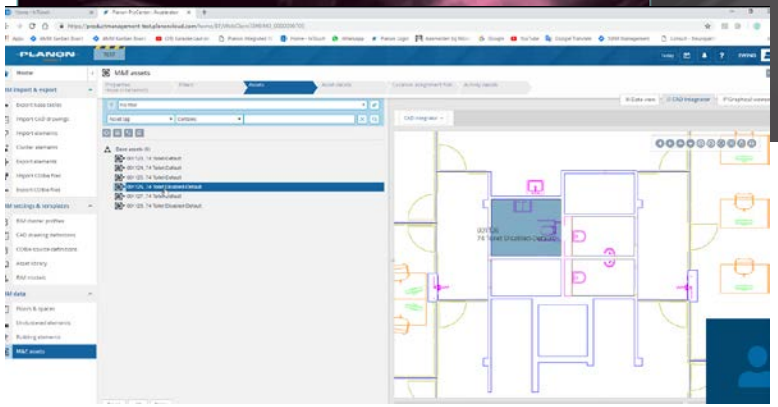
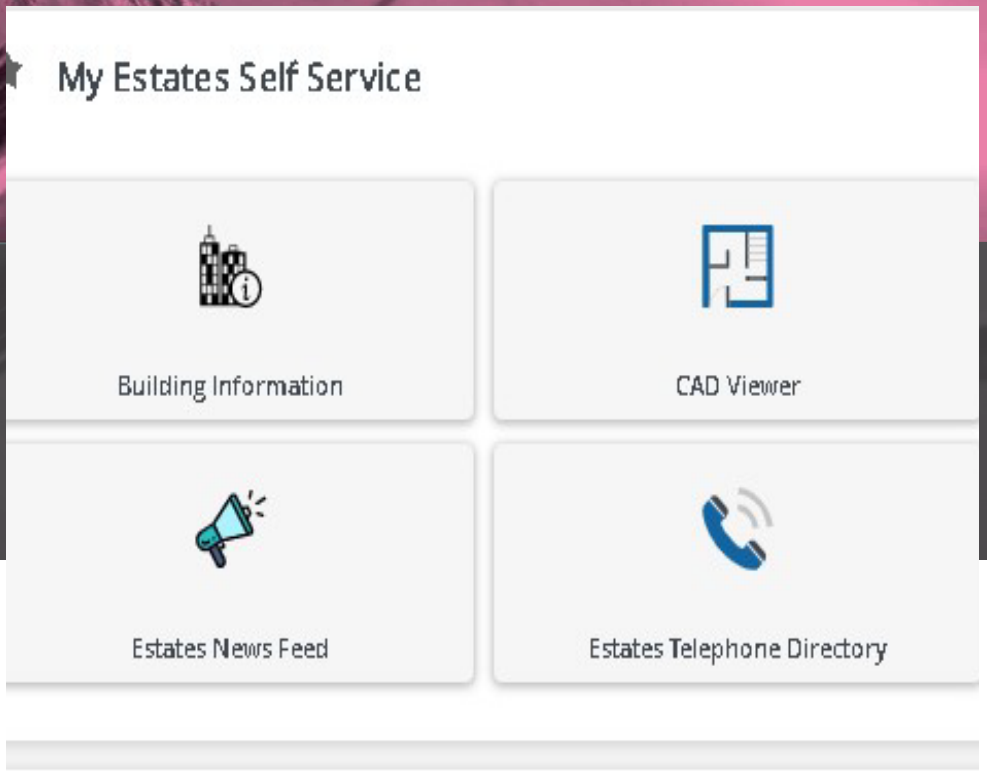
Systems Integration with Planon/CAFM







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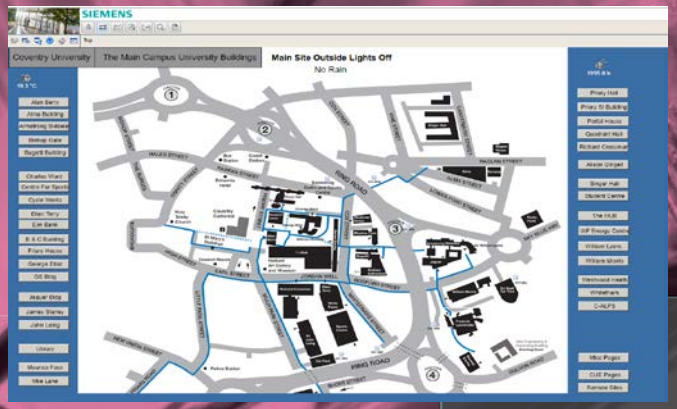
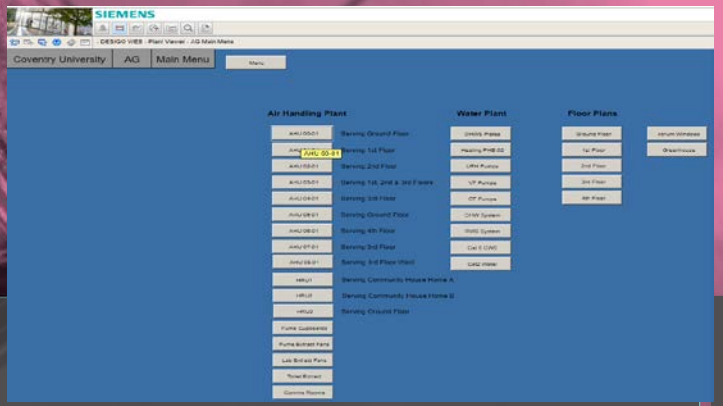
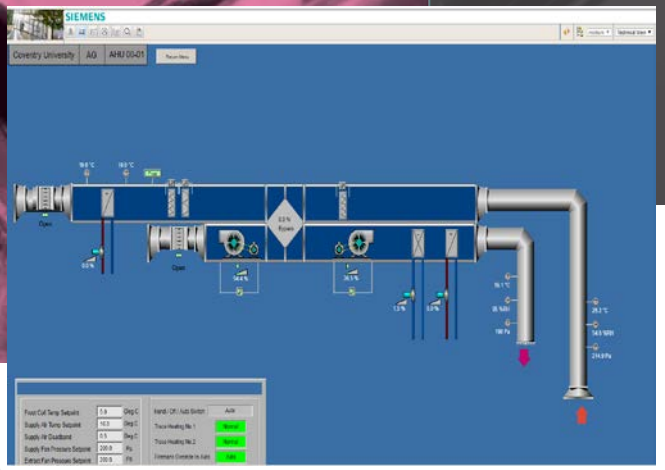
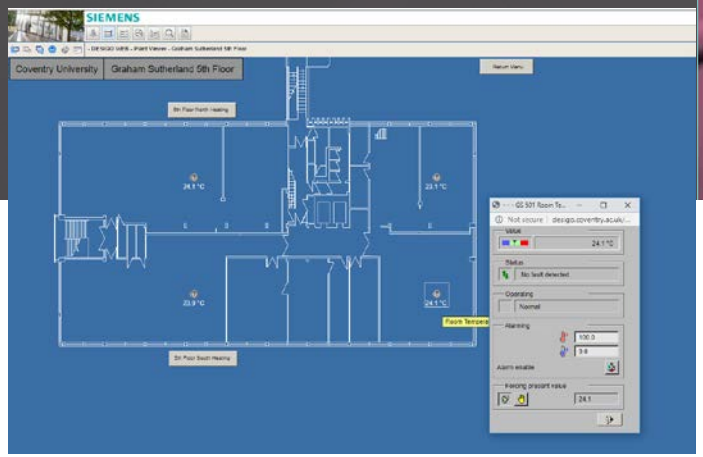
Systems Integration with Desigo/BMS









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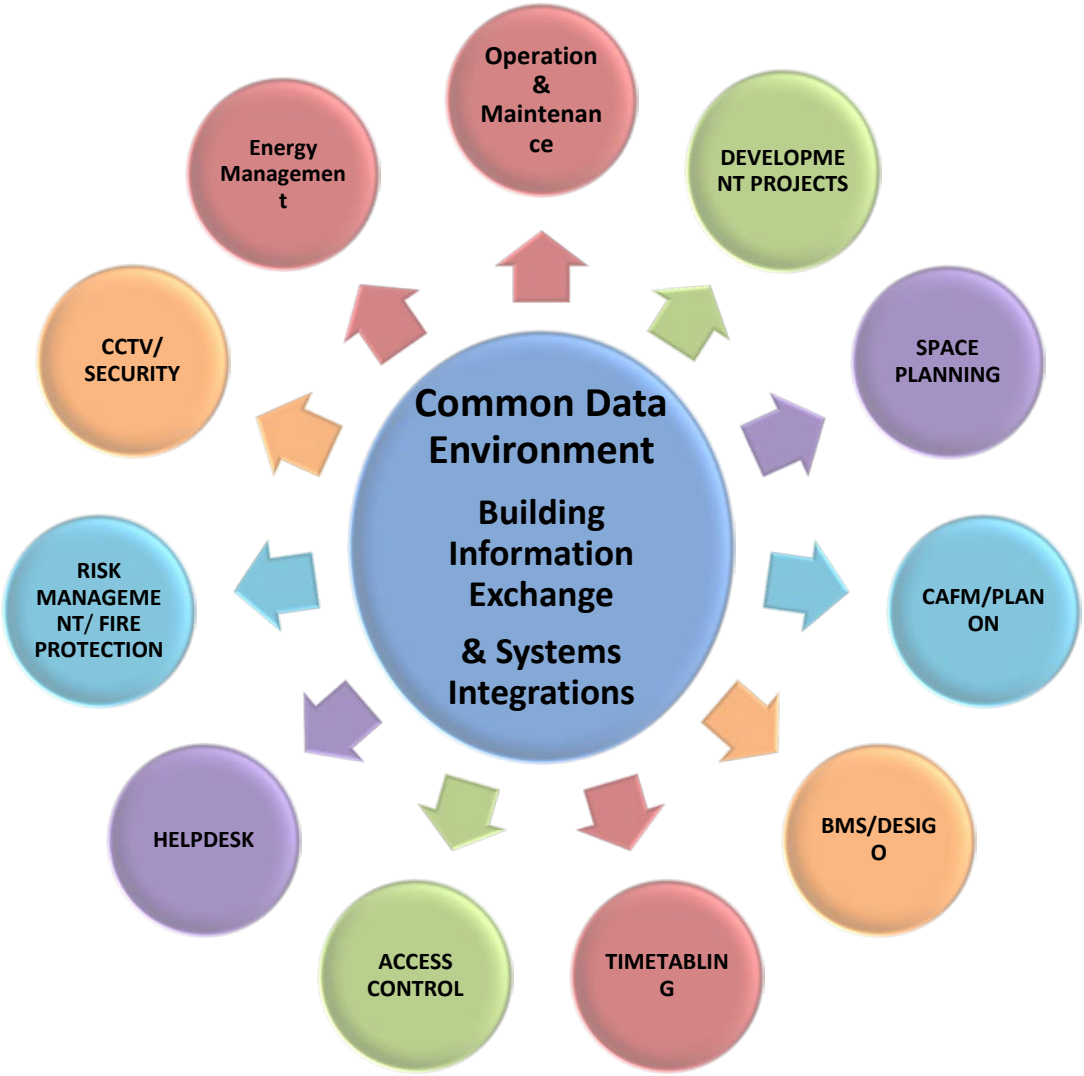
Future of Estates Digital Integration



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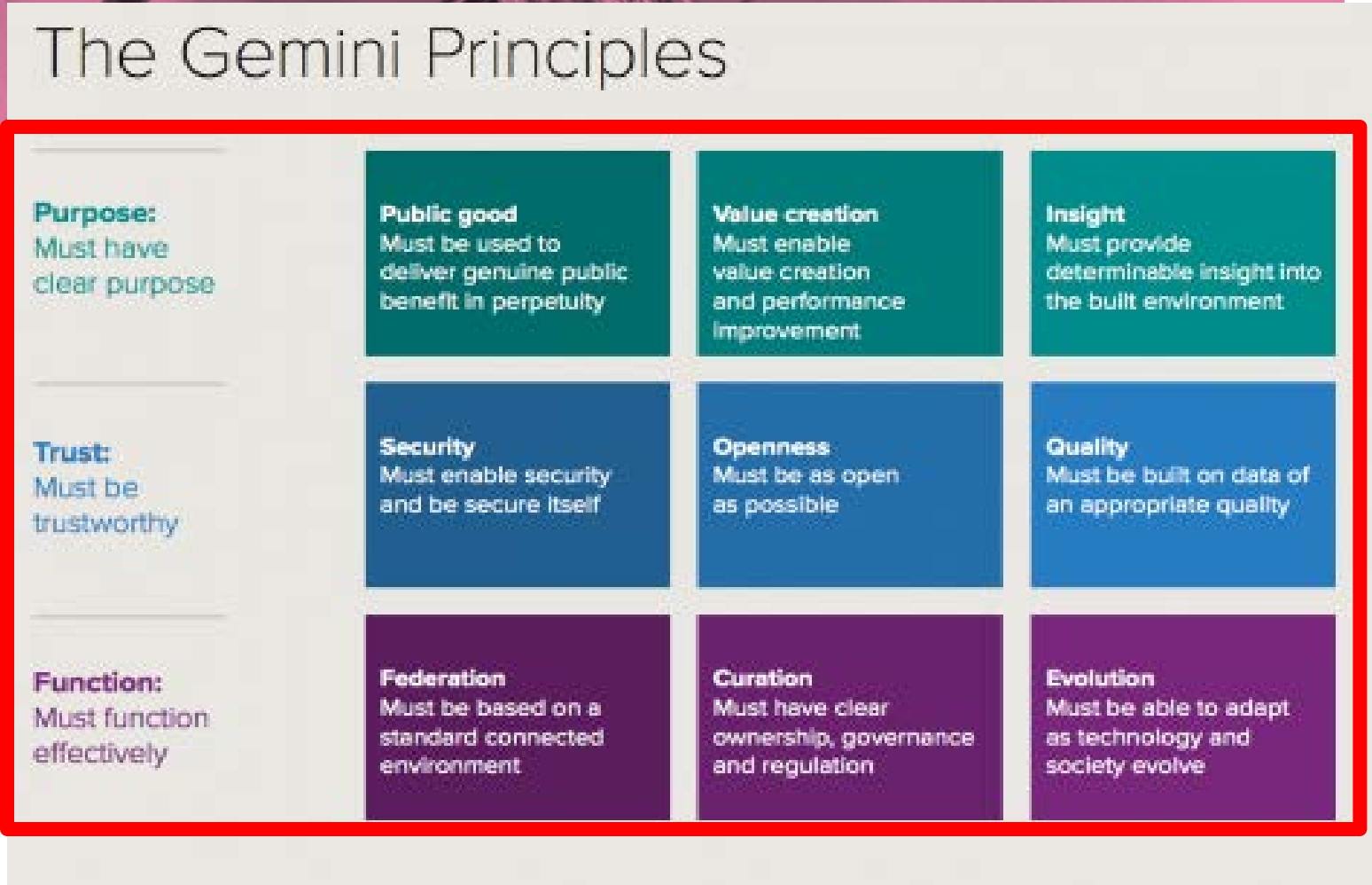
Digital Twins

The Gemini Principles2 define a digital twin as "a realistic digital representation of assets, processes or systems in the built or natural environment".



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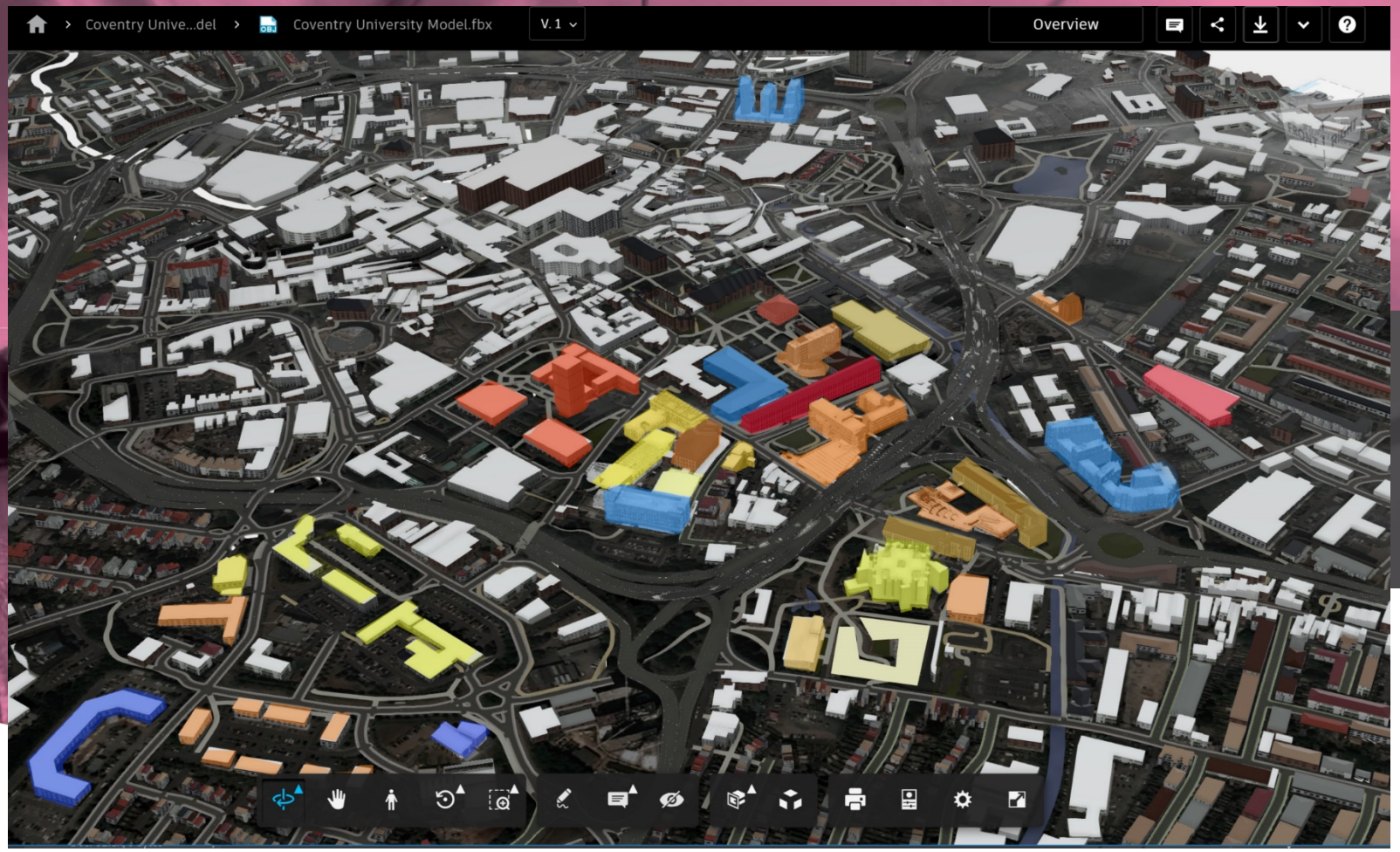
Coventry University Digital Campus



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System VS USER

Users make it work!

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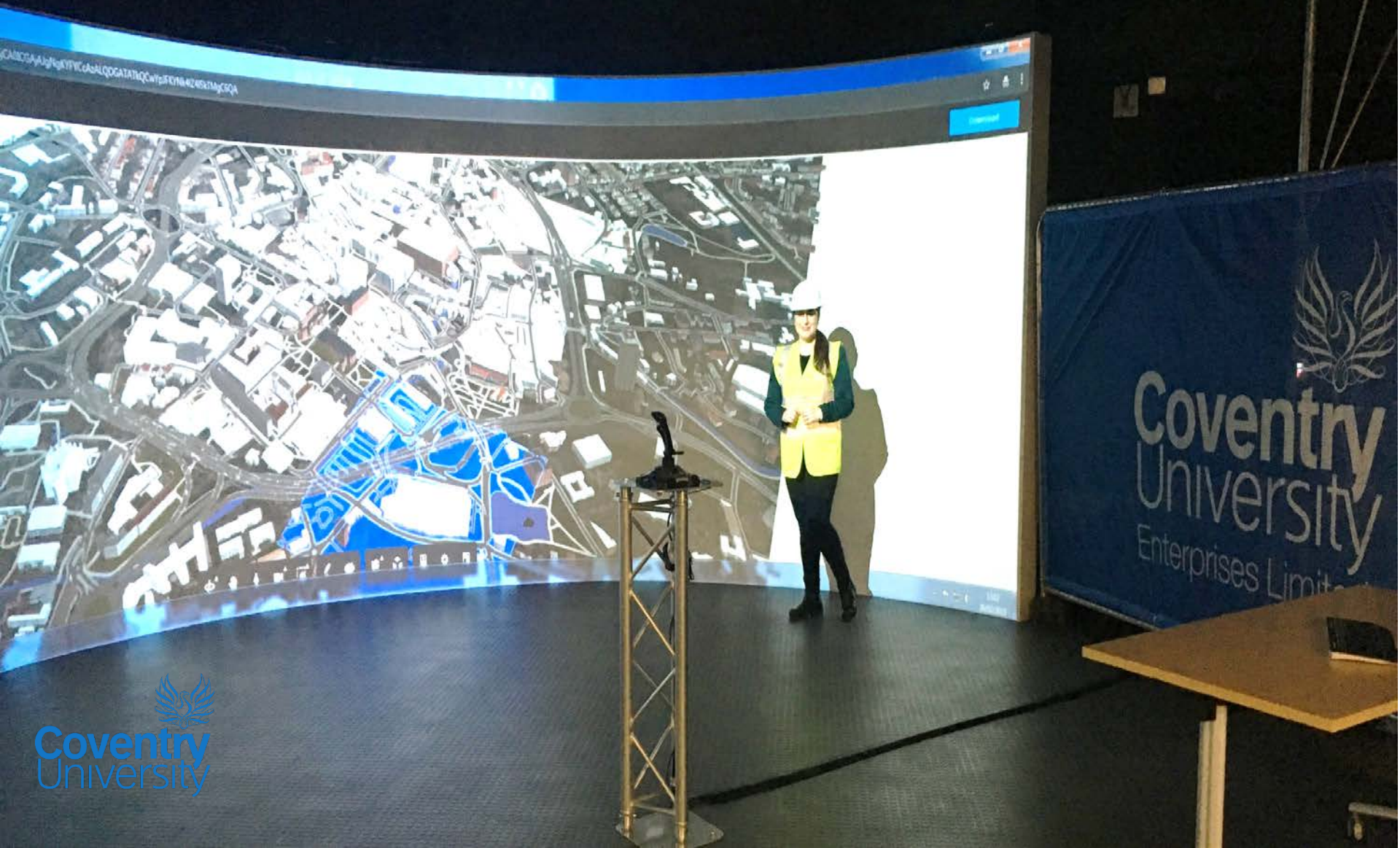
Continuous Development Simulation Centre



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Continuous Development
City Campus – Digital Estates

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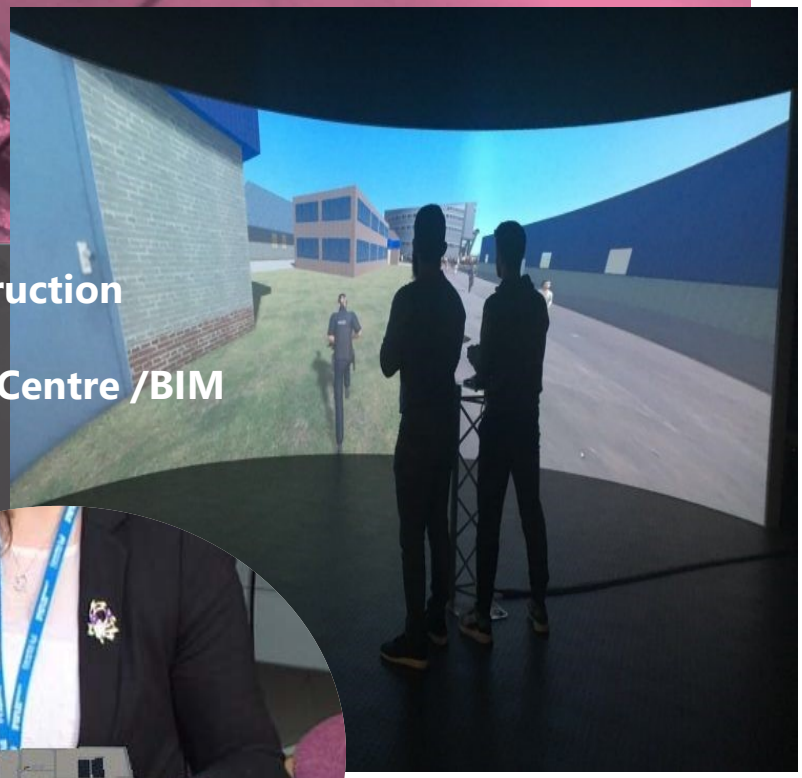
Summery
CU Digital Estates

- **Better Information Management**
- **Central Location for Data**
- **Digitised Campus**
- **Asset Management Procedures/Tags/Barcodes**
- **System Governance**
- **Research & Teaching – Online MSc BIM and Construction Management**
- **Virtual Reality & Augmented Reality – Simulation Centre /BIM Cave**
- **AWARDS! (BSL + SEED RISE AWARD)**
- **UK BIM ALLIANCE COMMUNITIES LEAD**
- **BIM4ESTATES Group**
- **CDBB Digital Twin HUB**



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CitA | TECHLIVE 2020

Digital Twins

Thank you

Hadeel Saadoon – Estates Digital Services BIM Manager

Twitter : @hadeelsafaa @BIM4Estates

The CitA Virtual Summit: **Changing the way we work**

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