

COBie ...and the Demanding Client

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- **37 years in architecture and construction**
- **30 years in what is now called BIM**
- **Joined AEC3 UK Limited in 2010**
- **Involved in advising UK Government BIM Task Group on:**
 - **2016 Level 2 BIM Strategy**
 - **2025 Level 3 BIM Strategy**
- **Development of UK Standards**
- **Participate in UK Government funded research and development projects**
- **Consulting to the AEC industry**

- **Why are clients/owners interested in standards?**
- **The asset (object) based approach.**
- **The role of COBie**

The role of standards and the use of COBie as a data exchange mechanism

- **Free wisdom and future proofing**
 - A great deal of useful knowledge is available defining best practices.
 - Knowing your processes and communication media will continue to be accepted.
- **Better supply/service chain relationships**
 - Ease and quality of communication and delivery between systems.
- **Benchmarking and comparisons**
 - Repeatability of process.
 - A standard to benchmark against.
 - Like for like comparisons.

Facilities must be better ...

- Designed and Specified
- Constructed
- Used

- Lean production and logistics
- Just-in-time and logistics
- Off-site assembly
- Whole life cycle costs
- Whole life cycle environmental impacts
- Energy monitoring and rating
- “Improved value, carbon and cost”

“Government as a client can derive significant improvements in cost, value and carbon performance through the use of open sharable asset information”



The BIM Task Group

- **Valuable:** the overall aim is to maximise client value
- **Understandable:** the approach is to be presented in an understandable learning package for all 44,000 government asset procurers.
- **General:** the approach is equally applicable to buildings and infrastructure, whether large or small.
- **Non Proprietary:** All requirements are non-proprietary as to applications and as to the required formats of the deliverables.
- **Competitive:** Wherever possible, there are at least two solutions or methods available, so as to minimise market influence in terms of anti competitive clauses.
- **Open:** Wherever possible, low-cost methods are to be made available to allow all stakeholders to participate, irrespective of size and experience, so as to minimise barriers to involvement.
- **Verifiable:** All contractual expectations are documented with transparent and testable measurement of pass/fail.
- **Compliant:** Measurement of Whole Lifecycle Cost/Carbon/Sustainability/etc. are to published UK, EU and ISO standards.
- **Implementation:** The approach is self funding by the industry.
- **Timescale:** The approach is phased in over 5 years.

The UK Government BIM initiative is founded on expecting open, structured, object-based data from the supply chain.

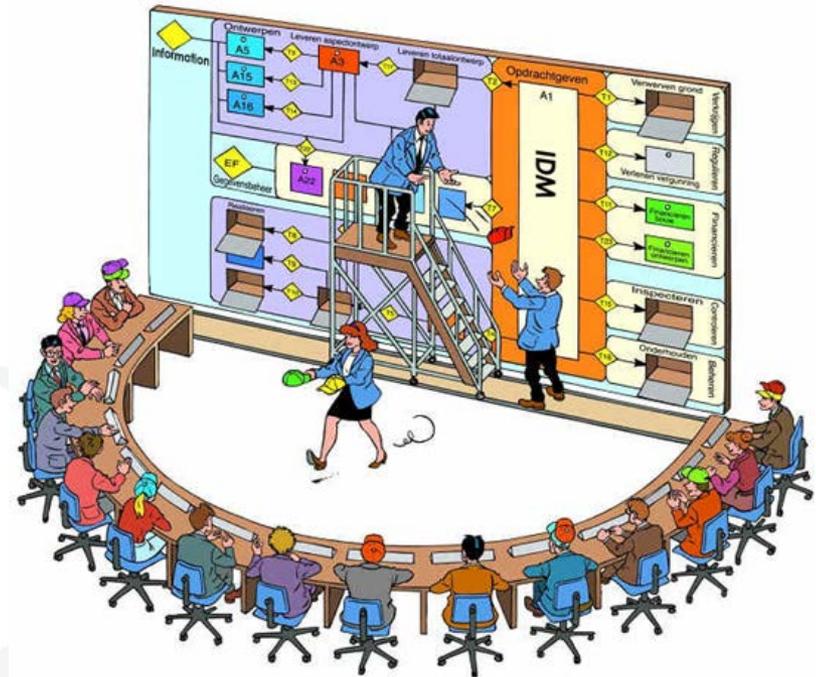
The fundamental reasons are indicated in the “Construction Strategy 2011” report as being to support:

- **Comparisons of performance and cost between projects, assets, systems and zones.**
- **Better portfolio, facility and asset management from the use of detailed information.**
- **Checking and analysis of data to create, repeat and improve processes.**

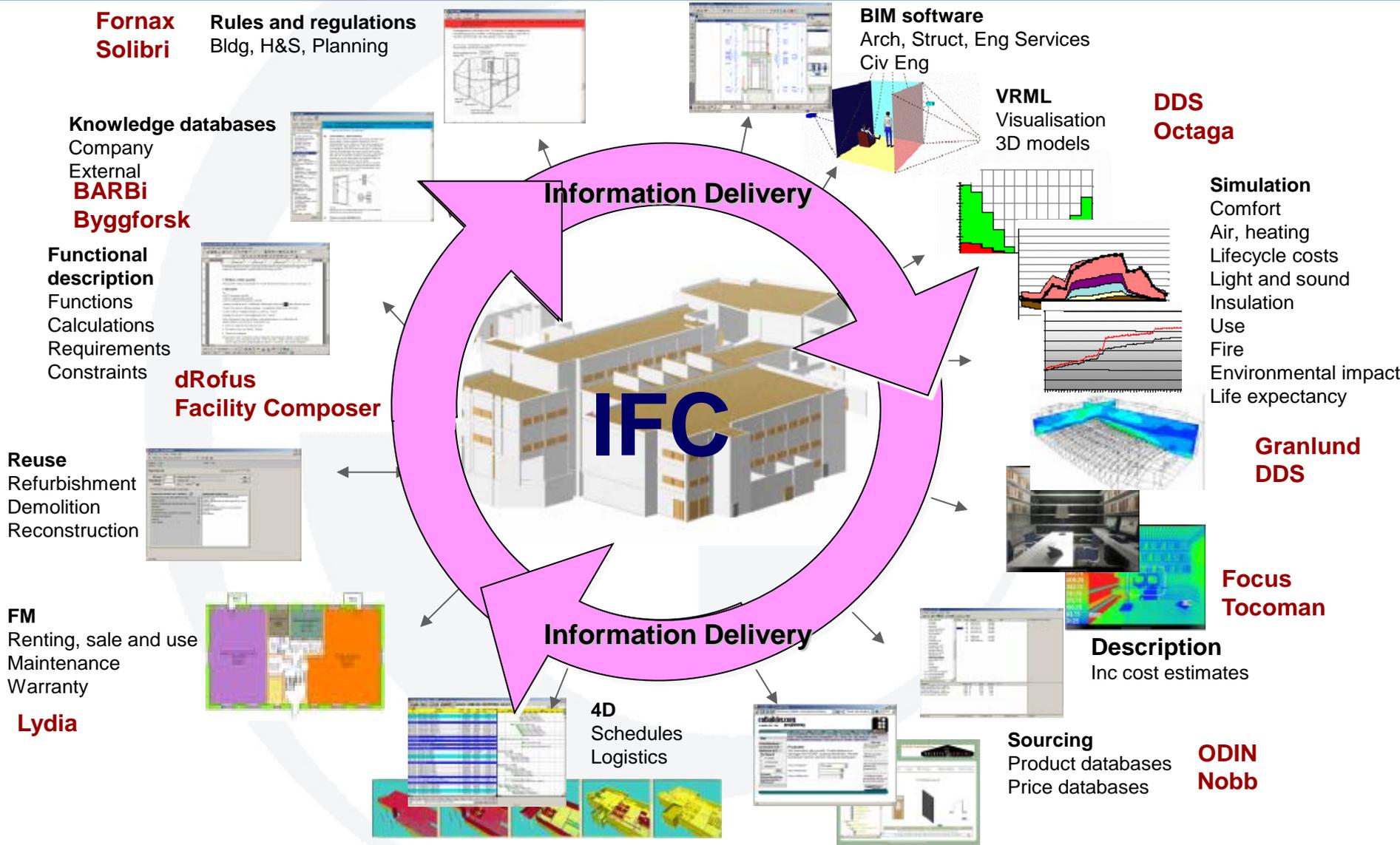
Purposes of Optimised Management of Assets

	Purpose	Detail	BSI Pas 55 references
P01	Registration	Registration of assets to support accurate audit and reporting. This includes GIS, land and address identification for the facility. It includes spaces and zoning, including stacking or sectoring, and components and systems and typing.	4.5.1a, 4.4.6, 4.6.6, 4.5.1.3
P02	Use and utilisation	Documentation of the intended use, capacity and utilisation of the Facility to support comparisons of actual use and utilisation and portfolio management. It also supports improved briefing for future projects. Includes data for any soft-landings usage review	4.5.1b, 4.5.1 i, 4.5.1.4
P03	Operations	Information necessary for the normal operations of the building to support the facility operators and the owner to anticipate costs of operations.	4.5.1 i, 4.5.1.2, 4.6.1
P04	Maintenance and repair	Information on the recommended maintenance tasks including planned preventative maintenance to support the facility operators the owner to anticipate costs of maintenance.	4.5.1c, 4.5.1.2, 4.5.1.5, 4.5.2
P05	Replacement	Information on the reference or expected replacement service life and costs should be available to the facility operators and to the owner to anticipate costs of maintenance.	4.5.1.7
P06	Assessment and re-use	Information on factors to support the management of the end of use stage, whether resale, tenancy release or demolition.	4.5.1d, 4.5.1.6
P07	Impacts	Economic and environmental (but not social) impacts	4.5.1 iii
P08	Business case	Information to support the on-going evaluation of the business case for ownership of the facility, as required during the design development gates. Continuously review is the primary driver for the intermediate 'Drops'.	4.5.1
P09	Security and surveillance	Information to support the management of the security and surveillance of the facility, excluding sensitive parameters.	4.4.7
P10	Regulation and Compliance	Information to help ensure the health and safety (H&S and CDM) of the users of the facility, such as known issues and sub-optimal configurations.	4.5.1 iii, 4.6.2, 4.4.8

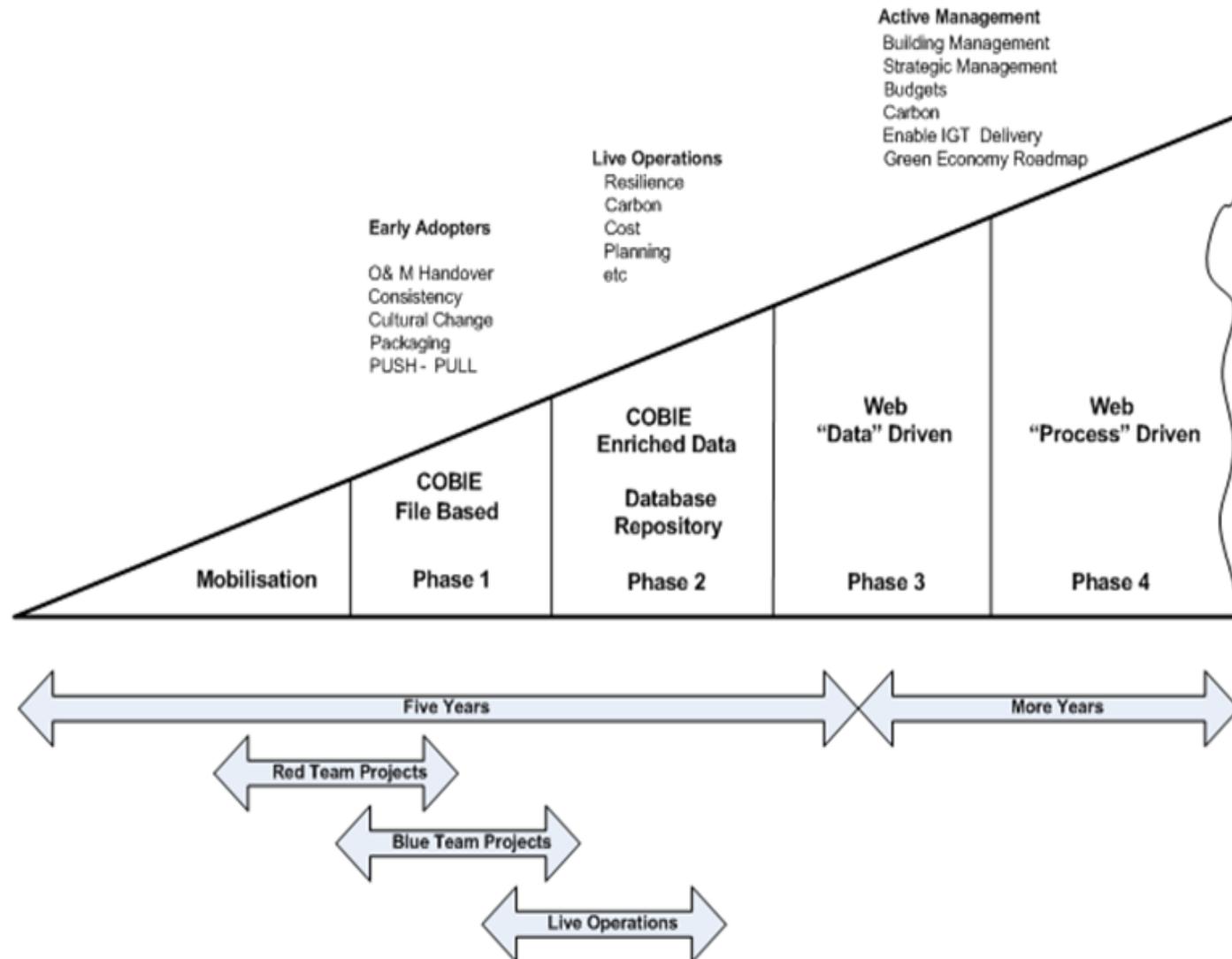
- **Sharing**
- **Structured**
- **Information**
- ... not documents
- One **input** ...
 - Many **outputs** ... and new applications for the data
 - Many **checks** ... and automated checking
 - Many **workflows** ... and more interoperability



Information Delivery Cycle

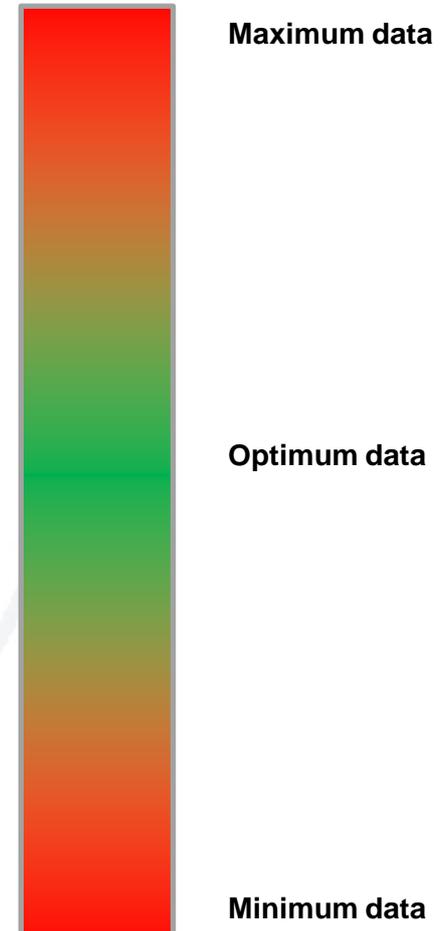


The UK Government Implementation Plan



- **The digital Plan of Work (dPoW)**
- A generic schedule of phases, roles, responsibilities, assets and attributes, made available in a computable form.
- **Employer's Information Requirements (EIR)**
- A pre-tender document setting out the information to be delivered, and the standards and processes to be adopted by the supplier as part of the project delivery process.

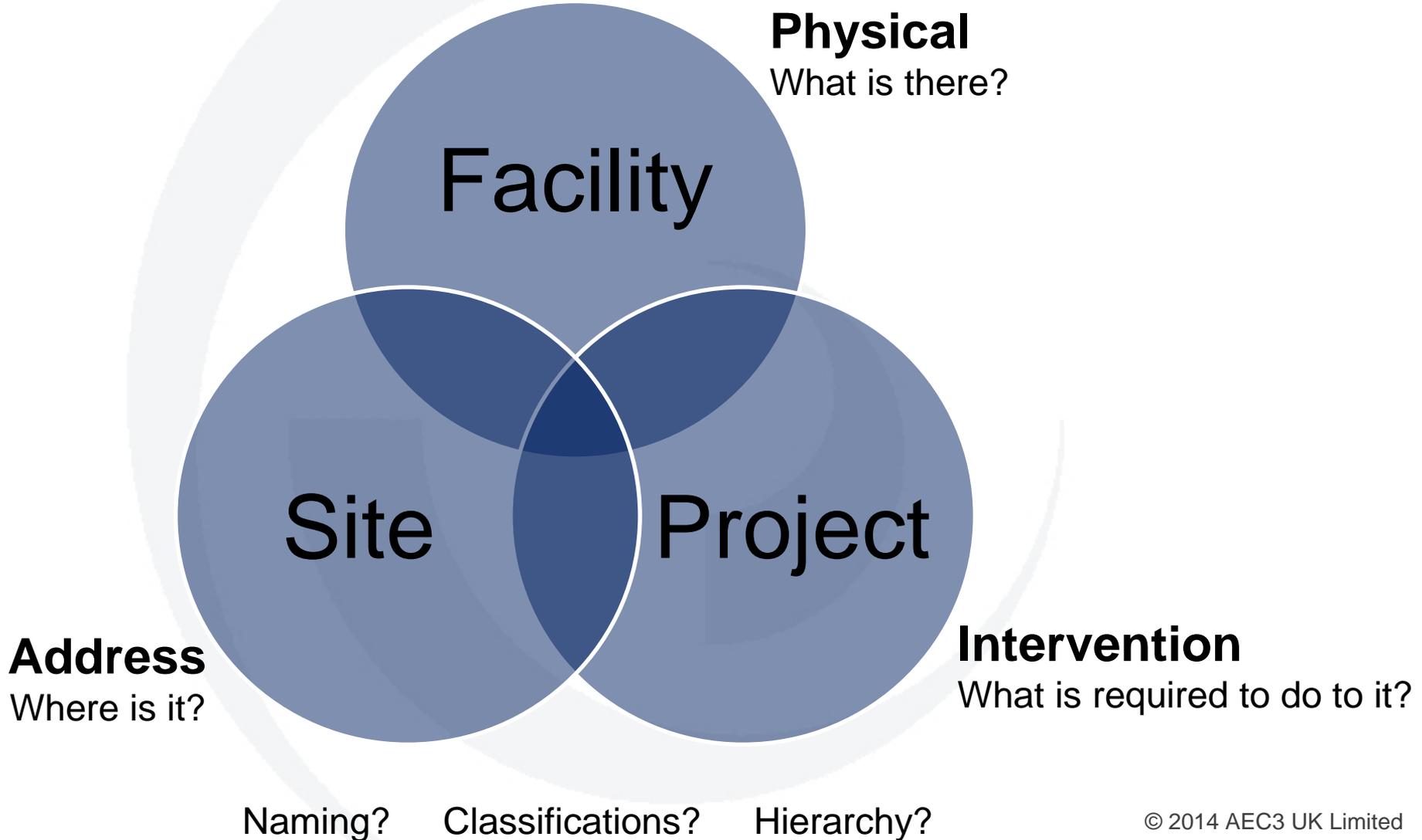
- **Maximum data content**
 - COBie can hold most of the non-graphic data from any BIM
- **Best practice development**
 - Optimising the data content
- **Minimum Data content**
 - Use of dPoW and process maps to plan and agree repeatable work.

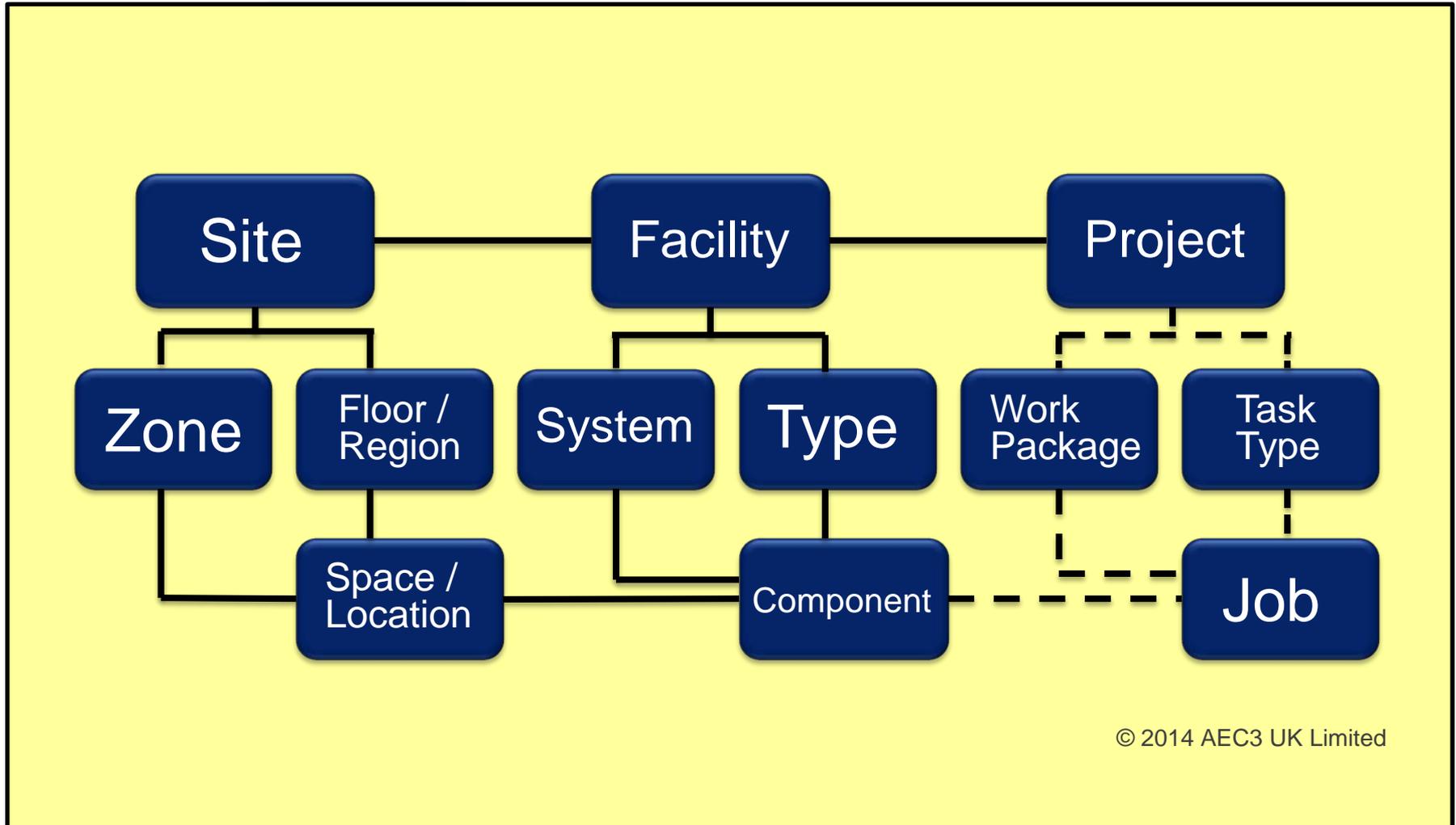


The asset (object) based approach.

Addresses, facilities and projects.

Naming, classifications and hierarchy.





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The role of COBie

A better suitcase,
Independent of 3D/2D

industry led creation of COBIE format



National Institute of Building Sciences
Facilities Information Council
National BIM Standard



- A subset of BS ISO 16739 IFC documented as a buildingSMART model view definition (MVD) which includes operational information
- A smaller subset of BS ISO 16739 IFC is documented as a buildingSMART MVD named "Basic FM Handover" which excludes operational information needed for handover but can be used during design and construction.

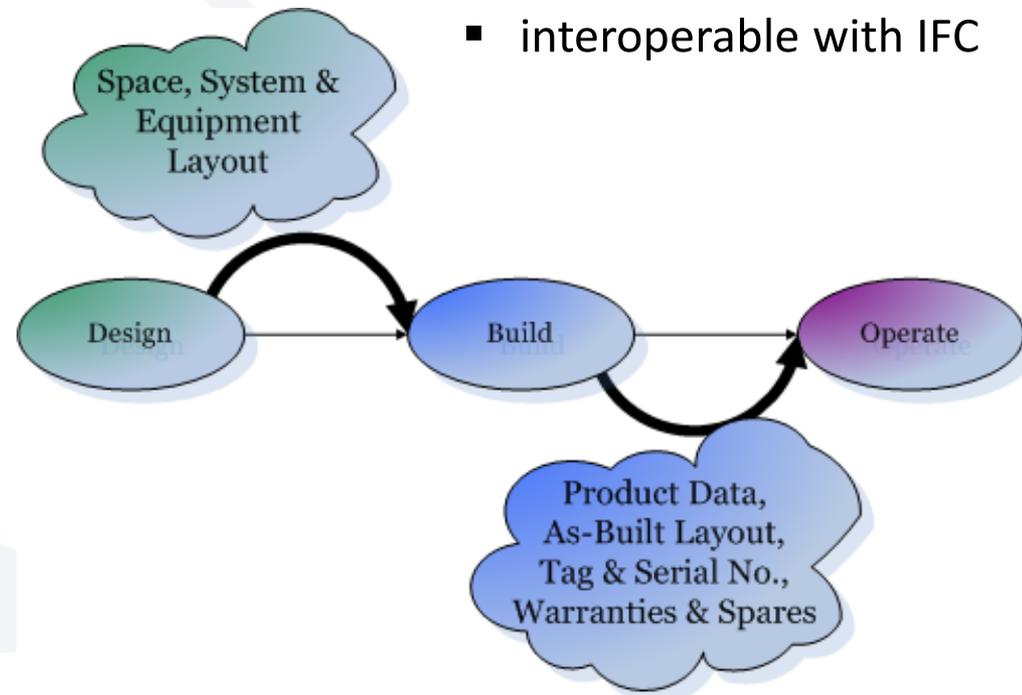
where is COBie2 required ?

- designer deliverable
- construction handover specification
- construction commissioning specs

easy to use

- spreadsheet
- each party adds only their part
- interoperable with IFC

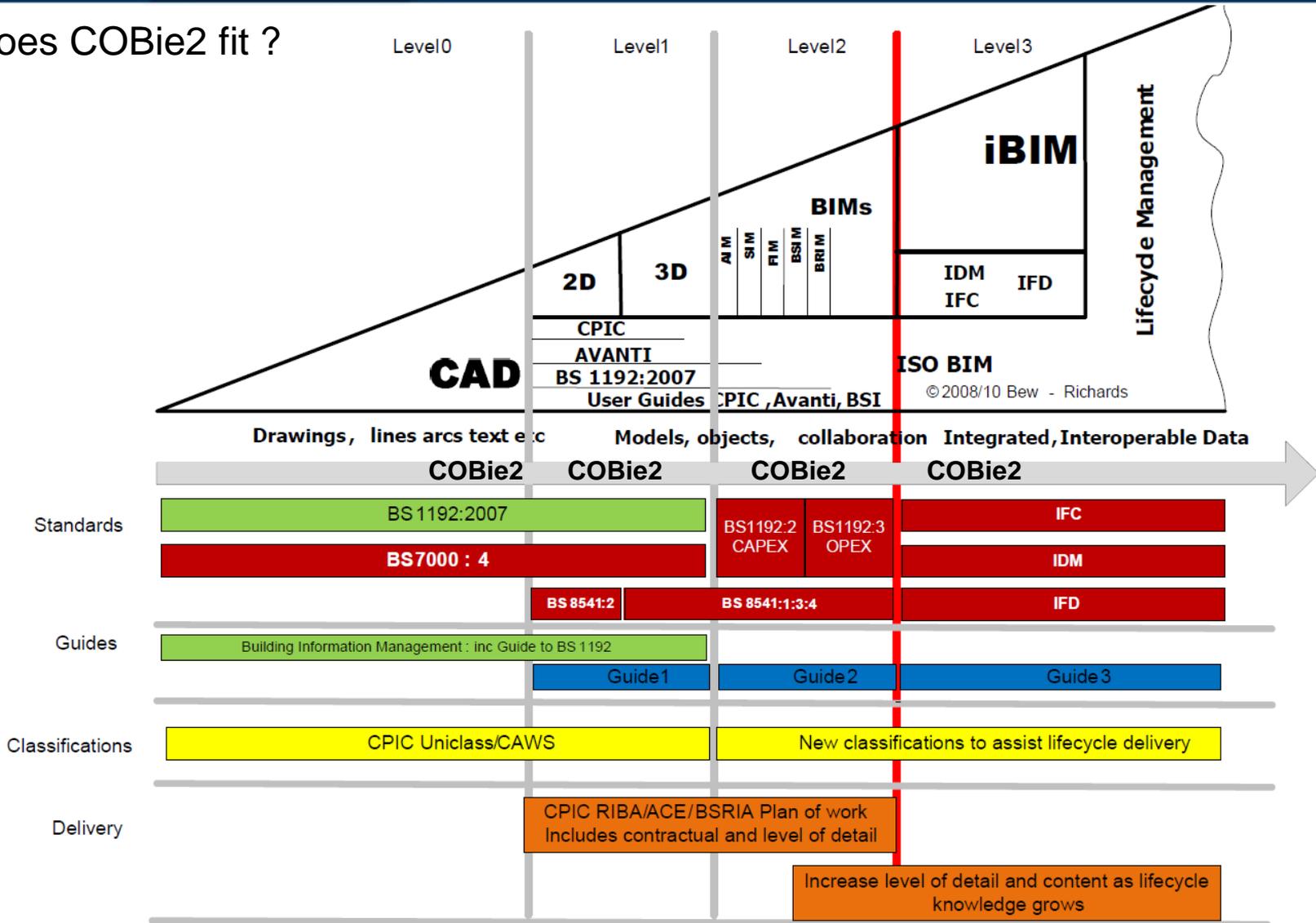
- capture data as you go
 - design
 - construction
 - commissioning



- The COBie file's main layout is determined by the requirements of the client and the design requirements of the designers.
- This is filled out extensively by the contractors and sub-contractors with the appropriate information.
- This information is then given back to the client/owner and forms the information they requested; making it easier to manage and it can start from an earlier date.

Relationship of COBie2 to the BIM wedge

- Where does COBie2 fit ?



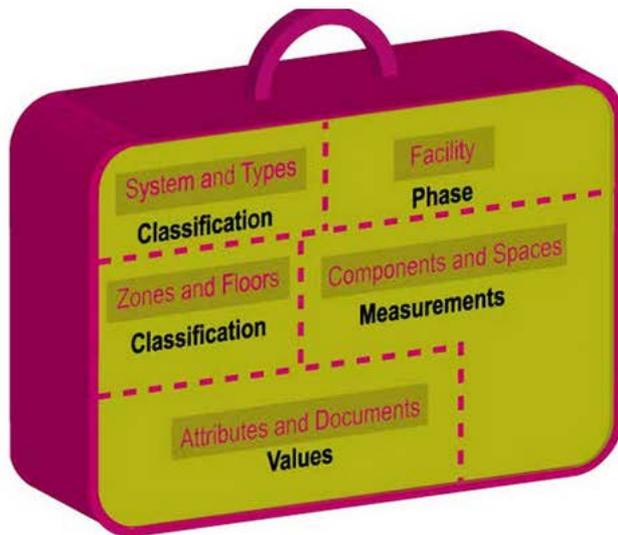
- The fundamental point of COBie is that it is a change in the delivery of handover documents to the client.
- An aggregate of data which is built-up over time; not a dump of information at the end.
- It requires users at all stages to contribute and therefore requires a significant amount of collaboration from all members throughout the lifecycle of a project, not just work at the end.
- This change not only affects the output but also the process too.

Collaborative production of information

Part 4: Fulfilling employer's information exchange requirements using COBie – Code of practice



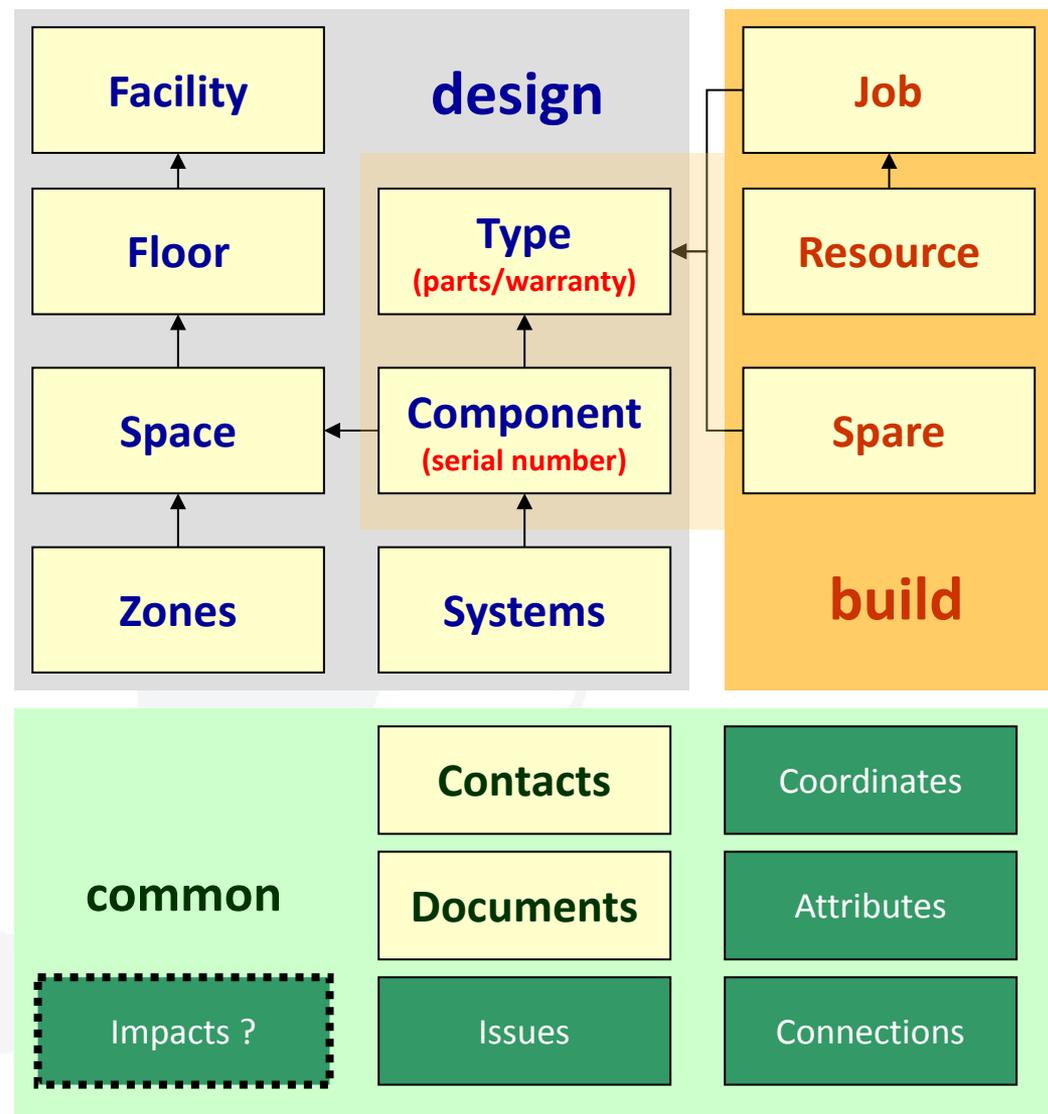
Coping with COBie - think "well appointed suitcase" to underpin BIM data sharing



- Metaphor: Phil Jackson
- Words: Nick Nisbet
- Illustration: Moni M

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- Design
 - Build
 - Common
-
- Skeleton
 - Physiology
 - Muscle



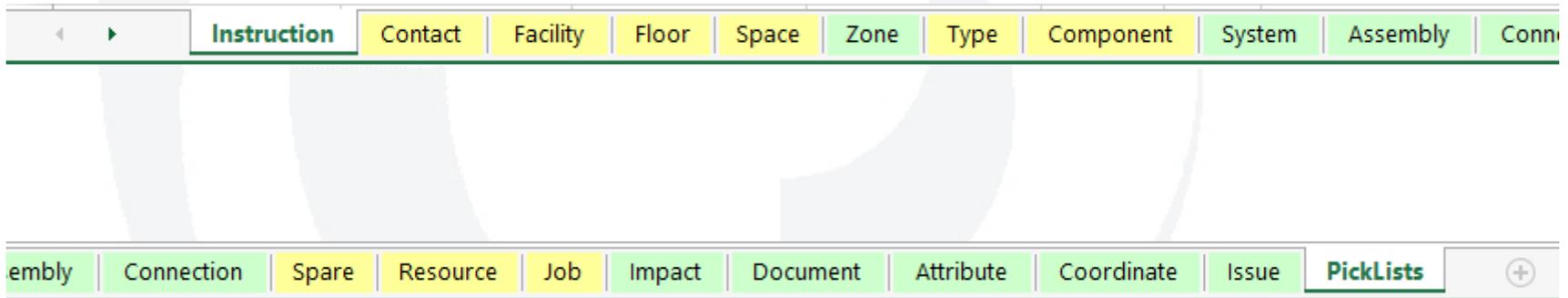
Title	COBie
Version	2
Release	4
Status	IFC2x3
Region	en-GB

Introduction sheet



Title	COBie						
Version	2						
Release	4						
Status	IFC2x3						
Region	en-GB						
Purpose		From	Till	Count	Ratio	Key	This spreadsheet supports the exchange of facility, physical and spatial information through the life of the project.
Outline		1900-01-00T00:00:00	1900-01-00T00:00:00	0	0.00	Additional information per Object	Individual worksheets are organized by project phase as shown below
All Phases	Sheet	From	Till	Count	Ratio	Key	Contents
	Contact		0	0	0	0	Contacts per Object People and Companies
Early Design Worksheets	Sheet	From	Till	Count	Ratio	Key	Contents
	Facility	1900-01-00T00:00:00	1900-01-00T00:00:00	0			
	Floor	1900-01-00T00:00:00	1900-01-00T00:00:00	0	0.00	Floors per Facility	Vertical levels and exterior areas
	Space	1900-01-00T00:00:00	1900-01-00T00:00:00	0	0.00	Spaces per Floor	Spaces
	Zone	1900-01-00T00:00:00	1900-01-00T00:00:00	0	0.00	Spaces per Zone	Sets of spaces sharing a specific attribute
	Type	1900-01-00T00:00:00	1900-01-00T00:00:00	0	0.00	Components per Type	Types of equipment, products, and materials
Detailed Design Worksheet	Sheet	From	Till	Count	Ratio	Key	Contents
	Component	1900-01-00T00:00:00	1900-01-00T00:00:00	0	0.00	Components per Space	Individually named or schedule items
	System	1900-01-00T00:00:00	1900-01-00T00:00:00	0	0.00	Components per System	Sets of components providing a service
	Assembly			0	0.00	Assemblies per Object	Constituents for Types, Components and others
	Connection			0	0.00	Connections per Object	Logical connections between components
	Impact			0	0.00	Impacts per Object	Economic, Environmental and Social Impacts at various stages in the life cycle
Construction Worksheets	Sheet	From	Till	Count	Ratio	Key	Contents
							Note: submittals and approvals added on Documents Note: manufacturer and model added on Type Note: serial and tag added on Component
Operations and Maintenance	Sheet	From	Till	Count	Ratio	Key	Contents
	Spare			0	0.00	Spares per Type	Onsite and replacement parts
	Resource			0	0.00	Resources per Type	Required materials, tools, and training
	Job			0	0.00	Jobs per Type	PM, Safety, and other job plans Note: warranty information added on Type
All Phases	Sheet	From	Till	Count	Ratio	Key	Contents
	Document			0	0.00	Documents per Object	All applicable document references
	Attribute			0	0.00	Attributes per Object	Properties of referenced item
	Coordinate			0	0.00	Coordinates per Object	Spatial locations in box, line, or point format
	Issue			0	0.00	Issues per Object	Other issues remaining at handover.
Legend	Style						Contents
	text						required
	text						reference to other sheet or pick list
	text						external reference
	text						if specified as required
	text						secondary information when preparing product data
	text						Regional, owner, or product specific fields
Configuration							Options
							Regional, owner, or product specific data may be added as new columns to the right of standard template columns. Regional classification codes may be substituted for the specifiable classification picklists.
Copyright and Licence							Aspects
							Copyright (c) 2006-2013 buildingSMART Alliance and buildingSMART UK! COBie is licenced under a Creative Commons Attribution-NoDerivs 3.0 Unported License UK classification tables are included with permission from the rights holders including CIC, CPIC and RICS

A COBie spreadsheet is divided into 20 specific sheets.



- A named distinct operational built or geographic asset, typically a building or section of infrastructure along with details and extent of the geographic site and of the temporal project.
- includes its constituent aspects:
 - **Space (location),**
 - **Floor (region),**
 - **Zone,**
 - **Component,**
 - **Type**
 - **and System**

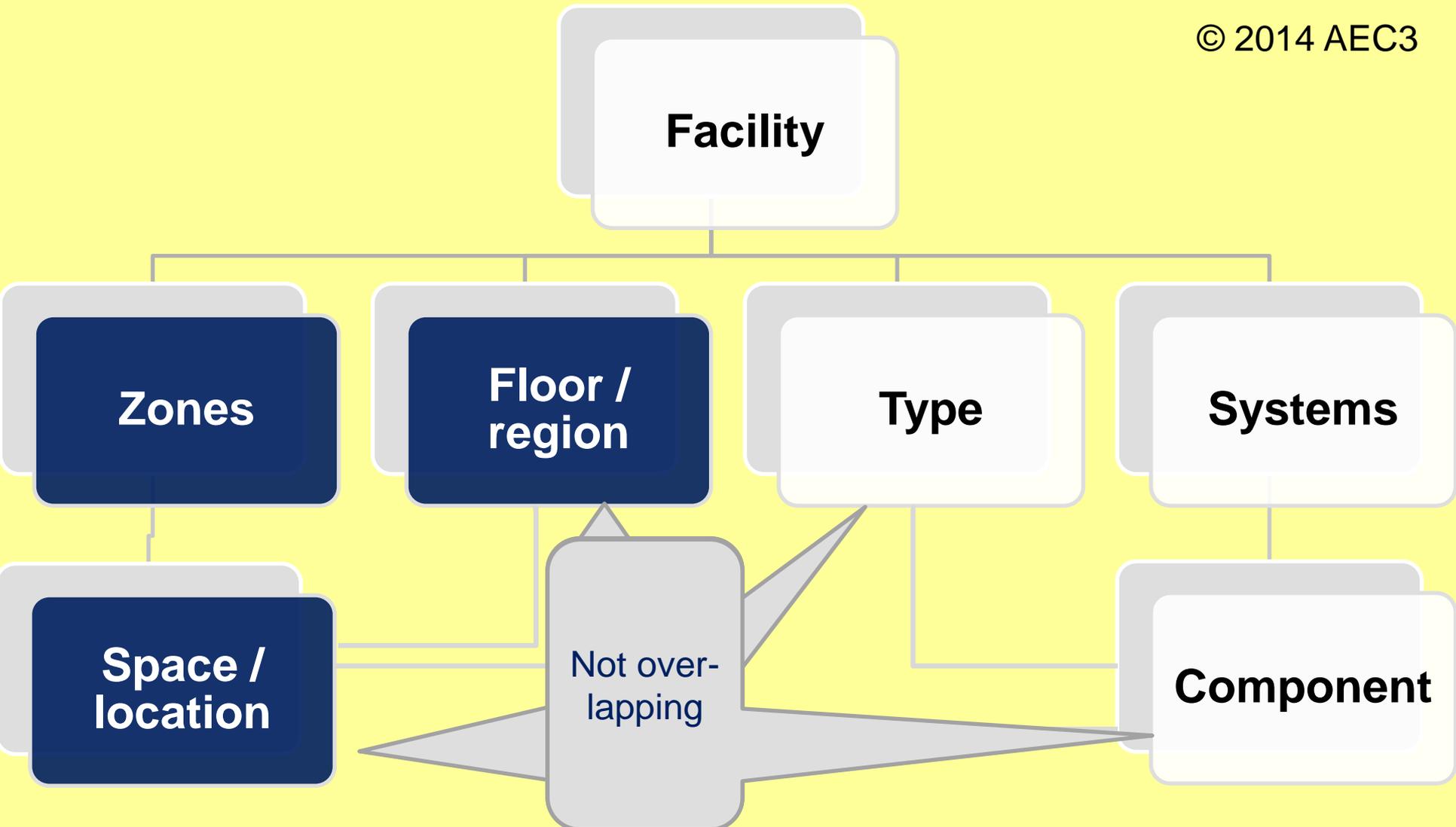
The scope of the information exchange

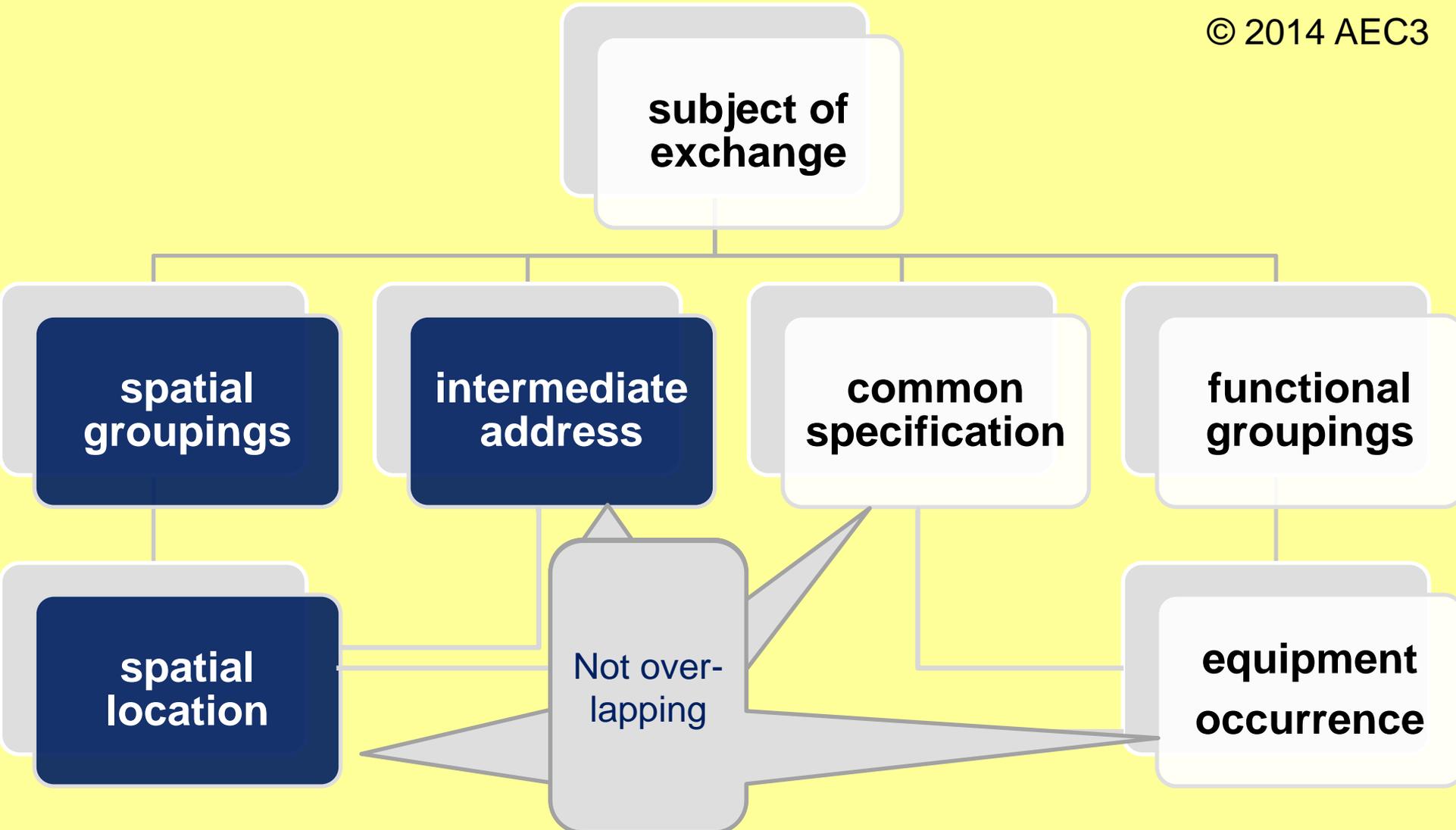
- What is the facility? What is the site? Is there a project?

Column	Facility	Example and Notes
Name	StandardCell	Yellow: Required, checkable data
CreatedBy	nn@aec3.com	
CreatedOn	2012-02-12T11:00:00	
Category	D376 : Detention secure facilities prisons	
ProjectName	StandardCell	Salmon: Keyed in from other sheets
SiteName	StandardCell	
LinearUnits	millimeters	
AreaUnits	squaremeters	
VolumeUnits	cubicmeters	
CurrencyUnits	Pounds	Purple: Required if linked from applications
AreaMeasurement	Indicative	
ExtSystem	AEC3 BimServices	
ExtObject	IfcProject	
ExtIdentifier	1TB8MXxf6BAI7EOFPDWY8	Green: Requirable Fields (see contract specs)
ExtSiteObject	IfcSite	
ExtSiteIdentifier	1TB8MXxf6BAI7EOFPDWYA	
ExtFacilityObject	IfcBuilding	
ExtFacilityIdentifier	1TB8MXxf6BAI7EOFPDWY9	
Description	Standard Cell	
ProjectDescription	StandardCell	
SiteDescription	Crook Wood, Kent	
Phase	CIC 6 : Handover	

rows and columns swapped !

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Floors (regions) such as storeys, roof, and site

Name	CreatedBy	CreatedOn	Category	ExtSystem	ExtObject	ExtIdentifier	Description	Elevation	Height
First Floor	bjerold@je.com	2009-11-04T11:08:38	Floor		IfcBuildingStorey		First (primary) floor	0.00	44.25
Roof	bjerold@je.com	2009-11-04T11:08:38	Roof		IfcBuildingStorey		Roof and roof space	44.25	0.00
Site	bjerold@je.com	2009-11-04T11:08:38	Site		IfcBuildingStorey		Surrounding site	0.00	0.00

Yellow:
Required,
checkable data

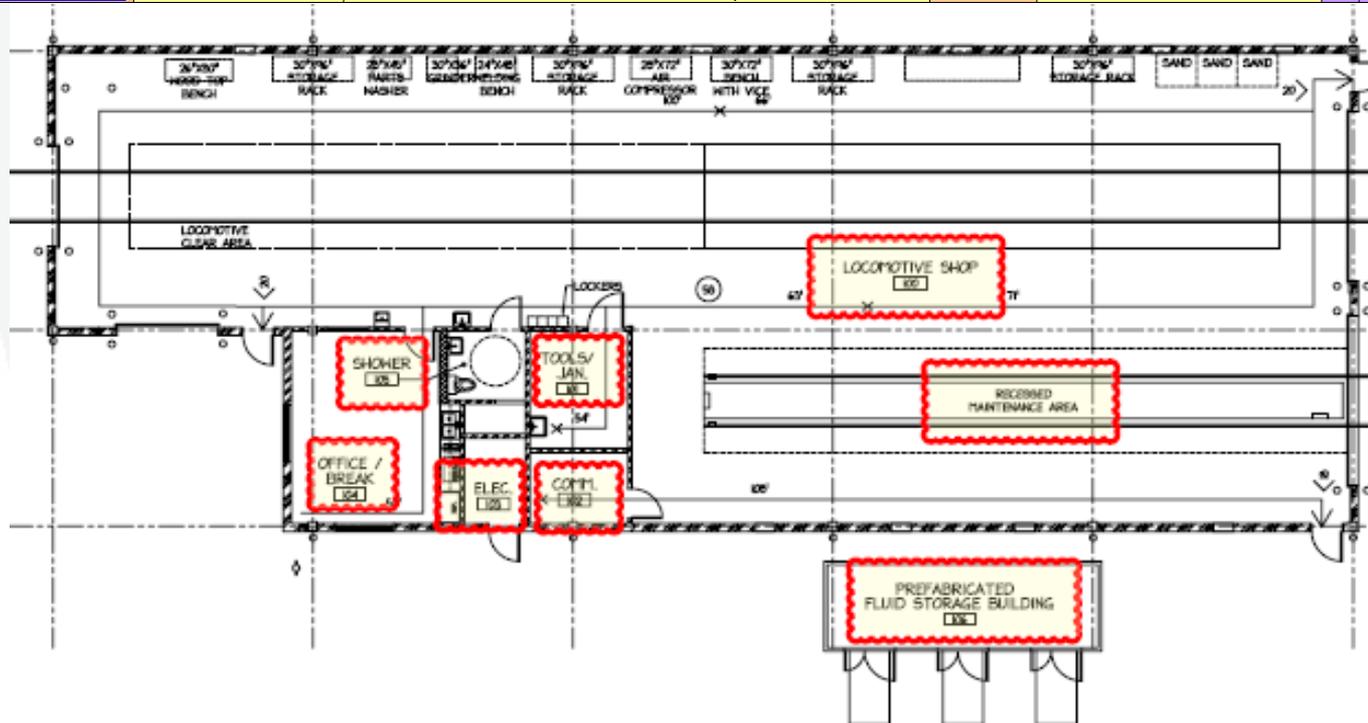
Purple:
Required if linked
with applications

Green:
Requirable Fields
(see contract specs)

Salmon:
Keyed in from other
sheets

Spaces (locations)

Name	CreatedBy	CreatedOn	Category	FloorName	Description	ExtSystem	ExtObject	ExtIdentifier	RoomTag	UsableHeight	GrossArea	NetArea
100A	bierold@je.com	2009-11-04T11:08:38	13-15 21 17: Maintenance Spaces	First Floor	Locomotive Shop		lfcSpace				2880.00	
100B	pmerletta@pmdesigngroup.com	2009-11-04T11:08:38	13-15 21 17: Maintenance Spaces	First Floor	Recessed Maintenance Area		lfcSpace				828.00	
101	pmerletta@pmdesigngroup.com	2009-11-04T11:08:38	13-75: Storage Spaces	First Floor	Tools/Janitor		lfcSpace				54.00	
102	pmerletta@pmdesigngroup.com	2009-11-04T11:08:38	13-81 21 24: Telecommunications Room	First Floor	Communication room		lfcSpace				18.00	
103	pmerletta@pmdesigngroup.com	2009-11-04T11:08:38	13-81 21 21: Electrical Room	First Floor	Electrical Room		lfcSpace				24.00	
104	pmerletta@pmdesigngroup.com	2009-11-04T11:08:38	13-15 11 34 11: Office	First Floor	Office/ Break		lfcSpace				228.00	
105	pmerletta@pmdesigngroup.com	2009-11-04T11:08:38	13-41 11 14 14: Shower	First Floor	Shower		lfcSpace				48.00	
106	pmerletta@pmdesigngroup.com	2009-11-04T11:08:38	13-75 41 99: Other Special Storage Space	Site	Prefab Fluid Storage Bldg.		lfcSpace				144.00	
RF	pmerletta@pmdesigngroup.com	2009-11-04T11:08:38	13-65 11 99: Other Spaces for Protection from the Elements	Roof	Roof		lfcSpace					
EXT	pmerletta@pmdesigngroup.com	2009-11-04T11:08:38	13-91 11 11: Ground Vehicular Travel Spaces	Site	Exterior Pavement		lfcSpace					



Space (Location)

- A named location for activities such as use, inspection or maintenance, including un-occupied or un-inhabitable spaces, but not necessarily inaccessible voids

Floor (Region)

- A named intermediate spatial subdivision, including distinct vertical levels and horizontal areas and sections with Spaces allocated

Zone

- A named set of Spaces (locations) sharing a specific attribute, such as activity, access, management or conditioning

List of major systems and zones

Name	CreatedBy	CreatedOn	Category	ComponentNames	ExtSystem	ExtObject	ExtIdentifier	Description
Overhead Coiling Doors	pmerletta@pmdesigngroup.com	2009-11-04T11:08:38	21-41 51 13 21 00 Exterior Doors	Door-100A,Door-100F,Door-100G,Door-101A,Door-102A,Door-10	ifcSystem			Overhead Coiling Doors as a perimeter security system
Radiant heaters	jenny.kipling@knengrs.com	2009-11-04T11:08:38	21-51 51 12 11: Heat Generation for Single Facility	HP-1,RH-1,RH-2,RH-3,RH-4,RH-5,RH-6,RH-7,RH-8,RH-9,RH-10	ifcSystem			System of Radiant heaters
Ventilation	jenny.kipling@knengrs.com	2009-11-04T11:08:38	21-51 51 16 11: Ventilation	HP-1,RH-1,RH-2,RH-3,RH-4,RH-5,RH-6,RH-7,RH-8,RH-9,RH-10	ifcSystem			Ventilation system
Heat pump	jenny.kipling@knengrs.com	2009-11-04T11:08:38	21-51 51 18: HVAC Distribution	HP-1,RH-1,RH-2,RH-3,RH-4,RH-5,RH-6,RH-7,RH-8,RH-9,RH-10	ifcSystem			Heat pump system
Potable hot and cold	jenny.kipling@knengrs.com	2009-11-04T11:08:38	21-51 31 11 11: Water Supply	OWS-1,WH-1,EEW-1,DF-1,SH-1,SS-1,S-1,L-1,L-2,WC-1,GPLS	ifcSystem			Potable hot and cold water system
Air compressor	jenny.kipling@knengrs.com	2009-11-04T11:08:38	21-81 31 32 41: Compression Equipment	AC-1	ifcSystem			Air compression system
Fire Alarm Systems	bjerold@je.com	2009-11-04T11:08:38	21-51 11 11: Fire and Smoke Detection and Alarm	FCP	ifcSystem			Fire Alarm Systems and monitoring
Electrical Service	wiley.nicky@knengrs.com	2009-11-04T11:08:38	21-51 71 11 14: Electric Service and Distribution for Single Facility	Trans	ifcSystem			Electrical Service system
Fluorescent Fixtures	wiley.nicky@knengrs.com	2009-11-04T11:08:38	21-51 71 15 11: Interior Lighting	YCP	ifcSystem			Internal lighting circuit
Exterior Floods	wiley.nicky@knengrs.com	2009-11-04T11:08:38	21-51 71 15 51: Exterior Lighting	ExtLight,PP,T1,LP,INV	ifcSystem			External lighting system
Power Distribution	wiley.nicky@knengrs.com	2009-11-04T11:08:38	21-71 61 67: Electrical Power Distribution	PowerMH	ifcSystem			Power Distribution system
Comm Outside Plant	wiley.nicky@knengrs.com	2009-11-04T11:08:38	21-71 61 68: Communication Utility Distribution	CommMH,Telecom,	ifcSystem			Comm Outside Plant system
Oil Distribution System	wiley.nicky@knengrs.com	2009-11-04T11:08:38	21-51 31 14 21: Process Systems	P-1	ifcSystem			Oil Distribution System
Oil Distribution System	wiley.nicky@knengrs.com	2009-11-04T11:08:38	21-51 31 14 21: Process Systems	P-2	ifcSystem			Oil Distribution System (continued)
Oil Distribution System	wiley.nicky@knengrs.com	2009-11-04T11:08:38	21-51 31 14 21: Process Systems	P-3	ifcSystem			Oil Distribution System (continued)

- Systems: functional collection of components
- Zones: collections of spaces/locations

Name	CreatedBy	CreatedOn	Category	SpaceNames	ExtSystem	ExtObject	ExtIdentifier	Description
Main Bay	bjerold@je.com	2009-11-04T11:08:38	Occupancy Zone	100A, 100B		ifcZone		Main workshop has high and low areas
Storage	bjerold@je.com	2009-11-04T11:08:38	Occupancy Zone	101		ifcZone		Storage zone
Storage	bjerold@je.com	2009-11-04T11:08:38	Occupancy Zone	106		ifcZone		Storage zone (continued)
Support	bjerold@je.com	2009-11-04T11:08:38	Occupancy Zone	102, 103, 104, 105		ifcZone		Support zone

Import designer's type and document register



Name	CreateBy	CreateOn	Category	Description	AssetType	Manufacturer	ModelNumber	WarrantyGuarantorParts	WarrantyDurationParts	WarrantyGuarantorLabor	WarrantyDurationLabor	WarrantyDurationUnit	ExtSystem	ExtObject	ExtIdentifier	ReplacementCost	ExpectedLife	DurationUnit	WarrantyDescription
Metal Roof Panel	bjeroald@je.com	2009-11-04T11:08:38	23-35 20 14 11 ft. Metal Roof Panels	Metal Roof Panel	Fixed	n/a	n/a	warranty@jroof.com	1	warranty@jroof.com	1	year		objType				gear	Standard manufacturer warranty certificate
Doors frames and Accessories	bjeroald@je.com	2009-11-04T11:08:38	23-30 10: Doors	Doors, frames and Accessories	Fixed	n/a	n/a	warranty@seatacdoor.com	1	warranty@seatacdoor.com	1	year		objType				gear	Standard manufacturer warranty certificate
Overhead Coiling Doors Assem	bjeroald@je.com	2009-11-04T11:08:38	23-30 10 17 27 ft. Overhead Coiling	Overhead Coiling Doors Assembly	Fixed	info@Overhead_Door_Corp.com	810-C600 Slat	warranty@seatacdoor.com	1	warranty@seatacdoor.com	1	year		objType				gear	Standard manufacturer warranty certificate
Insulated Translucent Fiberglass	bjeroald@je.com	2009-11-04T11:08:38	23-30 10 H 21: Translucent Plastic Glazing	Insulated Translucent Fiberglass Panel	Fixed	n/a	n/a	warranty@pkieggroup.com	1	warranty@pkieggroup.com	1	year		objType				gear	Standard manufacturer warranty certificate
Hardware Nems	bjeroald@je.com	2009-11-04T11:08:38	23-30 10 11 Hardware for Doors	Hardware Nems	Fixed	info@securall_Doors.com	HE30604	warranty@northernbath.com	1	warranty@northernbath.com	1	year		objType				gear	Standard manufacturer warranty certificate
Fire Extinguishers and wall brack	bjeroald@je.com	2009-11-04T11:08:38	23-65 70 17 27: Fire Extinguishers	Fire Extinguishers and wall brackets	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	Standard manufacturer warranty certificate
Sprinkler system	bjeroald@je.com	2009-11-04T11:08:38	23-65 70 17: Fire Fighting Terminals	Sprinkler system	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Plumbing Fixtures	bjeroald@je.com	2009-11-04T11:08:38	23-45: Sanitary, Laundry, and Cleaning Equip	Plumbing Fixtures	Fixed	info@Utility_Vault.com	860-SA	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Compressed Air System Comp	bjeroald@je.com	2009-11-04T11:08:38	23-40 70 24 ft. Compressed Air Vehicle Ser	Compressed Air System Components	Fixed	info@Ingersoll_Rand.com	2475N7.5	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
HVAC System Components and	bjeroald@je.com	2009-11-04T11:08:38	23-75: Climate Control (HVAC)	HVAC System Components and Equipment	Fixed	info@Carrier.com	25HNA348	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
TAB Related HVAC Submittals	bjeroald@je.com	2009-11-04T11:08:38	23-75 86: Plant and Service Test Equipment	TAB Related HVAC Submittals	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Fuel Oil System and Pumps	bjeroald@je.com	2009-11-04T11:08:38	23-85 05 199: Other Liquid Supply Systems	Fuel Oil System and Pumps	Fixed	info@lincoln.com	84934	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Diffusers registers and grilles	bjeroald@je.com	2009-11-04T11:08:38	23-75 70 HVAC: Distribution Devices	Diffusers, registers, and grilles	Fixed	info@GUS_Aire.com	H4004	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Loweres	bjeroald@je.com	2009-11-04T11:08:38	23-75 70 HVAC: Distribution Devices	Loweres	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Bird screens	bjeroald@je.com	2009-11-04T11:08:38	23-75 70 2127 ft. Diffusers, Registers, and G	Bird screens	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Lighting Poles	bjeroald@je.com	2009-11-04T11:08:38	23-60 30 24 ft. Lighting Poles and Standard	Lighting Poles	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Transformer	bjeroald@je.com	2009-11-04T11:08:38	23-80 10 14: Transformers	Transformer	Fixed	info@SquareD.com	100S3HEE	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Panelboards Transformer Invert	bjeroald@je.com	2009-11-04T11:08:38	23-80 30 14: Power Distribution	Panelboards, Transformer, Inverter	Fixed	info@RPanasonic.com	EPABX	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Conduit	bjeroald@je.com	2009-11-04T11:08:38	23-80 30 17: Conduit, Wireways, and Ducts	Conduit	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Circuit Breakers Fuses Surge Pr	bjeroald@je.com	2009-11-04T11:08:38	23-80 10: Electric Power Protection Device	Circuit Breakers, Fuses, Surge Protective Devices	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Switches Receptacles Motor Co	bjeroald@je.com	2009-11-04T11:08:38	23-80 70 ft. Switches and Receptacles	Switches, Receptacles, Motor Controllers, Manual	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Luminaires Ballasts Lamps etc	bjeroald@je.com	2009-11-04T11:08:38	23-80 70 ft. Luminaires for Internal Lighting	Luminaires, Ballasts, Lamps, etc	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Luminaires	bjeroald@je.com	2009-11-04T11:08:38	23-80 70 14: Luminaires for External Lighting	Luminaires	Fixed	n/a	n/a	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Manholes and Handholes	bjeroald@je.com	2009-11-04T11:08:38	23-30 10 11 ft. Underground Ducts and Man	Manholes and Handholes	Fixed	info@Kistner_Concrete_Products.com	MPL-Electric	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Cables Splices Connectors	bjeroald@je.com	2009-11-04T11:08:38	23-85: Information and Communication	Cables, Splices, Connectors	Fixed	info@Kistner_Concrete_Products.com	PMH-PM468	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Fire Alarm System	bjeroald@je.com	2009-11-04T11:08:38	23-85 30 21 ft. Fire Detection, Monitoring an	Fire Alarm System	Fixed	info@Centra.com	FCP 300	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Lighting Controls	bjeroald@je.com	2009-11-04T11:08:38	23-85 10 127: Lighting Controls	Lighting Controls	Fixed	info@Auricles.com	3-EM	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Grinder Pump Station	bjeroald@je.com	2009-11-04T11:08:38	23-70 10 114 ft. Packaged Sewage and Slu	Grinder Pump Station	Fixed	info@Pome_Tec_Uilities.com	Medium Pump	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
Crane system Crane runway trac	bjeroald@je.com	2009-11-04T11:08:38	23-50 30 37 11 ft. Bridge Cranes	Crane system, Crane runway track system	Fixed	info@North_American_Industries.com	Class D Crane	warranty@ce.com	1	warranty@ce.com	1	year		objType				gear	
AC-1	nm@aec3.com	2009-12-03T16:42:12	23-75: Climate Control (HVAC)	AC-1	Fixed	n/a	n/a	n/a	n/a	n/a	n/a	AVEVAPID	IfcDistributionElement	123224DistributionElem	n/a	n/a	gear		
Energy Monitoring and Control	nm@aec3.com	2009-12-03T16:42:12	23-75: Climate Control (HVAC)	Energy Monitoring and Control	Fixed	n/a	n/a	n/a	n/a	n/a	n/a	AVEVAPID	IfcDistributionElement		n/a	n/a	gear		
Potable Water System	nm@aec3.com	2009-12-03T16:42:12	23-45: Sanitary, Laundry, and Cleaning Equip	Potable Water System	Fixed	n/a	n/a	n/a	n/a	n/a	n/a	AVEVAPID	IfcDistributionElement		n/a	n/a	gear		

Types and Documents

Name	CreateBy	CreateOn	Category	ApprovalBy	Stage	SheetName	RowName	Directory	File	ExtSystem	ExtObject	Ext Identifier	Description Reference
Hardware for Doors Product Data	dsun@quic.edu	2009-11-04T11:08:38	Product Data	Contractor Certified	As Built	Type	Hardware Items	document	2009-01-26-PD-Doors.pdf		Ifc DocumentReference		
Overhead Coiling Doors Product Data	dsun@quic.edu	2009-11-04T11:08:38	Warranty Documents	Information Only	As Built	Type	Overhead Coiling Doors Assembly	document	2009-01-26-PD-OverheadDoors.pdf		Ifc DocumentReference		
Heat Pump Product Data	dsun@quic.edu	2009-11-04T11:08:38	Shop Drawings	Owner Approval	As Built	Type	HVAC System Components and Equipment	document	2009-02-02-PD-HeatPump.pdf		Ifc DocumentReference		
Heat Pump Installation Instructions	dsun@quic.edu	2009-11-04T11:08:38	Product Data	Contractor Certified	As Built	Type	HVAC System Components and Equipment	document	2009-02-04-IL-HeatPump.pdf		Ifc DocumentReference		
Heat Pump O&M Manual	dsun@quic.edu	2009-11-04T11:08:38	Shop Drawings	Information Only	As Built	Type	HVAC System Components and Equipment	document	2009-02-04-OM-HeatPump.pdf		Ifc DocumentReference		
Large Radiant Heater Product Data	dsun@quic.edu	2009-11-04T11:08:38	Product Data	Contractor Certified	As Built	Type	HVAC System Components and Equipment	document	2009-01-26-PD-RadiantHeatersLarge.pdf		Ifc DocumentReference		
Small Radiant Heater Product Data	dsun@quic.edu	2009-11-04T11:08:38	Operation and Maintenance	Information Only	As Built	Type	HVAC System Components and Equipment	document	2009-01-26-PD-RadiantHeatersSmall.pdf		Ifc DocumentReference		
Radiant Heater Installation Instructions	dsun@quic.edu	2009-11-04T11:08:38	Warranty Documents	Information Only	As Built	Type	HVAC System Components and Equipment	document	2009-02-04-IL-RadiantHeaters.pdf		Ifc DocumentReference		
Exhaust Fan 1 Product Data	dsun@quic.edu	2009-11-04T11:08:38	Shop Drawings	Owner Approval	As Built	Type	HVAC System Components and Equipment	document	2009-01-27-PD-EF1.pdf		Ifc DocumentReference		
Exhaust Fan 2 Product Data	dsun@quic.edu	2009-11-04T11:08:38	Product Data	Owner Approval	As Built	Type	HVAC System Components and Equipment	document	2009-01-27-PD-EF2.pdf		Ifc DocumentReference		
Exhaust Fan 3 Product Data	dsun@quic.edu	2009-11-04T11:08:38	Warranty Documents	Owner Approval	As Built	Type	HVAC System Components and Equipment	document	2009-02-06-PD-EF3.pdf		Ifc DocumentReference		
Exhaust Fan 14 and 7 Product Data	dsun@quic.edu	2009-11-04T11:08:38	Test Reports	Owner Approval	As Built	Type	HVAC System Components and Equipment	document	2009-02-06-PD-EF4andEF7.pdf		Ifc DocumentReference		
Exhaust Fan 5 and 6 Product Data	dsun@quic.edu	2009-11-04T11:08:38	Certificates	Owner Approval	As Built	Type	HVAC System Components and Equipment	document	2009-02-06-PD-EF5andEF6.pdf		Ifc DocumentReference		
Exhaust Fan 8 Product Data	dsun@quic.edu	2009-11-04T11:08:38	Shop Drawings	Owner Approval	As Built	Type	HVAC System Components and Equipment	document	2009-02-06-PD-EF8.pdf		Ifc DocumentReference		
Exhaust Fan 9 Product Data	dsun@quic.edu	2009-11-04T11:08:38	Product Data	Owner Approval	As Built	Type	HVAC System Components and Equipment	document	2009-02-06-PD-EF9.pdf		Ifc DocumentReference		
Exhaust Fan 3, 4, and 7 Installation Instruct	dsun@quic.edu	2009-11-04T11:08:38	Manufacturer Instructions	Information Only	As Built	Type	HVAC System Components and Equipment	document	2009-02-06-IL-EF3,4,7.pdf		Ifc DocumentReference		
Oil Water Separator Product Data	dsun@quic.edu	2009-11-04T11:08:38	Operation and Maintenance	Owner Approval	As Built	Type	Plumbing Fixtures	document	2009-02-02-PD-OilWaterSeparator.pdf		Ifc DocumentReference		
Water Heater Product Data	dsun@quic.edu	2009-11-04T11:08:38	Closeout Submittals	Information Only	As Built	Type	Plumbing Fixtures	document	2009-02-02-PD-WaterHeater.pdf		Ifc DocumentReference		
Water Heater O&M Manual	dsun@quic.edu	2009-11-04T11:08:38	Product Data	Owner Approval	As Built	Type	Plumbing Fixtures	document	2009-02-02-OM-WaterHeater.pdf		Ifc DocumentReference		
Air Compressor Product Data	dsun@quic.edu	2009-11-04T11:08:38	Warranty Documents	Owner Approval	As Built	Type	Compressed Air System Components	document	2009-02-02-PD-AirCompressor.pdf		Ifc DocumentReference		
Emergency Eyewash Product Data	dsun@quic.edu	2009-11-04T11:08:38	Product Data	Information Only	As Built	Type	Plumbing Fixtures	document	2009-02-02-PD-EmergencyEyewash.pdf		Ifc DocumentReference		
Emergency Eyewash Installation Instructions	dsun@quic.edu	2009-11-04T11:08:38	Certificates	Information Only	As Built	Type	Plumbing Fixtures	document	2009-02-04-IL-EmergencyEyewash.pdf		Ifc DocumentReference		
Oil Supply Pump Product Data	dsun@quic.edu	2009-11-04T11:08:38	Warranty Documents	Information Only	As Built	Type	Fuel Oil System and Pumps	document	2009-02-02-PD-OilSupplyPumps.pdf		Ifc DocumentReference		

Components from schedules

Name	CreatedBy	CreatedOn	TypeName	SpaceNames	Description	ExtSystem	ExtObject	ExtIdentifier	SerialNumber	InstallationDate	WarrantyStartDate	TagNumber	BarCode	AssetIdentifier
EF-1	bjerold@je.com	2009-11-04T11:08:38	HVAC System Components and Equipment	100A	Exhaust Fan		objComponent	00-1-00-EF	00-1-00-EF	2009-03-01	2009-03-01	EF-1		
EF-2	bjerold@je.com	2009-11-04T11:08:38	HVAC System Components and Equipment	100A	Exhaust Fan		objComponent	00-2-00-EF	00-2-00-EF	2009-03-01	2009-03-01	EF-2		
EF-3	bjerold@je.com	2009-11-04T11:08:38	HVAC System Components and Equipment	103	Exhaust Fan		objComponent	00-3-00-EF	00-3-00-EF	2009-03-01	2009-03-01	EF-3		
EF-4	bjerold@je.com	2009-11-04T11:08:38	HVAC System Components and Equipment	101	Exhaust Fan		objComponent	00-4-00-EF	00-4-00-EF	2009-03-01	2009-03-01	EF-4		
EF-5	bjerold@je.com	2009-11-04T11:08:38	HVAC System Components and Equipment	100B	Exhaust Fan		objComponent	NEF-003-01	NEF-003-01	2009-03-01	2009-03-01	EF-5		
EF-6	bjerold@je.com	2009-11-04T11:08:38	HVAC System Components and Equipment	100B	Exhaust Fan		objComponent	NEF-003-02	NEF-003-02	2009-03-01	2009-03-01	EF-6		
EF-7	bjerold@je.com	2009-11-04T11:08:38	HVAC System Components and Equipment	100A	Exhaust Fan		objComponent	00-4-01-EF	00-4-01-EF	2009-03-01	2009-03-01	EF-7		
EF-8	bjerold@je.com	2009-11-04T11:08:38	HVAC System Components and Equipment	100A	Exhaust Fan		objComponent	00-5-00-EF	00-5-00-EF	2009-03-01	2009-03-01	EF-8		
EF-9	bjerold@je.com	2009-11-04T11:08:38	HVAC System Components and Equipment	100A	Exhaust Fan		objComponent	00-6-00-EF	00-6-00-EF	2009-03-01	2009-03-01	EF-9		

Components

EXHAUST FANS										
TAG	AREA SERVED	BASIS OF DESIGN		QTY	CFM	S.P. IN.W.G.	WATTS / HP	VOLTAGE	WEIGHT LBS	
		MAKE	MODEL							
EF-1	HIGH BAY	GREENHECK	SB-2L30-7	1	8000	0.125	3/4 HP	208/3/60*	125	2,3,5
EF-2	HIGH BAY.	GREENHECK	SB-2L30-7	1	8000	0.125	3/4 HP	208/3/60*	125	2,3,5
EF-3	ELECTRICAL ROOM	GREENHECK	CSP-A510	1	350	0.25	217 W	115/1/60	36	5
EF-4	RECESSED MAINT AREA	GREENHECK	CSP-A710	1	250	0.625	325 W	115/1/60	36	2
EF-5	PARTS WASHER	NEDERMAN	N16	1	500	3.75	1/2 HP	115/1/60	XX	1
EF-6	WELDING BENCH	NEDERMAN	N16	1	500	3.75	1/2 HP	115/1/60	XX	1
EF-7	TOILET,JAN.,COMM	GREENHECK	CSP-A710	1	210	0.625	325 W	115/1/60	36	
EF-8	HIGH BAY	GREENHECK	SB-2L30-7	1	8000	0.125	3/4 HP	208/3/60*	125	2,3,5
EF-9	OFFICE / KITCHEN	GREENHECK	SP-B150	1	150	0.125	129 W	115/1/60	10	3,6

* ALL 208 VOLT MOTORS SHALL BE 200 VOLT NAMEPLATE.

NOTES: 1. CONTROLLED BY LIGHT SWITCH.

5. CONTROLLED BY THERMOSTAT.

Components, Types and Systems

Column	Type	Example and Notes
Name	Wallgate ALS180 Basin 470w x 300d	
CreatedBy	nn@aec3.com	
CreatedOn	2012-02-12T11:00:00	
Category	L72104 : Washbasins	
Description	basin replaces the M.O.J SAFER CELL 2 piece ALS_80 basin used throughout the secure environment for the past 10 years. Anti-ligature in design with	
AssetType	Fixed	
Manufacturer	sales@wallgate.co.uk	
ModelNumber	ALS180	
WarrantyGuarantorParts	warranty@wallgate.co.uk	
WarrantyDurationParts	3	
WarrantyGuarantorLabor	warranty@wallgate.co.uk	
WarrantyDurationLabor	0.5	
WarrantyDurationUnit	year	
ExtSystem	AEC3 BimServices	
ExtObject	IfcSanitaryTerminalType	
ExtIdentifier	n/a	
ReplacementCost	350	
ExpectedLife	15	
DurationUnit	year	
WarrantyDescription	suppliers warranty	
NominalLength	470	
NominalWidth	300	
NominalHeight	450	
ModelReference	ALS180	
Shape	shaped	
Size	470mm (W) x 455mm (H) x 300mm (D)	
Color	hyco,frost,bluestone,slate,thames,white	
Finish	standard	
Grade	Highly vandal resistant	
Material	standard	
Constituents	n/a	
Features	n/a	
AccessibilityPerformance	n/a	
CodePerformance	durability, stain resistance, cigarette burns etc	
SustainabilityPerformance	BREEAM points rated	

Column	System	Example and Notes
Name	Plumbing 1	
CreatedBy	nn@aec3.com	
CreatedOn	2012-02-12T11:00:00	
Category	5A1 : Sanitaryware	
ComponentNames	Wallgate ALS180 Basin:470w x 300d:470w x 300d:211813	
ExtSystem		
ExtObject		
ExtIdentifier		
Description	Plumbing for Level 1	

Column	Component	Example and Notes
Name	Wallgate ALS180 Basin:470w x 300d:470w x 300d:211808	
CreatedBy	nn@aec3.com	
CreatedOn	2012-02-12T11:00:00	
TypeName	Wallgate ALS180 Basin 470w x 300d	
Space	L0-02B	
Description	Wallgate ALS180 Basin:470w x 300d:470w x 300d:211808	
ExtSystem	AEC3 BimServices	
ExtObject	IfcFlowTerminal	
ExtIdentifier	3cBcy7GEjBwPmXo\$zkl3KH	
SerialNumber	bs10101	
InstallationDate	2012-02-12T11:00:00	
WarrantyStartDate	2012-02-12T11:00:00	
TagNumber	211808	
BarCode	n/a	
AssetIdentifier	n/a	

rows and columns swapped !

Component

- A named and individually scheduled physical item or feature that might require management, such as inspection, maintenance, servicing or replacement, during the in-use phase

Type

- A named specification for Components including equipment, products and materials

System

- A named set of manageable Components providing a common function

- Attributes
- Documents

Column	Attribute	Example and Notes
Name	PhaseReference	
CreatedBy	nn@aec3.com	
CreatedOn	2011-03-07T15:38:05	
Category	Requirement	
SheetName	Type	
RowName	DistributionBoardA	
Value	three	
Unit	n/a	
ExtSystem	AEC3_BimServices	
ExtObject	IfcPropertySingleValue	
ExtIdentifier	Pset_ElectricalDeviceCommon	
Description	The phase identification used for the device electrical input.	
AllowedValues		

Column	Document	Example and Notes
Name	1524_Settee(3-Seater)_ProductData	
CreatedBy	nn@aec3.com	
CreatedOn	2010-02-08T13:30:00	
Category	Product Data	
ApprovalBy	Information Only	
Stage	Submitted	
SheetName	Type	
RowName	1524_Settee(3-Seater)	
Directory	.	
File	3SeaterSofa_ProductInfo.pdf	
ExtSystem	TriForma	
ExtObject	IfcFurnitureType	
ExtIdentifier	3VtJ67QBzBiQon9kUSVYbh	
Description		
Reference		
Source		

also

- Impacts
- Issues

COBie2.4

Supplementary information

Impact

Cost, Carbon

Issue

H&S, Design

Connection

MEP, Controls

Assembly

Equipment

Coordinate

Positions

Document

Other sources

Attribute

Specification

Ifc
Property
Set

Ifc
Action
Request

Ifc
Rel
Connects

Ifc
Rel
Aggregates

Ifc
Coordinate

Ifc
Document
Reference

Ifc
Property

additional descriptive information associated to the assets:

- **Document**
 - A named external document associated to an asset
- **Attribute**
 - A named specific characteristic associated to an asset
- **Impact**
 - A named economic and environmental measure, such as cost and CO2 emissions, associated to an asset
- **Issue**
 - A named deficiency in the information or risk associated to the assets
- **Assembly**
 - A named physical aggregation of a Type or Component into another Type or Component where both the overall (owning) assembly part and the constituent (owned) part has significance for their operation and use, for example having different attributes, replacement parts, preventative maintenance schedules or warranties
- **Contact**
 - A named person and/or organisation involved in the Facility lifecycle
- **Coordinate**
 - A named position associated to Facility, Floor (region), Space (location), Component or Assembly
- **Connection**
 - A named logical relationship between two Components

COBie2.4

Spares

Solid, Fluid

Ifc Construction Product
Resource

Jobs

Inspection, Repair

Ifc Task

Resources

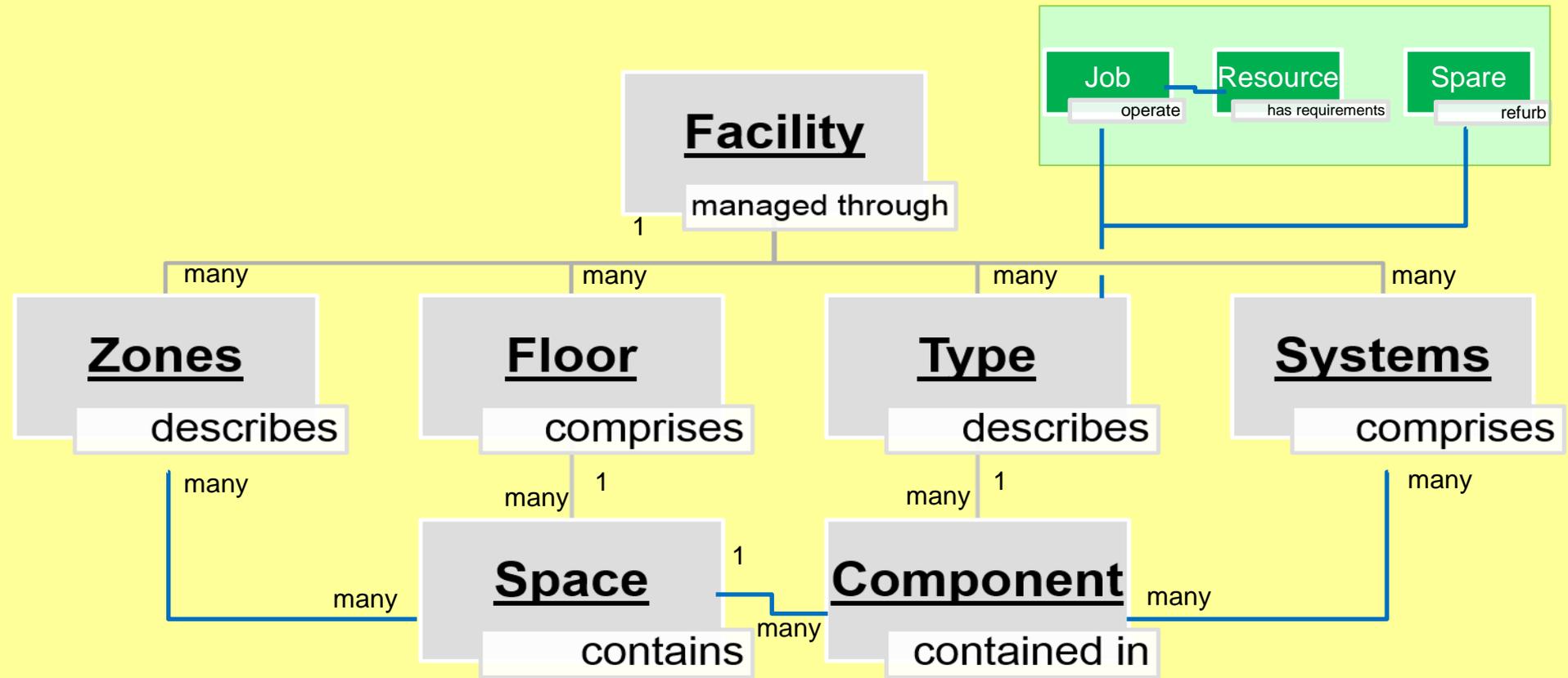
Skills, Tools

Ifc Construction Equipment
Resource

Information specifying operational activity associated to Types:

- **Job**
 - A named task or activity during the in-use phase associated to Types.
- **Resource**
 - A named material or skill required to execute Jobs.
- **Spare**
 - A named replaceable part associated to Types.

COBie - The Elevator Diagram



Impact

Cost, Carbon

Issue

H&S, Design

Connection

MEP, Controls

Assembly

Equipment

Coordinate

Positions

Document

Other sources

Attribute

Specification

Communication and Reusability of Information:

- **Machine Readable and User Readable Data**
- **Not PDF Drawings, Text Files, Photos and Emails**

Thank you !

Any questions?

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