BSI Standards Publication

Collaborative production of information

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

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Contents

Summary of pages
This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 50, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 1192 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 September 2014. It was prepared by Technical Committee B/555, *Construction design, modelling and data exchange*. A list of organizations represented on this committee can be obtained on request to its secretary.

Relationship with other publications

BS 1192-4 is closely aligned with the following:

- BS 1192:2007, *Collaborative production of architectural, engineering and construction information – Code of practice*
- PAS 1192-2, *Specification for information management for the capital/delivery phase of construction projects using building information modelling*
- PAS 1192-3, *Specification for information management for the operational phase of assets using building information modelling*

BS 1192:2007, PAS 1192-2 and PAS 1192-3 document best practice for the management of collaborative projects using Facility and Asset Information Modelling based design, construction and use.

BS 1192-4 defines the UK usage of COBie, an internationally agreed information exchange schema for exchanging facility information between the employer and the supply chain.

Figure 1 shows the core maturity model underlying these standards.

BS 1192-4 documents the best practice recommendations for the implementation of COBie as developed in UK Government pilot projects.

Use of this document

As a code of practice, BS 1192-4 takes the form of guidance and recommendations. It should not be quoted as if it was a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this part of BS 1192 is expected to be able to justify any course of action that deviates from its recommendations.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Throughout this Code of Practice, the standard COBie sheets, such as Facility, are capitalized. Example values and units in tables are in italics. Definitions are provided in Clause **3**.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Figure 1   **Core maturity model**
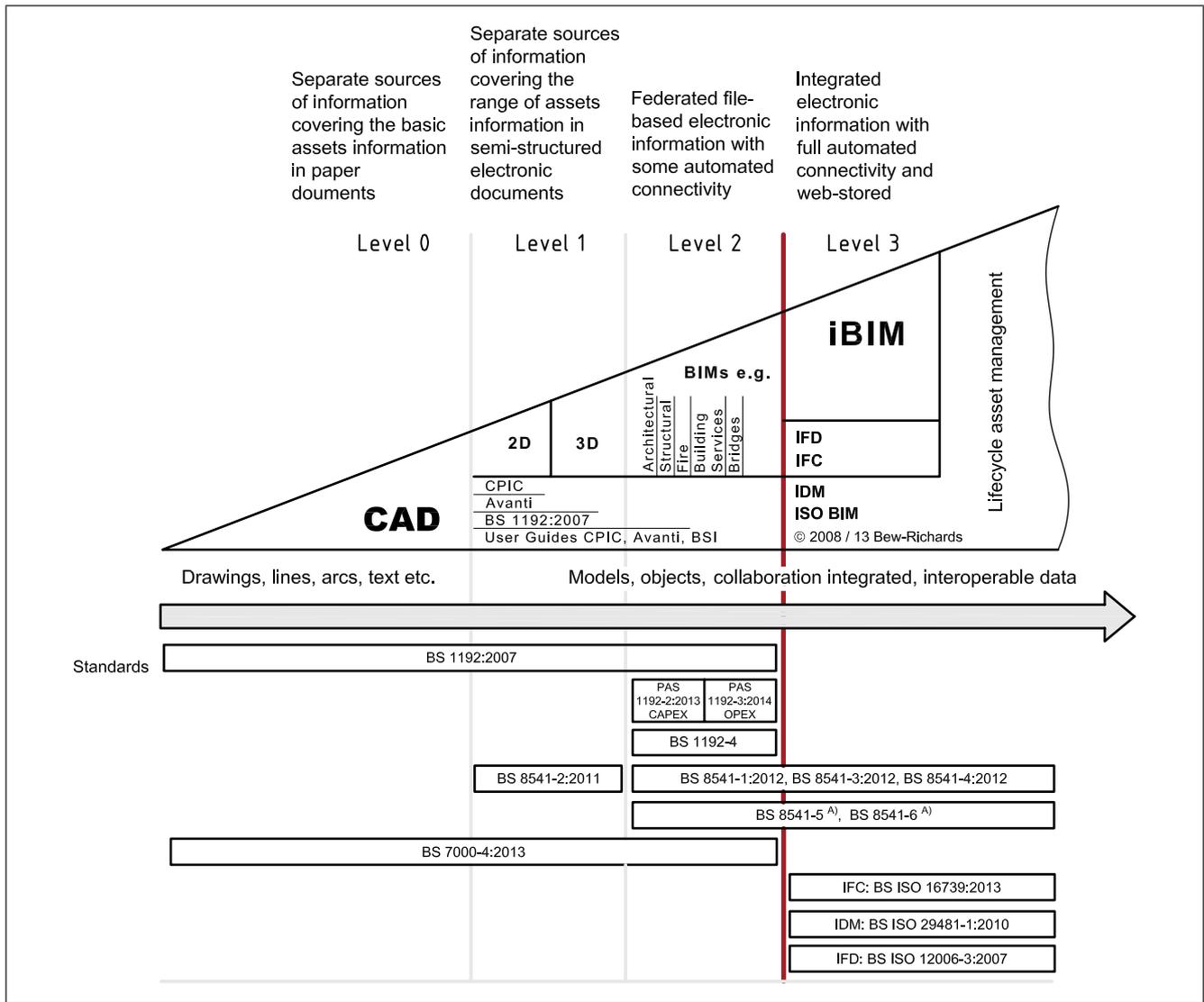
Introduction

COBie (Construction Operations Building information exchange) provides a common structure for the exchange of information about new and existing Facilities, including both buildings and infrastructure.

This standard defines expectations for the exchange of information throughout the lifecycle of a Facility. The use of COBie ensures that information can be prepared and used without the need for knowledge of the sending and receiving applications or databases. It ensures that the information exchange can be reviewed and validated for compliance, continuity and completeness.

COBie is the UK Government's chosen information exchange schema for federated building information management (BIM) (UK level 2), alongside BIM models and PDF documents, with the aim of integrating commercially valuable information with other parts of the employer's business. It can be used within less structured projects (UK level 1) and might have a role within integrated BIM (UK level 3) alongside a fuller building information model.

The scope of the exchange is given by the Facility – a distinct operational unit, typically a building or section of infrastructure or network – along with the temporary project and permanent site details. COBie holds information about the spatial locations and the equipment and components that make up the Facility. To make these manageable during the Facility lifecycle, spatial locations are allocated to intermediate addresses or locations and into other spatial groupings, and equipment, and components are assigned their common specification and grouped by their functional purposes (see Figure 2).

Figure 2   **Generic view of COBie**

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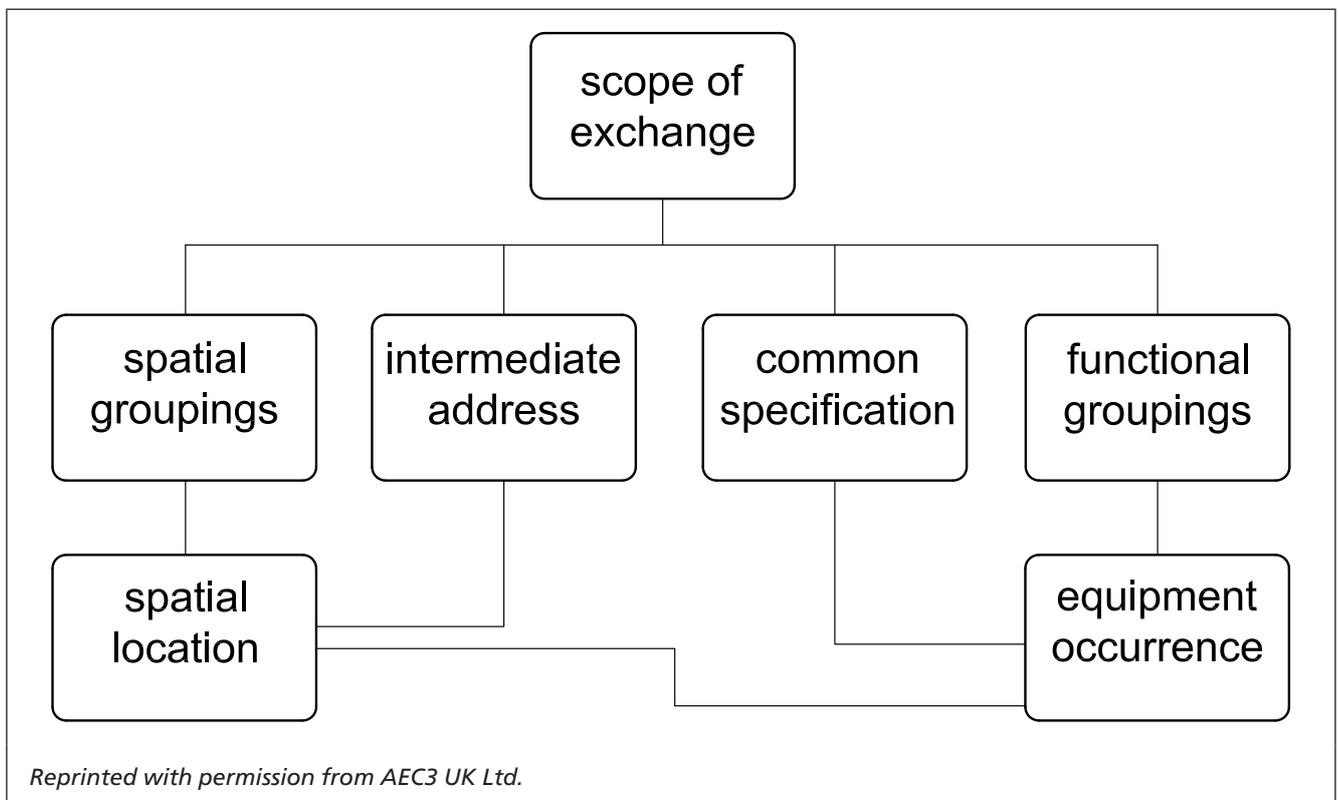
For infrastructure, the assets include the Facility as a whole, and its constituent locations and Components. These are managed through groupings into Zones, regions, Types and Systems (see Figure 3).

Figure 3   **Infrastructure view of COBie**

```
                        ┌──────────────┐
                        │   Facility   │
                        └──────┬───────┘
          ┌────────────┬───────┴────────┬──────────────┐
   ┌──────┴─────┐ ┌────┴─────┐    ┌──────┴────┐  ┌──────┴─────┐
   │   Zones    │ │  region  │    │   Type    │  │  Systems   │
   └──────┬─────┘ └──────────┘    └──────┬────┘  └──────┬─────┘
   ┌──────┴─────┐                        │       ┌──────┴─────┐
   │  location  │────────────────────────┴───────│ Component  │
   └────────────┘                                └────────────┘
```

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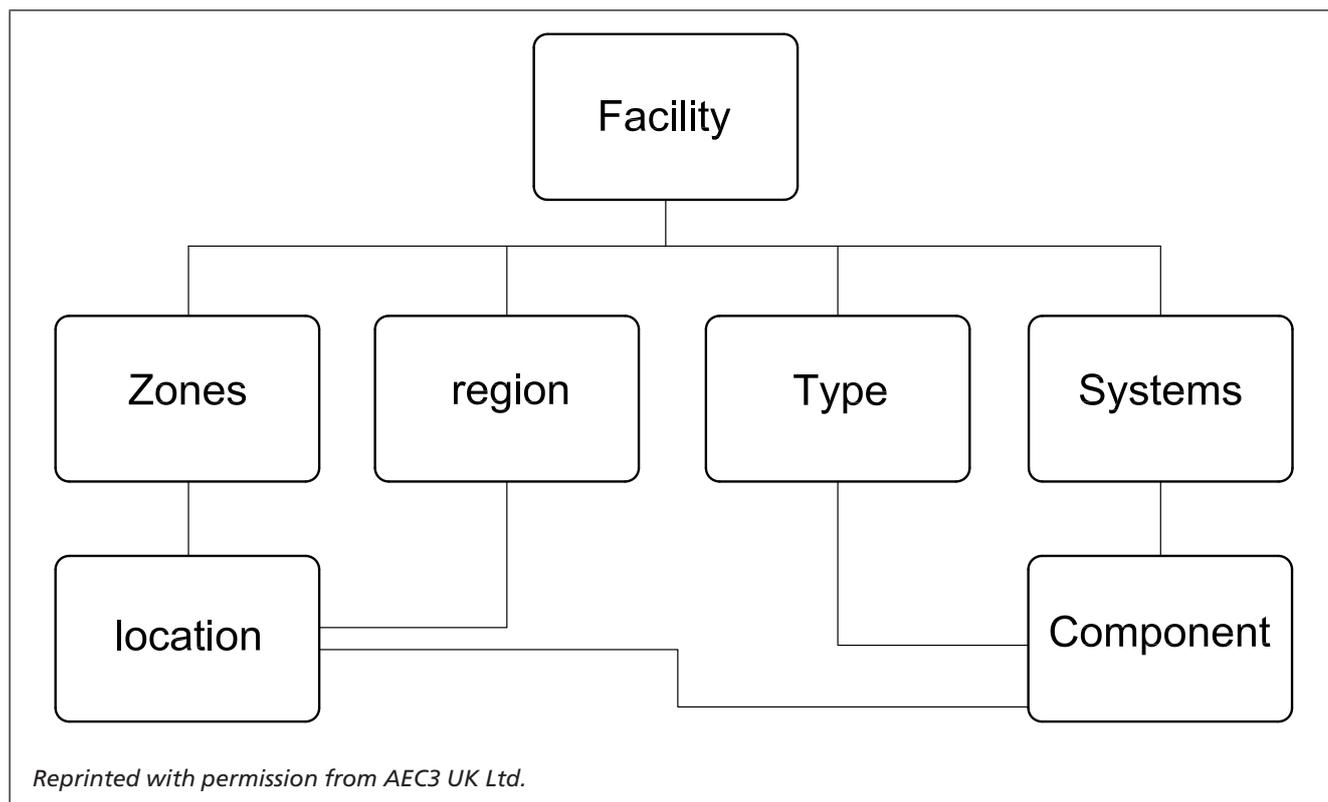
For buildings, the assets include the Facility as a whole and its constituent Spaces and Components. These are managed through groupings into Zones, Floors, Types and Systems (see Figure 4).

Figure 4   **Building view of COBie, using standard terms**

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                        ┌──────────────┐
                        │   Facility   │
                        └──────┬───────┘
          ┌────────────┬───────┴────────┬──────────────┐
   ┌──────┴─────┐ ┌────┴─────┐    ┌──────┴────┐  ┌──────┴─────┐
   │   Zones    │ │  Floor   │    │   Type    │  │  Systems   │
   └──────┬─────┘ └──────────┘    └──────┬────┘  └──────┬─────┘
   ┌──────┴─────┐                        │       ┌──────┴─────┐
   │   Space    │────────────────────────┴───────│ Component  │
   └────────────┘                                └────────────┘
```

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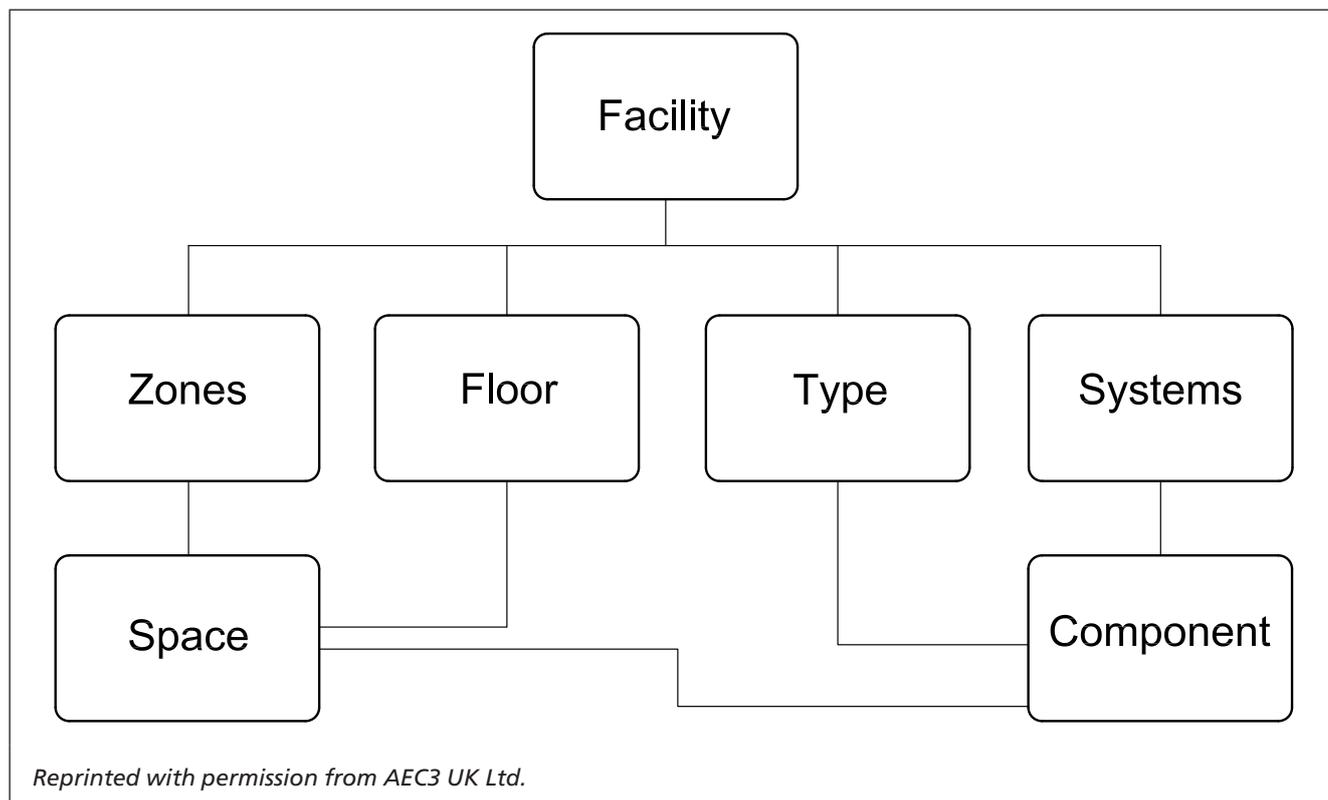
1 Scope

This British Standard defines a methodology for the transfer between parties of structured information relating to Facilities, including buildings and infrastructure. It defines expectations for the design and construction project phases prior to handover and acquisition and the subsequent in-use phase.

This code of practice assists the demand side, including employers with portfolio managers, asset managers and facility managers, to specify their expectations while helping information providers, including the lead designers and contractors, to prepare concise, unambiguous and accessible information.

NOTE 1   *During briefing and renovation, these roles might be reversed. Other participants might have both roles.*

NOTE 2   *Suppliers and specialist designers and contractors might also be involved in providing information.*

Clause **4** documents these processes and by whom and when such exchanges are envisaged.

Employer's Information Requirements (EIR) can be specified by the purposes intended for the information; Clause **5** structures these demands by use of "why" and "what".

Clause **6** defines the management and quality criteria that are to be applied in the preparation and acceptance of the information exchange.

Specific implementation for buildings and infrastructure facilities and for new and existing facilities are detailed in Clause **7**.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 1192:2007, *Collaborative production of architectural, engineering and construction information – Code of practice*

PAS 1192-2, *Specification for information management for the capital/delivery phase of construction projects using building information modelling*

PAS 1192-3, *Specification for information management for the operational phase of construction projects using building information modelling*

BS ISO 16739, *Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries*

3 Terms and definitions

For the purposes of this part of BS 1192, the terms and definitions given in BS 1192:2007, PAS 1192-2 and PAS 1192-3 and the following apply.

3.1 Asset

3.1.1 assets
includes the overall Facility (**3.1.3**) and the constituent aspects Space (location) (**3.1.5**), Floor (region) (**3.1.4**), Zone (**3.1.8**), Component (**3.1.2**), Type (**3.1.7**) and System (**3.1.6**)

3.1.2   Component

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

NOTE 1   The employer might define manageable Components by reference to their criticality to the operation of the Facility. See BS 8544 for operational criticality.

NOTE 2   See A.9 for the COBie spreadsheet representation.

3.1.3   Facility

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

NOTE 1   The Facility name is expected to match into other asset management registers.

NOTE 2   See A.4 for the COBie spreadsheet representation.

3.1.4   Floor (region)

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

NOTE   See A.5 for the COBie spreadsheet representation.

3.1.5   Space (location)

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

NOTE 1   Spaces (locations) may be internal or external.

NOTE 2   See A.6 for the COBie spreadsheet representation.

3.1.6   System

named set of manageable Components providing a common function

NOTE   See A.10 for the COBie spreadsheet representation.

3.1.7   Type

named specification for Components including equipment, products and materials

NOTE   See A.8 for the COBie spreadsheet representation.

3.1.8   Zone

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

NOTE 1   Zones are different from volumes in design management; see PAS 1192-2.

NOTE 2   See A.7 for the COBie spreadsheet representation.

3.2   Construction Operations Building information exchange (COBie)

subset of BS ISO 16739 IFC documented as a buildingSMART model view definition (MVD) which includes operational information

NOTE 1   The definition is maintained by buildingSMART Alliance (US) and buildingSMART UKI [1]. The current version is "COBie 2.4", first published in 2009.

NOTE 2   COBie is documented in the US National Institute of Building Science "National BIM Standard v3" (NBIMS) [2] with its representation as a spreadsheet.

NOTE 3   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. This MVD is published by buildingSMART international.

NOTE 4   ISO 16739:2005 covers IFC2x3 and BS ISO 16739:2013 covers IFC4.

3.3   digital Plan of Work (dPoW)

generic schedule of phases, roles, responsibilities, assets and attributes, made available in a computable form

NOTE   *It might be used to complement the EIR.*

3.4   Employer's Information Requirements (EIR)

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

NOTE 1   *For information on the project delivery process, see PAS 1192-2.*

NOTE 2   *The EIR might be used to complement the dPoW.*

3.5   Operational information

3.5.1   Job

named task or activity during the in-use phase associated to Types

NOTE   *See A.15 for the COBie spreadsheet representation.*

3.5.2   operational information

information specifiying operational activity associated to Types

3.5.3   Resource

named material or skill required to execute Jobs

NOTE   *See A.14 for the COBie spreadsheet representation.*

3.5.4   Spare

named replaceable part associated to Types

NOTE   *See A.13 for the COBie spreadsheet representation.*

3.6   Supplementary information

3.6.1   Assembly

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

NOTE1   *For example, having different attributes, replacement parts, preventative maintenance schedules or warranties.*

NOTE 2   *There will often be several constituent parts making up the overall part.*

NOTE 3   *See A.11 for the COBie spreadsheet representation.*

3.6.2   Attribute

named specific characteristic associated to an asset

NOTE   *See A.18 for the COBie spreadsheet representation.*

3.6.3   Connection

named logical relationship between two Components

NOTE 1   *Connections may include interfaces, control relationships and other dependencies.*

NOTE 2   *See A.12 for the COBie spreadsheet representation.*

3.6.4   Contact

named person and/or organization involved in the Facility lifecycle

NOTE   *See A.3 for the COBie spreadsheet representation.*

3.6.5 Coordinate
named position associated to Facility, Floor (region), Space (location), Component or Assembly

NOTE   See **A.19** for the COBie spreadsheet representation.

3.6.6 Document
named external document associated to an asset

NOTE 1   Documents might include other representations of the Facility delivered with the COBie data set; for example, PDFs of documents and drawings and model files.

NOTE 2   Where possible, a hyperlink or URL to the named resource is to be included.

NOTE 3   See **A.17** for the COBie spreadsheet representation.

3.6.7 Impact
named economic and environmental measure

NOTE 1   For example, cost and CO_2 emissions associated to an asset.

NOTE 2   Impacts may have a repeating cycle.

NOTE 3   See **A.16** for the COBie spreadsheet representation.

3.6.8 Issue
named deficiency in the information or risk associated to the assets

NOTE   See **A.20** for the COBie spreadsheet representation.

3.6.9 Supplementary information
additional descriptive information associated to the assets

4 Business process

4.1 General

The process of exchanging COBie deliverables should be integral to the whole Facility lifecycle (see Figure 5) to maximize the benefit and efficiency of the employer-side pull for information.

NOTE   The process can be reviewed by roles (**4.2**) or by provider/receiver relationship (**4.3**) or by Facility lifecycle (**4.4**).

4.2 Processes by role

4.2.1 Employer's role

The employer should be specific about the purposes supporting the ownership of the Facility for which the information is required and about the timing and content of any interim deliveries so as to allow the supply chain to respond appropriately.

An employer should require the delivery of COBie from the lead designer and/or lead contractor. A finalized COBie should be required at the time of handover, but earlier serial deliveries may be used to monitor the business case and lifecycle decisions for the Facility, and to help plan for taking the Facility into ownership and operation.

NOTE 1   For further information see PAS 1192-2.

The COBie information should be archived for record purposes when delivered, and may be held in Portfolio, Asset and Facility Management applications.

The information should be maintained so as to be available to support the tendering of parallel operational activities and for future projects.

NOTE 2   For further information see PAS 1192-3.

Figure 5 **The Facility lifecycle**
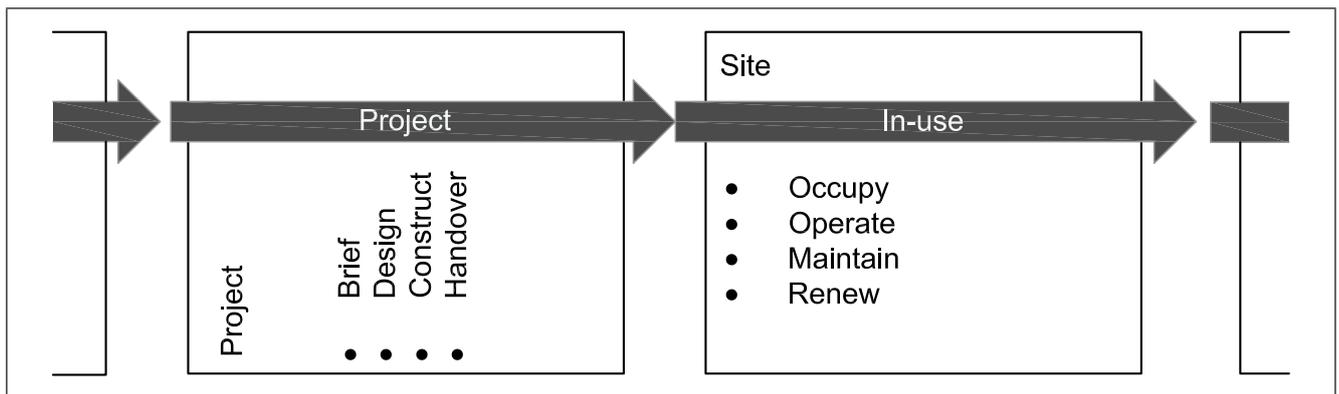
4.2.2 Designers, contractors and service providers role

The project team should document information about a Facility in both its spatial and physical aspects. Spatially they should document the Spaces (locations) and their allocation to a Floor (region) and their grouping into Zones. Physically they should document the Components and their specification by product Type and their grouping into functional Systems.

NOTE 1 In federated BIM (level 2) projects, information for COBie is likely to be available from the models, structured specifications and other schedules.

Wherever possible, data should be mapped to COBie automatically. The lead designer and contractor should specify the required COBie information on specific aspects from their supply chain. Lead parties should ensure that their supply chains deliver these specified aspects for inclusion in the COBie deliverable.

NOTE 2 For further information see PAS 1192-2 and PAS 1192-3.

NOTE 3 In projects with less structured information (level 1), the information needed to complete the COBie deliverable might already be available in reports and schedules and in other unstructured material prepared for handover. In integrated BIM (level 3) projects, the majority of the information required is likely to be available from direct access to the model but the COBie deliverable might remain useful to the employer.

Where an asset is sensitive from a security perspective (physical and/or information security), this information should be handled in a separate limited access COBie deliverable.

4.2.3 Supply chain role

The supply chain should deliver the specified aspects of the Requirements.

NOTE 1 The supply chain might include consultants, specialist sub-contractors, product suppliers and manufacturers.

If the employer's information purposes include the "specification/selection/ replacement" process, then the product Types should be given the necessary specification Attributes.

NOTE 2 The product information might also include operational recommendations relating to the installation, maintenance operation and emergency procedures. It might also include information relating to the economic and environmental Impact of the product. It might include information about its Connections and other interfaces.

NOTE 3 The chosen dPoW might contain more specific properties.

NOTE 4 See BS 8541 for further information.

4.3 Provider/Receiver relationships

COMMENTARY ON 4.3
During the project phase, the information provider might be the lead designer/contractor/service provider and team but in the in-use phase (and during project briefing) the information provider is the employer. During the project phase the information receiver is typically the employer but in the in-use phase this might be the lead designer/contractor/service provider and team.

4.3.1 General

Governance should be in place throughout the process to ensure compliance with the COBie requirements in Clause **5**, Clause **6** and Clause **7**, and to enable emerging issues to be addressed (see Figure 6).

Figure 6   **Governance**
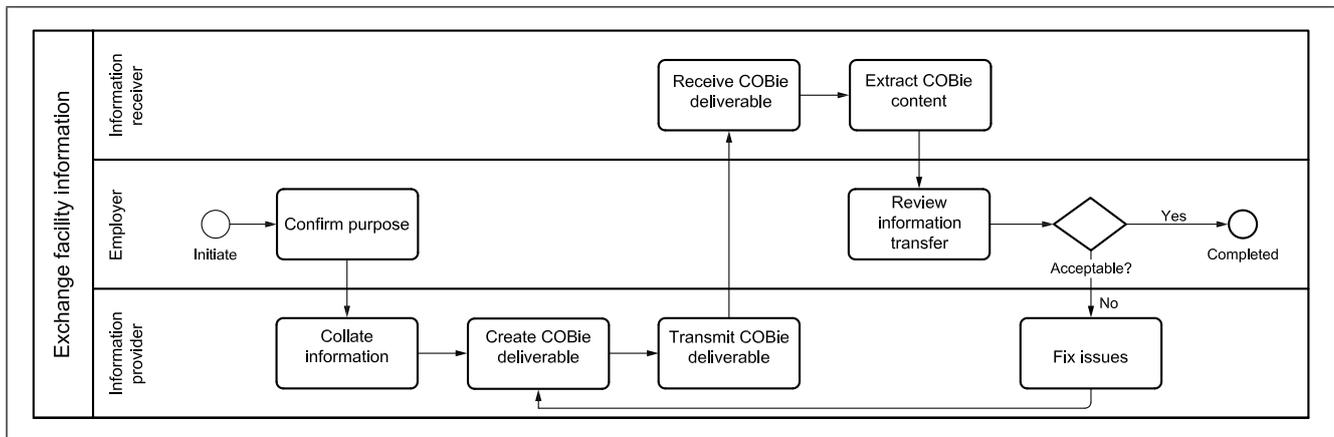
The COBie deliverable should include all the information that needs to be transferred as part of an information exchange including the COBie data and local Documents referenced from it. On receipt, the extraction process should cover the activities of populating the target systems and data stores using the content of the COBie deliverable. The review process should involve both Information Receiver and Information Provider to ensure that either there has been no significant loss of information as a result of the transfer, or that a process is initiated to resolve the issues.

NOTE 1   The employer has final approval of overall transfer of information.

The process used should be able to accommodate the handling of sensitive and/or classified material that relates to the specification, design, operation and maintenance of the Facility.

The information provider should fulfil their strategic, managerial and implementation actions for the COBie deliverable as discussed in **4.3.2**, **4.3.3** and **4.3.4**.

4.3.2 Strategic actions of the information provider

The strategic actions should include the following.

a)   Receive and review the EIR.

b)   Determine what information requires special handling for security, data protection or commercial sensitivity reasons, and the required process and procedures to protect it.

c)   Delegate aspects of the EIR downwards to the next tier of the supply chain.

d) Create, acquire and store required information in accordance with the security requirements set out in the EIR.

e) Review and approve the COBie deliverable prior to submission.

4.3.3 Management and quality assurance actions

The management and quality assurance actions should include the following.

a) Review of received information.

b) Receipt and integration of submissions received from the next tier of the supply chain.

c) Review of consolidated information against the EIR (see Clause **5**), and dPoW and the management criteria (see Clause **6**).

4.3.4 Implementation actions

The implementation actions should include the provision of expected information, including interpretation of the purposes and requirements (see Clause **7**, the dPoW and the EIR).

4.4 Processes over the Facility lifecycle

There should be progressively more complete COBie deliverables throughout the project phases, culminating at the handover into in-use. Any COBie deliverable after handover should include any corrections and updates, and any data obtained during post-occupancy assessments.

The in-use COBie should be provided to the project lead at the commencement of a project affecting an existing asset to enable the re-use of the information and its further development.

Where COBie deliverables include configuration and operation information relating to security, access control, and building/industrial control systems, this information should be managed and protected in accordance with the security requirements established in the EIR such as security strategy, policy, processes and procedures.

5 Purposes

5.1 General

The employer should state their purposes for requiring information deliverables, including the aspects of the Facility that are intended to be managed.

NOTE 1   These purposes can be used to determine the scope of the information exchange and the EIR, which may include a schedule of "Plain Language Questions" (PLQs).

NOTE 2   See PAS 1192-2 for EIR.

The supply of information should support the employer's purposes in managing the facility, including:

a) when information deliverables are required, by reference to the agreed Facility lifecycle phases;

b) which purposes are included and excluded by reference to **5.2**, **5.3** and **5.4**, along with any additional purposes. Each of these purposes should be explicitly included and detailed or excluded from the EIR;

c) any additional validation, checks and metrics by extension to Clause **6**;

d)   any additional content by extension to Clause **7**. This should also define which of the "requirable" fields are required or excluded (see Annex A), and any specific Attributes needed; and

e)   if other document and model formats are also being received, these Documents should be associated to the appropriate assets using the "Document" sheet.

5.2   Overall purposes requiring information

5.2.1   General

The employer should request information relating to the overall management of the Facility in accordance with **5.2.2**, **5.2.3** and **5.2.4**.

NOTE   The headings in **5.2.2, 5.2.3** and **5.2.4** were derived from BS ISO 55000.

5.2.2   Register

A register of assets should be provided to support accurate auditing and reporting. This should include both spatial and physical assets and their groupings.

NOTE 1   This information might be included whether or not specified by the EIR or chosen dPoW.

Information should be managed and protected where the register includes:

a)   sensitive information about the functional use of Space, Floors or Zones; and/or

b)   configuration and operation information relating to security, access control, and building/industrial control Systems.

This information should be managed and protected in accordance with the security requirements established in the EIR such as security strategy, policy, processes and procedures.

NOTE 2   See PAS 1192-5 for more information [1].

Every named inside or outside Space (location) should be documented along with every distinct Floor (region) containing them. The Zones defining public/private access should be documented, along with other Zones as required. Volumes defined for design or construction management should not be included.

NOTE 3   For information on the use of volumes see PAS 1192-2.

Every manageable Component should be documented along with every distinct functional System whether containing manageable Components or not, and every distinct product Type defining the manageable Components including both generic and specific product and materials.

5.2.3   Support for business questions

The employer should specify if information is required to support the evaluation of the business case for ownership and operation of the Facility. This should include continuous development of the Impacts and of the beneficial aspects of the Facility from the earliest deliverable onwards.

NOTE 1   See **5.3** for benefits.

NOTE 2   See **5.4** for impacts.

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[1]   PAS 1192-5 will be developed in due course.

5.2.4 Support for compliance and regulatory responsibilities

The employer should specify if information is required to support the maintenance of the health and safety of the users of the Facility such as construction design and management (CDM) Issues.

Issues should be related to named assets but might also be related to Attributes, Documents or Impacts.

NOTE 1   Compliance to CDM regulations may be satisfied by other means.

Jobs covering safety and security procedures and cautions within those safety procedures should be documented for handover.

NOTE 2   Information about security procedures is to be managed and protected in accordance with the security requirements established in the EIR such as security strategy, policy, processes and procedures.

NOTE 3   This purpose may be omitted if not specified by the EIR or chosen dPoW, but all parties could have legal compliance responsibilities.

5.3 Management of facility benefits

5.3.1 General

The employer should request information relating to the management of the capacity and benefits of the Facility.

5.3.2 Management of capacity and utilization

Documentation of the intended capacity and utilization of the Facility should be provided as it is required to support comparisons of actual use and utilization and portfolio management.

NOTE 1   It also supports improved briefings for future projects.

NOTE 2   This documentation might include data for soft-landings usage review, and benchmarking of facilities to agreed metrics.

The Facility, Floors (regions), Zones and Spaces (locations) should be documented with their areas and volume as appropriate. The method of measurement used should be documented on the Facility sheet. This should be complemented with measures of the functional capacity such as occupants or flows supported.

NOTE 3   For example, RICS (Appendix A and Appendix B contain formal rules of area measurement. Appendix E contains a list of suggested beneficial measures) [3]. Other Facilities might have other capacity measures.

Utilization should be provided based on the hours of intended use, expressed as a fraction where 24/7/52 = 100%.

NOTE 4   This purpose may be included unless excluded by the EIR or the chosen dPoW.

5.3.3 Management of security and surveillance

Information should be required or supressed to support the management of the security and surveillance of the Facility and neighbouring or adjacent sites in line with the security requirements set out in the EIR.

NOTE 1   This might include a confidential schedule of Components (such as CCTV cameras) or Attributes (gate key codes) to be omitted from any COBie deliverable outside of the employer's security systems.

NOTE 2   This purpose may be omitted if not specified by the EIR or chosen dPoW.

5.3.4   Support for repurposing

Repurposing of each Space (location) and the whole Facility should be supported with detailed information about the capacity, in terms of areas, volumes, occupancy, environmental conditions and structural load bearing.

Where information on repurposing relates to commercially or operationally sensitive information about the functional use of a Space, Floor (location) or Zone, this information should be managed and protected in accordance with the security requirements established in the EIR such as the security policy, processes and procedures.

NOTE   *This purpose may be excluded if not specified by the EIR or chosen dPoW.*

5.4   Management of Facility Impacts

5.4.1   General

The employer should request information relating to the operation of the Facility.

Where information on operations relates to commercially or operationally sensitive information about classified operations, systems or capabilities, this information should be managed and protected in accordance with the security requirements established in the EIR such as the security policy, processes and procedures.

5.4.2   Predicted and actual Impacts

The employer should require information relating to the Impacts from cost, carbon (CO_2e), energy, waste, water consumption or other environmental effects.

NOTE 1   *The employer might need to specify the method or standard to be adopted in preparing the data.*

Impacts should be associated to the Facility as a whole. The project (production) and in-use (running) Impacts should be documented separately.

NOTE 2   *Project Impacts are one-offs, whereas in-use Impacts might repeat on an annual or more complex pattern.*

NOTE 3   *Detailed predicted or actual Impacts might also be associated to any asset.*

When summing Impact values, summed assets should be complete and non-overlapping.

NOTE 4   *For example, the Impact of the Facility might be derived from summing the Impacts of the Systems but only if all relevant Systems are listed.*

NOTE 5   *This purpose may be excluded if not specified by the EIR or chosen dPoW.*

5.4.3   Operations

Information necessary for the normal operations of the Facility should be provided to support the facility operators and the employer to anticipate costs of operations.

NOTE 1   *The provision of log books required by some Building Regulations might be satisfied by other means.*

NOTE 2   *This purpose may be included if not excluded by the EIR or chosen dPoW.*

NOTE 3   *This might include data for soft-landings operations review, such as:*

*   *Power consumption (w) of Components, Types and Systems (as Attribute);*
*   *Jobs including "start-up", "shutdown" and "operation" procedures;*
*   *Test results and normal settings and readings from commissioning; and*
*   *If Facility Impacts are included then the usage is to be included as a yearly Impact from "Primary Energy Consumption" (MJ) and Impact Stage is "use".*

5.4.4 Maintenance and repair

Information on the recommended maintenance tasks, including planned preventative maintenance (PPM), should be provided to support the facility operators to anticipate and plan for costs of maintenance. This information should include:

- Jobs associated to Types including inspection/diagnostics, PPM and repairs (frequency is duplicated with Impact where the Impact Stage is "maintenance");
- Spares; and
- Impacts of maintenance operations.

NOTE 1   Labour cost rates are not required.

NOTE 2   This purpose may be excluded if not specified by the EIR or chosen dPoW.

5.4.5 Replacement

Information on the reference or expected replacement service life and costs should be available to the facility operators and to the employer to anticipate the costs of replacement. Recycling of the physical assets should be supported with detailed information relating to the principal constituent materials.

All the "requirable" fields for Type should be provided if relevant to the product, including the expected life and replacement cost.

NOTE   Further details of the replacement process might be provided as a Job and as an Impact. Additional Attributes may be specified in the chosen dPoW.

This purpose should be included, if not excluded by the EIR or chosen dPoW.

5.4.6 Decommissioning and disposal

Information on the recommended decommissioning Job should be provided to support the facility operators to anticipate and plan for end-of-life costs.

NOTE 1   Further details of the process might be provided as cost and waste Impacts.

Where the item to be decommissioned or disposed of has a security function, or has processed or stored commercially sensitive, or personally identifiable information (PII) or classified information it should be decommissioned and disposed of in accordance with the relevant security guidance and best practice as identified in the security strategy, or subsequently modified in light of new national, legal or regulatory requirements.

NOTE 2   This purpose may be excluded if not specified by the EIR or chosen dPoW.

6 Management and quality criteria

6.1 General

Information providers should provide management and quality oversight and review of the requirement in terms of the clauses outlined below. Testing should be against compliance with the COBie definition schema with additional rules implied by the specific requirements here and in Clause **7**.

NOTE 1   Known discrepancies might be documented as Issues.

6.2 Validity

The deliverables should be compliant to the COBie schema as defined in **3.2**.

NOTE   See Figure B.1 for an outline unified modelling language (UML) diagram of the COBie schema.

6.3 Structure

6.3.1 General

COBie should be delivered as a single model in "Spreadsheet XML 2003" format.

NOTE 1 This format is acceptable to most spreadsheet and database applications. Formats containing macros or other embedded code might be rejected by firewalls and security scans.

All sheets, columns and header rows should be present in the deliverable, and named and ordered in the same way as the standard. A blank row should not occur before a row containing data or a header.

Applications used for preparing or using COBie data need not reproduce the naming of the sheets or columns (see Annex A), but the delivered COBie should do so.

NOTE 2 Applications creating COBie data need not reproduce the colour coding of the COBie worksheets found in the manual COBie template and example files (see Annex A). However, when manually pasting into the COBie sheet, it is preferable to paste only text, so as to maintain the cells' colouration, formatting and validation.

The Instruction sheet should be included with: Title, Version, Release, Status and Region. This information should not change.

NOTE 3 For more information see A.1.

Any additional sheets specified by the employer should occur in the deliverable after the final PickLists sheet.

NOTE 4 Any additional sheets might not be read by receiving applications.

Any additional columns specified by the employer should occur to the right of the final specified columns and should have a header column name.

NOTE 5 Such columns might be read by receiving applications, as if they were textual Attributes. They can be used to simplify the generation of COBie information where the Attribute is applicable to the majority of the objects on the sheet. For example, if all or most Spaces (locations) are expected to have a "FloorCovering" value, then such a column can be added.

Any additional PickList values specified by the employer should occur below the recommended values.

NOTE 6 Such values might be accepted and used by receiving applications; 7.3 includes some potential additions.

The integrity of references should be ensured as follows:

a)   Every Space (location) should be assigned to one Floor (region).

b)   Every Space (location) should be assigned to at least one Zone.

c)   Every Floor and Zone should have at least one Space (location).

d)   Every Component should be assigned to at least one Space (location), from which it is used, inspected or maintained.

e)   Every Component should be assigned to one Type.

f)   Every Component should be assigned to at least one System, identifying its function.

g)   Every Type should apply to at least one Component.

h)   Every reference to other sheets should be valid.

i)   Every reference to PickList enumerations and classifications should be valid.

j)   Enumerations specified in the Attributes and PickLists should be adhered to.

6.3.2   Data types

Data types should be consistent with the COBie template.

Dates should be presented in accordance with BS ISO 8601 and as shown in Table 1. The time component is optional.

Table 1   **Date format**

Example	Sheet	Column
2012-03-15T12:45:00	(all sheets)	Created On
2012-03-15	Component	Installation Date
2012-03-15	Component	Warranty Start Date
2012-03-15	Job	Start

Lists, including classifications, should be comma delimited as shown in Table 2.

Table 2   **Comma separated lists**

Example	Zone	Column
L0-01A, L0-01B	Zone	Space Names[A)]
Acme YT405 WC 285036, Acme BM180 Basin 230172	System	Component Names[B)]
1. Spray the basin with a standard cleaner, *2. Scale can be removed using proprietary products and abrasives,* *3. Stains and surface marks might be removed with the use of a scouring pad.*	Job	Description (sub tasks)
Acme YT405 WC DL7523, CandG P101 Certificate	Job	Resource Names
2,5,10	Attribute	Value ranges, such as low, typical and high values
(0,31,softwood), (31,648,concrete NTF 504), (648,1177,concrete unspecified), (1177,1210, concrete NTF 504)	Attribute	Value tables (also using brackets) and lists

[A)]   On the Zone sheet the use of lists of Spaces (locations) may be avoided by repeating the row for each member Space (location).

[B)]   On the System sheet the use of lists of Component may be avoided by repeating the row for each member Component.

Uniqueness of information should be ensured. Names should be unique within their sheet, except that the System, Zone and Attribute names should be unique in conjunction with other columns.

a)   On the "Attribute" sheet, every Attribute Name (column A), taken with Sheet-Name (column E) and Row-Name (column F) should be unique.

b)   On the "System" sheet, every System Name (column A) taken with Component-Names (column E) should be unique.

c)   On the "Zone" sheet, every Zone Name (column A) taken with Space-Names (column E) should be unique.

6.3.3   Clarity of naming

To ensure the clarity of naming, the following should be done.

- Names should use the characters A-Z, a-z and 0-9 with spaces and full stops.

- Contacts should be named by use of their valid email address, including "@".

- Names should not contain commas or double spaces, nor unusual characters (e.g. &,%, ', ", <, >).

- Classifications should use the colon to separate code from description and should not use commas.

6.3.4   Consistency of units

Length, Area and Volume and Currency values should be consistent with the units selected on the Facility sheet (see Table 3). Units for linearly referenced locations should be consistent with the applicable Linear Referencing Method (LRM) and geospatial coordinates should be consistent with the applicable Coordinate Reference System (CRS).

NOTE   The allowable values for units use non-UK spellings in Tables 3, 4, 8, 11, 12, 13 and A.10.

Table 3   **Common units of measure**

Example	Sheet	Column
millimeters	Facility	Linear Units
squaremeters	Facility	Area Units
cubicmeters	Facility	Volume Units
pounds	Facility	Currency Unit

Numeric values should be provided without units appended. Unknown values should be entered as "n/a" (see Table 4).

Table 4   **Use of common units of measure**

Example	Sheet	Column
millimeters	Floor (region)	Elevation
millimeters	Floor (region)	Height
millimeters	Space (location)	Useable Height
squaremeters	Space (location)	Gross Area
squaremeters	Space (location)	Net Area
millimeters	Type	Nominal Length, Nominal Width, Nominal Height
pounds	Type	Replacement Cost
millimeters	Coordinate	Coordinate X Axis, Coordinate Y Axis, Coordinate Z Axis

Units should be provided separately for all Attribute and Impact numeric measures selected from the provided PickLists (see Table 5). The units of measure for length, area, volume and currency should be as defined on the Facility sheet.

Table 5   **Use of units from PickLists**

Example	Sheet	Value Column	Unit Column
W	Attribute	Value	Unit
kg	Impact	Value	Impact Unit

The units of measure for warranty durations and expected life on Type sheet and Frequency and Duration on Job sheets should be provided in the separate column, selected from the PickLists provided. Impact durations should be expressed in Years (see Table 6).

Table 6   **Time units**

Example	Sheet	Value Column	Unit Column
Year	Type	ExpectedLife	DurationUnit
hour	Job	Duration	DurationUnit
Year	Job	Frequency	FrequencyUnit
Year	Impact	LeadInTime	(Year)
Year	Impact	Duration	(Year)
Year	Impact	LeadOutTime	(Year)

NOTE   *The Job Frequency is a duration measured between Job starts. The Impact timings define a repeating cycle, starting at the time of handover.*

Initial impacts such as capital costs and embodied carbon should have zeros entered for their LeadInTime, Duration and LeadOutTime timings.

6.4   Consistency

COBie deliverables should have continuity with earlier deliverables and preferably be developed cumulatively to allow comparison and checking.

Unique asset names should be maintained from earlier deliveries.

The External System identifiers such as Globally Unique Identifiers (GUIDs) should be maintained.

NOTE 1   *Some authoring applications do not support or make optional the maintenance of the GUID during design development.*

Constant Attributes (excluding identification, quantities and location details) should be assigned to:

• the Type or System, not the Component; and

• the Floor (region) or Zone, not the Space (location).

Constant Documents (excluding condition reports, photographs and commissioning reports) should be assigned to:

• the Type or System not the Component; and

• the Floor (region) or Zone, not the Space (location).

Constant Impacts (excluding actual readings or measurements) should be assigned to:

- the Type or System not the Component; and

- the Floor (region) or Zone, not the Space (location).

NOTE 2   The EIR or dPoW may specify precision and tolerances.

6.5 Completeness

6.5.1 General

Any deliverable should be assessed for completeness by applying the appropriate review and testing before the information exchange.

NOTE 1   This might be by reference to the minimal deliverable compliant with the employer's information purposes or by testing against the EIR and any chosen dPoW.

6.5.2 Veracity

The information provided should match the intended or actual Facility.

6.5.3 Groupings

The relevant groupings used to manage the Facility should be provided. Every identifiable Space (location) should be assigned to at least one Zone and to a Floor (region). Every manageable Component should be assigned to at least one System and to a Type.

Category entries should be provided.

6.5.4 Supplementary information

Attributes, Documents, Impacts and Issues should be provided as specified by the purposes above, the EIR and the chosen dPoW.

*NOTE   Additional recommendations are listed in Clause **7**.*

Document entries should be provided for any documents and models forming part of the COBie deliverable, associated to the appropriate asset.

The following should not be documented as Attributes, Documents, Impacts or Issues:

a)   Zero, unset or undefined Values;

b)   Graphical and stylistic information;

c)   Parametric behaviour; and

d)   Information found elsewhere in COBie.

Connections and Assemblies and Coordinates are optional but should be provided if necessary to support the purposes above, the EIR and the chosen dPoW.

6.5.5 Operational information

Spares, Resources, and Jobs should be provided as specified by the purposes above, the EIR, the chosen dPoW and BS ISO 55000 if adopted.

6.5.6   Timeliness

Attributes should be provided by the phase specified by the chosen dPoW. All required and reference fields, including classification, should be provided by handover. All requirable fields not excluded by the EIR should be provided at handover.

7   Implementation

7.1   General

The implementation of COBie and the delivery of the EIR should be specific and appropriate to the Facility and should be led by the employer.

7.2   Means

Implementation should be through the use of robust applications, shared structured data and repeatable processes.

NOTE   Manual correction or enhancement of the COBie deliverable can be inefficient, unmanaged or unrepeatable, leading to loss or rework.

7.3   Existing and new Facilities

Existing Facilities and the context of new Facilities should be documented from surveys, document reviews and/or existing data sources.

NOTE 1   Existing Components and Spaces (locations) may be covered by pre-existing naming ("numbering" or "labelling") decisions. An example is the convention to name Spaces (locations) using their full Facility, Floor (region) and Space (location) number sequence.

The term "unknown" should be added to the category and other PickList columns to aid progressive documentation of any unknown attributes and measures.

Survey work that includes documenting condition or deterioration should use a consistent multi-point scale.

NOTE 2   This is shown in detail in Table 14.

7.4   Infrastructure and buildings

7.4.1   General

Infrastructure and building Facilities should be documented using an appropriate spatial structure, if necessary mapping "regions" within the facility to the Floor (region) sheet, and ensuring that Spaces (location) correspond with recognisable "location" destinations for inspection and maintenance work.

NOTE   Other sectors such as environmental management may use other vocabulary for spatial and physical management. The discussion in Clause **1** and the definitions in Clause **3** can guide implementation.

The option "region" should be added to the Floor (region) category enumeration, as an alternative to "site".

7.4.2   Coordinates

Components are located relative to their spatial structure. Where absolute coordinates are required for Components then all spatial assets should be placed at 0,0,0 without offsets.

The option "feature" should be added to the PickList for Coordinate categories, as there might be situations where Components are positions relative to named but un-located coordinates such as a grid or edge line where no coordinate values need to be provided.

A reference to a geographic information system (GIS) resource should be provided using the ExtSystem, ExtObject and ExtIdentifier.

NOTE 1   For more information see **A.19.2**.

The options "linear-element" should be added to the PickList for Coordinate categories, to identify a linear element along which a linearly referenced location can be specified.

NOTE 2   For example, to locate a sign a specific distance along the A1 trunk road, the A1 trunk road may be added as a row in the Coordinate spreadsheet with a Category value of "linear-element".

NOTE 3   See BS ISO 19148 for more information on linearly referenced locations.

The option "referent" should be added to the PickList for Coordinate categories, as there might be situations where Coordinates specify positions relative to named locations, such as railway or roadway mileposts. The milepost should be added to the Coordinate spreadsheet with a Category of "referent". Subsequent Coordinate rows that specify the referent in their RelativeTo column should have their X, Y, Z coordinate values measured from the referent location.

The option "crs" should be added to the PickList for Coordinate categories to be able to identify the Coordinate Reference System used as the RelativeTo value for subsequent Coordinate rows.

An additional column "RelativeTo", (column P) should be added to the Coordinate sheet to optionally refer to the name of earlier points.

NOTE 4   This allows relative placements of Coordinates to be explicitly documented. This overrides the default placement of Components relative to Spaces (locations), of Spaces (locations) relative to Floors (regions) and Floors (regions) relative to the Facility.

An additional column "LRM" (column R) should be added to the Coordinate sheet to optionally describe the Linear Referencing Method type.

NOTE 5   For more information see **A.19.3**.

7.4.3 Varying Attributes

Linear Components in infrastructure Facilities (e.g. roadways and rail) often have Attributes whose value changes along the length of the Component.

The value for the Attribute should be augmented by the location along the Component for which that value applies. These "from" and "to" locations along the Component should be specified using linearly referenced locations.

NOTE 1   See BS ISO 19148 for more information on linearly referenced locations.

The Description and Unit fields are used to define the pattern for the Value entries. The Unit field should contain a parenthesized list of units. The Description should start with a parenthesized list of keywords where the keywords can include:

- distanceAlong – the distance measured along the component from its start or from an alongReferent if an alongReferent is specified;

- alongReferent – the referent along the component from which the distanceAlong is measured; specified as the name of the Coordinate which defines the referent in the Coordinate spreadsheet;

- lateralOffset – the perpendicular distance measured left or right of the component or lateralReferent if a lateralReferent is specified;

- lateralReferent – the point from which the lateral offset is measured, specified either as a text string or as the name of the Coordinate which defines a feature in the Coordinate spreadsheet;

- verticalOffset – the perpendicular distance measured up or down from the component or vertical referent if a verticalReferent is specified;

- verticalReferent – the point from which the lateral offset is measured, specified either as a text string or as the name of the Coordinate which defines a feature in the Coordinate spreadsheet; and

- value – the value of the component attribute at the linear location specified.

NOTE 2   For more information see **A.18.2**.

7.5 Facility lifecycle management

Where detailed asset management is anticipated, Components representing the required performance should be separated from the Components representing their fulfilment. These should be linked as an Assembly.

NOTE   An example of detailed asset management is the tracking of substitutable Components.

7.6 General requirements on assets

Identity, including Name, Description, Classification, External System (ExtSystem) and External Identifier (ExtIdentifier) (if available), should be provided.

Assets should be classified and provided to support accurate audit and reporting. This should include code and description. Classifications should be as provided from the defined PickLists (see Table 7).

NOTE   These recommendations might be superseded in the EIR and chosen dPoW.

Table 7   **Classification recommendations**

Sheet	Column	Classification table	*Example*
Contact	Category	Uniclass Table C	*C3891: Manufacturers*
Facility	Phase	As defined (PAS 1192-2 and PAS 1192-3) prefixed with "CIC"	*CIC 6: Handover*
Facility	Category	Uniclass Tables D and E or RICS/BCIS Facility Classification	*D376: Detention secure facilities prisons,* *376: Prisons*
Space	Category	Uniclass Table D and E	*D3767: Cells*
Type	Category	Uniclass Table L	*L72104: Washbasins*
System	Category	Uniclass Table G & H or RICS SFCA, SF(CE)CA or RICS NRM	*G44: Sanitary and hygiene* *FFE, 5A1: Sanitaryware,* *NRM1 05.01: Sanitary installations*

NOTE   The prefix "CIC" is to be used for the unified industry phases, reflecting their inclusion in the CIC BIM Protocol Annex 1 [4].

7.7 Expected Attributes

7.7.1 General

Attributes should be provided as specified by the named fields in the COBie sheet templates and the templates available from the chosen dPoW.

NOTE 1   See **A.3** to **A.15**.

NOTE 2   Additional Attributes for Types and Systems are recommended at:

- www.buildingsmartalliance.org and www.buildingsmart.org.uk [1], (both IFC2x3 and IFC4 definitions contains recommendations)
- www.bimtaskgroup.org/COBie/ [5].
- www.nationalbimlibrary.com/api/ [6].
- http://bimtalk.co.uk/pdt_list [7].
- www.bimtaskgroup.org/infrastructure-asset-data-dictionary-for-uk/ [8].

7.7.2 Facility Attributes

The Attributes in Table 8 should be used for buildings and infrastructure Facilities.

Table 8   **Additional Facility Attributes (buildings and infrastructure)**

Name	Example Value	Example Unit	Description
GrossArea	20.00	squaremeters	Sum of all gross areas of spaces within the Facility. It includes the area of construction elements within the Facility. Might be provided in addition to the quantities of the Spaces (locations) and the construction Components assigned to the Facility. In case of inconsistencies, the individual quantities take precedence.
GrossVolume	55.00	cubicmeters	Sum of all gross volumes of Spaces (locations) enclosed by the Facility. It includes the volumes of construction Components within the facility. In case of inconsistencies, the individual quantities take precedence.
IsLandmarked	false	Logical	This Facility is listed as a historic landmark (TRUE), or not (FALSE), or unknown.
LandTitleNumber	ESX257525	n/a	The land title number (designation of the site within a regional system).
NetArea	18.50	squaremeters	Sum of all net areas of Spaces (locations) within the facility. It excludes the area of construction Components within the facility. In case of inconsistencies, the individual quantities take precedence.

Table 8   **Additional Facility Attributes (buildings and infrastructure)** *(continued)*

Name	Example Value	Example Unit	Description
NetVolume	46.25	cubicmeters	Sum of all net volumes of Spaces (locations) enclosed by the Facility. It excludes the volumes of construction Components within the Facility. In case of inconsistencies, the individual quantities take precedence.
RefElevation	50000.0	millimeters	Datum elevation relative to sea level.
RefLatitude	51, 30, 0	n/a	World latitude and longitude at reference point. Defined as integer values for degrees, minutes, seconds, and, optionally, millionths of seconds with respect to the world geodetic system WGS84.
RefLongitude	0, 0, 0	n/a	
RefNorthing	234243	meters	The absolute geospatial location referenced to three dimensions using a national coordinate grid system and datum. In Great Britain this is the Ordnance Survey's National Grid (OSGB36) and Ordnance Datum Newlyn (ODN) coordinates. In Northern Ireland this is the Irish Grid (IG) as used by Ordnance Survey Northern Ireland.
RefEasting	924233	meters	
TrueNorth	0.0 , 1.0	n/a	Cartesian vector indicating the orientation of the Facility against geographic north.
UPRN	44010823	n/a	The UPRN is the persistent key identifier providing consistency across the OS AddressBase product range. All historic, alternative and provisional addresses for a Basic Land and Property Unit (BLPU) are recorded against the same UPRN.
TOID	osgb1000006032892	n/a	The TOID is an OS unique feature identifier and comes from the OS MasterMap Topography Layer. The TOID is a 13 to 16 character number that is prefixed with "osgb" and which stays the same throughout the life of a feature.

NOTE 1   *This Table includes properties from buildingSMART/BS ISO 16739 IfcBuilding, IfcSite, and associated property sets. The UPRN, TOID RefEasting and RefNorthing are UK-specific and may be included in a property set named COBie_BuildingCommon_UK.*

NOTE 2   *The basis of measurements are to be specified separately.*

NOTE 3   *See A.4.*

The following Attributes in Table 9 should be used for building Facilities.

Table 9   **Additional Facility Attributes (building)**

Name	Example Value	Example Unit	Description
BuildingID	1234-567801-1234-45	n/a	A unique identifier assigned to a building. A temporary identifier is initially assigned at the time of making a planning application. This temporary identifier is changed to a permanent identifier when the building is registered into a statutory buildings and properties database.
IsPermanentID	true	logical	Indicates whether the identity assigned to a building is permanent (= TRUE) or temporary (=FALSE).
NumberOfStoreys	1	number	The number of storeys within a building.
OccupancyType	Prison	n/a	Occupancy type for this object. It is defined according to the presiding national building code.

NOTE   *This Table includes buildingSMART/BS ISO 16739 IfcBuilding, IfcSite, and Pset_BuildingCommon properties.*

The following Attributes in Table 10 should be used for infrastructure Facilities.

Table 10   **Additional Facility Attributes (infrastructure)**

Name	Example Value	Example Unit	Description
Coordinate ReferenceSystem	OS Grid	n/a	Name by which the Coordinate Reference System is identified. The name should be enumerated from the list recognized by the European Petroleum Survey Group. [A] The description might contain an informal description.
GeodeticDatum	WSG84	n/a	Name by which this datum is identified. The geodetic datum is associated with the Coordinate Reference System and indicates the shape and size of the rotation ellipsoid and this ellipsoid's connection and orientation to the actual globe/earth.
VerticalDatum	Dover-1952	n/a	Name by which the vertical datum is identified. The vertical datum is associated with the height axis of the Coordinate Reference System and indicates the reference plane and fundamental point defining the origin of a height system.
LinearReferencing Method	chainage	n/a	Name by which the LRM method is known; for example, chainage, stationing, reference post, address, unknown. An associated Document should confirm details.
PositiveLateral OffsetDirection	left	n/a	Left is common in the UK, right in the US (default).
PositiveVertical OffsetDirection	up	n/a	Up is default, down is used for boreholes.

[A]   The list is available at: http://www.epsg.org/.

NOTE   *This Table includes buildingSMART/BS ISO 16739 properties. The last three properties implement BS ISO 19148 and may be transmitted in a property set named COBie_FacilityLRM_UK.*

7.7.3   Space (location) Attributes

Space (location) Attributes should include identification, any distinct quantities and positional information. Any other consistent attributes should be applied or promoted to the Space's (location's) Zone or Floor (region).

The following Attributes in Table 11 should be used for internal and external Spaces (locations).

Table 11   Additional Attributes for internal and external Spaces (locations)

Name	Example Value	Unit	Description
Capacity	1	client (varies)	Beneficial measure.
GrossPerimeter	11546.8	millimeters	Gross perimeter of this Space (location). It includes all sides including those parts of the perimeter that are created by virtual boundaries and openings (like doors).
InteriorOrExteriorSpace	Internal	enumeration	Interior or exterior Space (location).
NetPerimeter	11546.8	millimeters	Net perimeter of this Space (location). It excludes those parts of the perimeter that are created by virtual boundaries and openings (like doors). It is the measurement used for skirting boards and might include the perimeter of internal fixed objects like columns.
OccupancyNumber	1	each	Number of people required for the activity assigned to this Space (location).
Utilization	0.95	ratio	Planned Availability as a fraction of 24/7/52.

The Attributes in Table 12 should be used for internal Spaces (locations).

Table 12   Additional Attributes for internal Spaces (locations)

Name	Example Value	Unit	Description
CeilingCovering	None	n/a	Label to indicate the material or finish of the space ceiling. The label is used for room book information and often displayed in room stamp.
FloorCovering	Carpet	n/a	Label to indicate the surface material or finish of the Space (location) flooring.
Concealed	false	boolean	Concealed.
FinishCeilingHeight	2500.0	millimeters	Height of the suspended ceiling (from the top of the flooring to the bottom of the suspended ceiling). To be provided only if the space has a suspended ceiling with constant height.
FinishFloorHeight	0	millimeters	Height of the flooring (from base slab without flooring to the flooring height). To be provided only if the space has a constant flooring height.

Table 12   **Additional Attributes for internal Spaces (locations)** *(continued)*

Name	Example Value	Unit	Description
GrossCeilingArea	*12.50*	*squaremeters*	Sum of all ceiling areas of the space. It includes the area covered by elements inside the space (columns, inner walls, etc.). The ceiling area is the real (and not the projected) area (e.g. in case of sloped ceilings).
GrossVolume	*97.25*	*cubicmeters*	Gross volume enclosed by the space, including the volume of construction elements inside the space.
GrossWallArea	*56.75*	*squaremeters*	Sum of all wall (and other vertically bounding elements, like columns) areas bounded by the space. It includes the area covered by elements inside the wall area (doors, windows, other openings, etc.).
NetCeilingArea	*11.75*	*squaremeters*	Sum of all ceiling areas of the space. It excludes the area covered by elements inside the space (columns, inner walls, etc.). The ceiling area is the real (and not the projected) area (e.g. in case of sloped ceilings).
NetVolume	*95.50*	*cubicmeters*	Net volume enclosed by the space, excluding the volume of construction elements inside the space.
NetWallArea	*113.95*	*squaremeters*	Sum of all wall (and other vertically bounding elements, like columns) areas bounded by the space. It excludes the area covered by elements inside the wall area (doors, windows, other openings, etc.).
WallCovering	*None*	*n/a*	Label to indicate the material or finish of the space walling. The label is used for room book information and often displayed in room stamp.

7.7.4   Component Attributes

Component Attributes should include identification, any distinct quantities and positional information. Any other consistent attributes should be applied or promoted to the Component's Type or System(s).

The following Attributes in Table 13 should be used for existing and new Components.

Table 13 **Additional Component Attributes**

Name	Example Value	Example Unit	Description
Area	5.74	squaremeters	Area
Length	4627.5	millimeters	Length
IsExternal	False	boolean	IsExternal
ElementalQuantity	5.74	squaremeters	Elemental Quantity (unit varies)
Mounting Height	1200.0	millimeters	Mounting Height
IsLoadBearing	False	Logical	Loadbearing
Criticality	high	enumeration	The operational criticality to the Owner/Operator (see BS 8544): Very low, Low, Normal, High, Very High
Volume	0.86	cubicmeters	Volume

NOTE   *Many properties and quantity measures are specified in buildingSMART/BS ISO 16739 for specific Components, Types and Systems.*

Remaining or economic life should be documented using *buildingSMART/ BS ISO 16739 Pset_ServiceLife.*

The Attributes in Table 14 should be used for Components in existing Facilities.

Table 14 **Additional Component Attributes (existing facilities)**

Name	Example Value	Example Unit	Description
AssessmentDate	2014-03-11	n/a	Date on which the overall condition is assessed.
AssessmentDescription	Broken pane	n/a	Qualitative description of the condition.
AssessmentCondition	AsNew	enumeration	The overall condition based on an assessment of the contributions to the overall condition made by the various criteria considered. Very poor, Poor, Adequate, Good, AsNew.

NOTE 1   *Other condition rating schemes may be preferred.*

NOTE 2   *This Table is based on buildingSMART/BS ISO 16739 IFC4 Pset_Condition.*

The following Attributes in Table 15 should be used where Components are under detailed asset management.

Table 15   **Additional Type Attributes (infrastructure)**

Name	Example Value	Example Unit	Description
RFIDTagRequired	*true*	*logical*	Clarification whether a Radio Frequency Identification Tag is required.
TagNameplateRequired	*true*	*logical*	Clarification whether a Tag Nameplate is required.

NOTE   This information may be transmitted in a property set named COBie_TypeCommon_UK.

The following Attribute in Table 16 should be used for Components where phased refurbishment or handover is undertaken.

Table 16   **Optional Component Attribute**

Name	Example Unit	Description	
AssetStatus	*enumeration*	Design	Being designed, but not yet approved for construction.
		Manufactured	Has been manufactured/fabricated but has not entered the logistics supply chain.
		Logistics	In transit to/from its place of manufacture but has not arrived in the site depot.
		OnSite	In the local storage facility and is ready for use in construction.
		Construction	Being procured, built and installed but not yet under formal testing or commissioning.
		TestAndCommissioning	Under formal test and commissioning programme, but not commissioned.
		Commissioned	Has passed testing and commissioning but is not under the control of the Infrastructure Manager.
		Operational	Has been commissioned and is under the control of the Infrastructure Manager.
		StrategicSpare	Available for use, but is not installed.
		Temporary	Supporting a programme of works but will not be handed over to an Infrastructure Manager.
		Decommissioned InSitu	Decommissioned, but remaining on site.
		Decommissioned Removed	Decommissioned and removed from site.

NOTE   This information may be transmitted in a property set named COBie_ComponentCommon_UK.

<div style="text-align: right">**Annex A**</div>
<div style="text-align: right">**(informative)**</div>

Example COBie entries

A.1 General

The presentation of COBie as a spreadsheet uses colour to convey the type of field.

a)   Expected: This field is expected (yellow, RGB #FFFF00).

b)   Reference: This field expects the name or email found on a COBie sheet (salmon, RGB #FA8072).

c)   Pick: This field expects the value from the associated PickList. (salmon, RGB #FA8072).

d)   Application: This field might be filled by the generating application (purple, RGB #800080).

e)   Requirable: This field might be required by the EIR or chosen dPoW (green, RGB #008000).

f)   Additional: This field is user-defined (light blue, RGB #ADD8E6).

A COBie workbook is made up of the tabs described in **A.2** to **A.21**.

NOTE   *Tables A.2 to A.26 transpose rows and columns to aid legibility.*

A.2 Instruction

Table A.1 shows an example of the COBie Instruction information.

Table A.1   **COBie Instruction example**

Instruction	*Example*	Notes
Title	COBIE	expected, fixed
Version	2	expected, fixed
Release	4	expected, fixed
Status	*ifc2x3*	expected
Region	*EN-UK*	expected, fixed

A.3   Contact

Table A.2 shows an example of COBie Contact information.

Table A.2   **COBie Contact example**

Contact	Example	Notes
Email	name@email.com	expected
CreatedBy	name@email.com	reference
CreatedOn	2009-02-12T11:00:00	expected
Category	C12:Quality management	pick
Company	Company name	expected
Phone	01 1111 1111111	expected
ExtSystem	Authoring Application	application
ExtObject	IfcPersonAndOrganisation	application
ExtIdentifier	n/a	application
Department	Standards	requirable
OrganizationCode	Company name	requirable
GivenName	First name	requirable
FamilyName	Surname	requirable
Street	Address Road	requirable
PostalBox	PO Box 111	requirable
Town	New Town	requirable
StateRegion	County	requirable
PostalCode	AA11 1AA	requirable
Country	Country	requirable

A.4   Facility

A.4.1   Building Facility example

Table A.3 shows an example of COBie building information.

Table A.3   **COBie building Facility example**

Facility	Example	Notes
Name	*Some School*	expected
CreatedBy	*name@email.com*	reference
CreatedOn	*2012-12-12T13:29:49*	expected
Category	*D713:Secondary schools*	pick
ProjectName	*SchoolExtension*	expected
SiteName	*SchoolPark*	expected
LinearUnits	*millimeters*	pick
AreaUnits	*squaremeters*	pick
VolumeUnits	*cubicmeters*	pick
CurrencyUnit	*Pounds*	pick
AreaMeasurement	*RICS BCIS*	expected
ExternalSystem	*BIM Authoring Application*	application
ExternalProjectObject	*IfcProject*	application
ExternalProjectIdentifier	*0NG5d_R6T8leptpG$lx7Lx*	application
ExternalSiteObject	*IfcSite*	application
ExternalSiteIdentifier	*0NG5d_R6T8leptpG$lx7Lv*	application
ExternalFacilityObject	*IfcBuilding*	application
ExternalFacilityIdentifier	*0NG5d_R6T8leptpG$lx7Lw*	application
Description	*Single storey secondary school*	requirable
ProjectDescription	*New build secondary school.*	requirable
SiteDescription	*Some school, Address Road, New Town, County, AA11 1AA*	requirable
Phase	*CIC 6:Handover*	pick

A.4.2   Infrastructure Facility example

Table A.4 shows an example of COBie Infrastructure information.

Table A.4   **COBie infrastructure Facility example**

Facility	Example	Notes
Name	J	expected
CreatedBy	name@email.com	reference
CreatedOn	2012-12-12T13:29:49	expected
Category	D115:Permanent way and track	pick
ProjectName	INSP2012	expected
SiteName	Site1	expected
LinearUnits	meters	pick
AreaUnits	squaremeters	pick
VolumeUnits	cubicmeters	pick
CurrencyUnit	Pounds	pick
AreaMeasurement	Approximate	expected
ExternalSystem	BIM Authoring Application	application
ExternalProjectObject	IfcProject	application
ExternalProjectIdentifier	0NG5d_R6T8leptpG$lx7Kx	application
ExternalSiteObject	IfcSite	application
ExternalSiteIdentifier	0NG5d_R6T8leptpG$lx7Kv	application
ExternalFacilityObject	IfcBuilding	application
ExternalFacilityIdentifier	0NG5d_R6T8leptpG$lx7Kw	application
Description	Queensbury to Kingsbury Metro Grey Line	requirable
ProjectDescription	Inspection 2012	requirable
SiteDescription	Queensbury to Kingsbury	requirable
Phase	CIC 7:Use	pick

A.5 Floor (region)

A.5.1 Building Floor example

Table A.5 shows another example of COBie building Floor information.

Table A.5 **COBie building Floor example**

Floor	Example	Notes
Name	*Level 0*	expected
CreatedBy	*name@email.com*	reference
CreatedOn	*2012-12-12T13:29:49*	expected
Category	*Floor*	pick
ExtSystem	*Authoring Application*	application
ExtObject	*IfcBuildingStorey*	application
ExtIdentifier	*0NG5d_R6T8leptpGyG4uky*	application
Description	*Entrance level*	requirable
Elevation	*0.0*	requirable
Height	*4000.0*	requirable

A.5.2 Infrastructure example

Table A.6 shows other examples of COBie Infrastructure information.

Table A.6 **COBie infrastructure example**

Floor	Example	Notes
Name	*B086*	expected
CreatedBy	*name@email.com*	reference
CreatedOn	*2012-12-12T13:29:49*	expected
Category	*region*	pick
ExtSystem	*Authoring Application*	application
ExtObject	*IfcBuildingStorey*	application
ExtIdentifier	*0NG5d_R6T8leptpGyG4uky*	application
Description	*Track between Queensbury and Kingsbury*	requirable
Elevation	*n/a*	requirable
Height	*n/a*	requirable

A.6 Space (location)

A.6.1 Building Space example

Table **A.7** shows an example of COBie building Space information.

Table A.7 **COBie building Space example**

Space (location)	Example	Notes
Name	*101*	expected
CreatedBy	*name@email.com*	reference
CreatedOn	*2012-12-12T13:29:49*	expected
Category	*D7181:General purpose classrooms*	pick
FloorName	*Level 0*	reference
Description	*Classroom*	expected
ExtSystem	*Authoring Application*	application
ExtObject	*IfcSpace*	application
ExtIdentifier	*3PbU3I0k5FVO3gc98VQGZm*	application
RoomTag	*CL 101*	requirable
UsableHeight	*2955.0*	requirable
GrossArea	*24.837*	requirable
NetArea	*24.837*	requirable

A.6.2 Infrastructure location example

Table **A.8** shows an example of COBie infrastructure location information.

Table A.8 **COBie infrastructure location example**

Space (location)	Example	Notes
Name	*B086-J*	expected
CreatedBy	*name@email.com*	reference
CreatedOn	*2012-12-12T13:29:49*	expected
Category	*D115:Permanent way and track*	pick
FloorName	*B086*	reference
Description	*Metro Grey Line between Queensbury and Kingsbury*	expected
ExtSystem	*Authoring Application*	application
ExtObject	*IfcSpace*	application
ExtIdentifier	*3PbU3I0k5FVO3gc98VQGZm*	application
RoomTag	*n/a*	requirable
UsableHeight	*n/a*	requirable
GrossArea	*245.0*	requirable
NetArea	*245.0*	requirable

A.7 Zone

Table A.9 shows an example of COBie Zone information.

Table A.9 **COBie Zone example**

Zone	Example	Notes
Name	*Teaching*	expected
CreatedBy	*name@email.com*	reference
CreatedOn	*2013-04-15T00:00:00*	expected
Category	*Circulation Zone*	pick
SpaceNames	*101, 102, 104*	reference
ExtSystem	*Authoring Application*	application
ExtObject	*IfcZone*	application
ExtIdentifier	*3PbU3l0k5FVO3gc98VQGZn*	application
Description	*Basic teaching spaces*	requirable

A.8 Type

Table A.10 shows an example of COBie Type information.

Table A.10 **COBie Type example**

Type	Example	Notes
Name	White Board	expected
CreatedBy	name@email.com	reference
CreatedOn	2013-04-15T00:00:00	expected
Category	L76134:Presentation systems	pick
Description	Short Throw Projector	expected
AssetType	Fixed	pick
Manufacturer	company@email.com	reference
ModelNumber	587	expected
WarrantyGuarantorParts	company@email.com	reference
WarrantyDurationParts	5	expected
WarrantyGuarantorLabor	company@email.com	reference
WarrantyDurationLabor	5	expected
WarrantyDurationUnit	Year	pick
ExtSystem	Authoring Application	application
ExtObject	IfcFurnitureType	application
ExtIdentifier	1lTs7iOoDD$830Kgut03mv	application
ReplacementCost	2760	requirable
ExpectedLife	15	requirable
DurationUnit	year	pick
WarrantyDescription	Onsite warranty and advanced replacement warranty	requirable
NominalLength	2105	expected
NominalWidth	50	expected
NominalHeight	1329	expected
ModelReference	Short Throw Projector	requirable
Shape	rectangular	requirable
Size	2105mm x 1329mm	requirable
Color	white	requirable
Finish	matt	requirable
Grade	tough	requirable
Material	various	requirable
Constituents	remote controller	requirable
Features	auto-shutdown	requirable
AccessibilityPerformance	visual impairment adapted	requirable
CodePerformance	fully earthed	requirable
SustainabilityPerformance	low-energy	requirable

A.9 Component

Table A.11 shows an example of COBie Component information.

Table A.11 **COBie Component example**

Component	Example	Notes
Name	White Board:247849	expected
CreatedBy	name@email.com	reference
CreatedOn	2012-12-12T13:29:49	expected
TypeName	White Board	reference
Space	101	reference
Description	WhiteBoard in room 101	expected
ExtSystem	Authoring Application	application
ExtObject	IfcFurnishingElement	application
ExtIdentifier	0lTs7iOoDD$830Kgut03mv	application
SerialNumber	S4567901	requirable
InstallationDate	2012-12-12T13:29:49	requirable
WarrantyStartDate	2012-12-12T13:29:49	requirable
TagNumber	247849	requirable
BarCode	4567901	requirable
AssetIdentifier	2f7761ec-6323-4dfc-80c0-52ae3703f410	requirable

A.10 System

Table A.12 shows an example of COBie System information.

Table A.12 **COBie System example**

System	Example	Notes
Name	Circuit 1	expected
CreatedBy	name@email.com	reference
CreatedOn	2012-12-12T13:29:49	expected
Category	G53:Electric power	pick
ComponentNames	WhiteBoard:247849	reference
ExtSystem	Authoring Application	application
ExtObject	IfcSystem	application
ExtIdentifier	2lTs7iOoDD$830Kgut03mv	application
Description	Small power circuit 1	requirable

A.11   Assembly (optional)

Table A.13 shows an example of COBie Assembly information.

Table A.13   COBie Assembly example

Assembly	Example	Notes
Name	Floor:Ground Bearing Concrete layer 01	expected
CreatedBy	name@email.com	reference
CreatedOn	2012-12-12T13:29:49	expected
AssemblyType	Layer	pick
SheetName	Type	pick
ParentName	Floor:Ground Bearing Concrete	reference
ChildNames	Masonry - Concrete Floor Block	reference
ExtSystem	Authoring Application	application
ExtObject	IfcMaterialLayer	application
ExtIdentifier	3lTs7iOoDD$830Kgut03mv	application
Description	Masonry - Concrete Floor Block:250.	requirable

A.12   Connection (content optional)

Table A.14 shows an example of COBie Connection information.

Table A.14   COBie Connection example

Connection (optional)	Example	Notes
Name	Internet connections	expected
CreatedBy	name@email.com	reference
CreatedOn	2012-02-12T11:00:00	expected
ConnectionType	Data	Pick
SheetName	Component	Pick
RowName1	WhiteBoard:247849	reference
RowName2	Server:21967	reference
RealizingElement	n/a	reference
PortName1	IC5	requirable
PortName2	IC5	requirable
ExtSystem	Authoring Application	application
ExtObject	IfcReConnects	application
ExtIdentifier	n/a	application
Description	Whiteboards to education resource server 1	requirable

A.13 Spare

Table A.15 shows an example of COBie Spare information.

Table A.15 **COBie Spare example**

Assembly	Example	Notes
Name	*White Board Bulb*	expected
CreatedBy	*company@email.com*	reference
CreatedOn	*2012-02-12T11:00:00*	expected
Category	*SpareSet*	pick
TypeName	*White Board*	reference
Suppliers	*company@email.com*	reference
ExtSystem	*Authoring Application*	application
ExtObject	*IfcConstructionEquipmentResource*	application
ExtIdentifier	*n/a*	application
Description	*projection bulbs*	requirable
SetNumber	*587-1*	requirable
PartNumber	*587-1*	requirable

A.14 Resource

Table A.16 shows an example of COBie Resource information.

Table A.16 **COBie Resource example**

Resource	Example	Notes
Name	*White Board Upgrade USB*	expected
CreatedBy	*company@email.com*	reference
CreatedOn	*2012-12-02T12:09:09*	expected
Category	*Material*	pick
ExtSystem	*Authoring Application*	application
ExtObject	*IfcConstructionResource*	application
ExtIdentifier	*n/a*	application
Description	*Manufacturer's upgrade memory stick*	requirable

A.15 Job

Table A.17 shows an example of COBie Job information.

Table A.17   **COBie Job example**

Resource	Example	Notes
Name	*White Board Upgrade*	expected
CreatedBy	*company@email.com*	reference
CreatedOn	*2013-04-15T00:00:00*	expected
Category	*PM*	pick
Status	*Not Yet Started*	pick
TypeName	*White Board*	reference
Description	*White Board upgrade procedure*	expected
Duration	*20*	expected
DurationUnit	*minute*	pick
Start	*2013-04-15T00:00:00*	expected
TaskStartUnit	*n/a*	pick
Frequency	*1*	expected
FrequencyUnit	*year*	pick
ExtSystem	*Authoring Application*	application
ExtObject	*IfcTask*	application
ExtIdentifier	*1lTs7iOoDD$830Kgut03nn*	application
TaskNumber	*1023*	requirable
Priors	*White Board Shutdown*	reference
ResourceNames	*White Board Upgrade USB*	reference

A.16 Impact

Table A.18 shows an example of COBie Impact information.

Table A.18 **COBie Impact example**

Resource	Example	Notes
Name	*White Board Replacement*	expected
CreatedBy	*company@email.com*	reference
CreatedOn	*2013-04-15T00:00:00*	expected
ImpactType	*Cost*	pick
ImpactStage	*Replacement*	pick
SheetName	*Type*	pick
RowName	*White Board*	reference
Value	*3 000*	expected
ImpactUnit	*currency*	pick
LeadInTime	*15*	requirable
Duration	*0*	requirable
LeadOutTime	*0*	requirable
ExtSystem	*Authoring Application*	application
ExtObject	*Pset_EconomicImpactValues*	application
ExtIdentifier	*n/a*	application
Description	*Estimated replacement cost*	requirable

A.17 Document

Table A.19 shows an example of COBie Document information.

Table A.19 **COBie Document example**

Document	Example	Notes
Name	*White Board Product Data*	expected
CreatedBy	*company@email.com*	reference
CreatedOn	*2013-04-15T00:00:00*	expected
Category	*Product Data*	pick
ApprovalBy	*Information Only*	pick
Stage	*Submitted*	pick
SheetName	*Type*	pick
RowName	*White Board*	reference
Directory	*n/a*	expected
File	*http://www.company.com/white board*	expected
ExtSystem	*Authoring Application*	application
ExtObject	*IfcDocumentReference*	application
ExtIdentifier	*n/a*	application
Description	*Short throw White Board Handbook*	requirable
Reference	*Short throw White Board Handbook*	requirable

A.18   Attribute

A.18.1   Single Attribute

Table A.20 shows an example of COBie single Attribute information.

Table A.20   **COBie single Attribute example**

Attribute	Example	Notes
Name	*Weight*	expected
CreatedBy	*company@email.com*	reference
CreatedOn	*2013-04-15T00:00:00*	expected
Category	*Submitted*	pick
SheetName	*Type*	pick
RowName	*White Board*	reference
Value	*40.000*	expected
Unit	*kg*	pick
ExtSystem	*Authoring Application*	application
ExtObject	*IfcPropertySingleValue*	application
ExtIdentifier	*n/a*	application
Description	*Installed weight (excluding packaging)*	requirable
AllowedValues	*n/a*	requirable

A.18.2   Table Attribute

Table A.21 shows an example of COBie table Attribute information.

Table A.21   **COBie table Attribute example**

Attribute	Example	Notes
Name	*SleeperMaterial*	expected
CreatedBy	*company@email.com*	reference
CreatedOn	*2013-04-15T00:00:00*	expected
Category	*AsBuilt*	pick
SheetName	*Component*	pick
RowName	*TrackBO86IJSBLO*	reference
Value	*(0,31,softwood), (31,648,concrete NTF 504), (648,1177,concrete unspecified), (1177,1210, concrete NTF 504)*	expected
Unit	*meter,meter,n/a*	pick
ExtSystem	*Authoring Application*	application
ExtObject	*IfcPropertyTableValue*	application
ExtIdentifier	*TrackSleepers*	application
Description	*(distanceAlong,distanceAlong,value)*	requirable
AllowedValues	*n/a*	requirable

A.19 Coordinate (optional)

A.19.1 Simple Coordinate

Table A.22 shows an example of COBie simple Coordinate information.

Table A.22 **COBie simple Coordinate example**

Coordinate	Example	Notes
Name	Level 1 point	expected
CreatedBy	name@email.com	reference
CreatedOn	2012-12-12T13:29:49	expected
Category	point	pick
SheetName	Floor	pick
RowName	Level 1	reference
CoordinateXAxis	0.0	expected
CoordinateYAxis	0.0	expected
CoordinateZAxis	4 000.0	expected
ExtSystem	Authoring Application	application
ExtObject	IfcBuildingStorey	application
ExtIdentifier	0NG5d_R6T8leptpGyG4uWz	application
ClockwiseRotation	0.000	expected
ElevationalRotation	0.000	expected
YawRotation	0.000	expected

A.19.2 GIS Coordinate

Table A.23 shows an example of COBie GIS Coordinate information.

Table A.23 **COBie GIS Coordinate example**

Coordinate	Example	Notes
Name	BO86/EM1	expected
CreatedBy	name@email.com	reference
CreatedOn	2012-12-12T13:29:49	expected
Category	feature	pick
SheetName	Component	pick
RowName	B086/EM1	reference
CoordinateXAxis	n/a	expected
CoordinateYAxis	n/a	expected
CoordinateZAxis	n/a	expected
ExtSystem	GIS Application	application
ExtObject	embankment	application
ExtIdentifier	10023	application
ClockwiseRotation	n/a	expected
ElevationalRotation	n/a	expected
YawRotation	n/a	expected

A.19.3 Linear Referencing Coordinates

Table A.24 shows an example of COBie Linear Referencing Coordinates information.

Table A.24 **COBie Linear Referencing Coordinates example**

Coordinate	Linear element example	Referent example	Notes
Name	BO86-J-SBLO le	BO86-J-SBLO ref	expected
CreatedBy	name@email.com		reference
CreatedOn	2012-12-12T13:29:49		expected
Category	linear element	referent	pick
SheetName	Floor (region)	Floor (region)	pick
RowName	BO86-J-SBLO	BO86-J-SBLO	reference
CoordinateXAxis	0.0	27.0	expected
CoordinateYAxis	0.0	0.0	expected
CoordinateZAxis	0.0	0.0	expected
ExtSystem	Authoring Application		application
ExtObject			application
ExtIdentifier	0NG5d_R6T8 leptpGyG4uWz	1NG5d_R6T8 leptpGyG4uWQ	application
ClockwiseRotation	0.000	0.0	expected
ElevationalRotation	0.000	0.0	expected
YawRotation	0.000	0.0	expected
RelativeTo	n/a	BO86-J-SBLO le	additional
LRM	n/a	relative meters	additional

A.20 **Issue (content optional)**

Table A.25 shows an example of COBie Issue information.

Table A.25 **COBie Issue example**

Issue	Example	Notes
Name	*Fall1*	expected
CreatedBy	*name@email.com*	reference
CreatedOn	*2009-11-04T11:08:38*	expected
Type	*Safety*	pick
Risk	*Very High*	pick
Chance	*Has Occurred*	pick
Impact	*Very High*	pick
SheetName1	*Document*	pick
RowName1	*Safety Policy*	reference
SheetName2	*Component*	pick
RowName2	*White Board:247849*	reference
Description	*loose fixings*	expected
Owner	*name@email.com*	reference
Mitigation	*warnings relayed to operatives*	expected
ExtSystem	*Authoring Application*	application
ExtObject	*Pset_Risk*	application
ExtIdentifier	*n/a*	application

A.21   PickLists

The PickLists sheet is optionally provided to support the manual creation and review of COBie deliverables (see Table A.26). It includes the allowed values for all the fields marked "pick" in the above tables.

Table A.26   **COBie PickLists example**

Issue	Example	Notes
AreaUnit	*squaremeters*	expected
AssetType	*Fixed*	expected
Uniclass Table D 1998	*D:Facilities*	requirable
Uniclass Table D and F 1998	*F:Spaces*	requirable
Uniclass G and H or RICS SFCA 1998	*G:Elements for buildings*	requirable
Uniclass L 1998	*L:Construction Products*	requirable
Uniclass C 1998	*C:Management*	requirable
CoordinateSheet	*Component*	expected
ConnectionType	*Control*	requirable
CoordinateType	*Point*	expected
DocumentType	*Preconstruction Submittals*	requirable
DurationUnit	*as required*	expected
FloorType	*Site*	expected
IssueCategory	*Change*	requirable
IssueChance	*Has Occurred*	expected
IssueImpact	*Very High*	expected
IssueRisk	*Very High*	expected
JobStatusType	*Not Yet Started*	expected
JobType	*Adjustment*	expected
objAttribute	*IfcPropertySingleValue*	application
objAttributeType	*BoundedValue*	application
objComponent	*IfcBeam*	application
objConnection	*IfcRelConnectsElements*	application
objContact	*IfcOrganization*	application
objCoordinate	*IfcBoundingBox*	application
objDocument	*IfcDocumentInformation*	application
objFacility	*IfcBuilding*	application
objFloor	*IfcBuildingStorey*	application
objIssue	*IfcApproval*	application
objJob	*IfcProcedure*	application
objProject	*IfcProject*	application
objResource	*IfcConstructionProductResource*	application
objSite	*IfcSite*	application
objSpace	*IfcSpace*	application
objSpare	*IfcConstructionProductResource*	application
objSystem	*IfcSystem*	application

Table A.26   **COBie PickLists example** *(continued)*

Issue	*Example*	Notes
objType	*IfcActuatorType*	application
objWarranty	*Pset_Warranty*	application
objZone	*IfcZone*	application
ResourceType	*Labor*	expected
SheetType	*Attribute*	expected
SpareType	*Part*	expected
StageType	*As Built*	expected
ZoneType	*Circulation Zone*	requirable
LinearUnit	*meters*	expected
VolumeUnit	*cubicmeters*	expected
CostUnit	*Pounds*	expected
AssemblyType	*Fixed*	expected
ImpactType	*Cost*	expected
ImpactStage	*Production*	expected
ImpactUnit	*currency*	expected
objAssembly	*IfcRelAggregates*	application
objImpact	*IfcPropertySet*	application
CIC Plan Of Works 2012	*CIC 6:Handover*	requirable

Unified modelling language (UML) diagram of the COBie schema

Figure B.1 shows an outline UML diagram of the COBie schema.

Figure B.1　COBie schema
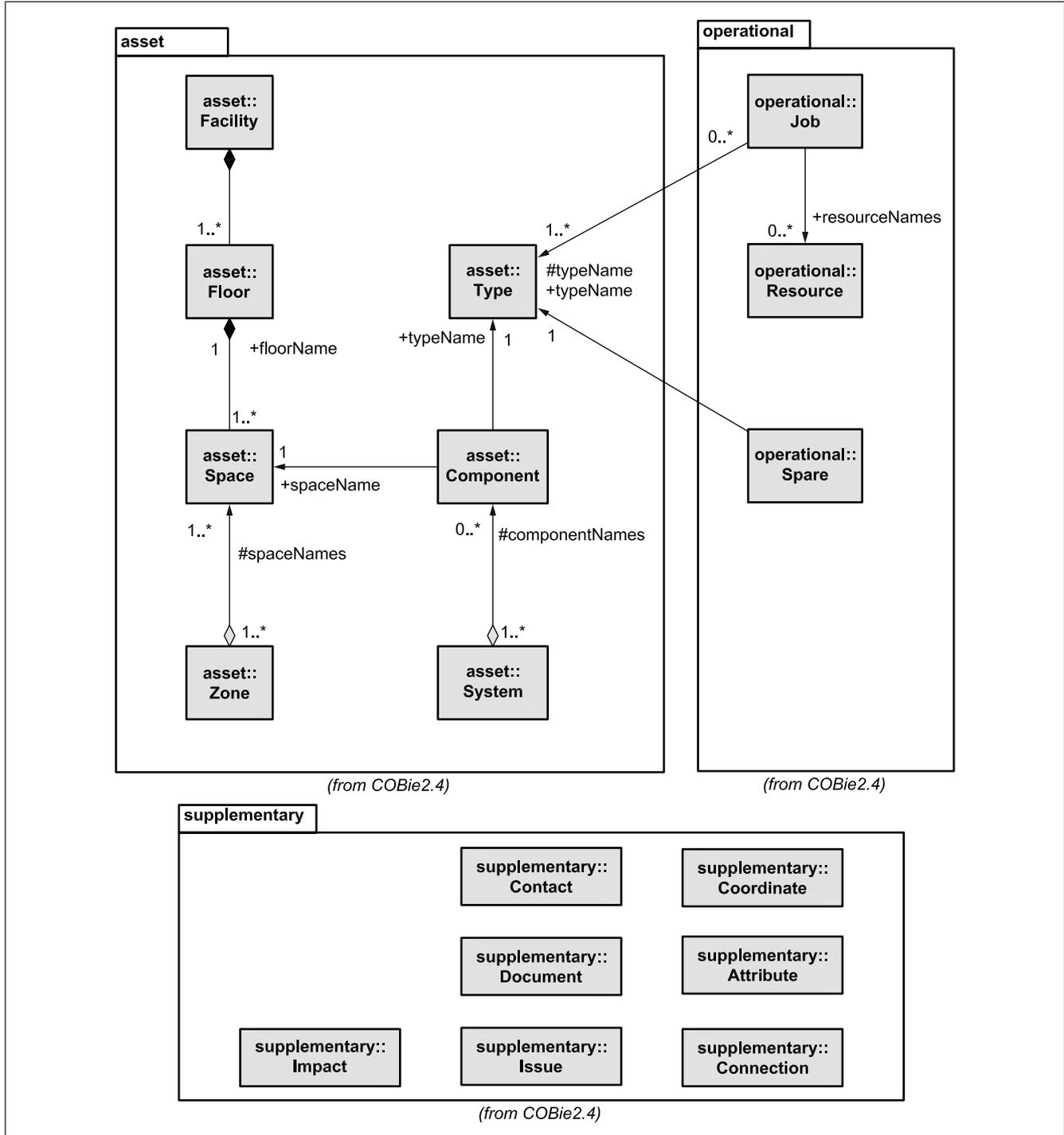
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BS 8541-3, *Library objects for architecture, engineering and construction – Part 3: Shape and measurement – Code of practice*

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[2)] PAS 1192-5 will be developed in due course.

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