



BSI Standards Publication

Collaborative production of information

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

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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.

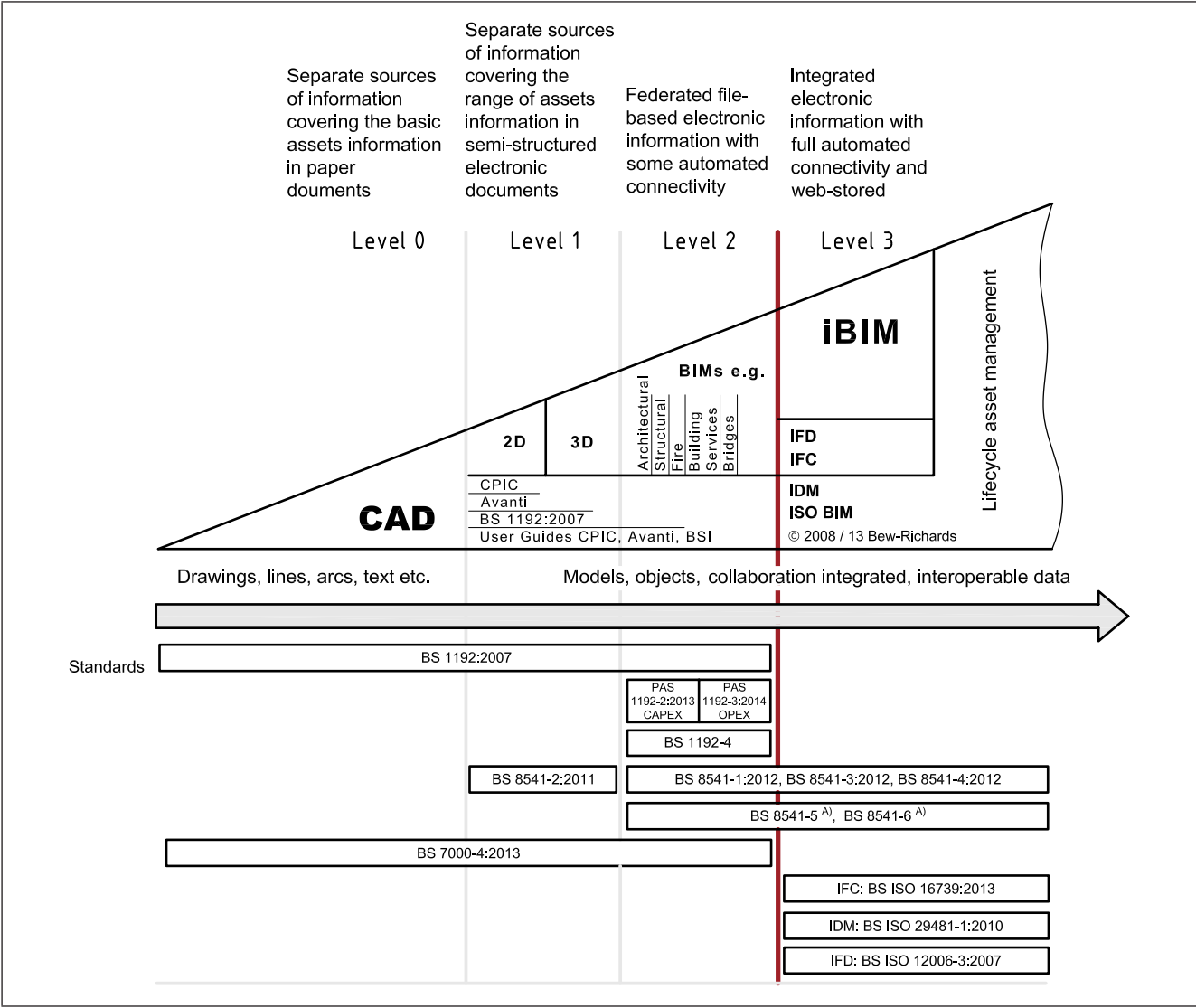
Throughout this Code of Practice, the standard COBie sheets, such as Facility, are capitalized. Example values and units in tables are in italics. Definitions are provided in Clause 3.

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

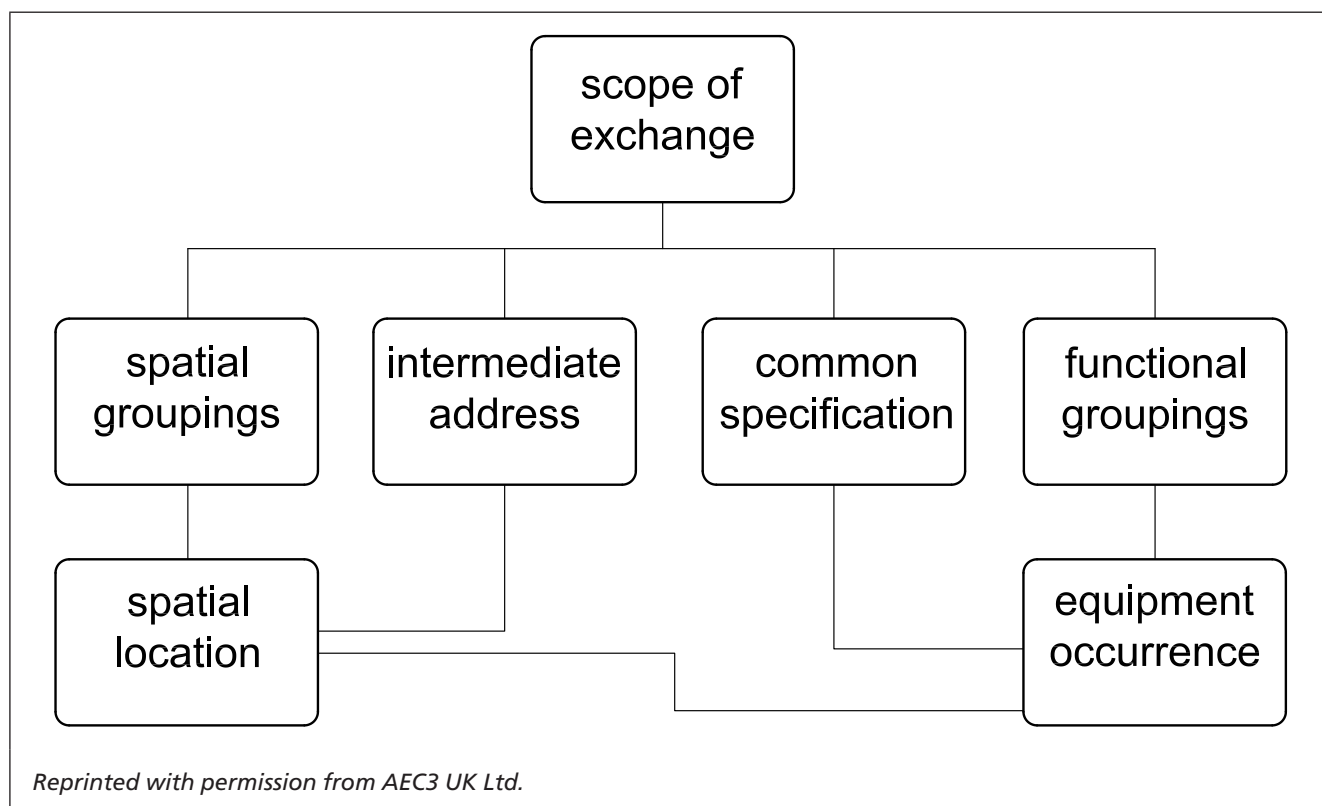
COBie (Construction Operations Building information exchange) provides a common structure for the exchange of information about new and existing Facilities, including both buildings and infrastructure.

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.

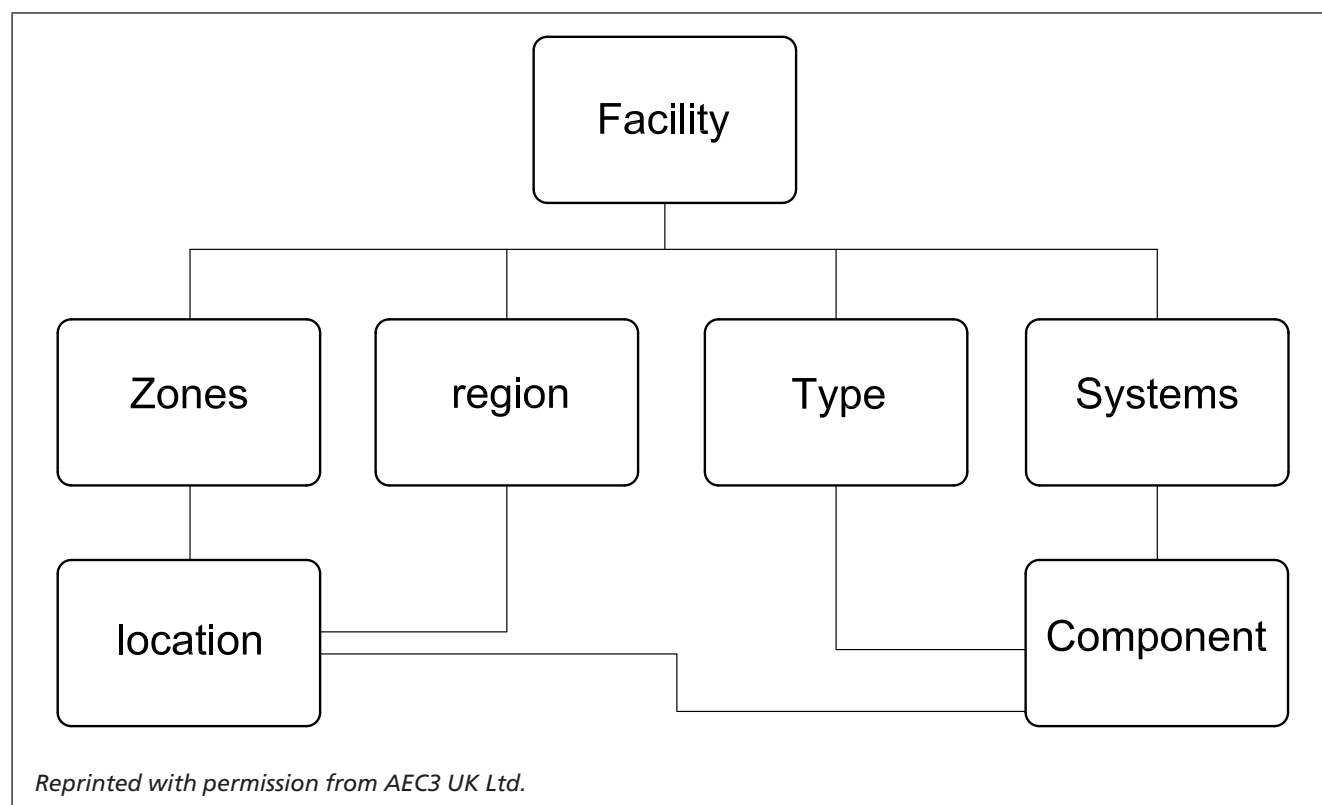
The scope of the exchange is given by the Facility – a distinct operational unit, typically a building or section of infrastructure or network – along with the temporary project and permanent site details. COBie holds information about the spatial locations and the equipment and components that make 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



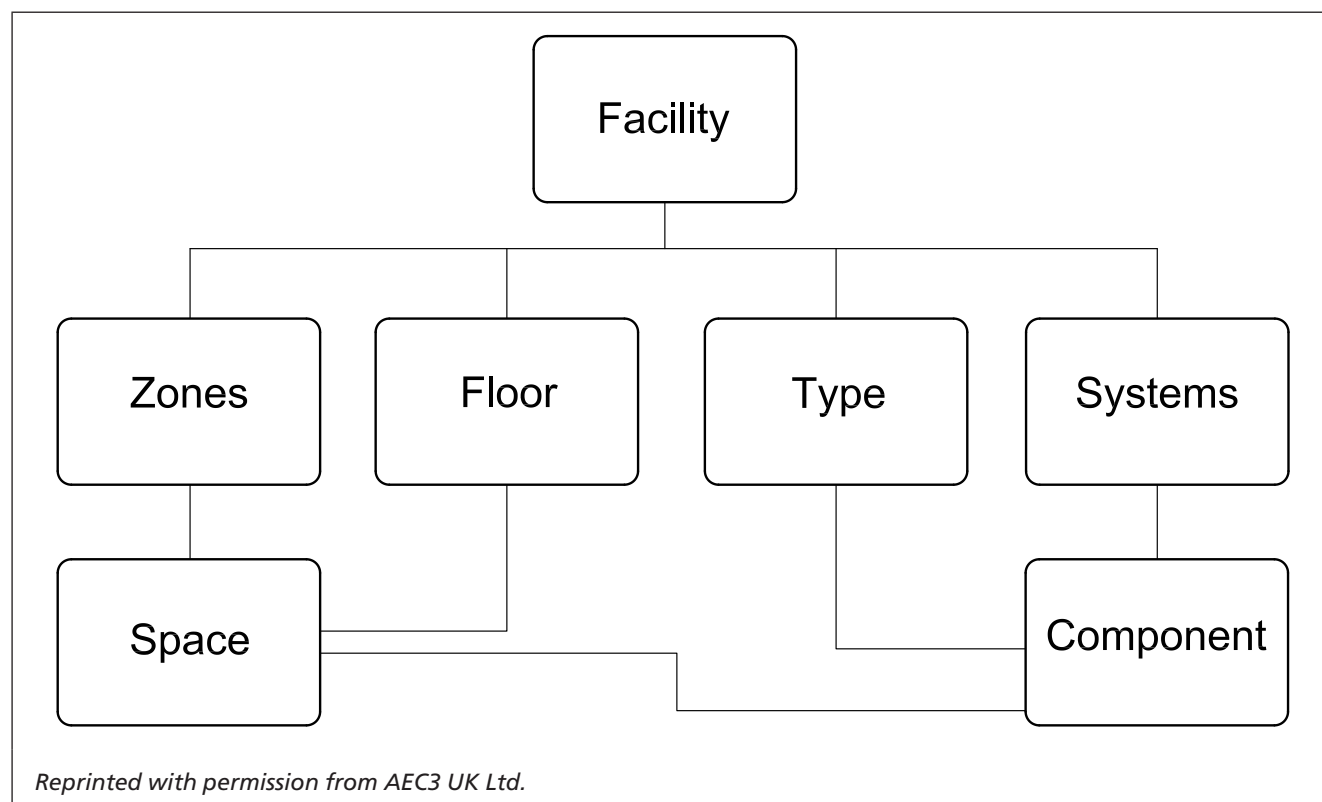
For infrastructure, the assets include the Facility as a whole, and its constituent locations and Components. These are managed through groupings into Zones, regions, Types and Systems (see Figure 3).

Figure 3 Infrastructure view of COBie



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



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 specifying 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

NOTE 1 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 CO₂ 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.

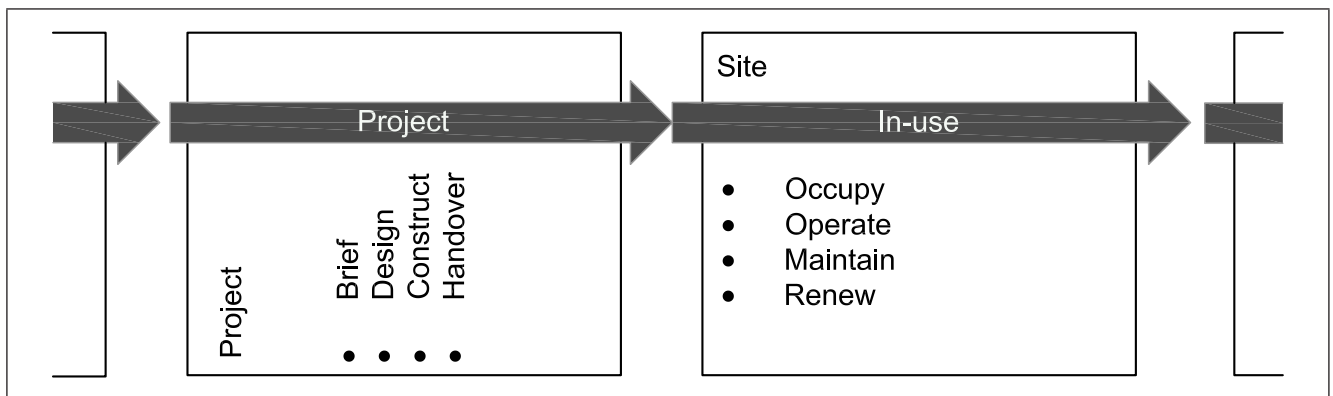
NOTE 1 For further information see PAS 1192-2.

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

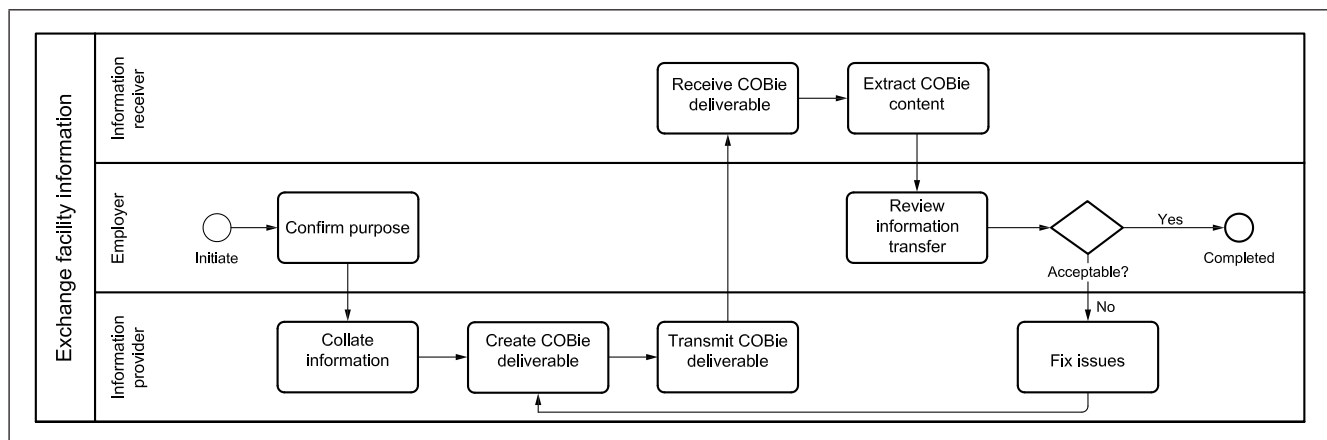
COMMENTARY ON 4.3

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.

- Receive and review the EIR.
- Determine what information requires special handling for security, data protection or commercial sensitivity reasons, and the required process and procedures to protect it.
- 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 information¹⁾.

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.

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 suppressed 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 (CO₂e), 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".*