BS 1192:2007+A2:2016

BRITISH STANDARD

# Collaborative production of architectural, engineering and construction information – Code of practice

ICS 01.100.30; 35.240.10

British Standards

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# Foreword

## Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution and came into effect on 31 December 2007. 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.

## Supersession

BS 1192:2007+A2:2016 supersedes BS 1192:2007+A1:2015, which is withdrawn.

## Information about this document

Text introduced or altered by Amendments No. 1 and No. 2, respectively are indicated in the text by tags [A1] ⟨A1⟩ and [A2] ⟨A2⟩. Minor editorial changes are not tagged.

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The changes incorporated in this revised standard include:

- Management processes to support collaborative working.
- Extending controlled naming to files and directories, as well as layers and sub-models.
- Compatibility with BS EN 82045-2 and ISO 82045-5.
- Incorporation of BS ISO 12006-2 compliant classification tables, such as Uniclass.
- Recommendations for implementation of BS EN ISO 13567-2.

## Use of this document

As a Code of Practice, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

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

## Presentational conventions

The provisions in 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.*

The word "should" is used to express recommendations of this standard. The word "may" is used in the text to express permissibility, e.g. as an alternative to the primary recommendation of the clause. The word "can" is used to express possibility, e.g. a consequence of an action or an event.

Notes and commentaries are provided throughout the text of this standard. Notes give references and additional information that are important but do not form part of the recommendations. Commentaries give background information.

## 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.**

# Introduction

Collaboration between the participants in construction projects is pivotal to the efficient delivery of facilities. Organizations are increasingly working in new collaborative environments in order to achieve higher standards of quality and greater re-use of existing knowledge and experience. A major constituent of these collaborative environments is the ability to communicate, re-use and share data efficiently without loss, contradiction or misinterpretation.

Each year considerable resources are spent on making corrections to non-standard data, training new personnel in approved data creation techniques, co-ordinating the efforts of subcontractor teams and solving problems related to data reproduction.

The use of this standard is particularly applicable where technology enabled processes are used to support projects. These processes include:

- automation of [A1] 3D model, data, [A1] drawing and document production processes;
- indexing and searching project material;
- filtering and sorting;
- quality checking and document comparisons.

Where the implementation of standards is adequately addressed, there are significant benefits to both the productivity of project teams and the profitability of the organization.

This standard applies to all construction project documentation. The set of project documents and each document within it are viewed as a hierarchy of named containers. It gives recommendations for structured names to convey information (meta-data) about the containers required for effective information management and exchange.

It is clear that standards and this British Standard in particular, are one way to enable project team members to work together more efficiently and accurately on construction projects. This standard enables increasing confidence in the use of a common naming convention and approach to collaborative working for use in architecture, engineering, construction and facilitates efficient data use in facilities management.

# 1 Scope

This standard establishes the methodology for managing the production, distribution and quality of construction information, including that generated by CAD systems, using a disciplined process for collaboration and a specified naming policy.

It is applicable to all parties involved in the preparation and use of information throughout the design, construction, operation and deconstruction throughout the project lifecycle and the supply chain.

The principles for information sharing and common modelling are equally applicable to building and civil projects.

This standard is also a guide for developers of software applications to enable them to support its implementation through the provision of configuration files or application add-ons.

*NOTE 1 The standard is an alternative where the formal meta-data recommendations as provided in BS EN 82045-2 and ISO 82045-5 cannot be used because of the absence of a compliant and common document repository within an organization or project team.*

*NOTE 2 This standard does not give guidance on the use of different data exchange file formats, the exchange of non-graphic data, structuring nor the exchange of data held as object classes and their instances nor the data structuring appropriate to specialist engineering analyses, nor the definition and use of data held as instance parameters.*

# 2 Normative references

The following referenced document is indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS ISO 12006-2, *Building construction – Organization of information about construction works – Part 2: Framework for classification*

*NOTE The implementation of BS ISO 12006-2 in the UK is published under the name "Uniclass".*

# 3 Terms and definitions

For the purposes of this British Standard, the following terms and definitions apply.

**3.1 code**
sequence of characters, often a mnemonic, having defined meaning when interpreted in the context of the field in which it is entered, used to concisely convey meta-data

**3.2 container**
named persistent set of data within a file system or application data storage hierarchy including, but not limited to, directory, sub-directory, data file, or distinct sub-set of a data file, such as a chapter or section, layers or symbol

*NOTE 1 "Named containers" is the common pattern on structured information for design and management. The actual implementation of "named containers" might be different in different operating systems and proprietary file formats. The "named container" pattern is, however, distinct in that a single name is associated to a collection. The principles of this standard can be applied independently of the actual implementation of the "named container" pattern.*

*NOTE 2 Directories include sub-directories and folders.*

*NOTE 3 Files include models, sub-models, A1 data, A1 sheets, documents, tables and schedules.*

*NOTE 4 Containers within files include layers, sections and symbols.*

**3.3 conventional Cartesian axis**
geometric convention using positive co-ordinates (X, Y, Z) ordered as (East, North, upwards), so that conventional plans use X, Y; and Z is upwards

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**3.4 document**
container for persistent information that can be managed and interchanged as a unit

[BS EN 82045-1, ISO/IEC 8613-1, **3.2.3** modified]

**3.5 drawing**
document used to present graphic information

**3.6 field**
part of a container name reserved for meta-data

*NOTE The standard controls the usage of fields for naming containers and codes used in those fields.*

**3.7 instance**
occurrence of an entity at a particular location and orientation within a model

**3.8 layer**
container comprising selected entities, typically used to group for purposes of selective display, printing and management operations

**3.9 meta-data**
data used for the description and management of documents and other containers of information

*NOTE Each item of meta-data resides in a field. Codes are the values allowed for fields.*

**3.10 model**
collection of containers organized to represent the physical parts of objects, for example a building or a mechanical device

*NOTE 1 Models can be two-dimensional (2D) or three-dimensional (3D), and can include graphical as well as non-graphical content. This standard is based on generating, sharing, etc., model files, not just drawings. Drawings are produced when the model is complete, correct and consistent.*

*NOTE 2 Models can include information by reference.*

A1 *NOTE 3 Information Models are a collective of 3D Models, Information/Data, (non-graphical), documents, drawings and any other information needed to deliver the project.* A1

**3.11 originator**
agent responsible for production of a container

*NOTE See Clause 7.*

**3.12 sub-model**
model included as an instance in another model

# 4 Collaboration management processes

## 4.1 Process considerations

### 4.1.1 Standard method and procedure

Projects should follow a common set of generic processes at the highest level, which are fine-tuned on a project-by-project basis. The procedures outlined apply to all approaches to project design production, [A1] and co-ordination of the information model. [A1]

### 4.1.2 General project issues

The project "standard method and procedure" should be agreed and committed to by all the relevant parties involved in the project (e.g. the client, design consultants, supply chain partners, etc.) at the pre-construction contract stage in the project lifecycle.

To implement the "standard method and procedure" the following elements should be in place:

- Roles and responsibilities should be agreed, in particular the responsibility for design co-ordination of the various design disciplines.
- Naming conventions should be adopted according to Clauses **5** to **15**.
- Arrangements should be in place to create and maintain the project specific codes as described in **6.3** to **15.4.3** and project spatial co-ordination as described in Annex A.
- A "Common Data Environment" (CDE) approach should be adopted to allow information to be shared between all members of the project team (see **4.2**). This is a repository, for example a project extranet or electronic document management system.
- A suitable information hierarchy should be agreed that supports the concepts of the CDE and the document repository as indicated in **5.4.2**.

## 4.2 Process and the Common Data Environment (CDE)

### 4.2.1 Outline of a Common Data Environment

*NOTE 1 There are four phases of the CDE as illustrated in Figure 1.*

Information, once prepared, should be placed into the WORK-IN-PROGRESS (WIP) (see **4.2.2**) area and passed through the model in an anti-clockwise direction through the phases of its life.

*NOTE 2 The naming, numbering and identification of all data held in the CDE are defined in Clause **5**.*

Key to the process is the management of moving the data between each of the four phases (see **4.2.2**, **4.2.3**, **4.2.4** and **4.2.5**), it is here that vital checking, approving [A1⟩, authorizing and accepting ⟨A1] processes are executed.

### 4.2.2 WORK-IN-PROGRESS

The WIP area of the CDE (see Figure 2) is where members of the project team carry out their own work using their organization's software systems. Whether the common repository or an organization's in-house repository is used, the models and documents should employ a similar management process as that used for the total project.

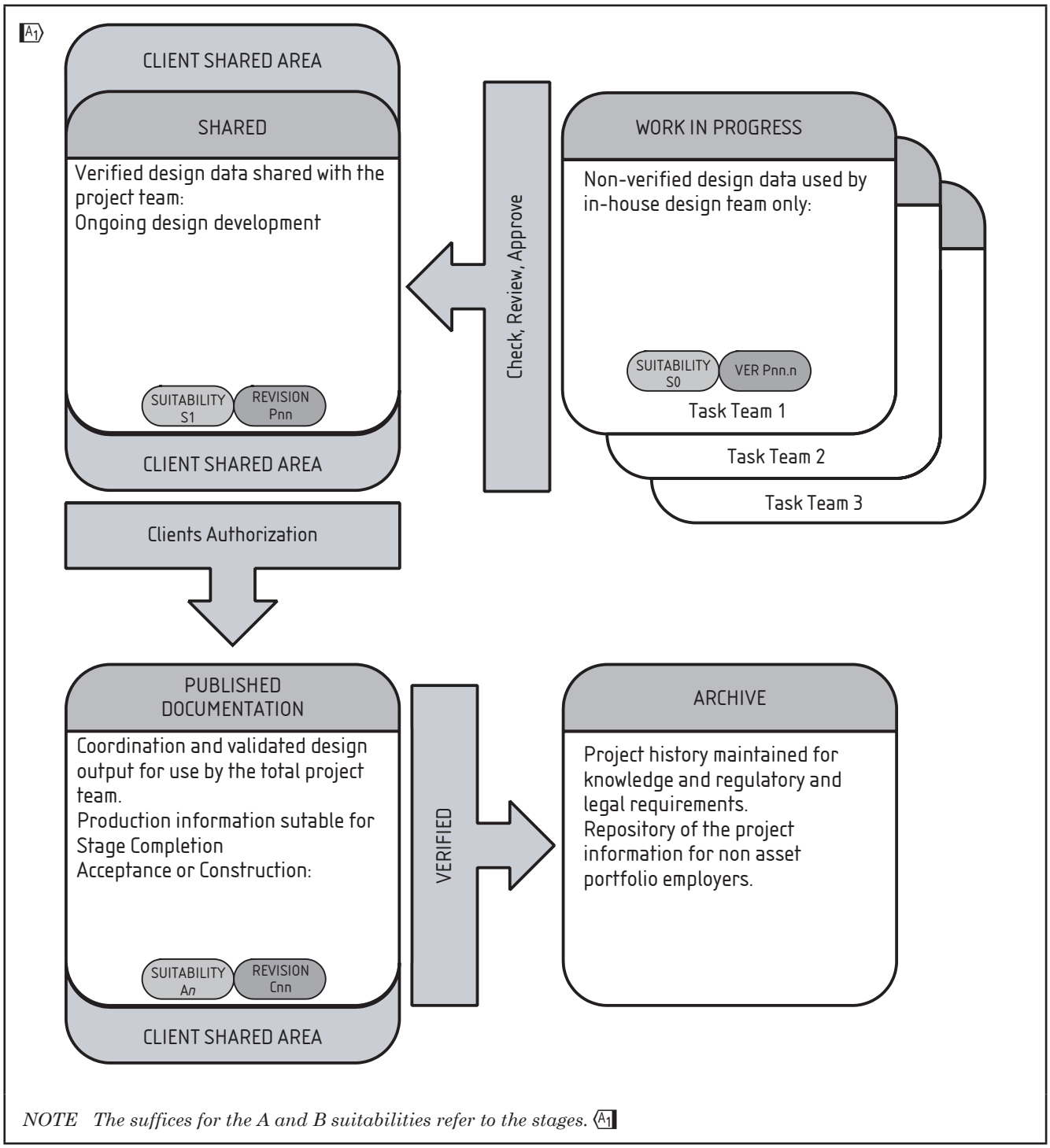
The organization is responsible for the quality of the WIP information and should ensure that appropriate checking and review processes are in place.

*NOTE 1 Each model [A1⟩ text deleted ⟨A1] only contains information for which each [A1⟩ task ⟨A1] team is responsible.*

*NOTE 2 The organization also includes work package subcontractors who develop design based on consultants' design, where contracts require this specific approach.*

The data continues to be updated in the WIP area and [A1⟩ options ⟨A1] should be indexed to indicate minor version changes, e.g. [A1⟩ P02.01 ⟨A1], etc. [A1⟩ *Text deleted* ⟨A1]

Figure 1 **Document and data management repository**




*NOTE The suffices for the A and B suitabilities refer to the stages.* A1

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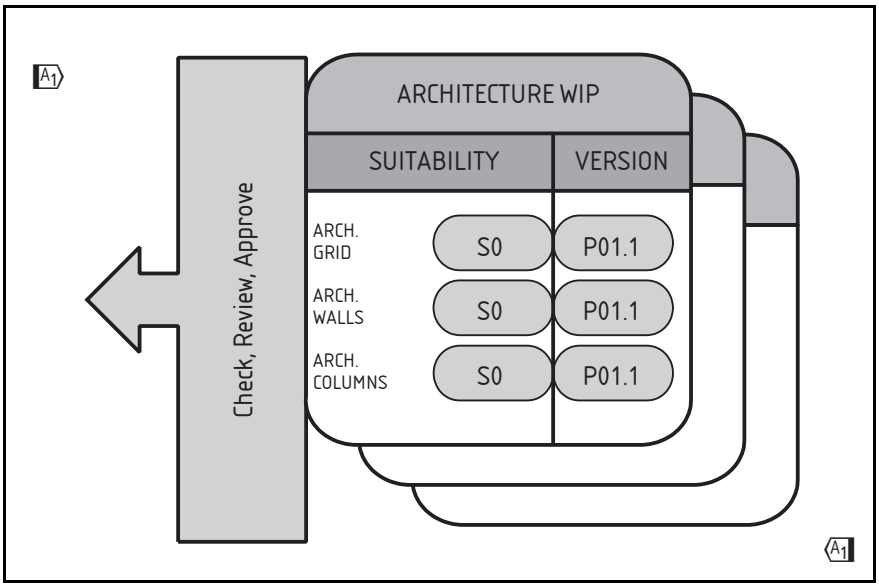
Figure 2 **WORK-IN-PROGRESS (WIP) and [A1] share [A1] process for architects model**




### 4.2.3 SHARED

When the data is SHARED with the other members of the project team, the data is checked and [A1] *text deleted* [A1] the revision code is updated to indicate a major revision, e.g. P01.

When a model has reached a status that is "[A1] suitable [A1] for co-ordination" it should be [A1] made available in [A1] the SHARED area of the CDE as illustrated in Figure 3.

*NOTE 1 The SHARED area ensures:*

- *sharing of data in a well-defined context;*
- *a secure safe space to allow constructive sharing;*
- *non-adversarial working;*
- *supports the generation of spatially co-ordinated data as part of the development process.*

*NOTE 2 The model is now available to be shared by the whole project team. [A2] This may be further controlled through the use of a security access list as defined within the Built Asset Security Management Plan (see PAS 1192-5:2015). [A2]*

Before uploading to the SHARED area, a model should be reviewed and checked according to compliance requirements in order to be [A1] suitable [A1] for a specific purpose. The information should also be checked for conformity to Annex B.

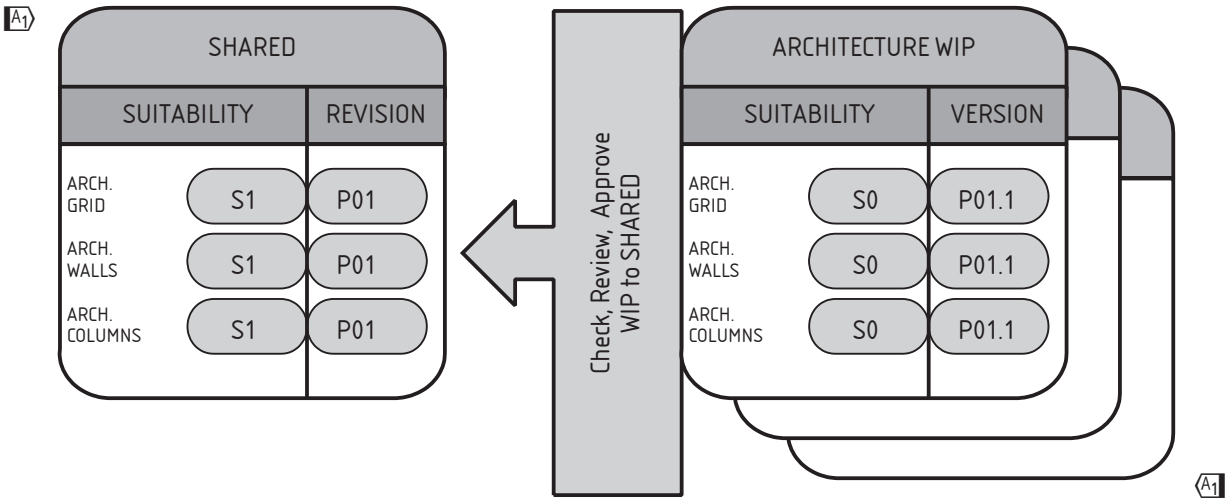
The "issue" status should be used to identify the suitability of the information provided. The "suitability" code (see **15.2.2**) gives ownership to the design teams and restricts access by others until information is sufficiently developed, co-ordinated, approved and authorized.

*NOTE 3 The suitability codes are distinct from the client/construction authorization status and from the contractors work packages purpose of issue.*

The data shared with status "[A1] Suitable [A1] for Co-ordination" should be in the changeable formats. All information having a different status should be produced as documents in non-changeable formats.

Models that are downloaded by others (see Figure 4), should never be re-uploaded to the SHARED area. When a model is used as background information by others (see Figure 5), it is important to ensure that this does not result in information in models being duplicated. Therefore, a procedure should be agreed that ensures information occurs only once in the SHARED area (see Figure 6).

Figure 3 **Architects model uploaded from WIP for sharing**




Architecture models checked, reviewed and approved within an internal review process and uploaded to the SHARED area.

The WIP model version is changed to a revision.

The models suitability is moved to "[A1] suitable [A1] for purpose".

In this example that is S1 "[A1] suitable [A1] for co-ordination".

*NOTE Any member of the project team can use the shared model files for reference or co-ordination. Other design team members can [A1] reference [A1] the latest versions of models from the SHARED area of the CDE as shown in Figure 4. These [A1] reference [A1] models can be used as background information onto which the recipient can overlay their design information. [A1] This produces a clash avoidance process. [A1]*

[A1] Only graphical models approved, suitable for co-ordination (S1), should be used as a reference. [A1]

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Figure 4 [A1] **Architect's SHARED models referenced to Structures WIP area** [A1]

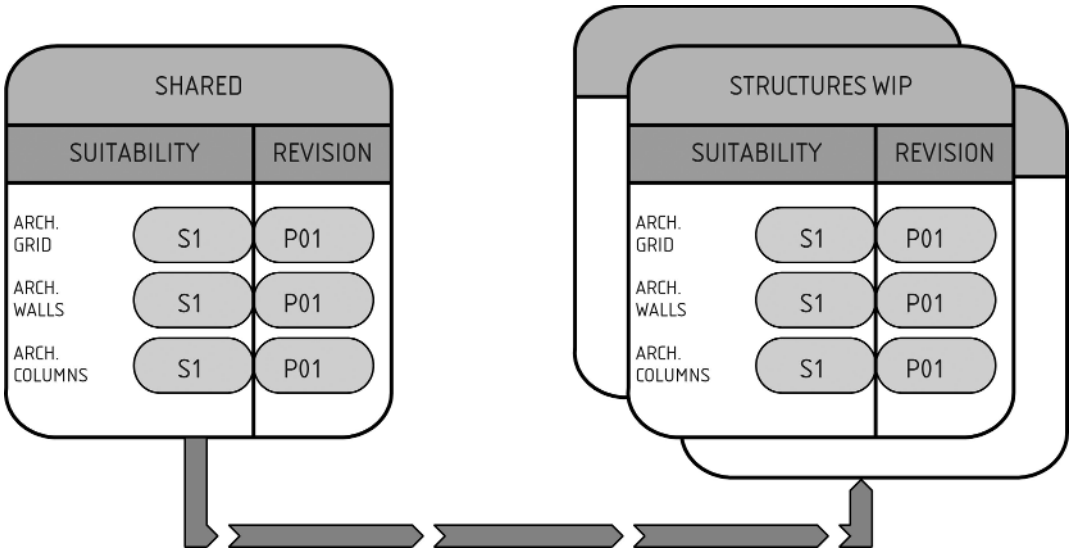
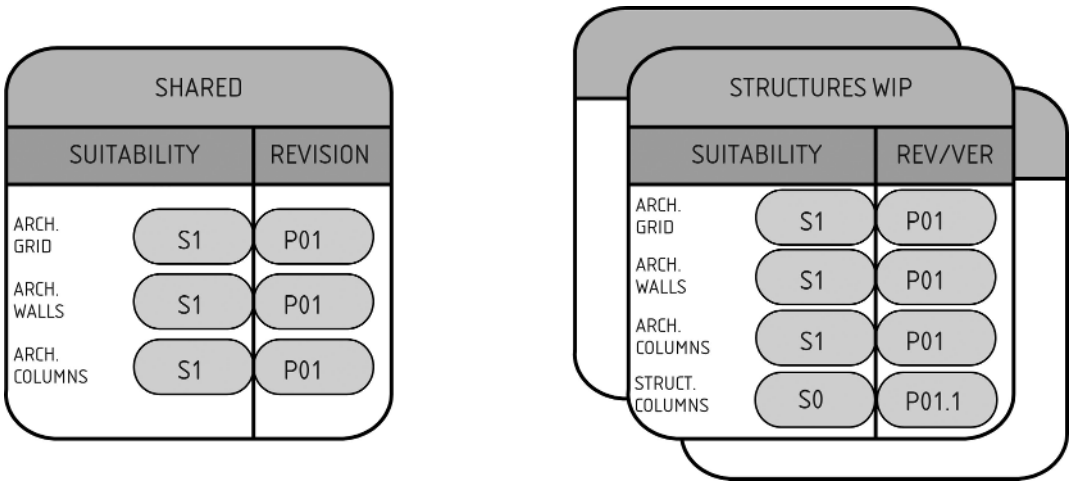



Figure 5 **Structures co-ordinates its model files using the architecture files as a reference**




*NOTE In the example shown in Figure 5, the structural engineer has designed the structural member sizes and takes ownership of the structural column* [A1] *model* [A1]*. When the structural engineer uploads this information into the SHARED area the architect's file is revised and re-shared to remove the architectural ownership of the columns.* [A1] *Although the finishes are still owned by the architect.* [A1]

### 4.2.4 DOCUMENTATION

Before information in the SHARED area of the CDE is made available to the wider project team, for example for tender or construction, it should be formally checked, approved and authorized (Figure 7). Suitable checking and approvals processes should be defined and applied.

[A1] *NOTE See PAS 1192-2 for a definition of a plan of work with stages.*

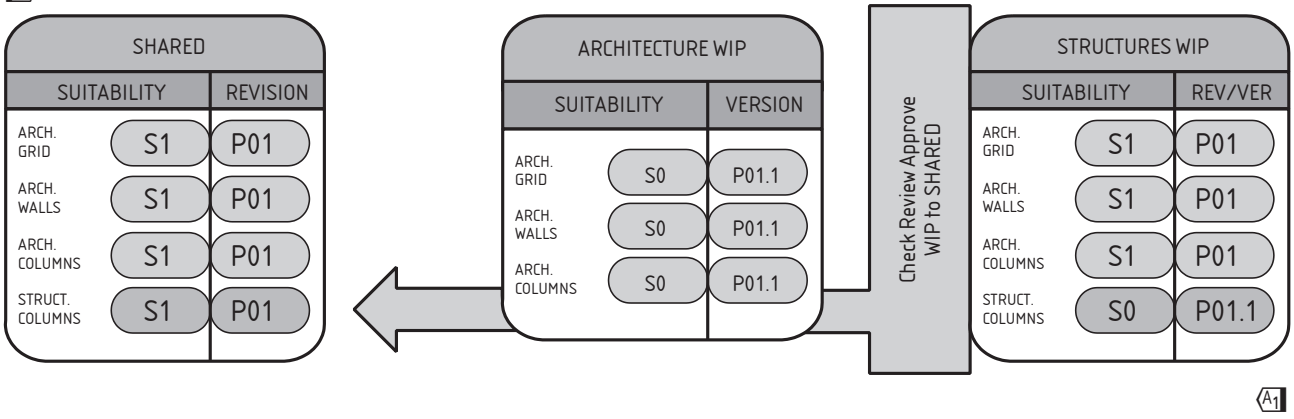
The sign off processes should allow for sign off at the end of each stage. [A1]

These should apply to [A1] all [A1] consultants and subcontractors' documents.

Once the document has been approved and authorized, [A1] *text deleted* [A1] the revision changes from "Preliminary" [A1] (P*n*) [A1] to "Contractual" [A1] (C*n*) [A1] (see **15.2.3**).

Figure 6 **Co-ordinated, reviewed and uploaded models [A1] shared [A1] to the SHARED area and duplicate [A1] information [A1] removed**

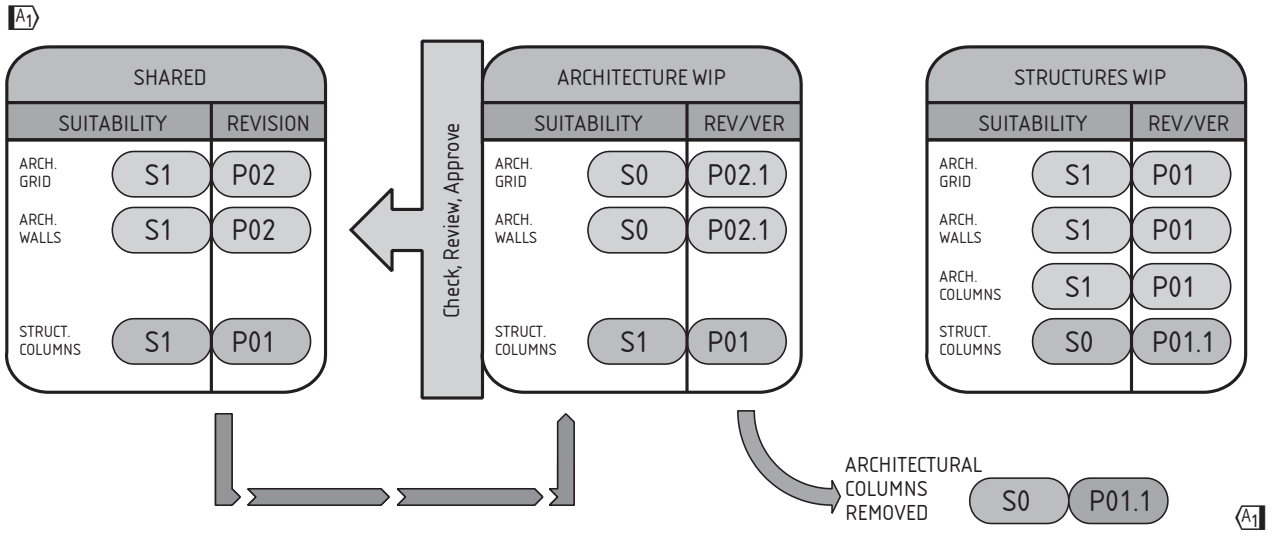
[A1]




[A1]

a) Structures uploads co-ordinated models to SHARED

[A1]




[A1]

b) Change of ownership – Architect downloads, removes their duplicates and resubmits

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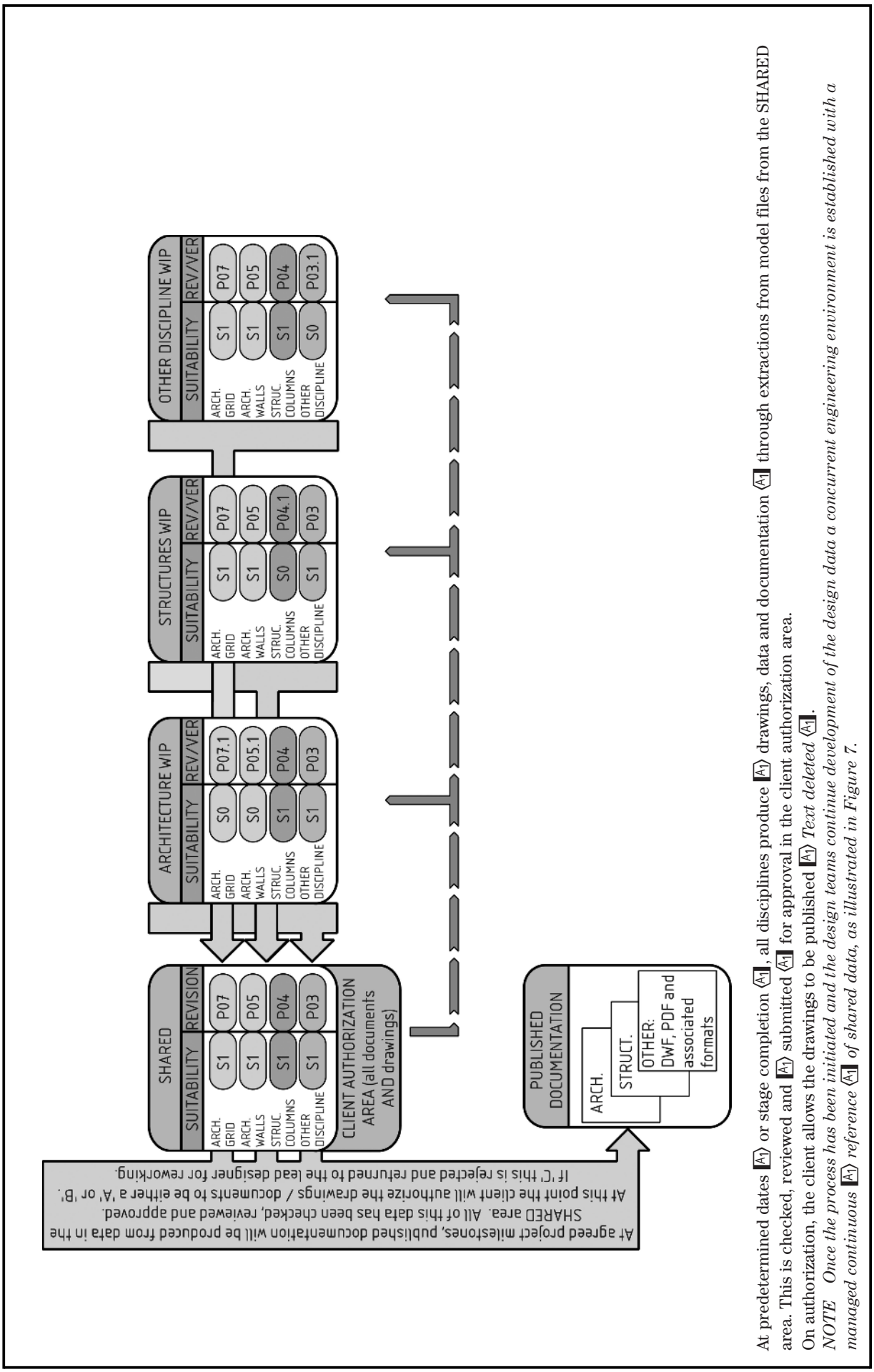
Figure 7 **Concurrent activities with continual upload and A1 reference A1**

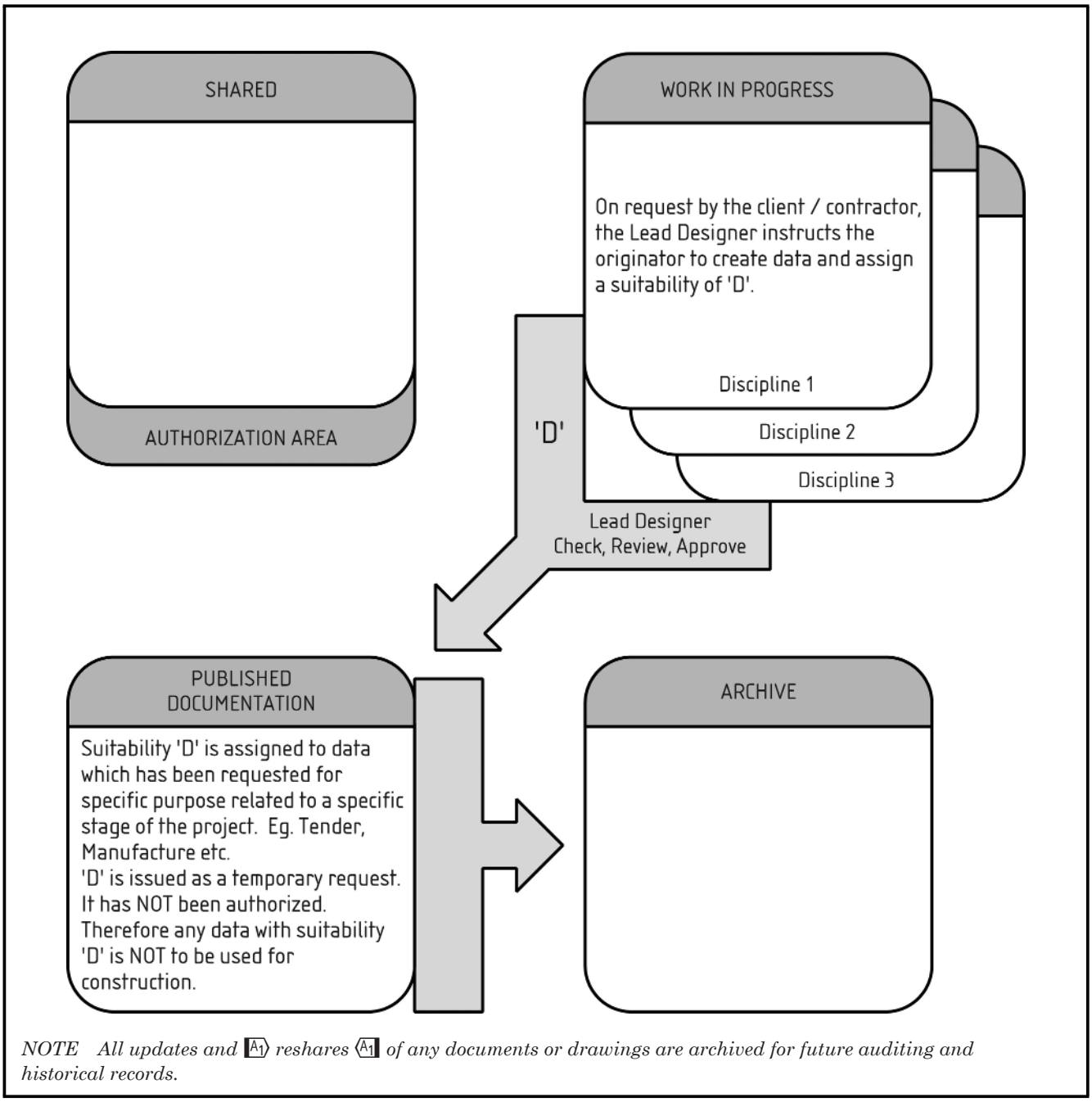



At predetermined dates A1 or stage completion A1, all disciplines produce A1 drawings, data and documentation A1 through extractions from model files from the SHARED area. This is checked, reviewed and A1 submitted A1 for approval in the client authorization area.

On authorization, the client allows the drawings to be published A1 *Text deleted* A1.

*NOTE Once the process has been initiated and the design teams continue development of the design data a concurrent engineering environment is established with a managed continuous* A1 *reference* A1 *of shared data, as illustrated in Figure 7.*

Figure 8 **Suitability "D" is data or documents not authorized by the client**




*NOTE All updates and* [A1] *reshares* [A1] *of any documents or drawings are archived for future auditing and historical records.*

*NOTE Where documents are required by the construction team for purposes other than construction (e.g. tendering or procurement), at a time prior to their approval for construction, the status "D" is used and transferred to the* [A1] *PUBLISHED/* [A1] *DOCUMENTATION area as illustrated in Figure 8 (see* ***15.3.2****). These "D" status documents retain a preliminary revision reference "*[A1] P01-P0*n* [A1]*".*

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### 4.2.5 ARCHIVE

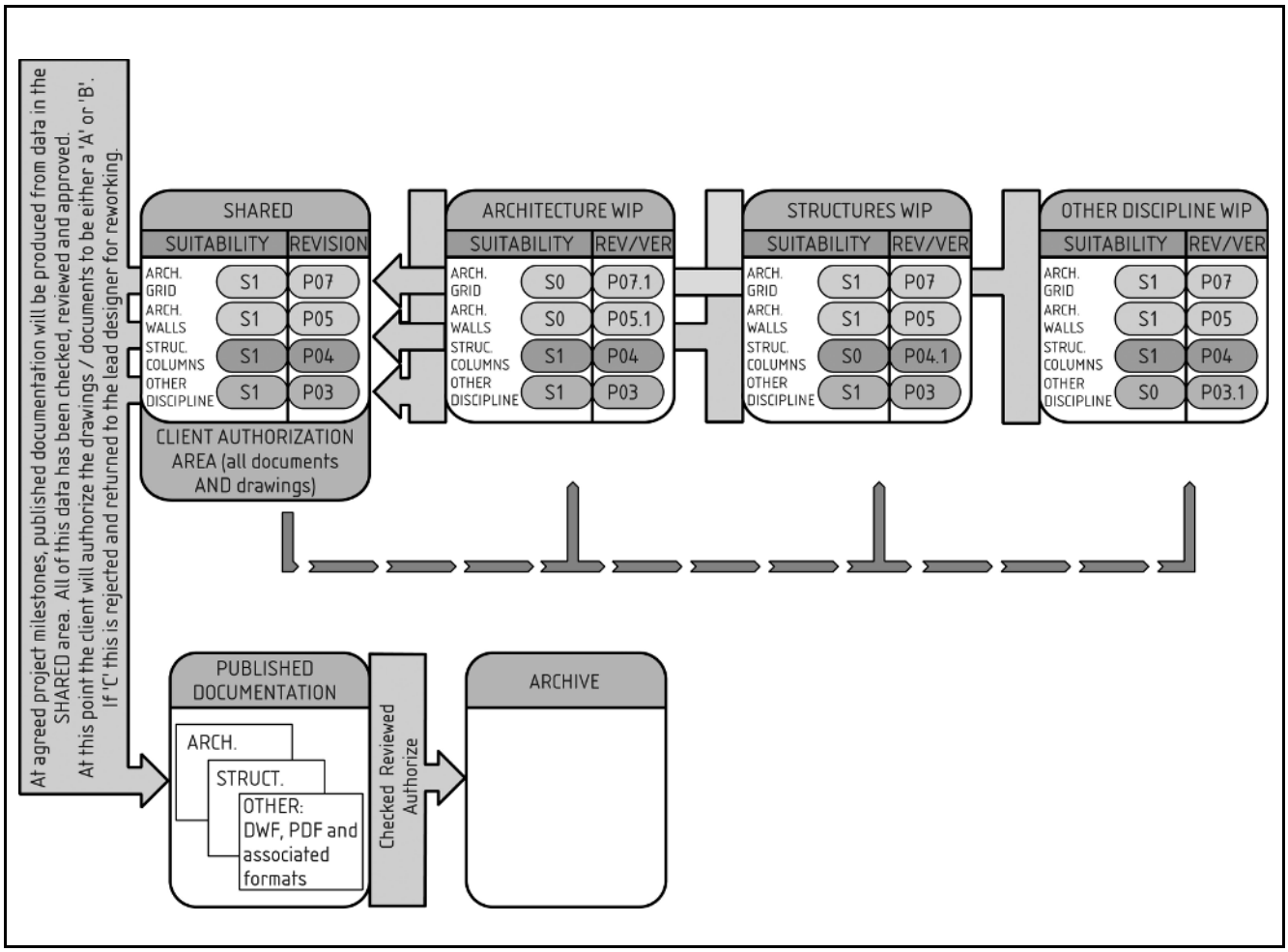
A process should be put in place to enable the continued availability of the ARCHIVE area information (see Figure 9), subsequent to the design and construction phases to support the following:

- history of the transfer of the project information;
- change audits;
- asset register;
- models;
- documents;
- legal purposes, e.g. Health and Safety file;
- operation and maintenance information.

*NOTE 1 The ARCHIVE area of the CDE is for inactive or superseded material in addition to the final signed-off* [A1] *"Construction Record".* [A1]

[A1] *NOTE 2 For a serial client the ARCHIVE may be transferred into the client's Asset Information Model (AIM) for continued maintenance and update.* [A1]

Figure 9 **Audit trail, data, documents, asset and facility management information held in ARCHIVE**



# 5 Naming of containers

## 5.1 Structure of names

*NOTE 1 Different containers have different fields joined together but otherwise use the same conventions.*

Names for containers should be created by joining together codes in the specified fields, in the specified order, using only the "-" hyphen character, which is therefore not allowed in any code.

*NOTE 2 Any "description" (see Clause **14**) is appended following an underscore "_".*

*NOTE 3 The hyphen character may be used in a description field but this is deprecated.*

## 5.2 Assigning codes

Containers should have codes assigned for each of the specified fields.

*NOTE The codes for fields are defined in Clauses **6** to **15**.*

Any container having more than one dominant code for any single field should be sub-divided.

## 5.3 Codes

### 5.3.1 Sources of codes

Codes should be selected from one of two sources:

a) standard codes (see **5.3.2**); or

b) project specific codes (see **5.3.3**).

### 5.3.2 Standard codes

Containers should have standard codes assigned for the fields as listed in **6.2** to **15.2**. Standard codes should be used wherever possible.

### 5.3.3 Project specific codes

Project specific values for fields should be given codes that are unique and distinctive, with clear descriptions. Project specific codes should not be overly long as some repository systems cannot handle long file-identifiers.

Containers should have codes assigned for the fields as specified in **6.3** to **15.3**.

Each code should not imply meaning that is duplicated in other fields.

*NOTE This is necessary to ensure that complex rules are not required to maintain consistency between the fields. For example, avoid putting meaning in a revision field that is related to the suitability field.*

The codes should be published and maintained alongside the document register. Codes should be mnemonics, where possible, to ensure users can clearly identify them and differentiate between them.

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## 5.4 Naming of containers

### 5.4.1 Patterns for naming containers

Names for containers should be created according to three patterns:

a) directories and folders (see **5.4.2**); or

b) files (see **5.4.3**); or

c) containers within files including layers (see **5.4.4**).

### 5.4.2 Directories and folders

Directories should be transmitted and stored in repositories with names composed by joining the one mandatory and two optional fields given in Table 1. An example is given in **5.5**.

*NOTE Implementations might introduce intermediate sub-directories based on fields present in the file naming specified in **5.4.3**.*

Table 1 **Naming of directories and folder containers**

| Field | Obligation | Clause |
|---|---|---|
| Project | Required | **6** |
| Suitability [A)] | Optional | **15.3.2** |
| Revision [A)] | Optional | **15.3.3** |

[A)] If information passes through an environment that cannot track meta-data then this field can be included to identify the "suitability" and "revision".

The two optional fields should be used or omitted together.

### 5.4.3 Files

Files should be transmitted and stored in repositories in a context which makes clear the fields defined for the directory (see **5.4.2**). Files should be transmitted and stored in repositories with names composed by joining the seven mandatory and three optional fields given in Table 2 (an example is given in **5.5**).

*NOTE The file name also contains the extension suffix identifying the type of application applicable.*

Table 2 **Naming of file**

| Field | Obligation | Clause |
|---|---|---|
| Project | Required | **6** |
| Originator | Required | **7** |
| [A1] Volume or system [A1] | Required | **8.1.2** |
| Levels and locations | Required | **8.1.3** |
| Type | Required | **9** |
| Role | Required | **10** |
| Classification | Optional | **11** |
| Number | Required | **13** |
| Suitability [A)] | [A1] meta-data [A1] | **15.2.2** |
| Revision [A)] | [A1] meta-data [A1] | **15.2.3** |

[A)] If files pass through an environment where there is no directory context, this field can be included to document the suitability and revision.

The [A1] meta-data [A1] fields "suitability" and "revision" should be used or omitted together.

### 5.4.4 Containers within files

Containers within files should have names composed by joining the three mandatory fields and one optional field given in Table 3 (an example is given in **5.5**).

*NOTE The provisions applicable to containers within files do not apply to unstructured documents such as un-scaled sketches, narrative and renderings.*

Table 3 **Naming of containers within files including layers**

| Field | Obligation | Clause |
|---|---|---|
| Role | Required | **10** |
| Classification | Required | **11** |
| Presentation | Required | **12** |
| Description | Optional | **14** |

## 5.5 Examples of naming containers

*COMMENTARY ON **5.5***

*Table 4 shows how the fields associated to the containers are used to create the container names. The codes are taken from the standard codes or are examples that might be used for project specific codes.*

Table 4 **Examples of field usage**

| Fields | Directories (see **5.4.2**) | Files (see **5.4.3**) | Containers within files including layers (see **5.4.4**) | Clause |
|---|---|---|---|---|
| Project | PR1 | PR1 | | **6** |
| Originator | | XYZ | | **7** |
| [A1] Volume or system [A1] | | [A2] 01 [A2] | | **8.1.2** |
| Levels and locations | | 01 | | **8.1.3** |
| Type | | M3 | | **9** |
| Role | | A | A | **10** |
| Classification | | [A1] Uniclass [A1] (optional) | [A1] Uniclass [A1] | **11** |
| Presentation | | | M | **12** |
| Number | | 0001 | | **13** |
| Description (optional) | | | Doors | **14** |
| Suitability (optional) | S1 | S1 | | **15.2.2** |
| Revision (optional) | [A1] P02 [A1] | [A1] P02 [A1] | | **15.2.3** |
| Name | PR1-S1-P2 | [A2] PR1-XYZ-01-01-M3-A-0001 [A2] | A-[A1] Uniclass [A1]-M_Doors | |

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# 6 Project

## 6.1 Principles

A single common project identifier should be defined at the initiation of the project; independent and recognizably distinct from any individual organization's internal job number. Where possible it should match any existing contract code. Where a project involves several elements or one element with several phases, each should be assigned an identifier.

*NOTE A project can be divided into sub-projects.*

## 6.2 Standard codes for project

*NOTE There are no standard codes mandated for the project field.*

## 6.3 Project specific codes for project

The code for the project and any sub-projects should be from two to six characters.

# 7 Originator

## 7.1 Principles

A unique identifier for each organization should be defined on joining the project. The unique identifier should identify the organization responsible for creating the data.

## 7.2 Standard codes for originator

*NOTE There are no standard codes mandated for the originator field.*

## 7.3 Project specific codes for originator

The code for each originating organization should be from three to six characters.

# 8 Divisions

## 8.1 Principles

### 8.1.1 Types of physical sub-division

The project should be divided into manageable sub-divisions using two criteria:

a) [A1] volume or system ⟨A1⟩ (see **8.1.2**);

b) levels and locations (see **8.1.3**) (see also Annex C).

*NOTE Buildings are vertically displaced named using levels but most civil structures are horizontally displaced and named using location or chainages. Civil projects occupying large areas such as oil refinery sites and airports would use the "location" code based on a grid basis [A1] or post code ⟨A1⟩. In each case "[A1] volume ⟨A1⟩" then adds additional sub-division.*

### 8.1.2 [A1] Volumes and systems [A1]

Every container should document a single building [A1] volume or system [A1] (location), contained within a simple volume of space.

There should be at least one set of [A1] volume per role [A1] explicitly designated to be non-overlapping.

[A1] *Text deleted* [A1]

*NOTE Where possible "[A1] volumes [A1]" should be defined so as to identify a logical portion of work intended to be delivered by a single team.*

### 8.1.3 Levels and locations

Where a container documents a single building level (floor) or location, the code for that level should be used. Where a container documents multiple levels, a distinct code should be used.

*NOTE The term "location" might be more appropriate for infrastructure projects.*

## 8.2 Standard codes for divisions

### 8.2.1 General

The standard codes for the spatial divisions of the project should be used wherever possible.

*NOTE Building projects are more likely to use standard codes.*

### 8.2.2 Standard codes for [A1] "volumes/system" [A1]

The "[A1] volume/system [A1]" code should be one or two characters. The following code should be used for a whole level.

[A2] ZZ All volumes [A2]

This list should be expanded in the project specific codes.

[A1] Wherever possible, repetition of the same codes, per Role, should be avoided. [A1]

### 8.2.3 Standard codes for "levels" and "location"

The "level [A1] *text deleted* [A1]" code should be two characters as follows:

ZZ Multiple levels
XX No level applicable
GF Ground floor
00 Base level of building (where ground floor is not appropriate) [A1] or linear assets [A1]

[A1] *NOTE 1 The location codes for linear assets are likely to require project specific codes.* [A1]

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For floor levels above ground floor, the floor number should be used as follows:

01 Floor 1
02 Floor 2, etc.

For mezzanine the prefix "M" should be used as follows:

M1 Mezzanine above level 01
M2 Mezzanine above level 02, etc.

For all levels below the ground floor the prefix "B" should be used:

B1
B2, etc.

*NOTE 2 For floor notation, see BS EN ISO 4157-1 and BS EN ISO 4157-2.*

## 8.3 Project specific codes for divisions

### 8.3.1 Principles

Project specific codes for divisions should be detailed in the project space statement (see Annex A). The project specific codes should not conflict with the standard codes given in **8.2**.

*NOTE Infrastructure projects are more likely to require project specific codes.*

### 8.3.2 Project specific codes for "[A1] volume ⟨A1⟩" and "[A1] system ⟨A1⟩"

"[A1] Volume ⟨A1⟩" and "[A1] system ⟨A1⟩" identifiers should be defined as required, with detailed demarcation in three dimensions and descriptions.

### 8.3.3 Project specific codes for "level" and "location"

"Level" and "location" codes should be defined with detailed demarcation especially in the vertical dimension and a detailed description.

# 9 Type

## 9.1 Principles

To aid recognition, every container should contain a single type of information, e.g. a drawing, location model, typical assembly or detail information.

## 9.2 Standard codes for types of information

The standard codes for file containers holding models and drawings the code should be exactly two characters as follows:

**〈A1〉 File types for drawings and models**

| *Code* | *File Type* |
|---|---|
| AF | Animation file (of a model) |
| CM | Combined model (combined multidiscipline model) |
| CR | Specific for the clash process |
| DR | 2D drawing |
| M2 | 2D model file |
| M3 | 3D model file |
| MR | Model rendition file for other renditions, e.g thermal analysis etc. |
| VS | Visualization file (of a model) |

**File types for documents**

| *Code* | *File Type* |
|---|---|
| BQ | Bill of quantities |
| CA | Calculations |
| CO | Correspondence |
| CP | Cost plan |
| DB | Database |
| FN | File note |
| HS | Health and safety |
| IE | Information exchange file |
| MI | Minutes / action notes |
| MS | Method statement |
| PP | Presentation |
| PR | Programme |
| RD | Room data sheet |
| RI | Request for information |
| RP | Report |
| SA | Schedule of accommodation |
| SH | Schedule |
| SN | Snagging list |
| SP | Specification |
| SU | Survey 〈A1〉 |

## 9.3 Project specific codes for “types” of information

Project specific “type” codes should be defined for documents.

*NOTE There is no mandate for any project specific codes for drawings.*

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# 10 Role

## 10.1 Principles

Each organization should be allocated to one or more roles within the project.

*NOTE Further subdivision of roles can be implied using the classification field, see Clause **11**.*

## 10.2 Standard codes for roles

The standard codes for file role should be exactly one character as follows:

A Architect
B Building Surveyor
C Civil Engineer
D Drainage, Highways Engineer
E Electrical Engineer
F Facilities Manager
G Geographical and Land Surveyor
H Heating and Ventilation Designer
I Interior Designer
K Client
L Landscape Architect
M Mechanical Engineer
P Public Health Engineer
Q Quantity Surveyor
S Structural Engineer
T Town and Country Planner
W Contractor
X Subcontractor
Y Specialist Designer
Z General (non-disciplinary)

## 10.3 Project specific codes for roles

The codes J, N, R, U or V or longer codes should be allocated for non-standard project specific roles [A1] listed and published. [A1]

# 11 Classification

## 11.1 Principles

Every container should be classified by a [A1] *text deleted* [A1] code, taken from the chosen reference dictionary, to accurately describe the construction assets represented. [A1] *Text deleted* [A1]

### 11.2 Standard codes for classification

Classification codes should be selected from a system compliant to BS ISO 12006 [A1] and the Uniclass publication. [A1]

[A1] *Text deleted* [A1]

[A1] *NOTE Refer to the BIM TOOLKIT and the UNICLASS publication for latest coding practices.* [A1]

### 11.3 Project specific codes for classification

*NOTE There is no mandate for any project specific codes for this field.*

## 12 Presentation

### 12.1 Principles

Every container should be consistent in its presentational conventions. For both drawings and documents, graphical and textual content should be distinguished by using containers within files such as layering or sections.

*NOTE This ensures that the information can still be re-used for a variety of presentational purposes without conflicting with re-use of information.*

### 12.2 Standard codes for presentation

The standard code for presentation should be exactly one character as follows.

D Dimensioning
H Hatching and shading
M Model related elements
P Plot/paper related elements
T Text

*NOTE There is no provision to extend this with project specific codes.*

### 12.3 Project specific codes for presentation

*NOTE There is no mandate for any project specific codes for this field.*

## 13 Number

### 13.1 Principles

A sequential number should be used when a container is one of a series not distinguished by any other of the fields defined in Clauses **6** to **12**.

*NOTE This applies most often to files.*

### 13.2 Standard coding for numbers

The numbering for standard coding should be exactly four integer numeric digits, used sequentially. Leading zeros should be used.

*NOTE There is no need to mandate any codes for this field.*

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### 13.3 Project specific coding

There is no further restriction for project specific coding but care should be taken not to embody information present in other fields.

## 14 Description

### 14.1 Principles

Descriptive text should not be used to imply further distinctions of meaning. However, descriptive text derived from the other fields and used consistently can be used to aid recognition.

*NOTE 1 This implies that this field is able to be deduced from the other fields.*

*NOTE 2 Avoid long, unwieldy and poorly worded descriptions.*

### 14.2 Standard coding for description

*NOTE There are no standard codes mandated for the description field.*

### 14.3 Project specific coding

*NOTE There is no further restriction for the project specific coding of the description field.*

## 15 Status

### 15.1 Principles

The identification and management of the "status" of containers should follow the principles given in Clause **4**.

### 15.2 Types of "status"

#### 15.2.1 General

If repositories are not able to track the "status" of each container (for example a model or drawing) then its "status" should be tracked through using two fields together:

a) suitability (see **15.2.2**); and

b) revision (see **15.2.3**).

*NOTE The "suitability" and "revision" of a document changes during the* ⟩A1⟨ *production* ⟩A1⟨ *process.*

#### 15.2.2 Suitability

Every container should have a field indicating the approved "suitability" for use of the contained information.

#### 15.2.3 Revision

Every container should carry a "revision" field, indicating the issue sequence of the contained information.

## 15.3 Standard coding

### 15.3.1 Standard status codes for "status"

Standard codes should be used for the "status" fields wherever possible.

*NOTE Some codes might not be appropriate depending on whether they are models or documents.*

### 15.3.2 Standard codes for "suitability"

The "suitability" code should be one or two characters.

The "suitability" codes given in Table 5 should be used.

*NOTE Use of a particular management process might make some codes inapplicable to some types of document.*

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Table 5 **Standard codes for suitability models and documents**

| Status | Description | Revision | Graphical Data | Non-Graphical Data | Documents |
|---|---|---|---|---|---|
| ***Work in Progress*** | | | | | |
| S0 | Initial status or WIP<br>Master document index of file identifiers uploaded into the extranet. | [A2] P01.01 etc to P0*n*.0*n* etc [/A2] | ✓ | ✓ | ✓ |
| ***Shared (Non-contractual)*** | | | | | |
| S1 | Suitable for Co-ordination<br>The file is available to be 'shared' and used by other disciplines as a background for their information. | [A2] P01 to P0*n* [/A2] | ✓ | ✗ | ✗ |
| S2 | Suitable for Information | [A2] P01 to P0*n* [/A2] | ✗ | ✓ | ✓ |
| S3 | Suitable for Review & Comment | [A2] P01 to P0*n* [/A2] | As required | ✓ | ✓ |
| S4 | Suitable for Stage Approval | [A2] P01 to P0*n* [/A2] | ✗ | ✗ | ✓ |
| [A2] *Text deleted* [/A2] | | | | | |
| S6 | Suitable for PIM Authorization (Information Exchanges 1-3) | P01 to Pn*n* | ✗ | ✗ | ✓ |
| S7 | Suitable for AIM Authorization (Information Exchange 6) | P01 to Pn*n* | ✗ | ✗ | ✓ |
| ***WIP to Published<br>Unauthorized and (Non-contractual) use at risk.*** | | | | | |
| D1 | Suitable for Costing | [A2] P01.01 etc to P0*n*.0*n* [/A2] | ✓ | ✓ | ✓ |
| D2 | Suitable for Tender | [A2] P01.01 etc to P0*n*.0*n* [/A2] | ✗ | ✓ | ✓ |
| D3 | Suitable for Contractor Design | [A2] P01.01 etc to P0*n*.0*n* [/A2] | ✓ | ✓ | ✓ |
| D4 | Suitable for Manufacture/Procurement | [A2] P01.01 etc to P0*n*.0*n* [/A2] | ✗ | ✓ | ✓ |
| ***Published Documentation (Contractual)*** | | | | | |
| A1, A2, A3, A*n* etc | Approved and accepted as stage complete (C= Contractual/Complete) | C01 to C0*n* | ✓ | ✓ | ✓ |
| B1, B2, B3, B*n etc* | Partially signed-off:<br>with minor comments from the Client. All minor comments should be indicated by the insertion of a cloud and a statement of 'in abeyance' until the comment is resolved, then resubmitted for full authorization. | P01.01 etc to P0*n*.0*n* etc | ✓ | ✓ | ✓ |
| ***Published for AIM Acceptance*** | | | | | |
| CR | As Construction Record documentation, PDF, Models etc | C01 to C0*n* | ✓ | ✓ | ✓ |

### 15.3.3 Standard codes for "revisions"

Versions created within the WORK-IN-PROGRESS area should be numbered using decimals, e.g. [A1] P01.1, P01.2, P01.3 [A1], etc.

This should be changed to integer [A1] P01 [A1] when signed-off by the originator for sharing. Thereafter the version within the WIP area should become [A1] P02.01 [A1] as detailed in **4.2.4**.

Formal revisions should be numbered sequentially, marking the revision as either [A1] preliminary (P0*n*) or contractual (C0*n*) [A1].

Preliminary revisions should be numbered sequentially as the [A1] preliminary [A1] design develops, e.g. [A1] P01, P02, P03 [A1], etc.

[A1] Contractual [A1] revision should be numbered sequentially for any changes or update to the signed-off containers, e.g. [A1] C01, C02, C03 [A1], etc.

*NOTE 1 The "C" notation indicates that the container can be used for construction [A1] or [A1] contractual purposes [A1] (e.g. Stage Completion) [A1].*

*NOTE 2 There is provision to extend this with project specific codes.*

## 15.4 Project specific coding

### 15.4.1 Project specific codes for status

The project specific codes should not conflict with the standard codes.

### 15.4.2 Project specific codes for suitability

Extra suitability codes can be defined indicating other suitability for use, if required, with detailed descriptions, reflecting the contractual arrangements. These codes should not conflict with the standard codes.

### 15.4.3 Project specific codes for revisions

Extra revision codes can be defined, if required, with detailed descriptions. These codes should not conflict with the standard codes.

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# Annex A (normative) Project space statement

## A.1 General

All models, whether 2D or 3D, should be created using a common project origin and orientation using a conventional Cartesian axis and common unit of length. The statements given in **A.2** to **A.4** should be included with the project dictionary, and refined as necessary. Models should be created at 1:1.

Units should be SI units of measure.

*NOTE 1 SI units are defined in BS ISO 31.*

The basic unit of length within models should be agreed to be metres for infrastructure projects or millimetres for building.

*NOTE 2 The accuracy achievable using the chosen units and origins might need to be checked.*

## A.2 Space

A statement or diagram of the project origin and orientation should be included with the project dictionary. The origin should be related to both the project grid and to the site context. The orientation should be related to a specific geospatial north.

*NOTE The project origin is best located within or close to the project or site extent.*

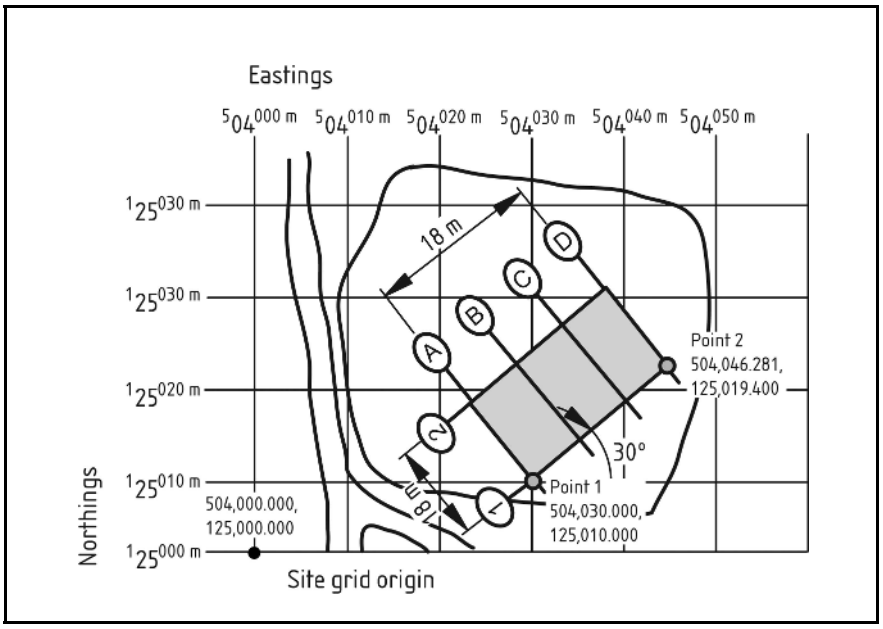
## A.3 Geospatial

A statement or diagram should relate the project space to a named global geospatial system in three dimensions (decimal degrees latitude, longitude and elevation in metres) and a plan orientation (decimal degrees clockwise rotation from north) (see Figure A.1).

*NOTE 1 Alternatively reference can be made to a standard named projection such as the UK Ordnance Survey grid (see http://www.ordnancesurvey.co.uk/oswebsite/gps/information/coordinatesystemsinfo/guidecontents/guide1.html).*

*NOTE 2 A decimal latitude in degrees requires eight decimal places to achieve positioning to within 1 mm.*

Figure A.1 **Geospatial referencing**



# Annex B (normative) Quality management

## B.1 Quality policy

Quality policy should ensure that models are maintained over their lifetimes. At the outset of any project all facets of the organization of the project's graphical database should be formulated by the authors of the data with a view to satisfying end users.

*NOTE 1 These constitute the in-house standards. Early strategic thinking helps to ensure that all demands made on the model over its lifetime can be met effectively and realistically.*

Models, which need to be maintained over long periods of time, might be subject to both major and minor updates and the same in-house standards should be applied to these amendments in order to ensure model integrity is preserved.

In-house standards should be published and regularly reviewed, for example, at the adoption of each new software release. When models are to be extended to cover new topics, consideration should be given to the strategy adopted for structuring the new information and the way it will be integrated. Sustained data quality requires methodical checking at the time of input and persistent discipline when changes are made.

Data quality should be checked systematically. This should include:

a) elimination of spurious data outside normal file extents or limits;

b) checks on file set-up parameters;

c) testing of container allocations by switching on and off containers;

d) listing of containers;

e) elimination of information which is not to scale;

f) purging of all unnecessary data;

g) elimination of references to un-checkable (i.e. uncontrolled) files such as renditions;

h) formats that do not maintain dimensional integrity should not be used;

i) other content checks.

*NOTE 2 If an organization is registered under a formal quality management (QM) system to BS EN ISO 9001 its quality policy is clearly identified in a quality manual. Further guidance on the management of the construction design process is given in BS 7000-4.*

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## B.2 Data exchange

To avoid problems associated with data exchange, participants in the exchange process should:

a) follow the recommendations given in this standard;

b) agree as early as possible which data should be exchanged, when, and in what format;

c) agree the version of format to be used for data exchange;

d) establish procedures to test, monitor and report the accuracy of data transfer, and conduct initial data transfer trials;

e) agree a method of recording each issue and receipt of digital data, and what constitutes an acceptable transfer.

A1 *NOTE 1 See BS 1192-4 COBie for information exchange methods.* A1

*NOTE 2 Aspects that have been found to cause problems include:*

*a) mismatch between the entities supported by the sending system, neutral format, and receiving system;*

*b) line styles and text, in particular, text justification, the manner in which text size is defined, and special fonts;*

*c) treatment of non-graphical data assignment;*

*d) differences in the handling and specification of co-ordinate geometry. In particular, different software systems might have adopted different approaches to the specification of co-ordinate geometry. The three most commonly used methods are:*

*1) real world dimensions;*

*2) arbitrary model units which are scaled uniformly for all entities in a model; or*

*3) a combination of real world dimensions and scale factors as part of an instance.*

# Annex C (informative) Conventions for layer naming in international projects

## C.1 Differences between British and international standards

BS EN ISO 13567-2 recommends the use of additional characters in each of the required fields, and a more elaborate layering structure, in order to accommodate diverse national requirements and construction classification systems. This Code of Practice recommends the use of a simpler, ISO compatible, layer naming and coding strategy, to minimize the number of different layers used and reduces complexity when data are exchanged between the different parties to a project.

Table C.1 compares the layer naming required in **5.4.4** with those recommended in BS EN ISO 13567-2.

Table C.1 **Differences between international and British layer naming fields**

| Mandatory/optional field | Field name and order in BS EN ISO 13567-2 | Number of characters | Field name and order in BS 1192 | Number of characters |
|---|---|---|---|---|
| M | 1. Agent responsible | 2 | 1. Role | 1 then hyphen |
| M | 2. Element | 6 | 2. Classification | 2–5 then hyphen |
| M | 3. Presentation | 2 | 3. Presentation | 1 |
| O | 10. User defined | Unlimited | 4. Description | Underscore then unlimited |

## C.2 Managing the relationship between British and international structures

A UK organization working on an international project, to which BS EN ISO 13567-2 code conventions for layering are to be applied, can convert layers for export in a straightforward manner because the layer structure in **5.4.4** is a subset of the ISO structure. Data received from overseas organizations can be converted to this structure, but some loss of layer structuring information is likely to occur. UK organizations might therefore be obliged to use a more complex and unfamiliar structure. In such circumstances, it is useful for the project teams to agree at an early stage how they will allocate named containers for specific projects and document these. It is likely that software will be used for converting between the standards.

*NOTE BS EN ISO 13567 parts 1 and 2 contain many detailed recommendations on how to exchange data internationally.*

Layer management software provides options for converting ISO layers ▌A2⟩ to layers as in this British Standard ⟨A2▐.

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# Bibliography

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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BS 7000-4, *Design management systems – Part 4: Guide to managing design in construction*

BS EN 82045-1, *Document management – Part 1: Principles and methods*

BS EN 82045-2, *Document management – Part 2: Metadata elements and information reference model*

BS EN ISO 4157-1, *Construction drawings – Designation systems – Part 1: Buildings and parts of buildings*

BS EN ISO 4157-2, *Construction drawings – Designation systems – Part 2: Room names and numbers*

BS EN ISO 9001, *Quality management systems*

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### Further reading

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