BS 7000-4:2013

Incorporating Corrigenda Nos. 1 and 2

BSI Standards Publication

Design management systems

Part 4: Guide to managing design in construction

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Contents

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 38, an inside back cover and a back cover.

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 2013. 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

This British Standard supersedes BS 7000-4:1996, which is withdrawn.

Information about this document

Text introduced or altered by Corrigenda Nos. 1 and 2 is indicated in the text by tags [C1] ⟨C1⟩ and [C2] ⟨C2⟩. Minor editorial corrections are not tagged.

Relationship with other publications

This part of BS 7000 relies significantly on methods and processes described in BS 1192, PAS 1192-2, and BIP 2207[1].

Use of this document

As a guide, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it.

Presentational conventions

The guidance in this standard is presented in roman (i.e. upright) type. Any 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.

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.

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0 Introduction

0.1 General

The aim of the design process is to provide information that enables a project to be completed in a manner that satisfies client requirements. These requirements might include the provision of information useful to the period of operation of the building/facility. The manner of that provision might be in the form of a Building Information Model (BIM) [1)].

The client could be a user, owner occupier, investor or construction contractor. The role is sometimes described as employer, emphasizing the financial relationship and the authority and control that this position carries.

0.2 Collaborative working

The introduction of new technologies, in particular BIM, brings with it a greater imperative for operating a collaborative design process across the recognized design disciplines and incorporating economic and process considerations. This increases the need for greater rigor in the management of that process, and for the application of appropriate measures and techniques. The benefits of true collaborative working have been known for many years but it has struggled to gain favour due to perceived liability/financial risks involved in the interdependencies necessary to operate in this way. A properly managed process minimizes these risks significantly. A part of that process is placing any residual risk with those best placed to resolve it in a properly managed environment. Construction agreements do not generally prescribe management processes but the application of good processes is expected and accommodated within standard and conventional contract forms. This British Standard seeks to provide guidance that is appropriate for a wide range of procurement routes/choices and the agreements that support them; and for the application of technology at levels 0, 1 and 2 of the Bew/Richards maturity model (Figure 1) for the application of CAD and BIM technology. The guidance is also generally appropriate where primarily manual or a mix of manual and computer drafting methods are used.

0.3 The influence of new technologies

The speed of uptake of new technologies in the construction and related industries is increasing, and advanced CAD and BIM systems are becoming more widely adopted. Figure 1 shows a model against which this British Standard assists in the implementation of Building Information Modelling and Management [BIM(M)]. The purpose of the levels is to categorize types of technical and collaborative working to enable a concise description and understanding of the processes, tools and techniques to be used.

The levels are as follows.

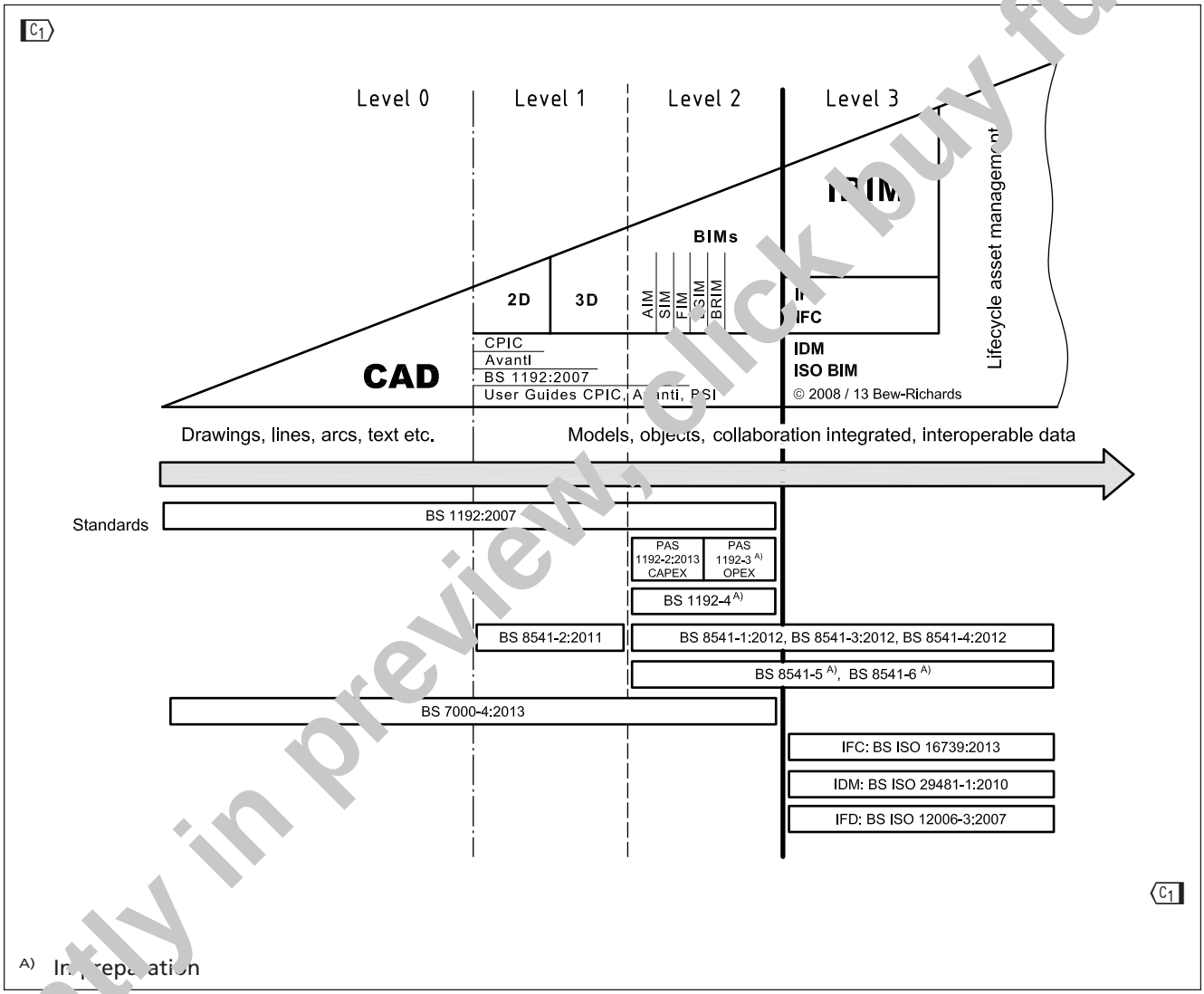
- Level 0, CAD: usually 2D with paper or electronic paper, e.g. PDF, as the most likely data exchange mechanism. Management is likely to be post design coordination requiring the resolution of discrepancies rather than collaboration.
- Level 1, Managed CAD: in 2D or 3D format using BS 1192, with a collaboration tool providing a common data environment, possibly some standard data structures and formats. Commercial data managed by stand-alone finance and cost management packages with no integration.

[1)] The acronym BIM is used for all building activity including engineering infrastructure works such as road and railway construction.

- Level 2, Managed: 3D environment held in separate discipline BIM tools with attached data.
- Level 3: Fully open process and data integration enabled by IFC/IFD. Managed using a collaborative model server.

This British Standard is a part of a range of documents applicable to the developments in the use of new technologies, and relates to levels 0, 1 and 2 of the maturity model (Figure 1). For the foreseeable future, any design or construction business is likely to be operating at any or all of these levels concurrently, so this British Standard is equally applicable to all the levels. Within level 3, additional guidance is required, in particular to cover references to managing the process related to both capital and operational expenditure aspects. Within level 3 those responsible for design management require a greater understanding of the function of the 〚C2〛 systems. 〈C2〉

Figure 1 **Maturity model showing standards and guidance applicable**



A) In preparation

0.4 The effect of construction procurement

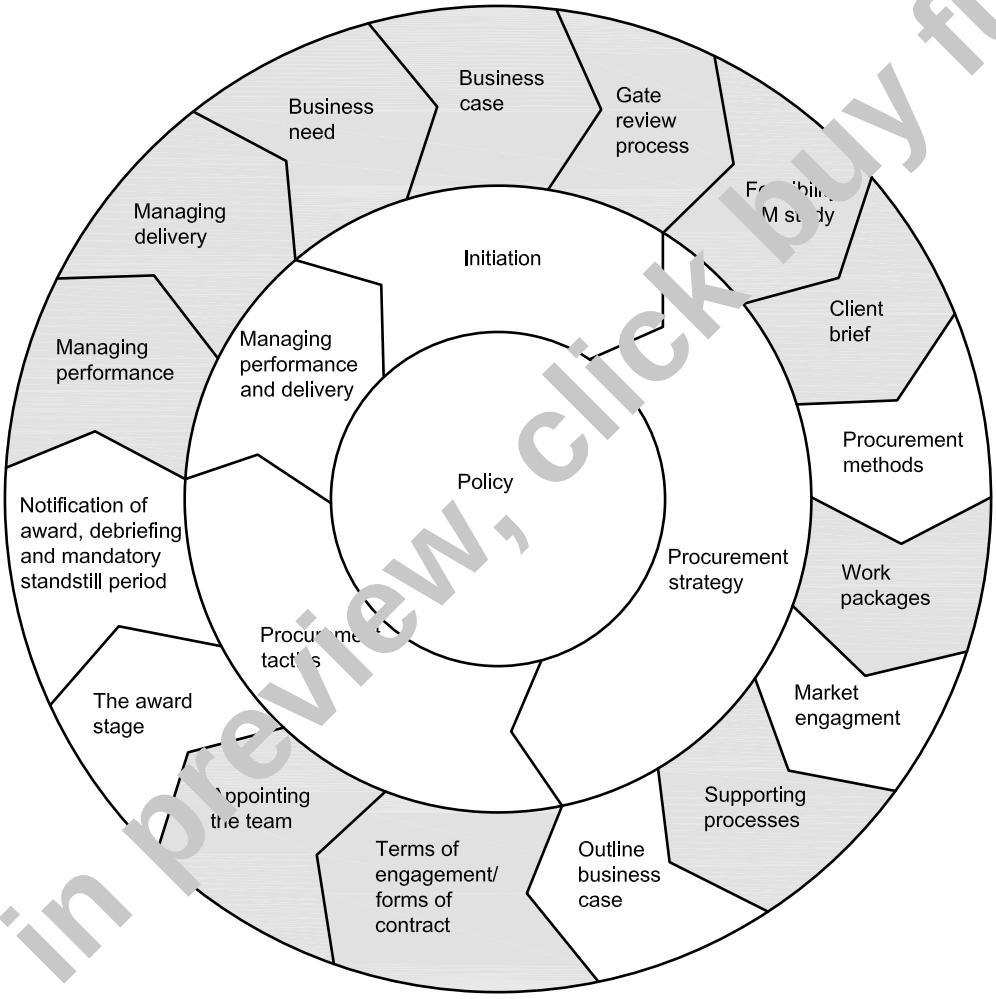
Construction procurement takes various forms, and BS 8534 gives recommendations on the development within a public or private sector organization of policies, strategies and procedures for the procurement of construction in the built environment.

Three basic aspects of design procurement are common to all methods of construction procurement:

- Clients/employers having a business need for construction requiring design that leads to the creation of a project with an overall management structure within which design management operates.
- Design capability, provided by the construction industry, and often distributed among many organizations in the form of managed design facilities providing design services referred to in this British Standard as tasks.
- Client/employer requirements that are set out in an agreed brief that is realized through various agreements.

This British Standard gives guidance on achieving a managed design, the objective of which is to fulfil the brief. It does not set this within any particular procurement organizational frameworks.

Figure 2 **Procurement as defined in BS 8534**



Shading indicates aspects critical to the design process.

0.5 Roles and responsibilities (see Figure 3)

With the increase in the use of BIM, the publication of PAS 1192-2 and the CIC BIM Protocol [2] the role of Information Manager has been formalized (see Note 3 to Table 1).

Table 1 **Functions and titles used in BS 7000-4**

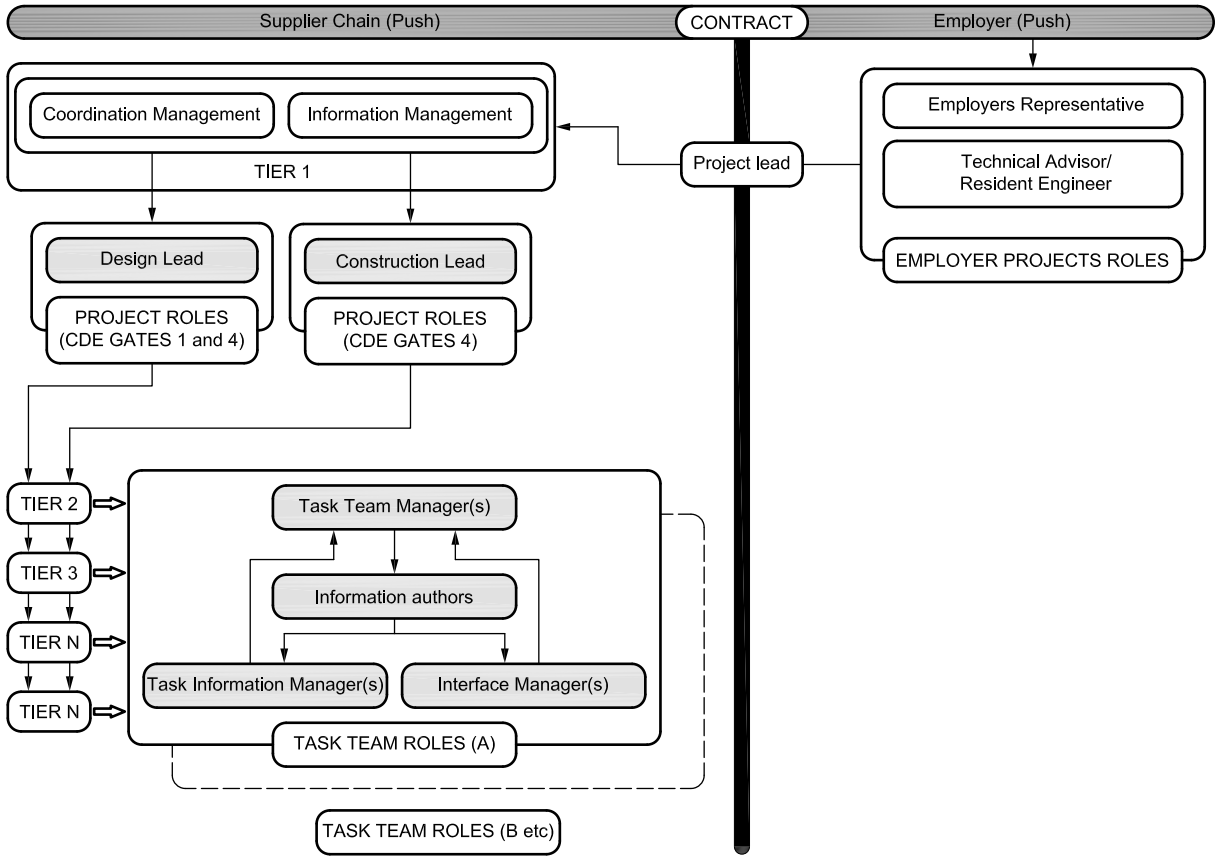
Function	Functional titles
Overall	
Total project delivery – see Note 2 (Information management – see Note 3)	Project Lead: PL (Information Manager: IM)
Design	
Total project design (Information management, design – see Note 3) (Interface management, design – see Note 3)	Design Lead: DL (Information Manager, Design: IMD) (Interface Manger, Design: IfMD)
Design tasks: DT1, DT2, DT3, etc.	Task Team Managers: TTM1, TTM2, TTM3, etc.
(Information management, task design – see Note 3)	(Information Manager, Task Design: IMTD
Construction	Construction Lead: CL
Total Construction delivery (Information management, construction – see Note 3)	(Information Manager, Construction: IMC)

NOTE 1 The single point of responsibility for total project delivery can operate on either side of the construction arrangement. Most commonly this is on the supply side but for procurement methods such as construction management it might be on the employer side. On small projects an individual might have several roles.

NOTE 2 Depending upon the size and nature of the project, any of the positions in this table might have an internal support team with various levels of formal, delineated and agreed delegations in place, for example related to particular zones of the total project.

NOTE 3 PAS 1192-2 and the CIC BIM Protocol [2] set out a specific function of information management and role of Information Manager. This role can be undertaken by another member of the team, for example the Project Lead, with the scope of services incorporated into the appointment of that person. CIC has published a Scope of Services (CIC/INF MAN/S/1) for the role of Information Manager the most significant feature of which is that the Information Manager has no design responsibility or duties.
PAS 1192-2 also introduces the function of interface management and role of Interface Manager primarily responsible for spatial coordination particularly for issues that have compromised the design process protocols and become flagged using clash rendition as clashes in the model.

Figure 3 **Roles and responsibilities in the management of design (adapted from PAS 1192-2)**



Task teams are any team assembled to complete a task (e.g. architictural task teams, structural task team, multi disciplinary task team) to design a specialist part of the project such as a bespoke curtain wall. This might also include collaberation between the specialist and professional design team.

In an infrastructure project there might be rail or road task teams, station task teams or bridge task teams.

The Project Lead is responsible to the employer for total project delivery. The placing of this role depends on the procurement method chosen. For example, in the case of design and construct "turnkey" contracts it is to the left of the contract line, and in the case of construction management to the right.

0.6 The effect of scale

For large projects, divisions of managerial responsibility might be clearly apparent and follow the pattern set out in Figure 3, deploying separate roles and possibly teams to all of the functions listed in Table 1. Other related specific project or organization roles requiring, for example, particular specialist knowledge might also be introduced. However as projects reduce in size and/or complexity, the distribution of responsibilities and functions reduce, eventually to the point where all project and design management is the responsibility of one person working with design originators.

Section 1: General

1 Scope

This part of BS 7000 gives guidance on management of the construction design process at all levels, for all organizations and for all types of construction projects. The guidance given is applicable to purpose-built constructions, equipment and components. It is intended for those who work in and with the construction industry, particularly designers and those managing design. Where general management principles are given, they may be adapted to suit any size of design organization or construction project. The guidance given is applicable to management of design activities throughout the life-cycle of a construction project, and the principles of the facilities management function.

This part of BS 7000 makes reference to, but does not cover activities prior to client/employer initiation of a project or factors considered by clients/employers when selecting the most appropriate form of construction procurement.

NOTE 1 Guidance on the design of manufactured products and services is given in BS 7000-2 and BS 7000-3 respectively.

NOTE 2 This part of BS 7000 complements BS EN ISO 9001.

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

BS 4778-*2, Quality vocabulary – Part 2: Quality concepts and related definitions*

BS 7000-10*, Design management systems – Part 10: Vocabulary of terms used in design management*

BS EN 12973, *Value management*

BS EN ISO 10012, *Measurement management systems – Requirements for measurement processes and measuring equipment*

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

PAS 1192-2*, Specification for information management for the capital/delivery phase of construction projects using Building Information Modelling*

3 Terms and definitions

For the purposes of this part of BS 7000, the terms and definitions given in BS 7000-10, BS 4778-2, BS 1192 and PAS 1192-2 and the following apply.

3.1 CDM Coordinator
employee whose role is to "advise and assist the client to comply with their duties under the Construction (Design and Management)] Regulations" [2)]

[2)] From *Explanatory Memorandum to the Construction (Design and Management) Regulations 2007 No. 320* Avaliable from http://www.hse.gov.uk/construction/cdm/legal.htm