UK BIM FRAMEWORK

Government Soft Landings

Revised guidance for the public sector on applying BS8536 parts 1 and 2

Updated for ISO 19650

Published by

UK BIM FRAMEWORK

bsi. cdbb Centre for Digital Built Britain UKBIM ALLIANCE Enabling Digital Transformation

Foreword

Dr David Hancock

Construction Director
Infrastructure and Projects Authority

Government Soft Landings (GSL) can play an important role in enabling a smooth transition from construction to operation. It also helps clients to assure the performance of an asset and inform future project performance setting. Notably, GSL is also fundamental to maintaining the "golden thread" of a facility's purpose by aligning the interests of those who commission, design and construct with those who use and maintain. This approach, and its focus on early end-user engagement, helps to realise better public-sector value from the construction process, a key objective of the UK Government.

This revised guidance is an evolution of the original, with the aim of aligning it with the UK BIM Framework (including ISO 19650 and BS 8536) and industry best practice. It provides further specific guidance around the 'GSL Champion's role' to offer specific assistance to clients.

GSL reminds us that we design and construct to aid the performance of our facilities. This creates the best possible opportunity for outcomes to be delivered. Targeting the delivery of high performing assets contributes to effective environmental, social, security and economic outcomes. By setting and monitoring performance targets we can ensure that the facilities are productive and deliver value for money for the taxpayer.

I believe that this GSL framework provides clients with a framework upon which to build an appropriate pathway to support their operational objectives and be better equipped to adopt and deliver the UK BIM Framework.

Acknowledgements

Lead author:	David Philp, *Centre for Digital Built Britain*
Contributing authors:	David Churcher, *Hitherwood Consulting Ltd*
	Sarah Davidson, *The University of Nottingham*
Thanks also to:	Roy Evans, *Government Property Agency*

Introduction

This guidance is written with public-sector clients procuring design and construction works (including maintenance-focussed activities) in mind. However, the benefits of a government soft landings (GSL) approach offers are equally relevant to projects undertaken for the private sector. It is anticipated therefore, that clients, in both public and private sector will find this guidance to be of value.

Much of this guidance refers to recommendations and activities set out in BS 8536-1: 2015 *Briefing for design and construction – Part 1: Code of practice for facilities management (Buildings infrastructure)*. It consequently takes a vertical building focus. It also draws on the BSRIA Soft Landings Framework and it will be helpful to read the guidance in conjunction with the standard and framework.

Recommendations for infrastructure projects are set out in BS 8536-2: 2016 – *Part 2 Code of practice for facility management (Linear and geographical infrastructure)* and these recommendations are not considered here.

It should also be noted that this publication is not 'a guide' to BS 8536-1:2015 itself. It is however associated with the UK BIM Framework, which includes BS 8536-1 and BS 8536-2.

This guidance explains how the adoption of GSL can be aided if design and construction projects work in accordance with BS EN ISO 19650-1: 2018 and BS EN ISO 19650-2: 2018 *(Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling)*. These standards are hereinafter referenced as 'the ISO 19650 series', ISO 19650-1' or 'ISO 19650-2'. GSL can however, be implemented distinct from BIM, but there is a greater value proposition when these two initiatives work hand-in-hand.

Where appropriate, terminology has been cross-referenced to the terms in the ISO 19650 series. ISO 19650 terms are usually in brackets following a UK term, for example *aligning the interests of clients (appointing parties in ISO 19650)* – see Appendix A.

The ISO is consistent in its reference to a building, element, or system as an 'asset' but in this guidance reference to 'facility' as defined in BS 8536-1 has been adopted.

It is recommended that the adoption of GSL is proportionate to the size and complexity of the project and careful consideration of this is required.

The contents of this guidance are for general information purposes only and nothing in this guidance constitutes legal advice or gives rise to a solicitor/client relationship. Specialist legal advice should be taken in relation to specific circumstances.

Any data or analysis from this guidance must be reported accurately and not used in a misleading context. If using any information from this guidance, then its source and date of publication must be acknowledged.

Abbreviations and acronyms

This guidance includes a number of abbreviations and acronyms as indicated in Table 1:

Table 1: Abbreviations and acronyms

Abbreviation or acronym	Term
BIM	Building information modelling
BMS	Building management system
CAFM	Computer aided facilities management
CO2	Carbon dioxide
CIBSE	Chartered Institution of Building Services Engineers
GIFA	Gross internal floor area
GSL	Government Soft Landings
kWh	Kilowatt hour
PLQ	Plain language question
POE	Post occupancy evaluation
RICS	Royal Institution of Chartered Surveyors
SRO	Senior responsible officer
UBT	Usable Buildings Trust

Contents

List of figures

List of tables

Activity Overview

Stage	Strategic Assessment / Outline Business Case Stage	Final Business Case (FBC) / Briefing Stage	Design and Construct Stage	Pre-handover Stage	In-use/Operational Stage
Alignment with BS8536-1	BS 8536-1 stage: 0 Strategy BS 8536-1 clause: 5.1	BS 8536-1 stage: 1 Brief BS 8536-1 clause: 5.2	BS 8536-1 stages: 2 Concept + 3 Definition + 4 Design + 5 Build and Commission BS 8536-1 clause: 5.3 + 5.4 + 5.5 + 5.6	BS 8536-1 stage: 6 Handover and Close-out BS 8536-1 clause: 5.7	BS 8536-1 stage: 7 Operation and End of life BS 8536-1 clause: 5.8
Summary of key GSL Activities by stage	Establish the operational vision and strategy Establish GSL roles and responsibilities Review lessons learned and feedback from similar projects Appoint a project GSL champion Identify and map all relevant internal and external stakeholders Prepare a GSL strategy and implementation plan Refer to and align with information requirements (see the ISO 19650 series) Develop a facilities management strategy and plan Establish Treasury five-stage business case				
Stage Objectives	The outcome from this first stage should be the confirmation of high-level project objectives in consideration of operational and performance requirements.	The primary output at this stage is a well-defined project brief, considering end-user and facility/ facilities manager requirements, aligned with measurable performance targets.	The key output at this stage is a design and a constructed facility that meets the end-users' needs.	The key output at this stage is a design and a constructed facility that meets the end-users' need	The primary objectives at this stage is to ensure that: • The facility performs according to the brief • The initial aftercare period is implemented and supported • The performance of the facility is monitored and evaluated via the POE methodology for the extended aftercare period • Lessons learned are captured with any feedback from operational stakeholders.

Golden thread of information

Activity Overview

UK BIM FRAMEWORK

Stage	Strategic Assessment / Outline Business Case Stage	Final Business Case (FBC) / Briefing Stage	Design and Construct Stage	Pre-handover Stage	In-use/Operational Stage
Alignment with BS8536-1	BS 8536-1 stage: 0 Strategy BS 8536-1 clause: 5.1	BS 8536-1 stage: 1 Brief BS 8536-1 clause: 5.2	BS 8536-1 stages: 2 Concept + 3 Definition + 4 Design + 5 Build and Commission BS 8536-1 clause: 5.3 + 5.4 + 5.5 + 5.6	BS 8536-1 stage: 6 Handover and Close-out BS 8536-1 clause: 5.7	BS 8536-1 stage: 7 Operation and End of life BS 8536-1 clause: 5.8
Summary of key GSL Activities by stage	Based on lessons learned develop the lessons learned tracker Develop the facilities management strategy Establish stakeholder/end-user needs Generate a GSL opportunities and risks schedule Establish environmental targets Establish functional and effectiveness targets Establish the security related targets Establish economic targets Create an environmental management plan Determine the POE strategy Embed GSL requirements and assessment criteria into tender information				
Stage Objectives	The outcome from this first stage should be the confirmation of high-level project objectives in consideration of operational and performance requirements.	The primary output at this stage is a well-defined project brief, considering end-user and facility/ facilities manager requirements, aligned with measurable performance targets.	The key output at this stage is a design and a constructed facility that meets the end-users' needs.	The key output at this stage is a design and a constructed facility that meets the end-users' need	The primary objectives at this stage is to ensure that: • The facility performs according to the brief • The initial aftercare period is implemented and supported • The performance of the facility is monitored and evaluated via the POE methodology for the extended aftercare period • Lessons learned are captured with any feedback from operational stakeholders.

Golden thread of information

Activity Overview

UK BIM FRAMEWORK

Stage	Strategic Assessment / Outline Business Case Stage	Final Business Case (FBC) / Briefing Stage	Design and Construct Stage	Pre-handover Stage	In-use/Operational Stage
Alignment with BS8536-1	BS 8536-1 stage: 0 Strategy BS 8536-1 clause: 5.1	BS 8536-1 stage: 1 Brief BS 8536-1 clause: 5.2	BS 8536-1 stages: 2 Concept + 3 Definition + 4 Design + 5 Build and Commission BS 8536-1 clause: 5.3 + 5.4 + 5.5 + 5.6	BS 8536-1 stage: 6 Handover and Close-out BS 8536-1 clause: 5.7	BS 8536-1 stage: 7 Operation and End of life BS 8536-1 clause: 5.8
Summary of key GSL Activities by stage	Evidence that operational targets, statutory regulations and user needs can be delivered by modelling and testing the developed and constructed design Review the developed design and construction specifications to ensure that end-user needs, and targets can be achieved Review all construction and installation details and highlight any that will have a negative impact upon the actual performance relative to the required performance Confirm any unavoidable changes in design that might give rise to a change in the performance of the asset/facility Update the commissioning specification if appropriate	Update the risk and opportunity register Prepare forecasts of final capital and operational costs Update the information models as required in light of further design and operational information and data. Create early building readiness and commissioning plans, including a schedule of pre-commissioning activities Update the handover plan to include training requirements for the operator, operations team or facility manager, as appropriate, and end-users Prepare a detailed move-in plan for people and equipment if appropriate Continue ongoing end-user and engagement, including project walkabouts	Identify any skills that end-users and other key stakeholders need to have acquired before attending commissioning demonstrations Implement information exchanges at key project gateways to check if performance targets are forecast to be achieved. Trial transfer of information containers from the project information model to the asset information model systems such as the asset registry or CAFM solutions		
Stage Objectives	The outcome from this first stage should be the confirmation of high-level project objectives in consideration of operational and performance requirements.	The primary output at this stage is a well-defined project brief, considering end-user and facility/ facilities manager requirements, aligned with measurable performance targets.	The key output at this stage is a design and a constructed facility that meets the end-users' needs.	The key output at this stage is a design and a constructed facility that meets the end-users' need	The primary objectives at this stage is to ensure that: • The facility performs according to the brief • The initial aftercare period is implemented and supported • The performance of the facility is monitored and evaluated via the POE methodology for the extended aftercare period • Lessons learned are captured with any feedback from operational stakeholders.

Golden thread of information

Activity Overview

UK BIM FRAMEWORK

Stage	Strategic Assessment / Outline Business Case Stage	Final Business Case (FBC) / Briefing Stage	Design and Construct Stage	Pre-handover Stage	In-use/Operational Stage
Alignment with BS8536-1	BS 8536-1 stage: 0 Strategy BS 8536-1 clause: 5.1	BS 8536-1 stage: 1 Brief BS 8536-1 clause: 5.2	BS 8536-1 stages: 2 Concept + 3 Definition + 4 Design + 5 Build and Commission BS 8536-1 clause: 5.3 + 5.4 + 5.5 + 5.6	BS 8536-1 stage: 6 Handover and Close-out BS 8536-1 clause: 5.7	BS 8536-1 stage: 7 Operation and End of life BS 8536-1 clause: 5.8
Summary of key GSL Activities by stage	As-built project information model delivered to client (appointing party). Information transferred from the project information model to client facility management systems End-user orientation and training undertaken. Facilities management familiarization with key operating systems such as the BMS Building log book in place All commissioning logged and reviewed against targets Initial and extended aftercare plans in place and team mobilised Take receipt of digitised operation and maintenance manual	As-built project information model delivered to client (appointing party) Information transferred from the project information model to client facility management systems End-user orientation and training undertaken. Facilities management familiarization with key operating systems such as the BMS			
Stage Objectives	The outcome from this first stage should be the confirmation of high-level project objectives in consideration of operational and performance requirements.	The primary output at this stage is a well-defined project brief, considering end-user and facility/ facilities manager requirements, aligned with measurable performance targets.	The key output at this stage is a design and a constructed facility that meets the end-users' needs.	The key output at this stage is a design and a constructed facility that meets the end-users' need	The primary objectives at this stage is to ensure that: • The facility performs according to the brief • The initial aftercare period is implemented and supported • The performance of the facility is monitored and evaluated via the POE methodology for the extended aftercare period • Lessons learned are captured with any feedback from operational stakeholders.

Golden thread of information

Activity Overview

UK BIM FRAMEWORK

Stage	Strategic Assessment / Outline Business Case Stage	Final Business Case (FBC) / Briefing Stage	Design and Construct Stage	Pre-handover Stage	In-use/Operational Stage
Alignment with BS8536-1	BS 8536-1 stage: 0 Strategy BS 8536-1 clause: 5.1	BS 8536-1 stage: 1 Brief BS 8536-1 clause: 5.2	BS 8536-1 stages: 2 Concept + 3 Definition + 4 Design + 5 Build and Commission BS 8536-1 clause: 5.3 + 5.4 + 5.5 + 5.6	BS 8536-1 stage: 6 Handover and Close-out BS 8536-1 clause: 5.7	BS 8536-1 stage: 7 Operation and End of life BS 8536-1 clause: 5.8
Summary of key GSL Activities by stage	Undertake aftercare walkabouts and review meetings/ workshops instigated with aftercare and facilities management teams to determine any initial issues with end-users. Maintain records Monitor systems to establish actual performance versus theoretical targets. Fine tune engineering systems as required. Record and feedback fine tuning details Project end review – capture lessons learned, undertake scheme benefits review Undertake seasonal commissioning Update the asset information model Undertake and report on POE surveys Update building log book				Complete a scheme benefits review
Stage Objectives	The outcome from this first stage should be the confirmation of high-level project objectives in consideration of operational and performance requirements.	The primary output at this stage is a well-defined project brief, considering end-user and facility/ facilities manager requirements, aligned with measurable performance targets.	The key output at this stage is a design and a constructed facility that meets the end-users' needs.	The key output at this stage is a design and a constructed facility that meets the end-users' need	The primary objectives at this stage is to ensure that: • The facility performs according to the brief • The initial aftercare period is implemented and supported • The performance of the facility is monitored and evaluated via the POE methodology for the extended aftercare period • Lessons learned are captured with any feedback from operational stakeholders.

Golden thread of information

Part 1: Introduction to Government Soft Landings (GSL)

1.1 GSL in context

A key objective of Her Majesty's Government is to improve the value generated through the public sector estate. The 2011 Government Construction Strategy contained a specific goal to improve the performance of its facilities and to meet the requirements of those that use them by aligning the interests of clients (appointing parties in ISO 19650), delivery teams and end-users. The 2017 Transforming Infrastructure Performance plan adds to this through its focus on increasing the effectiveness of investment in economic and social infrastructure.

The GSL process supports this goal by driving a structured and consistent approach to the delivery of facilities by focussing on operational requirements from the outset of a project.

GSL in part takes its reference from the Soft Landings framework developed by the Usable Buildings Trust (UBT) and BSRIA, which was published by BSRIA in 2009 and continues to be updated. The BSRIA/UBT framework sets out the link between:

- Better understanding of end-user needs
- Better briefing of project team
- A planned and gradual handover process
- A period of up to three years of aftercare

Where public sector clients are appointing delivery teams who are more familiar with the BSRIA/UBT framework, it might be helpful to these delivery teams, to identify the activities specific to the GSL approach.

1.2 The scope and principles of GSL

The term 'soft landing' is typically used to reflect a smooth transition from construction into handover and close out and then into facility operation.

However, this is only one aspect of GSL, which in addition, requires[1]:

- A clear business case for a project alongside articulation of security needs for both the project and the ongoing operation of the facility (BS 8536-1 clause 4.1 a) and b))
- That clear, measurable targets are set for facility performance outcomes to align with the business case (BS 8536-1 clause 4.1 d))
- The targets to be reviewed at information exchanges throughout the project (BS 8536-1 clause 4.1 d))
- That there is a defined period of aftercare, supported by the delivery team(s) (BS 8536-1 clause 4.1 e))
- That post-occupancy evaluation (POE) and other performance reviews are undertaken in conjunction with the delivery team(s) (BS 8536-1 clause 4.1 f))
- A smooth transition of data and information contained in the project information model to that required for facility operation in the form of the asset information model (BS 8536-1 clause 4.1 g))

An important benefit of the smooth transition into operation coupled with the extended aftercare period is the potential to optimise facility operating performance as early as possible. The adoption of a POE methodology then enables the comparison of actual performance outcomes to those that were planned and designed for. This in turn informs lessons learned and enables timely action to be taken where performance is either above or below target(s).

1 Refer to BS8536-1 clause 4.1

1.3 The Benefits of adopting GSL

Some of the key benefits of the adoption of a GSL approach are set out in Table 2:

Table 2: Benefits of adopting a GSL approach

1	The maintenance and operational costs of a facility during its lifecycle far outweigh the original capital cost of construction. GSL identifies the need for this to be recognised: • through early and ongoing end-user engagement • setting capital plus operational cost as a GSL performance target • evaluation of whole life cycle cost throughout the project and during use
2	GSL promotes better outcomes for facilities, meaning that the facility is more likely to meet end user needs. This is achieved through the combination of: • Lessons learned (at the start and throughout the project) • User centred briefing • Setting relevant performance targets • Structured information exchanges to support evaluation and reality checking • Extended after-care and POE
3	Effort invested at the outset of a project has significant impact on the performance outcomes delivered and long-term cost of operating and maintaining the facility.
4	Early and ongoing engagement with operators and end-users enables design to progress with the benefit of their insight and in mind of their requirements. This means: • Reduced risk of changes in construction or operation when cost, time and safety impacts can be significant • Increased likelihood of optimising value • Deign decisions taken in consideration of whole life cost and performance
5	Proactive attention to ongoing adoption of a security minded approach where appropriate security related targets are established and measured (such as information breaches or near misses)
6	A strategic approach to maintenance and operational information supports decision making throughout design and construction and where appropriate will help populate facility management systems. This should reduce time, cost and operational risk (such as health and safety risks)
7	The planned and timely provision of operational and end-user training reduces the cost of protracted handover and enables early optimisation of facility performance
8	A strategic approach to commissioning of the facility's systems ensures that this is planned, timely and is repeated as necessary (for example, seasonal commissioning)
9	The on-site availability of design and construction delivery team(s) for initial aftercare (typically six – eight weeks following handover) supports operational optimisation
10	The ongoing support of design and construction delivery team(s) during the extended period of aftercare (typically three years) enables measurement of performance targets and fine-tuning of systems
11	An ongoing focus on facility performance enabled by POE. This also informs an ethos of continuous learning to support strategic briefing for future projects enabling increasing efficiencies and improvements

1.4 Adopting GSL in the private sector

As noted in guidance section 1.1 GSL was developed to generate predictable and improved long-term performance of facilities for public sector clients. Although GSL is a UK government sponsored initiative, this objective and the benefits created (see Table 2) are equally important and relevant to private sector clients whether they are short-term investors or long-term occupiers or operators.

1.5 GSL and key project roles

Roles and responsibilities are detailed in BS 8536-1 clause 4.6.1 and cover those of the owner, the owner's representative, the operator, operations team and facility manager(s) and end users. Clause 4.6.2 note 1 acknowledges that the owner's representative might also be referred to as the 'soft landings champion' or some other term. Reference to GSL champion is made throughout this guidance instead of the owner's representative.

BS 8536-1 also notes that the delivery team(s) should nominate a representative to co-ordinate transition-related activities with the GSL champion although this representative is not given a name. For example, a building services manager, design manager or a combination of both might be appropriate to ensure provision of the right skill set[2].

The roles of project sponsor, project manager, and GSL champion are fundamental to the delivery of GSL and these roles are explained in Part 3.

1.6 Plain language questions (PLQs)

PLQs are an important element of GSL and are defined in BS 8536-1 clause 3.1.44. PLQs also appear in the ISO 19650 series as project information requirements.

PLQs should be drafted by the client (appointing party) for each key decision point and corresponding information exchange. The purpose of PLQs is to obtain information to enable decisions to be taken in a timely and effective manner.

PLQs can also be generated by the project delivery team(s) to enable it to perform its work and to contribute effectively to the outcomes expected by the client (appointing party).

Note that it is fundamental that PLQs are expressed clearly, using simple, easy to understand language.

PLQs are particularly beneficial where:

- It is difficult to categorically identify the information needed
- The information needed might comprise multiple formats (for example, where a PLQ is related to the planning approval process)
- The information needed is an aggregation of separate deliverables (for example analysis of multiple information sources)

It is recommended that PLQs are only be used where detailed information needs are not known. For example, where certainty of construction completion is required, it is more straightforward to request a project programme showing the critical path, instead of asking the PLQ: *how is the project completion date assured?*

BS 8536-1 Annex G provides examples of PLQs and useful prompts at different work stages.

1.7 Summary of the GSL Process

The GSL process is shown in BS 8536-1 figure 2. This sets out the primary activities needed to enable a GSL approach within an information exchange framework. It emphasises the requirement for ongoing review, feedback and action throughout the whole life of the facility. This life cycle approach is exactly in line with the information management process summarised in ISO 19650-1 clause 13. This whole life view is necessary to deliver a 'golden thread' of information that is accurate, complete, consistent and accessible.

2 Refer to BS 8536-1 clause 4.6.6

Part 2: GSL and related initiatives

2.1 Introduction

GSL can be cross-referenced to other initiatives being discussed and developed within the built environment. In particular, there are links to the review of building regulations and fire safety, and to the development of information management using building information modelling, which are summarised below.

2.2 Building a Safer Future

Building a Safer Future is the independent review of building regulations and fire safety published in 2018 following the Grenfell Tower fire of 2017. The report is primarily concerned with high-rise residential buildings and finds that the processes that drive compliance with building safety requirements are weak and complex with poor record keeping and change control. These findings are probably representative of all built environment sectors.

The report calls for a 'golden thread of good quality information' to be generated so that building owners receive the information they need and that there is a clear link between design, construction, occupation and maintenance. A key purpose of this golden thread is to ensure that there is an accessible, complete and correct record of a facility's construction and its regulatory compliance. This might be generated through mechanisms including formal, recorded change control, gateway testing (the GSL equivalent is information exchange), and the managed approach to the delivery of complete and correct facility information.

The creation of a golden thread of information is inherent where a robust GSL process is adopted for the design, construction and operation of a facility because:

1. Clear targets for expected outcomes are set out at the start of a project (for example, *the facility must be safe to access and egress*). This helps effectively frame end-user requirements and the project briefing activities.
2. Each outcome is reviewed throughout the project as information is produced and approved for sharing before it is published. This process enables an ongoing focus on the outcomes (*the facility must be safe to access and egress*). If there is a risk that an outcome will not be delivered then amendments to design can be made as required to ensure delivery. Alternatively, the design might be retained and the requirement to deliver the outcome removed or altered. The GSL ethos of an evidenced based approach means that in any event changes to the design or the outcome should be subject to conscious, collaborative decision making and a change control process.
3. POE then enables measurement of the tangible outcomes (*how is the facility being safely accessed and egressed?*). The actual outcome(s) should match up to the anticipated outcome(s) and where it doesn't then the likelihood is that this is due to the way in which a facility is being used as opposed to the design or construction of the facility.

The outcomes and evidence requirements might be articulated through a series of plain language questions (see guidance section 1.6) posed at appropriate information exchanges – for example:

How is the facility safe for access and egress?

This approach enables the project delivery team to respond to the plain language question using the most appropriate evidence.

It could be argued then, that the adoption of the GSL process is fundamental to generating the golden thread envisaged in Building a Safer Future.

2.3 Using the UK BIM Framework to enable GSL

The UK BIM Framework comprises the ISO 19650 series, the current BS/PAS 1192 series plus the BS 8536 series. As noted in the Introduction GSL is supported by the BS 8536 series but there is also a complementary relationship particularly between the BS 8536 series and the ISO 19650 series.

Both require that:

- Information requirements are determined
- Information is produced in collaboration
- Information is reviewed, approved and accepted.

Figure 1 shows how the expected performance outcomes noted in BS 8536-1 clause 4.3, key decision point/information exchange requirements (clause 4.5) and associated plain language questions (clause 4.9.1) are articulated in the client's (appointing party's) project information requirements (ISO 19650-2 clause 5.1.2 and 5.1.3) and then exchange information requirements required in ISO 19650-2 clause 5.2.1.

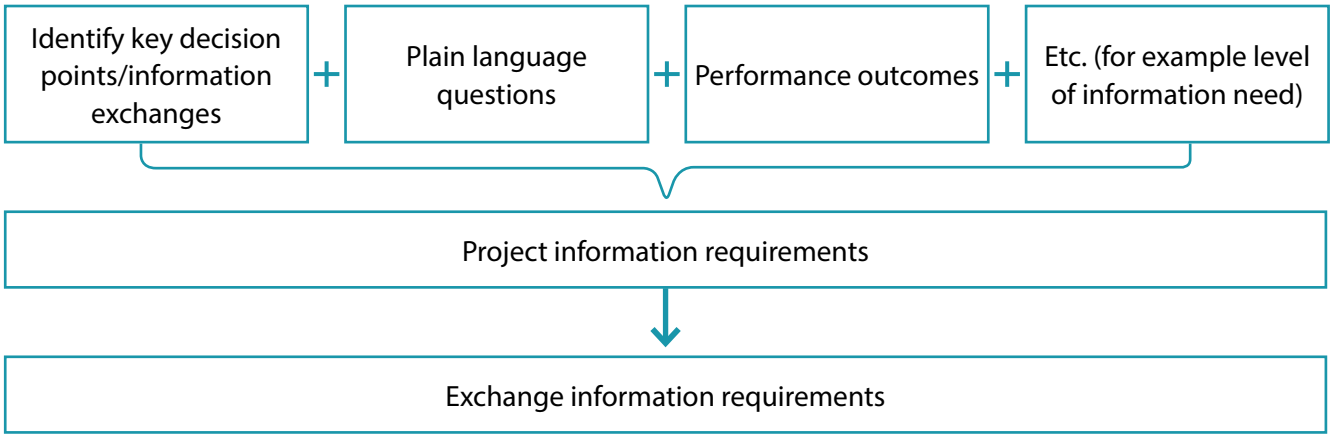

Figure 1: GSL requirements and information requirements

Reviewing information to ensure that it meets the exchange information requirements and can be shared is required in ISO 19650 clause 5.6.4.
In the context of GSL, reviews of this kind are where the design is evaluated by members of the project team, to check whether it meets target performance outcomes.

For example: A lesson learned from previous projects might concern insufficient maintenance space between adjacent boilers in plant rooms. This would be expressed in a plain language question such as "Is there sufficient clearance space between items of primary plant?" and this appears as an exchange information requirement for a soft-clash report from the mechanical design consultant. This performance outcome is then checked at GSL review meetings to make sure that adequate maintenance space is being provided.

These review activities continue throughout the project.

GSL GUIDING PRINCIPLES

(developed in conjunction with the public sector)

- GSL is a key element of the briefing design, construction and handover process, because it maintains a 'golden thread' of the facility's purpose and also enables structured monitoring of performance standards during delivery and facility operation.
- Early engagement of end-user stakeholders and inclusion of a GSL champion, on behalf of the client (appointing party), to direct this engagement with the delivery teams during the design, construction, handover and operation process.
- There should be a commitment to aftercare post-construction from the delivery teams responsible for design and construction.
- POE feedback to departmental teams within the appointing party will become standard practice. This is especially important for those who create business cases and briefs and capture lessons learned to inform future projects. Information from POE activities will form part of the asset information model. Note that even a one-off client (appointing party) can benefit from the POE process, as it checks building performance against initial aspirations and expectations to inform any relevant actions.
- Information exchanges will allow the early testing of maintainability and performance targets as the design develops. In addition, adoption of the UK BIM Framework (see guidance section 2.3) will help provide structured facility data, which can then be used to populate a computer-aided facilities management (CAFM) system.facilities management (CAFM) system.

Part 3: The GSL roles and responsibilities

3.1 Introduction

The adoption of GSL calls for a collaborative approach, with the engagement of all key project stakeholders, the client team (appointing party) and the delivery team(s). The GSL activities are co-ordinated by a GSL champion who works alongside other project related roles. Further details are explained below.

A key activity is to ensure that operational teams are engaged with GSL from the outset of a project.

3.2 GSL activities/responsibilities

3.2.1 Owner

The owner will typically be the client (appointing party). In terms of GSL they are responsible for ensuring the role of the owner's representative is fulfilled. In accordance with BS 8536-1 the owner is responsible for certain activities (see clause 5.1.2) but they can require that these are undertaken by the GSL champion. It is likely that some activities will be carried out by the owner and the GSL champion in collaboration.

3.2.2 Project sponsor/senior responsible officer (SR0)[3]

The project sponsor/SRO typically has personal accountability and overall responsibility for the successful outcomes of a project.

3.2.3 GSL department lead

Each client/department should identify a senior lead for GSL, who should ensure that the following are addressed:

- Create a GSL strategy and implementation plan This should be in the context of organizational/ departmental requirements
- Adhere to GSL process The GSL process should be adhered to for each new build or refurbishment project.
- Identify GSL champion Each organization/ department project has a GSL champion identified.
- Lessons learned Experiences are shared to identify the best practice and potential operational issues.

3.2.4 Project manager

One of the activities of the project manager (who is accountable to the project sponsor) is to ensure that a clear plan for project delivery is developed and project items such as risk, budgeting and change are managed. As such, they are involved in delivery against GSL targets and performance outcomes.

3.2.5 GSL champion

The GSL champion is appointed as early as possible in the project (by the owner) and should be a continuous, active presence throughout the project then into facility operation and beyond. Their main objective is to *ensure that design and construction is planned and controlled to enable a smooth transition into operation and for the defined periods of aftercare* (BS 8536-1 clause 4.6.2).

The GSL champion could be an individual within the owner's organization or they could be an independent third party. They are fundamental to the integration of the operator, operations team or facility manager(s) in the design and construction process. The GSL champion effectively offers a voice for end-users (who are often silent in the design and construction stages). The GSL champion is therefore central to the collaborative ethos of a project.

One of the objectives of the GSL champion is to ensure the delivery team(s) maintain focus on the target performance outcomes and that evidence of delivery of the outcomes is generated through the information exchange process. BS 8536 confirms that *the day- to-day role of the GSL champion should not be delegated to another party*[4]. It also clarifies that the GSL champion is not undertaking the same functions as a project manager or a facilities manager[5].

BS 8536-1 sets out GSL champion activities (refer to Table 3) but the owner may require the GSL champion to undertake additional activities that might not be articulated in BS 8536-1. Note that the scope of the GSL activities should be proportionate to the scale and complexity of the project.

3 The project sponsor/SRO may be fulfilling the role of the 'owner' as noted in BS 8536-1
4 BS 8536-1 clause 4.6.3
5 BS 8536-1 clause 4.6.2. Note 2

Table 3: GSL activities aligned with BS 8536-1

Clause in BS 8536-1	Activity
4.6.2	Determine the composition of the delivery team(s) (if not undertaken by the owner)
4.6.3	Facilitate the engagement of the operator, operations team or facility manager(s) and end user with the work of the delivery team(s)
4.6.3	Liaise with the built facility security manager to ensure their security requirements are fulfilled
4.6.3 **5.2.2**	Ensure that: • Target performance outcomes and operational requirements are determined • The operational budget is determined • Performance against expected outcomes is verified through successive work stages (via information exchange) • Plans are developed for commissioning, training and handover of systems plus phasing in of facility management • POE requirements are established and implemented so that operational performance can be measured and compared to target performance outcomes • An advisory report (prepared by the operator, the operations team or facility manager(s)) is co-ordinated and published during the extended period of aftercare • A security minded approach is adopted by the operator, the operations team or facility manager(s) in respect of the asset information model and the owner's information management system • An energy monitoring strategy is developed
4.6.6	Consider the appointment of a commissioning manager and a security manager (this is noted as an owner activity but it might be appropriate for the GSL champion to contribute)
4.6.6	Approve delivery team responsibility assignment matrices
4.6.7	Determine and communicate requirements for on-site full-time support during the initial period of aftercare
4.7	Prepare a plan for stakeholder engagement
4.7	Oversee commissioning, training and handover planning
4.7	Ensure operational input throughout design and construction
5.2.2	Determine the activities to be undertaken by the operator, operations teams or facility manager(s) (if not determined by the owner)
5.8.2	Determine the extent of technical guidance and support to be provided by the aftercare team
5.8.2	Arrange for aftercare review meetings (for the three year period) and define the frequency with which energy performance and system reviews should be carried out
5.8.2	Compare facility performance in use with required performance, commenting on potential improvements, to inform annual reviews

3.2.5 GSL champion continued

The GSL champion might also be involved in defining requirements for information management using BIM and they may participate in the agreement of an information management strategy on behalf of the owner (BS 8536-1 clause 5.1.1). Furthermore, they might participate in design reviews (BS 8536-1 clause 5.3.2.2) and could (where authorised by the owner) take on the owner's responsibility for approving changes via a formal change control process (BS 8536-1 clause 5.5.1).

Although BS 8536-1 clause 4.6.3 requires the GSL champion to ensure that certain activities are carried out and outputs generated, it does not require that these activities and outputs are carried out or generated by the GSL champion themselves. However, BS 8536-1 clause 5.1.2 (which identifies primary activities of the owner) does prompt the owner to consider which of these activities will be undertaken by the GSL champion. These activities include those detailed in clause 4.6.3 plus others.

The GSL champion is a critical friend of the project and in this context, BS 8536-1 clause 5.2.2.2 recommends that the GSL champion assess the experience of the owner to fulfil the owner's obligations. They may also participate in the evaluation of the delivery team(s) experience.

BS 8536 clause 4.6.2 note 1 states that the GSL champion *should be expected to have first-hand working knowledge of the owner's organization and an understanding of the facility's/facility's future. Where an existing facility is to be refurbished, the owner's representative should have an understanding of its history.* Suggested attributes/skills of the GSL champion are located in Appendix B.

3.3 Deliverables

3.3.1 GSL champion

Regardless of which activities the GSL champion carries out themselves they are responsible for providing the delivery team(s) with certain deliverables which are identified in BS 8536-1 clause 5.1.10[6]. These are summarised as:

- Strategic definition including an elaborated business case
- Required target performance outcomes
- Performance evaluation measures and POE methodology
- Stakeholder engagement and communication plan
- Risk and opportunity register
- Format for presenting evidence to support project proposals.

3.3.2 Other deliverables

BS 8536-1 proposes deliverables within each work stage. Deliverables in early work stages are typically the responsibility of the owner or the GSL champion. Consequently, they're tasked with generating a responsibility assignment matrix (BS 9536-1 clause 5.1.8). As a project evolves, deliverables typically become the responsibility of the delivery team(s). BS 8536, clause 5 identifies deliverables associated with each work stage plus activities that are required to facilitate the deliverables. The responsibility assignment matrix could form part of the information exchange requirements required in accordance with the ISO 19650 series.

The delivery of lessons learned occurs throughout all project stage. Initially the responsibility of the owner or organizational/departmental GSL champion and later in the project the responsibility of the delivery team(s).

It is anticipated that these activities may already be a requirement of public sector clients but where an independent third party is appointed as GSL champion or activity lead (e.g. for POE) then an appropriate budget should be determined and allocated.

6 Note that clause 5.1.10 identifies minimum requirements

Part 4: Thematic outcomes and measurement

4.1 Introduction

GSL requires the definition of target performance outcomes at the outset of the project. These should be established following consideration of the business case and the functional requirements of the facility.

BS 8536 clause 4.3 recommends performance outcomes to be considered; these are categorized as:

- Environmental
- Social
- Security
- Economic

These are explained in more detail below.

4.2 Outcomes: Environmental

The objective of this focus areas is to ensure that new and refurbished facilities minimise their environmental impacts on the planet and its natural resources.

BS 8536-1 Annex B sets out evaluation criteria for environmental performance.

The content of Table 4 should be considered in determining environmental performance outcomes. The targets will then be regularly reviewed and evaluated according to the project's information exchange programme. The handover and aftercare activities should be used to continue evaluation of performance, assuring targets are achieved.

Table 4: Environmental performance targets

	Environmental Performance Targets
1	**Annual energy use – consumption, including both regulated and unregulated consumption** (kWh per annum per m2 GIFA) GSL requires the use of a recognised annual energy assessment and reporting methodology. This should include energy measurement and an advisory report to suggest improvements. Targets should use a range that is recognised as achievable while encouraging upper levels of attainment. See also BS 8536-1 Annex B.2. **Reference documents:** CIBSE's Energy Assessment and Reporting Method for the evaluation of energy consumption in use (TM22). This document also supports optimisation of performance against these targets. CIBSE's Building Log Book (TM31) provides useful guidance on how to record how a facility is used. This information is essential to assess expected performance against actual performance. Also: • CIBSE Guide A Environmental Design • CIBSE TM 39 Building Energy Metering • CIBSE TM 46 Energy Benchmarks

Environmental Performance Targets	
2	**Operational carbon dioxide emissions** (tonnes per annum CO2e) GSL requires the use of a recognised annual energy assessment and reporting methodology. This should include calculation of carbon dioxide emissions and an advisory report to suggest improvements. This is calculated from the total energy use using the methodology required for the Display Energy Certificate. See also BS 8536-1 Annex B.2. **Reference documents** CIBSE's Engineers Operational Ratings and Display Energy Certificates (TM47:2009).
3	**Annual water consumption** (litres per annum per m2 GIFA or per occupant) GSL recommends that this evaluation might typically include measurement of water consumption and an advisory report to suggest ways of reducing water consumption. See also BS 8536-1 Annex B.3.
4	**Waste** (tonnes per annum per m2 GIFA). Set targets and operational waste management strategy based upon past projects. This evaluation might typically include measurement of waste and an advisory report to suggest ways of reducing waste. See also BS 8536-1 Annex B.4.

4.3 Outcomes: Social

The reason for setting performance targets here is to ensure that facilities provide comfortable, manageable and maintainable environments that are conducive to occupant productivity. This requires clarity about the proposed operation of the facility and the requirements of those who work in it, whether they are permanent, part-time or visiting.

Social performance targets are likely to vary significantly between organizations/departments and projects. Social performance measures may need to address conceptual ideas about work environments; these may stretch beyond the physical boundaries of the facility itself (such as the impact of the surrounding environment).

Productivity is influenced not only by the facility created but also by the business management, and these factors need to be considered. Information to inform decisions about functionality and effectiveness may come from a variety of sources, including:

- The conceptual brief, developed by the project sponsor and the delivery team, supported by specialist consultants, as appropriate (generally architects, designers and space planners).
- Feedback from similar projects/departments.
- Engagement with current employees, particularly when dealing with refurbishment/ remodelling projects.

BS 8536-1 Annex C sets out evaluation criteria for social performance.

The content of Table 5 should be considered in determining social performance outcomes. The targets will then be regularly reviewed and evaluated according to the project's information exchange programme. The handover and aftercare activities should be used to continue evaluation of performance, assuring targets are achieved.

The following performance targets and measures should be considered for the facility:

Table 5: Social performance target

Social performance target
Social (i.e. functionality and effectiveness) – the facility should be designed and constructed to meet the functional and operational requirements of the owner and their end-users, including: • Overall concept • Context • Uses • Access • Visual form • Space • Internal environment • Durability and adaptability GSL recommends that a scoring system is used to ascribe a numerical value to a qualitative assessment of aspects of performance. Operation should meet the operator and end-user requirements, including: • Utility • Usability • Safety • Maintainability • Security • Inclusiveness • Comfort **See also BS 8536-1 Annex C.** **Related documents** A number of methods exist for measuring performance as set out in the note to BS 8536-1 clause 5.8.2.3.4. Individual departments/organizations may have they have their own service provision requirements which should be read in conjunction with the foregoing.

4.4 Outcomes: Security

Although BS 8536-1 identifies security as a performance outcome it does not provide guidance on performance evaluation. It is recommended that the provisions of PAS 1192-5:2015 *Specification for security-minded building information modelling, digital built environments and smart facility management*[7] are considered and GSL targets are set in consideration of the built asset security strategy and built asset security management plan.

The targets will then be regularly reviewed and evaluated according to the project's information exchange programme. The handover and aftercare activities should be used to continue evaluation of performance, assuring targets are achieved.

Note that the project's built facility security manager should work closely with the GSL champion to monitor and manage against any targets.

4.5 Outcomes: Economic

The facility should establish and meet performance targets for capital and operational cost. These should be considered side-by-side to ensure that design decisions are made in respect of the facility's whole-life costs. Performance outcomes and targets should be specific to the facility and verified in each information exchange. As far as possible, an evidence-based approach should be taken to measuring performance.

4.5.1 Capital costs

Capital costs should be estimated and planned according to best practice methodologies published by the RICS (refer to the New Rules of Measurement series). Effective cost benchmarking should be employed throughout design to evaluate the risks associated with capital cost calculations [8].

Capital cost might be represented in multiple ways for example, cost/m2 GIFA, cost/functional unit (such as cost/pupil for schools), cost/element and relative cost/element (% allocated to preliminaries compared to the total cost of construction elements).

See also BS 8536-1 Annex D.2 for further explanation.

4.5.2 Operational costs

In the GSL context, the facility's operational budget will be provided as one of the key outputs from the facilities management process and should be monitored and benchmarked throughout the design development, construction and in-use phases.

Operational costs should be compared against the target(s) set in the project's brief to analyse accuracy and reasons for variance. These need to be fed back to the department and the facilities management team as part of the facilities management annual data return.

The operational target[9] should be used as a point of reference during the design of the facility. It is then tracked as the design progresses. Variations to the operational target should managed through formal change control.

The operational budget is the operational costs per annum (for a defined duration) and should then be set for the facility in use.

Gap analysis should be undertaken as part of the POE, which analyses:

1. Variance of actual operational costs to the operational budget
2. Variance of actual operational costs to the operational target.

Operational cost forecasts and related budgets can then be adjusted based on this insight.

The operational costs should be monitored and benchmarked throughout the extended aftercare period using the organization's/department's preferred reporting methodology (for example International Property Databank or RICS New Rules of Measurement 3).

See also BS 8536-1 Annex D.3.

7 At the time of writing, PAS 1192-5 is due to be superseded by ISO 19650-5 (anticipated 2020)
8 Note that this requires consistency of structure for estimating, cost planning and cost analysis to ensure like for like comparison. This applies to building and infrastructure projects.
9 Operational budget may also be referred as the operational service model

4.6 Measurement: POE

BS 8536-1 distinguishes between two types of aftercare period:

1. Initial aftercare (see BS 8536-1 clause 5.8.2.2)
2. Extended aftercare (See BS 8536-1 clause 5.8.2.3).

These aftercare periods are to enable understanding of facility performance, not to address defective works.

During design and construction, measurement of the performance targets should take place through the process of formal information exchange. Information exchanges can occur within and at the end of project stages[10].

POE is then the activity of measuring actual performance outcomes. If performance isn't as planned remedial action can be taken alongside fine-tuning of systems and behaviours as required. Insight generated through POE also informs lessons learned.

The project's GSL champion instigates, manages and evaluates each POE, although they may not carry out the POE activity themselves. The timing and format of the POE should be established as part of the GSL strategy and implementation plan.

In accordance with BS 8536-1 clause 5.8.2.3.4, formal POE of the building's performance should be conducted at the end of years one, two and three. Organizations/departments may want to vary this to suit their own specific needs.

The POE should address whatever targets have been set as performance outcomes (ref to guidance sections 4.2 – 4.5 inclusive). POE methodologies should be appropriate and could include surveys, data collection enabled via BMS (for example) and observations. In its simplest form POE could consist of short review meetings with end-users, operators and relevant members of the project team.

The POE should be recorded in a report considering all the performance targets determined for the project, with particular emphasis on:

- Operational management
- Durability and serviceability
- Performance of systems
- End-user experience
- Lessons learned

Note: Organizations/departments should decide whether POE activities are to be undertaken internally or carried out by an independent third party (in which case budgets will need to be established).

10 Information exchange is also noted in ISO 19650-1 as one of the primary activities within the information delivery cycle (refer to clause 6.3 and figure 6).

Part 5: GSL tasks by stage

5.1 Introduction

The tables in sub-sections 5.2-5.6 indicate the typical tasks that should be executed on a project as part of an organization's/department's GSL adoption. They are the result of departmental consultation and alignment against GSL project stages. These stages are different from the work stages that are explained in BS 8536-1 clause 4.5 and are used to structure the content in BS 8536-1 clause 5. A cross reference is included in each sub-section to indicate the equivalence between GSL stages and BS 8536-1 work stages.

It is recommended that a RACI matrix is used to allocate the different roles that are appropriate for each task. A RACI matrix template is given in Appendix 3. The RACI acronym is used to indicate the following, in relation to each task:

R = Responsible
A = Accountable
C = Consulted
I = Informed.

5.2 Strategic Assessment/ Outline Business Case Stage

BS 8536-1 stage: 0 Strategy
BS 8536-1 clause: 5.1

The outcome from this first stage should be the confirmation of high-level project objectives in consideration of operational and performance requirements.

Table 6: Strategic assessment/outline business case stage tasks

Ref	GSL task
5.2.1	Establish the operational vision and strategy for the project aligned with the project business case, including the required performance objectives (outcomes relating to social, economic and environment) of the proposed facility/facility, utilising, where possible, POE data benchmarks. If necessary, propose an occupant survey to identify baseline measures.
5.2.2	Establish GSL roles and responsibilities for the project, for both the client (appointing party) and the delivery team(s) including a GSL RACI matrix.
5.2.3	Review lessons learned and feedback from similar projects, legislative or departmental guidance and design/financial constraints. Pre-occupancy surveys may also be commissioned.
5.2.4	Appoint a project GSL champion with suitable skills and responsibility level.
5.2.5	Identify and map all of the relevant internal and external stakeholders.
5.2.6	Prepare a GSL strategy and implementation plan.
5.2.7	Refer to and align with information requirements (see the ISO 19650 series).
5.2.8	Develop a facilities management strategy and plan for the project, aligned with operational objectives, service-level requirements and operational cost targets.
5.2.9	Establish Treasury five-stage business case – benefits stated.

5.3. Final Business Case (FBC)/ Briefing Stage

BS 8536-1 stage: 1 Brief
BS 8536-1 clause: 5.2

The primary output at this stage is a well-defined project brief, considering end-user and facility/ facilities manager requirements, aligned with measurable performance targets. The activities needed to support GSL during this stage are illustrated in Table 7.

Table 7: Final business case stage tasks

Ref	GSL task
5.3.1	Based on lessons learned develop the lessons learned tracker.
5.3.2	Develop the facilities management strategy.
5.3.3	Establish stakeholder/end-user needs and ensure that these are embedded in the brief.
5.3.4	Generate a GSL opportunities and risks schedule in conjunction with the project team using lessons learned from previous projects – this can become a component of the main project risk register or a more detailed supplementary schedule. A specimen is included in BS536-1 Annex F.
5.3.5	Establish environmental targets – see guidance section 4.2. Ensure targets are considered in line with departmental targets, policy and objectives, operating targets and critical project targets. These will need to be constantly reviewed and evaluated as the project progresses.
5.3.6	Establish functional and effectiveness targets to ensure that the facility has comfortable, manageable and maintainable environments that are conducive to occupant productivity.
5.3.7	Establish the security related targets. These should be linked to the built facility security strategy (refer to PAS 1192-5:2015 Specification for security-minded building information modelling, digital built environments and smart facility management).
5.3.8	Establish economic targets. Both capital and operational cost targets should be calculated at this stage to support ongoing stage review, benchmarking then measurement.
5.3.9	Create an environmental management plan highlighting the performance objectives, which will be informed by various information sources such as the environmental impact analysis.
5.3.10	Determine the POE strategy for the project to confirm what should be measured, when and in what format. The strategy should also set out any methodology requirements and reference documentation, e.g. CIBSE TM22.
5.3.11	Embed GSL requirements and assessment criteria into tender information.

5.4 Design and Construct Stage

BS 8536-1 stages: 2 Concept + 3 Definition + 4 Design + 5 Build and Commission

BS 8536-1 clauses: 5.3 + 5.4 + 5.5 + 5.6

The key output at this stage is a design and a constructed facility that meets the end-users' needs. Key activities to support GSL during this stage are illustrated in Table 8:

Table 8: Design and construction stage tasks

Ref	GSL task
4.5.1	Evidence that operational targets, statutory regulations and user needs can be delivered by modelling and testing the developed and constructed design.
4.5.2	Review the developed design and construction specifications to ensure that end-user needs, and targets can be achieved.
5.4.3	Review all construction and installation details and highlight any that will have a negative impact upon the actual performance relative to the required performance.
5.4.4	Confirm any unavoidable changes in design that might give rise to a change in the performance of the asset/facility.
5.4.5	Update the commissioning specification if appropriate.
5.4.6	Update the risk and opportunity register.
5.4.7	Prepare forecasts of final capital and operational costs.
5.4.8	Update the information models as required in light of further design and operational information and data.
5.4.9	Create early building readiness and commissioning plans, including a schedule of pre-commissioning activities.
5.4.10	Update the handover plan to include training requirements for the operator, operations team or facility manager, as appropriate, and end-users.
5.4.11	Prepare a detailed move-in plan for people and equipment if appropriate.
5.4.12	Continue ongoing end-user and engagement, including project walkabouts.
5.4.13	Identify any skills that end-users and other key stakeholders need to have acquired before attending commissioning demonstrations.
5.4.14	Implement information exchanges at key project gateways to check if performance targets are forecast to be achieved.
5.4.15	Trial transfer of information containers from the project information model to the asset information model systems such as the asset registry or CAFM solutions.

5.5 Pre-handover Stage

BS 8536-1 stage: 6 Handover and Close-out
BS 8536-1 clause: 5.7

The key outcome at this stage is to ensure that the built facility is operationally ready to commence its in-use stage. Key tasks to support GSL during this stage are set out in Table 9:

Table 9: Pre-handover stage tasks

Ref	GSL task
5.5.1	As-built project information model delivered to client (appointing party).
5.5.2	Information transferred from the project information model to client facility management systems.
5.5.3	End-user orientation and training undertaken. Facilities management familiarization with key operating systems such as the BMS.
5.5.4	Building log book in place.
5.5.5	All commissioning logged and reviewed against targets.
5.5.6	Initial and extended aftercare plans in place and team mobilised.
5.5.7	Take receipt of digitised operation and maintenance manual.

5.6 In-use/Operational Stage

BS 8536-1 stage: 7 Operation and End of life
BS 8536-1 clause: 5.8

The primary activity at this stage is to ensure that:

- The facility performs according to the brief
- The initial aftercare period is implemented and supported
- The performance of the facility is monitored and evaluated via the POE methodology for the extended aftercare period
- Lessons learned are captured with any feedback from operational stakeholders.

Key activities to support soft landing during this stage are illustrated in Table 10.

Table 10: In-use/Operational stage tasks

Ref	GSL task
5.6.1	Undertake aftercare walkabouts and review meetings/workshops instigated with aftercare and facilities management teams to determine any initial issues with end-users. Maintain records.
5.6.2	Monitor systems to establish actual performance versus theoretical targets. Fine tune engineering systems as required. Record and feedback fine tuning details.
5.6.3	Project end review – capture lessons learned, undertake scheme benefits review.
5.6.4	Undertake seasonal commissioning.
5.6.5	Update the asset information model.
5.6.7	Undertake and report on POE surveys.
5.6.8	Update building log book.
5.6.9	Complete a scheme benefits review.

5.7 ISO 19650-2 tasks and deliverables

ISO 19650-2 requires that certain information management tasks are carried out at different stages within design and construction projects and in relation to separate appointments. For example, organizational information requirements, asset information requirements and project information requirements should be prepared during Strategic Assessment/Outline Business Case. These are not tasks solely for GSL roles, but should be reviewed to add relevant aspects to the GSL tasks in guidance tables 6-10. Please refer to the UK BIM Framework ISO 19650 Guidance Part 2: Processes for project delivery - appointing party activities.

Part 6: Summary

In summary, it is recommended that a GSL approach supported by the remainder of the UK BIM Framework is considered for all design and construction projects.

Unfortunately, poor record-keeping and change control is likely to be prevalent for many facilities. The notion of a golden thread of good quality information is therefore relevant for the design, construction and operation of all facilities.

GSL does introduce some new activities for the client (appointing party) and for delivery teams. It is important to consider the full scope of activities required in the context of the scope and complexity of each individual project.

The upfront effort and investment needed to implement a GSL approach should generate significant benefits throughout the lifetime of a facility.

6.1 Key actions in achieving GSL

Key actions to implement GSL can be summarised as:

- **GSL's strategic purpose** in helping deliver better facilities should be embraced by each department/organization. This can be supported by visible statements from senior management.
- **GSL roles** should be allocated within the client organization, at both programme and project level where appropriate, and the individuals delivering those roles should have the necessary skills and knowledge to do so effectively. This may require training and other forms of support. These individuals must also be adequately resourced to carry out their tasks.
- **Clear targets** should be set for the required business outcomes at the start of the project. These targets need to be aligned with strategic objectives and they should be cascaded through the supply chain. These targets and their measures need to be reviewed during design, construction and operation. In setting targets and measures consideration should be given to statutory requirements, government policy, previous experience, operational knowledge and end-user needs.
- **Appropriate end-users** (defined though stakeholder mapping and categorisation) should be involved as part of the client's representation during briefing, design, construction and handover.
- **The transition from construction to operation** must be planned throughout the project and should be a smooth process enabling optimum performance to be reached as quickly as possible. The transition needs to consider the transfer of operational data, as well as training, commissioning, handover and aftercare.
- **Performance reviews** should, where appropriate, be undertaken post-completion for up to three years, and lessons learned from this should be recorded and shared for future projects.

Appendices

Appendix A: ISO 19650 parties in the GSL context

BS 8536-2 clause 4.3 recommends that performance outcomes and targets are specific to a project[11]. Before starting to articulate performance outcomes and targets it's useful to understand the different types of parties and teams that will support the project. ISO 19650-2 shows this in Figure 2. The following diagram is a colour coded, simplified version of this image, reproduced with permission from BSI:

Interfaces between parties and teams using ISO 19650 and GSL terms

(Simplified version)

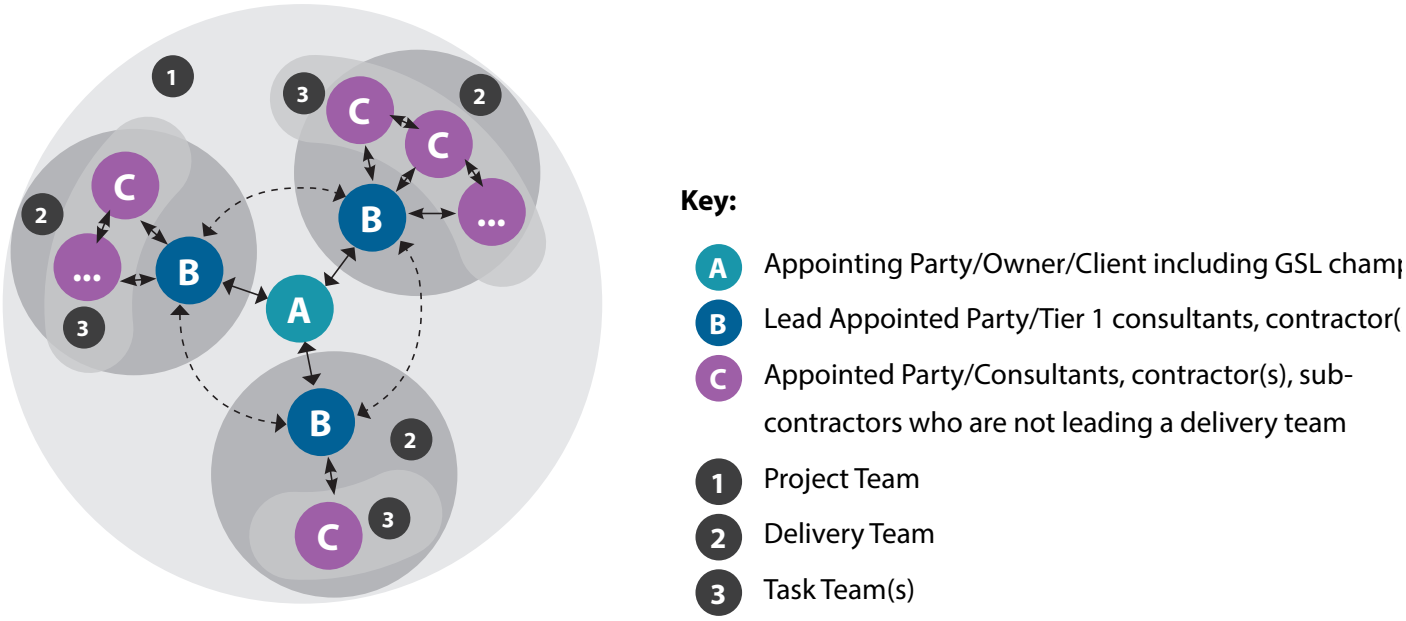

Figure 2: Example of project teams and parties according to the ISO 19650 series
Image reproduced with permission from BSI

The evidence to support the performance outcomes and targets[12] are expressed by the client (appointing party) as project information requirements (ISO 19650-2 clause 5.1.2) alongside information delivery milestones (ISO 19650-2 clause 5.1.3). However, the delivery of evidence may not be equally applicable to all those co-ordinating information from delivery teams (lead appointed parties) or those producing information (appointed parties and task teams).

Specific requirements that each lead appointed party should meet are expressed as exchange information requirements (ISO 19650-2 clause 5.2.1) and form part of the lead appointed party's appointment documents (ISO 19650-2 clause 5.4.6).

It is then for the lead appointed party to determine the exchange information requirements relevant to each appointed party/task team and to articulate them accordingly (ISO 19650-2 clause 5.4.3).

11 Although some performance outcomes might be determined at a higher organisational or programme level first
12 Noting that the targets themselves are technical requirements and should be expressed in accompanying specification/Employer's Requirements

Appendix B:
GSL Champion skills

GSL CHAMPION SKILLS

The skills required for the GSL champion are shown below:

An understanding of the:

- Operational aspects of building management, for example, facilities management and the needs of the users;
- Operational aspects of facility and end-use in the case of infrastructure;
- Operational costs of the existing estate and setting benchmarks for the operational costs of the project;
- Construction and design process.

The ability to identify and engage with:

- Project end-users to support the identification of KPIs against the process aspects of GSL, for example, measuring and reporting on the performance of the commissioning, training and handover team and also on the performance of the facilities management provider;
- Operational outputs/outcomes of the project, and develop these into new requirements for future projects.

The ability to communicate with:

- The operational aspects of building management, for example, facilities management and the needs of the users;
- The end-users and operational budget-holders of the establishment, acting as a focal point;
- Stakeholders to relate the performance of the building with any changes that may have occurred in its use.

An appreciation of:

- Building operational and facility management systems, for example, BMS and their use in identifying how actual building use (occupancy hours, temperatures) may differ from the original intended use against which the building was designed.

Knowledge and understanding of POE

- Requirements and output, which is conducted for three years after building occupation;
- Outline principles of energy assessment methods, carbon dioxide emission calculations and how to undertake a survey. Training may need to be provided for GSL champions on the energy assessment method adopted by their department;
- How to conduct the department's chosen user-satisfaction surveys to measure how well the building has enabled the management team to deliver the required social performance outcomes and functionality and effectiveness;
- The department's cost-reporting methods to record the capital cost of construction and the annual operating cost for a period of three years after building occupation.

Appendix C:
RACI matrix template

A template for a GSL RACI chart is given below. Populate the rows with GSL tasks, drawing on those in guidance Part 5, and supplemented by any additional tasks you have identified.

Use the RACI letters to indicate the roles in connection with each task:

- R Responsible for task
- A Accountable for task
- C Consulted during/about task
- I Informed of task completion/outcome.

Table 11: GSL RACI template

Task reference:	Tasks	Owner/ Project sponsor/SRO	GLS Lead	GSL champion	Project manager	Delivery team
	<<Insert task description>>					

Further reading

It is recommended that the following be read in conjunction with this guidance:

- BS 8536-1:2015 Briefing for design and construction. Code of practice for facilities management (Buildings infrastructure)
- BSRIA – Soft Landings Guides
- BSRIA – Soft Landings Framework 2018 (BG 54/2018)
- Scottish Futures Trust (SFT) – Whole life appraisal tool
- UK BIM Alliance/CDBB/BSI – Information management according to BS EN ISO 19650 Guidance Part 2: Processes for project delivery

Glossary of terms

Asset information model information model relating to the operational phase [ISO 19650-1]

Asset information requirements information requirements in relation to the operation of an facility [ISO 19650-1]

Building information modelling use of a shared digital representation of a built facility to facilitate design, construction and operation processes to form a reliable basis for decisions [ISO 19650-1]

Building management system is a computer-based control system installed in buildings that controls and monitors the building's mechanical and electrical equipment, such as ventilation, lighting, power systems, fire systems and security systems

Exchange information requirements information requirements in relation to an appointment [ISO 19650-1]

Facilities management integration of processes within an organization to maintain and develop the agreed services that support and improve the effectiveness of its primary processes and activities [from BS 8536-1]

Organizational information requirements information requirements in relation to organizational objectives [ISO 19650-1]

Plain language questions request for information that is expressed in simple, easy-to-understand terms [from BS 8536-1]; in the case of GSL this is likely to relate to information models to test the performance targets

Post-occupancy evaluation process of evaluating an facility/facility after it has been completed and is in use to understand its actual performance against that required and to capture lessons learned [from BS 8536-1]

Project information model information model relating to the delivery phase [ISO 19650-1]

Soft landings process for the graduated handover of a new or refurbished facility/facility, where a defined period of aftercare by the design and construction team is an owner's requirement that is planned and developed from the outset of the project [from BS 8536-1]

Engage with the UK BIM Framework

info@ukbimframework.org
@UKBIMFramework
https://ukbimframework.org/
UKBIMFramework

Philp, D, Churcher, D, Davidson, S 'Government Soft Landings'

DOI number: https://doi.org/10.17863/CAM.45315

UK BIM FRAMEWORK

bsi. cdbb Centre for Digital Built Britain UKBIM ALLIANCE Enabling Digital Transformation

The Centre for Digital Built Britain is part of the Construction Innovation Hub programme, funded by UK Research and Innovation through the Industrial Strategy Challenge Fund.

CONSTRUCTION INNOVATION HUB

INDUSTRIAL STRATEGY

UK Research and Innovation