



# CIOB

The Chartered  
Institute of Building



## Client Guide:

Leading Projects in  
the Built Environment

[ciob.org/industry/support-for-clients](https://ciob.org/industry/support-for-clients)

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I am very pleased to see this publication of the new CIOB guidance to support clients.

When our Past President Mike Foy OBE FCIOB suggested client and client contractor relationships as the theme for his presidential year, I was delighted to support his decision. Mike made the case that clients have the potential to help make huge positive change and are key to all our big challenges as an industry and an Institute.

The continuing drive to raise standards, ongoing efforts to improve collaborative working, the push to achieving net zero, encouraging innovation, delivering greater diversity... these are just some of the issues where clients can have a real impact and be a force for good. ”

**Caroline Gumble BSc (Open),  
CMS, MCIPD, FRSA, MIEEx, HonMCCM,  
CIOB Chief Executive**

# Foreword

Clients play a pivotal role on any construction project.

Being a construction client isn't just about creating the right building for the right price within the right time frame. It is also an opportunity to contribute to solving some of the biggest economic, ethical and ecological problems we face today.

Regardless of the kind of project, clients have ultimate responsibility for coordinating a complex web of resources; in some cases relying on many specialist consultants. With their projects potentially affecting thousands of people, often involving an enormous supply chain, and with a disproportionately high carbon footprint, clients must also consider their wider societal and environmental impacts.

Success depends on sound planning and good governance with, at its heart, an open, collaborative relationship between the client and its project team, including contractors. Along with growing expectations for public benefit outcomes from investors, industry professionals and end-users, the need to work better together has never been greater.

This commitment to high-quality, responsible procurement starts at the top. The determination and skills of clients' in-house teams are important, but great projects are more likely when the essential culture of those teams is aligned. Sitting at the head of construction projects and with the most control over their direction and finances, clients have a huge influence on not just their own projects but the impact of the built environment as a whole.

This new Client Guide is primarily for construction clients running larger projects/programmes but equally the principles apply to all clients regardless of project size.

You might work in government departments, universities, local authorities, or partnership arrangements associated with local delivery of public services.

Alternatively, you might be in the private or third sector – in utilities, in retail, in companies whose primary expertise is in the built environment, or in companies who exist for other purposes but who nevertheless need to develop and maintain built assets.

Either way, this guide is for you, especially if you are new to the process. It will help you to get the building blocks right from the start.

The Client Guide is part of CIOB's continuing strategic focus on empowering construction clients with the knowledge and skills for success. Our aim is to capture and share learnings to encourage clients to collaborate more, make good decisions, avoid known pitfalls, and minimise waste. Ultimately, we want to help clients achieve better project outcomes for them, the environment, and society at large.

This focus on support for clients will develop over time to include digital resources for knowledge-sharing, CPD, and toolkits on our website, [www.ciob.org](http://www.ciob.org).

The Client Guide is an important first step on this journey, introducing us as a trusted source of learning and helping you on the road to a better and more sustainable future.

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## Purpose of the guide

This guide is designed to get you started in your role as a construction client. It explains how projects are generally structured and managed, and what to look out for along the way. The final section brings it all together in a handy stage-by-stage summary.

Drawing on CIOB members' experience, it highlights the things you can do to benefit your project. The focus is on best practice and guidance that can be applied within the commercial and regulatory context to improve outcomes and create more value.

Note that the guide does not replace any legal or contractual obligations or documentation. CIOB strongly advises that you appoint local representatives when working in jurisdictions that are new to you and where relevant expertise cannot be provided from internal resources.

This guide is merely introductory. If you wish to learn more, consult the publications listed at the back of this guide, not least the CIOB's Code of Practice for Project Management for the Built Environment, 6th edition and the CIOB's Code of Practice for Programme Management in the Built Environment 1st edition (2nd edition to be published in 2024).

# Introduction

This guide is for individuals in the pivotal role of construction client – you.

Construction clients procure design and building work at every stage of a built asset's life cycle. They oversee its initial creation. They steer its ongoing physical expression, overseeing repairs, maintenance, conversions, extensions, and alterations. Finally, when the asset ceases to have a viable purpose, they oversee its retirement.

To do any of this, you must bring together a team to help. For example, for each project during the life cycle of an asset, you may need people to:

- Secure finance
- Assess and manage costs
- Work out the business case
- Advise on legal issues and procurement routes
- Manage risks
- Underwrite risks
- Design the asset
- Prepare the site
- Manufacture, install and build the asset
- Manage the build
- Commission and validate the build
- Maintain the asset
- Retire, recycle and repurpose the asset

Even if you carry out some of these functions yourself, you can't do it all. You will still need others, and the resulting management burden, contractual arrangements and supply chains can be complex.

With a potentially very large team assembled that may never have worked together before, maintaining focus on your goal requires good leadership and collaboration. Keeping on top of regulatory compliance, quality, the programme, and the budget, all amid risk and socio-economic uncertainty, is challenging.

Doing it all not just well but, as is increasingly expected, responsibly and to best-practice standards is demanding.

In short, managing a construction project is difficult and, since you are its instigator and chief decision-maker, its success or failure depends to an important extent on you.



# How projects are structured

From first idea to completion, all construction projects go through the same generic stages. However, the complexity involved can lead the unwary and poorly prepared to inefficiency, delay, and unnecessary cost. This is caused by misunderstanding, miscommunication and misaligned expectations as the project team goes through the work in a different sequence or at different rates<sup>1</sup>.

To mitigate these undesirable risks, the industry has over the years attempted to formalise the way things are done by imposing common project management methodologies.

The CIOB's code of practice<sup>2</sup> has eight 'life cycle' stages, each using the verb that best sums up the activity that produces important milestones in the life of an asset. In order, they are:

1. **Identify**: this is when the need and ambition for the project are identified in broad terms
2. **Assess**: the project is assessed for viability, with options considered
3. **Define**: the preferred option is chosen and distilled into a project brief
4. **Design**: the detail of the project is worked out, with specifications and functionality agreed
5. **Implement**: the design is manufactured, assembled and built
6. **Validate**: the built asset is validated against the design to ensure that it works as intended and can start to be used
7. **Operate**: the built asset is used, maintained and repaired
8. **Retire**: the built asset has reached the end of its life in its current form and is either demolished, recycled or repurposed

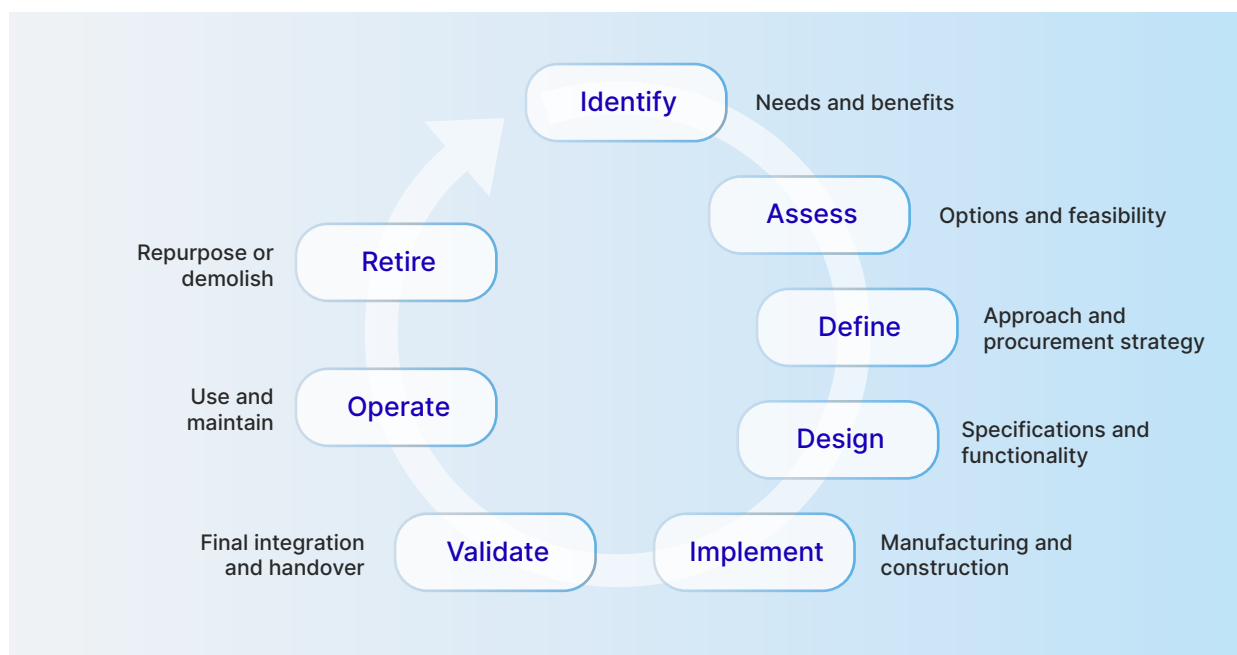


Figure 1.0 Project life cycle

<sup>1</sup> Developments in digital and advanced manufacturing technologies are attracting innovations on multiple fronts to tackle the construction industry's well-documented record of inefficiency and low productivity. For example, the UK Government's recent Transforming Construction challenge programme aimed to deliver projects 50% faster, reduce whole-life costs by a third; slash lifetime CO2 emissions by half, and raise productivity by 15%: Transforming construction challenge – UKRI

<sup>2</sup> Set out in the Code of Practice for Project Management for the Built Environment, 6th edition

These stages are conceived as a closed loop (see Figure 1.0). In other words, the stages are sequential and the decision to demolish or repurpose at the 'retire' stage is always the start of a new project and so inevitably overlaps with the 'identify' stage, starting the cycle afresh.

Clearly, not all stages will be directly relevant to you: persons in the client role can cede the role – sell the asset – to different parties at any stage during its life cycle. Even so, considering the whole life cycle like this helps you to make responsible decisions in the light of the big picture, and makes any hand-over that much more straightforward.

You are likely to encounter alternative industry project management methodologies in your dealings with various construction professionals – see Table 1 below. Although they all share a strong family resemblance, the CIOB methodology differs from others because of its focus on activities to reach milestones.

6th Edition of CIOB Code of Practice for Project Management	Royal Institute of British Architects (RIBA) Plan of Work 2020	ISO 55000:2014 Asset management overview, principles and terminology	BS 6079:2019 Project management – principles and guidance for the management of projects
1. <b>Identify:</b> needs and benefits	0. Strategic definition 1. Preparation and brief	Business case	Investigation
2. <b>Assess:</b> options and feasibility	2. Concept design		
3. <b>Define:</b> approach and procurement strategy	(programming and planning)		Development
4. <b>Design:</b> specifications and functionality	3. Spatial coordination 4. Technical design	Create or acquire	
5. <b>Implement:</b> manufacture and construction	5. Manufacture and construction		
6. <b>Validate:</b> integrate and handover	6. Handover		
7. <b>Operate:</b> use and maintain	7. Use	Operate and maintain	Operation
8. <b>Retire:</b> repurpose or demolish		Dispose or replace	Upgrade, or disposal/retirement/withdrawal

Table 1: Comparison of stages of construction project management from different standardised methodologies.

# Funding and business case considerations

Construction projects are capital-intensive and resource-hungry and so you should only proceed once you've established the business case. There is much to do, from formulating a funding strategy and actually securing funds (including for cash-flow), to assessing the viability of the project through its life cycle and, in the worst case, being prepared to take difficult decisions if the investment can no longer be justified.

The work involved in establishing and maintaining a business case will vary depending on the size and character of your organisation and the nature of the project or projects in your portfolio. However, there are certain key issues that you should always consider, regardless of the specific context.

## Funding

You may decide to fund the project from reserves (cash, or capital raised from shareholders in the form of rights issues or grants) or by borrowing (from investors or the market). Alternatively, you may involve a consortium of funders and funding instruments such as community or heritage funds.

During the 'identify' stage a single, privately owned organisation may well be able to start work without a definitive financial plan. As soon as other parties are involved, however, that flexibility will not be possible. Where you are a public limited company (PLC), or have multiple investors, or your funding is from grants or international investors such as the United Nations, a business case will be required from the start of the project, with regular updates to confirm ongoing viability.

In the UK, public-sector clients will often rely on direct investment by the Treasury as part of agreed borrowing plans and in line with overall spending reviews to allocate funding across multiple government departments and political priorities. This means that public-sector clients may only have a clear line of sight to the next significant milestone rather than for the whole project. Public-sector projects will sometimes raise funds from financing mechanisms such as public-private partnerships (PPPs) or other commercial models designed to prioritise investor interests such as the 'green' agenda.

Regardless of the source of funds and as the project progresses, you must keep funders aligned and supportive, ensuring that the project has adequate cash-flow.

## Investment appraisal

Investment appraisals make the economic case for a project, providing information on the forecasted return on investment (ROI) for funders. They estimate net cash-flows over time, including:

- The whole-life costs of the asset, i.e. costs in use as well as the design and build costs, and
- Benefits that can be expressed in financial terms

You will want to apply a discount rate (set by corporate finance) to enable the 'worth' of the project in the future to be assessed in 'today's money'.

Although very important, investment appraisals are just one part of the overall business case.

## Creating the business case

In addition to the economic case, other matters are critical in the overall business case. They include:

- **The value to investors in non-financial terms.** Ideally, all benefits would be measured in pounds and pence but often this is inefficient or too uncertain to be reliable. Instead, you can consider non-financial benefits separately and weigh them alongside the economic case. For example, the well-being of occupants of residential property or the educational attainment of students in a school might be of critical importance to your business case. If so, you should find ways to account for them
- **The risk profile for the project.** Market risks tend to be accounted for in the discount rate used in the investment appraisal, but of course there are many risks associated with implementation beyond that, not least securing planning consent. Again, they can be counted and their estimated impact weighed alongside other factors
- **The strategic context of the project.** Sometimes projects only make sense in the bigger picture, where longer term benefits make an investment worthwhile. Examples include:
  - The UK Government's 'levelling up' policy where it is hoped that public investment primes the market for generational socio-economic uplift in neglected communities
  - The desire for a private company to be first to market
  - The intention to implement a key strategic imperative such as achieving net-zero carbon
- **Governance issues.** These are about the processes required to continually justify the investment to funders in the light of significant changes to the strategic context, or delivery performance

Involving contractors in estimating the cost and viability elements of the business case can be useful. They tend to have the necessary detailed knowledge of the type of asset and maturity of the relevant supply chain.

## Maintaining the business case

Early in the life cycle of an asset it is only possible to produce an outline business case. This is because the specific circumstances and context for your proposals are unique and so you can only compare it to roughly similar projects. Also, the detail is missing and so your plans are, at best, likely to be an informed estimate based on the best information available at the time.

As the project progresses, more is known and so you can improve the accuracy of the likely whole-life costs and non-financial benefits, allowing you to gradually adjust your business case for a better fit with reality.

Organisations require different levels of resolution in their business cases before a final investment decision is taken, which typically happens before the 'design' stage starts. At this point most expect the forecast return on investment to be within +/- 10% of the planned spend including contingency although the desired appetite for risk, and therefore estimating accuracy will vary from client to client. As the business case develops through

stages 1 (Define) to 3 (Assess), by the time you get to Design (stage 4), you can be more confident that the finances are accurate, or within the percentages specified above.

## Assuring the business case

Estimates and decisions associated with whole life costs and benefits are susceptible to decision biases such as sustained false optimism and groupthink. In your enthusiasm for the project, it is not uncommon to overestimate its benefits and underestimate its costs, especially early on in its conception.

Over-optimistic business cases run the risk of disappointing investors and other stakeholders as the project progresses, which of course is best avoided. You should ensure that levels of uncertainty are modelled in estimates to avoid misleading numbers and false confidence.

Beyond that there are many techniques that can help to assure your forecasts. For example, you can refer to historic (i.e., actual) data about equivalent assets (from your own experience or from published sources), add an 'optimism bias' contingency, or engage independent experts to challenge your assumptions.

# Roles, responsibilities and stakeholders

## Generic roles and responsibilities

Since the role of construction client is rather onerous, it is only rarely undertaken by a single individual. More often it is performed by a team within an organisation, perhaps even a team subcontracted to the head client.

This supply chain of consultants and contractors supporting you will vary depending on the relative size of your organisation and your project's scope of the works.

No matter how the wider client team is organised, individuals, departmental units, partner organisations, or subcontracted specialists in it typically take on roles with the following functions:

- The **client sponsor** is the chief decision-maker, accountable on behalf of the wider client organisation for achieving the beneficial outcomes of the investment. They should be in place from the start
- The **client project manager** (sometimes known as the programme director or construction manager) is responsible to the client sponsor for achieving the defined project objectives and administering all contracts on behalf of the client organisation. Wielding significant influence, they should be appointed early in the life cycle, ideally during the 'identify' stage but definitely during the 'assess' stage to ensure that plans are in place to engage all relevant stakeholders
- **Consultants**, such as designers, are specialist advisors to the client team. Consultants may appoint their own project manager who reports to the client project manager for the contracted scope of work. They may also appoint their own consultants. The timing of their appointment depends on their function

- **Contractors** are responsible for implementing the design, build or maintenance of the physical asset, in whole, or in part, in line with the contract(s) administered by the client project manager. Contractors will almost certainly appoint their own project manager who reports to the client project manager for the contracted scope of work. Contractors may also appoint their own consultants. The timing of their appointment depends on the build method selected; an off-site manufactured solution will require that they are involved comparatively early, probably during the 'define' stage
- **Operators** are responsible to the wider client organisation for the operation and maintenance of the asset as designed and built on behalf of the client. In some situations, the operator can be the same entity as the end user and client organisation

Note that although organisations may use different names for these functions, the functions themselves are unchanging.

## Building and sustaining the extended team

Every project is different, and so you have choices about how to establish the right team to lead and deliver the work. Most projects will require you to appoint consultants and contractors (the rare exceptions being where you directly employ all the requisite expertise yourself).

There are many ways to organise project resources to deliver your objectives. As the scale and scope of projects increases, the need for more specialist resources also increases. This can provide significant managerial complexity for you, particularly if using a mixed 'make and buy' model with people from your organisation working alongside consultants and contractors in the supply chain, or where a special commercial delivery vehicle is used, such as a joint venture or a public-private partnership.

The need to design the project organisation reflects the fact that you have choices to make about what work to perform in-house and what to contract, and what procurement and contracting strategy to use.

### Delivery model and procurement strategy

There are many ways for you as the contracting authority to structure the delivery of your project. This should be decided in the 'define' stage as part of the intermediate business case.

Things to consider before deciding on the delivery model and procurement strategy will include but are not limited to:

- Your appetite for risk
- The nature of your project – new build, extension or refurbishment?
- The scope of works – unusual scope or logistical issues?
- The extent to which you control the project – who owns the design?
- Accountability – do you want a single point or joint responsibility?



- Appointment of a contractor – negotiation or tender or a combination of both?
- Certainty of final cost – lump sum or reimbursable?
- Start and completion times – do you need the project fast-tracked?
- Restrictions – for example, are there security or noise issues?

To help you, the Government Construction Playbook<sup>3</sup> identifies the following model approaches for public projects:

- **Transactional:** most suitable when the requirement is known and there are multiple qualified suppliers in the market who would take part in a competitive tender
- **Hands-on leadership:** most suitable when the project has high socio-political complexity and the drivers are delivering outcomes and stakeholder satisfaction rather than lowest cost
- **Manufacturing:** most suitable when the asset to be built will be repeated over time so learning and progressive improvement is possible
- **Hands-off design:** most suitable when there is clarity of needs and benefits but many ways to solve the problem, so creativity and innovation are key.
- **Trusted helper:** most suitable when the client wants to retain control but needs to augment their own team with trusted support in an open, collaborative relationship

In a large and complex project, different delivery models might apply to different parts of the project life cycle so that assets are designed, built and operated by the right team and incentivised with the right performance metrics.

Public clients often set up frameworks arrangements for parcels of related work. If so, best practice is to adopt the Government's recently published Gold Standard.<sup>4</sup> It helps you to identify what questions you should ask when creating and implementing construction frameworks, what answers you should expect, and how you can make informed decisions.

## Appointing consultants and contractors

Following decisions on delivery model, the approach to selection of different suppliers must be agreed, including decisions on whether to use competitive tendering which could include some negotiation or a direct negotiation approach.

Standard forms of contract exist to simplify the contracting process and build common understanding across supply chains. Examples include the Joint Contracts Tribunal suite of contracts (JCT),<sup>5</sup> the NEC suite of contracts,<sup>6</sup> the FIDIC suite of contracts,<sup>7</sup> and the UK government's Model Services Contract.<sup>8</sup>

<sup>3</sup> HM Cabinet Office. The Construction Playbook v1.1. Available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1102386/14.116\\_CO\\_Construction\\_Playbook\\_Web.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1102386/14.116_CO_Construction_Playbook_Web.pdf) [Accessed 17 October 2022]

<sup>4</sup> [An Independent Review of Public Sector Construction Frameworks - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/1102386/14.116_CO_Construction_Playbook_Web.pdf)

<sup>5</sup> [The Joint Contracts Tribunal \(JCT\) \(jcttd.co.uk\)](https://www.jcttd.co.uk/)

<sup>6</sup> [Contracts, Project Management and Procurement | NEC Contracts](https://www.nec.com/)

<sup>7</sup> [The FIDIC Suite of Contracts](https://www.fidic.org/)

<sup>8</sup> [Model Services Contract - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/1102386/14.116_CO_Construction_Playbook_Web.pdf)

These contracts are designed to embed best practice in:

- Appropriate allocation of risk
- Allowable assumptions mechanisms
- Key performance indicators
- Dispute resolution

You may also wish to put in place framework agreements with select suppliers to enable fast 'call-off' of additional resources without committing to a binding agreement. Some framework agreements exist at industry level, for example the SCAPE Built Environment Consultancy (BEC) Frameworks.<sup>9</sup>

## Behavioural procurement

It is increasingly common during procurement to consider the behavioural and cultural fit of your suppliers in addition to more traditional selection criteria.<sup>10</sup>

Clients who have adopted this approach, for example the Environment Agency and National Highways, claim significant value is created, resulting in higher quality, faster delivery and lower costs – all enabled by a team that is collaborating and working to a singular goal.

An advantage of assessing behavioural and cultural fit is that it provides a common language to then develop the team and monitor performance. This is consistent with the Construction Innovation Hub's Value Toolkit,<sup>11</sup> which emphasises the importance of agreeing behavioural performance measures early in the life cycle to achieve social and environmental, as well as economic value.

## Sustaining team performance over time

You play a key role in building the extended team and sustaining its performance over time. As people join and leave, the dynamics change. The client project manager, working with relevant leaders in supplier organisations, must ensure ongoing focus on the project's overarching vision. This includes emphasising the means of achieving the vision, and the ways of working that are valued, including the focus on health, safety and sustainability. You are uniquely positioned to create the 'brand' for the project, a compelling narrative that can be used to underpin project communications and secure commitment from the project team and other stakeholders over time.

## Team creation and motivation

The client project manager has overall responsibility for creating and developing this teamwork, although in practice much of the detailed work involved may be delegated to others in the consultant or contractor teams.

<sup>9</sup> [www.scape.co.uk/sectors/he-fe](http://www.scape.co.uk/sectors/he-fe)

<sup>10</sup> The Hackitt review (written in the wake of the Grenfell Tower fire) highlighted a fragmented approach to – and a lack of consistency in – the processes and standards for assuring the competence of those working on buildings as a major flaw in the current regulatory system. Behaviour was implicated as much as skills, knowledge and experience. The industry combined forces to address the issue, producing a roadmap for improvement in their 'Setting the Bar' report: <https://www.cic.org.uk/shop/setting-the-bar>

<sup>11</sup> Construction Innovation Hub (2020) "The Value Toolkit". Available at: <https://www.constructionleadershipcouncil.co.uk/wp-content/uploads/2020/07/CIH-Value-Toolkit-final.pdf> [Accessed 17 October 2022]

Given that the composition of the team changes over the life of the project, it will pay you to set common goals and emphasise good teamwork at every life cycle stage. Here are some of the key approaches to adopt regardless of whether people are working virtually or co-located:

- Clearly define areas of responsibility and lines of authority for each project team member, with deputies identified as needed
- Ensure that everyone knows who else is in the team and what their roles are
- Establish clearly defined and measurable project objectives. These objectives can be tracked through performance management reviews for your internal team and through contractually agreed reports for suppliers. This includes clear exchange information requirements (EIRs) – see section on **Digital information and its management**
- Encourage a spirit of partnership and sharing of ideas from the start by rewarding initiatives which ultimately benefit the project
- Establish good communication protocols (particularly for electronic sharing of information) to keep everyone on the same page and up to speed
- Emphasise learning and sharing lessons both during and after the project to improve outcomes so that individuals can grow professionally

## Working with stakeholders

Construction projects affect many people outside of the immediate project team and, indeed, beyond any contractual tie. These groups or individuals are called stakeholders. The numbers involved will depend on the specific project, but you are either required by law to understand, engage and communicate with them or are strongly advised to do so to improve outcomes.

They fall into two main categories, including:

- Those who you must proactively engage with for the project to be compliant and viable, such as planning authorities, regulators, funders and lobbyists
- Those who will be closely involved and should be engaged with to ensure that they are supportive of the proposals. This group includes supply chain partners, end-users and operators

## Stakeholder analysis

Stakeholder engagement is best considered as a dynamic activity. First, you should analyse the stakeholders of your project. The objective of this analysis is twofold:

1. It helps you to understand the stakeholders' relative power or influence, level of interest and attitude to the project. Armed with this knowledge, it is possible to tailor your approach for engagement and communication with them for the best outcomes.
2. It helps you to understand the relationships between stakeholders. It is useful to know if separate parties are, for example, allied under a common cause. In this case you know to deal with them as a bloc when addressing their common cause.

The idea is of course to pre-empt any problems and get the stakeholders on your side. Note, though, that the engagement should be two-way. You have as much to learn from them as they do from you, and the ultimate goal is to procure a better asset.

## Stakeholder engagement and communication

The results of your analysis will suggest the best ways to engage and communicate with them. Some will only require periodic written updates. Others will need ongoing in-person engagement and perhaps negotiation to, for example, reconcile tensions and differences. There are countless tools available to you, including everything from face-to-face conversations and meetings through to more public and wide-reaching open days, newsletters or social media.

Allocating responsibilities to the right people for engagement is important to match the level of influence of the project leader with the stakeholder. The higher the stakes for the stakeholder, the higher the attention the project leadership should pay, either to keep the stakeholder 'on side' or to leverage their energy and support for wider benefit. It is typical for the client sponsor to be primarily focused on engaging with those stakeholders who are key to success – for example, funders or those who could influence planning decisions.

The client project manager should engage primarily with stakeholders whose influence will grow later on in the project's life cycle, such as supply chain partners, end-users and the operator.

It is good practice to maintain a communications plan (also known as a relationship management plan) as part of the overall project execution plan (PEP) – see section on **Creating and maintaining plans**. This will help you to plan your communications campaign and to document all activity.

## Creating and maintaining plans

You should make detailed plans to control subsequent activities during the 'define' stage, building on information already gathered.

These plans should address scope, quality, time, resources, costs, risks, contingency provision and draw-down; the idea being to have a baseline against which progress and performance can be measured.

You should record these plans in various documents, including the project mandate, the project brief and the Project Execution Plan (PEP).

To avoid confusion, these documents should all record the title, the document version and its distribution history.

### The project mandate

The project mandate outlines the business case for the project, setting out the following information:

- Summary of the reason for the project, including any need, opportunity, or strategic imperative

- Summary of the funding route
- Summary of the governance arrangements
- Outline of high-level requirements for success, including information on why those things are important
- Benefits of the project, showing how value will be measured
- Outline the information management purpose and scope
- List of any existing assets in scope that will be refurbished, repurposed or retired
- Outline timeframes, including known parameters and assumptions
- Other relevant information known at the 'identify' stage

## The project brief

The project brief builds on the project mandate. It is key to your intermediate business case and typically will include the following information:

- Summary of the chosen project concept, outputs and deliverables. It should outline what work is intended, i.e. the scope of works. It is just as important to state what is not in scope. For example, you might choose to exclude fit-out works, the installation of specialist equipment, or security requirements from the project
- Summary of the information requirements both during the project and for the asset on completion
- Map showing the link between outputs, outcomes, benefits and your objectives
- Summary of the governance arrangements
- High-level project timeline, including your desired start and end dates, and any key milestones along the way
- Resource requirements, including the types of resource (for example, labour, materials and specialist equipment) and likely availability and costs from the market. It is particularly important for your client project manager to monitor availability and costs of essential resources during challenging economic cycles
- Assumptions and any known constraints or dependencies
- Other relevant information known at the 'assess' stage

## The project execution plan (PEP)

The Project Execution Plan (PEP)<sup>12</sup> is a critical source of up-to-date information for the whole project team. Owned by the client project manager, it collects together all the up-to-date plans and protocols for carrying out your project.

The depth of information contained in the PEP should be proportionate to the complexity of the project. A core document prepared by the client project manager is often supplemented by other contractually agreed information supplied by members of the project team.

<sup>12</sup> Also sometimes known as the project management plan (PMP), the project initiation document (PID), or the project handbook.

In most cases, the task of maintaining and developing the PEP will be contractually delegated to the party responsible for the 'implement' stage, who will do so on behalf of the whole project team, including all consultants and contractors. Even so, the client project manager must remain in overall control.

Note that, other than for the smallest projects, the PEP is unlikely to be a single physical document. It is more likely to comprise an organised and coordinated collection of information.

First signed off at the end of the 'design' stage, the PEP should be kept up to date throughout the project according to an agreed change control process.

Elements of the PEP that are subject to change control include:

- Statements of needs and benefits, including key performance indicators
- Scope definition and breakdown
- Quality plans
- Health, safety and well-being protocols for all working on the project, either on or off site
- Other protocols, as necessary, to guide the project team on ways of working, for example, to achieve sustainability targets
- Dependency networks
- Resourced time plans (schedules and programmes)
- Procurement protocols and plans
- Team structure, roles and responsibilities, delegated limits of authority, including parameters of empowerment, for example, to spend, approve changes etc, including for contractors and consultants
- Budget and cost plans
- Risk management process
- Risk analyses (qualitative risk registers and any quantitative analysis)
- Contingency plans
- Issue resolution and problem-solving records (which might include evidence from audits or other assurance activities – see section on **Quality management**)
- Stakeholder analysis and stakeholder engagement, and communication protocols and plans
- Process for and governance of controlling changes
- Information management process, including for record-keeping, meetings and minutes
- Decisions taken at stage gates and other key decision points identified in the plan

You might also choose to include progress reports that allow you easily to track where you are against your original plans and to understand the justification for remedial actions



The PEP is used throughout the project, for example to:

- Bring new team members on board
- Communicate progress to stakeholders
- Document an audit trail of information, from risk registers to change control decisions
- Inform team members of their roles and responsibilities, key dates, and protocols
- Assure that processes and procedures are being carried out satisfactorily

## Considerations for planning projects

The client project manager remains responsible for the adequacy and completeness of all plans even though some of the detailed work is completed as part of the scope of work of consultants and/or contractors. Setting the relative priority of scope, quality, time, cost and so on remains your responsibility.

The key considerations are:

### Scope

The scope identifies all the work for the project. To ensure that it is complete, list the project under the following headings:

- **What product is required?**
- **What work is required to produce the product?**
- **How much will it cost to produce the product?**
- **How will the work be organised?**

### Quality

The quality of both the project's product and its process are important and should be adequately resourced. Considering quality in your planning will ensure that the standards targeted are understood and that the skills required are secured. Expectations for quality, including acceptance criteria for deliverables, should be stated explicitly. Smaller projects might be able to collect together plans for quality in one place. On larger ones, though, it is common for there to be separate plans that deal with discrete systems or elements.

### Time

Time planning, variously called scheduling or programming, ensures that all the logical dependencies between activities are understood and accounted for. This determines the critical path or chain of activities and thus when it might be possible to complete the project.

With critical activities accurately listed and milestones known, best practice is to estimate the time for all activities based on how much effort each will take. The estimate should consider best, medium and worst-case scenarios, and plan for the most likely based on current information.

Common problems with scheduling include:

- Basing it on an incomplete scope

- Missing or misrepresenting the logical dependencies between activities
- Over-optimism, with the range between best and worst-case not wide enough, or estimates of what is most likely skewed to the best case

Other pitfalls to watch out for are partial schedules that represent, for example, the work of the contractor without accounting for key client milestones or dependencies.

### Resource optimisation

The ideal time plan typically needs to be adjusted to account for resource availability. Resources include people, equipment, facilities and other entities required to complete the work.

Ensure that resources are being used as efficiently as possible by ‘smoothing’ the resource profile to protect the end date of the project. If resources are likely to be constrained or otherwise in short supply, ‘levelling’ ensures that they are used optimally even though it inevitably extends the overall project duration. Be sure to record your assumptions.

The result of this exercise is a resourced time plan, where the resources required over time can be visualised. In turn, this information helps to develop the project cost plan, i.e. the budgeted cost of the work scheduled.

If time is relatively more important than cost, this exercise also helps you to calculate the cost of accelerating the programme by bringing more resources to bear. Alternatively, if cost is more important than time, this exercise helps you to model the opportunities for reducing costs by re-programming.

### Cost

Initial cost estimates for the project are likely to have been made ‘top-down’, using available historic data from your own experience or in reference to published cost data. Before the final investment decision, however, you should make ‘bottom-up’ estimates, including for the cost of time-dependent effort (as described above) and for costs that are not dependent on time. Exceptions will be where delivery of part of the scope is contracted in the supply chain on a fixed or lump sum basis.

Understanding the cost profile over time allows you to manage the project’s finances, for example, by forecasting and tracking liquidity and milestone payments to suppliers. Key questions for you include understanding what the expected out-turn cost of the project is, how much work has gone into the estimates, and what options are available to reduce costs.

### Risk analysis and contingency planning

Projects are inherently uncertain and risky, subject to many factors beyond your control including everything from the weather to political announcements. Estimates of effort, time and cost are therefore all risk based.

It is important to understand the potential impact of these risks, again by looking at best, medium and worst-case scenarios. This also helps you to overcome the potential for optimism bias – see section on **Funding and business case considerations**.

Risks in plans can be expressed in several ways. The overall budget is typically split into the provision for known scope, the provision for known risks (often called the risk budget), and a further provision for any unidentified/unknowable risks (often called the management reserve).

A crude way to size a contingency is to add a percentage based on a combination of experience and the perceived risk in the plan. A more sophisticated method is to model the combined effects of estimating uncertainty and specific risks identified by the team so that confidence levels can be expressed for particular out-turn times and costs. For example, a P50 cost is the value where there is a 50% chance of meeting the time-line and/or budget, whereas a P80 cost is where there is an 80% chance.

Risk modelling is specialist work. The key for you is to be able to interpret and challenge the data. You should know which estimating uncertainties (e.g. productivity rates) or specific risks have the biggest impact on the end date, budget and quality at completion. Also, you should know if any class of risk (e.g., very low likelihood risks) has been excluded from the analysis, and why.

## Controlling the project

With plans agreed and a baseline set, your client project manager can monitor progress against that baseline, capturing data on actual performance and making assessments and forecasts for future performance. Combined with analysis of any changes arising in the external project context, this internal exercise helps you and your fellow decision-makers on governance boards to take corrective action where necessary.

Considering what you want monitored and reported is a key part of planning – so the baseline plans must contain all the relevant information. Best practice involves ‘earned value analysis’ which tracks:

- a) the schedule performance (productivity) – the work achieved compared to plan, and
- b) the cost performance (efficiency) – the work achieved for the actual and accrued spend

Other aspects of performance that you might want to track include:

- Health and safety performance
- Environmental performance
- Quality performance
- Benefits realisation
- Stakeholder satisfaction

Controlling the project encompasses pro-active anticipation of risks and actions that reactively correct issues and problems as they arise. Having a clear view of roles, responsibilities, and delegated authorities of the project team, (which is an important feature of the PEP), helps you to understand how risks should be mitigated and who should resolve problems.

# Quality management

A concern for time and cost should not be at the expense of quality. Good quality is defined in many different ways, but at the very least it is about delivering the project to the right standards and specification as well as on time and to budget.

The cost of losing track of quality is high. It can lead to expensive re-work and regulatory breaches, putting the safety and well-being of people at risk and damaging confidence in the project.

You can avoid these risks by managing quality through inspection and testing (known as quality control), audits (quality assurance), and continual improvement at all stages but especially at the 'validate' stage, when the asset is commissioned and handed over into use.

## Quality control

Quality control is about verifying that the work meets required standards, most often through inspection and testing. Inspection and testing regimes are designed to prevent defects being passed on to the next 'customer' in the chain of activities.

Ideally, you would inspect and test everything but that is impractical. There is a cost to it all, and it would be inefficient to check everything in all circumstances. Some work – a weld, for example – cannot be inspected without destroying it. Also, inspection and testing consume specialist resource and take time.

How far you take quality control is about balancing costs and practicality against risks and making use of all the tools available to you – for example, non-destructive testing regimes, or only testing and inspecting representative samples. Quality control is sensible but the extent to which you use it should be proportionate to the risks.

## Quality assurance

If quality control is about ensuring bad quality is not passed on, quality assurance is about building good quality in.

Quality management systems help you to set the standards for your organisation's culture, approach to collaboration, attention to compliance, and continual improvement. Organisations that run quality management systems give confidence that the services they provide or products they produce are fit for purpose and right every time. This is especially true if the organisations have been externally certified to conform to published standards (such as BS EN ISO 9001:2015<sup>13</sup>) by independent certification bodies.

In response to well-publicised quality failings in the built environment, a new standard – BS 99001:2022<sup>14</sup> was published in 2022 to complement the generic BS EN ISO 9001:2015. This new standard helps with quality assurance matters specific to construction projects, such as ensuring building materials are fit for purpose, or managing off-site pre-fabrication activities.

<sup>13</sup> ISO 9001:2015 Quality management systems – Requirements: [ISO - ISO 9001:2015 - Quality management systems — Requirements](#)

<sup>14</sup> BS 99001:2022 Quality management systems. Specification for the application of BS EN ISO 9001:2015 in the built environment sector: [BS 99001:2022 | 31 Jul 2022 | BSI Knowledge \(bsigroup.com\)](#)

There are other generic quality management standards for issues that are relevant to the built environment, such as the standard for environmental management (ISO 14001 series of standards) and safety management (ISO 45001 series of standards).

As part of your due diligence when appointing your project team, and if the project demands it, you can give yourself considerable peace of mind by contracting with those who run recognised quality management systems, especially if they are third-party certified.

## Continual improvement

A cornerstone of quality management for more than 50 years, the idea of continual improvement requires a focus on incremental learning. Japanese management practices are commonplace in this area, with approaches such as 'six sigma' and 'lean manufacturing' used effectively to eliminate waste in factory processes and systems.

Rather than waiting for quality control to identify actual problems, or for quality assurance audits to highlight management system failures, continual improvement is a 'bottom-up' activity. It engages the people doing the work, empowering them to collaborate and find improved ways of working that make sure that products and processes meet requirements.

Although different to mass production work (where the same activities are performed many times over), project-based work can nonetheless benefit from the principles of continual improvement both during a single project (for repeated elements) and especially if a team remains together over multiple projects.

## Quality during commissioning and handover

When assets have been built and the project is at the 'validate' stage, there is a particular focus on checking that the asset works as intended.

First, each individual system in the asset – for example, the heating and ventilation system – must be commissioned and validated as fit for purpose. Then, all the systems must be validated together to ensure that they work harmoniously, i.e., are effective, safe, don't conflict with each other, and are capable of being maintained as a whole.

It is at this point that the soft landings process (**see page 29**), which is in theory started during the 'design' stage, bears fruit. The early focus on ensuring that the brief accommodates the operator's future needs is time well spent.

Many assets will require so-called 'seasonal commissioning', i.e. adjustment to account for the changing seasons, and validation during operation. Where this is the case, responsibility for operating the asset will only be handed over on completion of such work.

# Sustainability considerations

The wide-ranging concept of sustainability has over the years been increasingly regulated and so parts of it are now a matter of compliance. However, there is still a gap between what is required in legislation and what is expected of you by your funders, your end-users, your markets and even your project team.

Since the built environment accounts for about 40% of global carbon emissions<sup>15</sup> (to say nothing of its impacts on resource consumption, material waste, habitat loss, water conservation, pollution, and social equality), responsible construction clients will go beyond the letter of the law to invest in best practice. You are encouraged to think beyond the end of the project to consider the whole-life of the asset, from completion to retirement.

Exactly what you do is down to you. You must consider your organisational objectives and the degree to which driving social and environmental as well as economic value from your investment is important to you. Your conclusions will inform the design and implementation of the sustainability strategy for your project.

The publications listed below will help your decision-making:

- ISO 14001:2015.<sup>16</sup> This is an international quality management standard for managing the impact of organisational activities on the natural environment in all sectors
- The UN Sustainable Development Goals.<sup>17</sup> In 2015, the United Nations published its 17 desired objectives for a sustainable world. It included a “call for action by all countries – poor, rich and middle-income – to promote prosperity while protecting the planet”
- International New Construction Technical Manual SD233<sup>18</sup> and New Construction Non-Domestic Buildings Technical Manual SD5078.<sup>19</sup> Published in 2016, the Building Research Establishment’s (BRE) technical manual on new construction offers guidance on sustainable materials. This was followed up in 2018 with advice on practices for non-domestic buildings in the UK

The UK Government produced the 10-point plan for a green industrial revolution in 2020 highlighting the need for greener and more energy-efficient buildings. It calls for industry to reduce its overall ecological footprint. Prominent strategies include technological innovation to meet the ever-increasing demand for built space without damaging the planet, and accelerating the circular economy to minimise waste of natural resources.

The strategic drivers for sustainability are increasingly compelling and clients need to decide the degree to which responding to them is mission-critical.

There are several certification schemes that will help, notably BCorps.<sup>20</sup> Such certification

<sup>15</sup> [Built for the Environment report \(architecture.com\)](#)

<sup>16</sup> International Standards Organisation (2015) “ISO 14001:2015 Environmental management systems — Requirements with guidance for use”

<sup>17</sup> United Nations (2015) “Transforming our World: the 2030 Agenda for Sustainable Development” A/RES/70/1

<sup>18</sup> Building Research Establishment (2016), “International New Construction Technical Manual SD233” BRE Global.

<sup>19</sup> Building Research Establishment (2018), “UK New Construction Non-Domestic Buildings Technical Manual SD5078” BRE Global.

<sup>20</sup> Certified B Corporations, or B Corps, are companies verified by B Lab to meet high standards of social and environmental performance, transparency and accountability.



demonstrates your commitment not just to the beneficial owners of the organisation but to non-shareholding stakeholders too.

Environmental, social and governance (ESG) drivers are increasingly important. According to Howard-Grenville (2021), “Around the globe, a third of all professionally managed assets, or roughly \$30 trillion, are now subject to ESG criteria ... an increase of more than 30% since 2016.”<sup>21</sup>

Sustainability isn't just about environmental considerations. It is also about social impacts. In the built environment, this includes the impact on end-users and the as-yet unknown people who will be involved in operating the asset over its working life.

Just as environmental values are enshrined in law, many social values are too, for example, to prevent modern slavery and uphold workers' health, safety and well-being standards. Equally, just as environmental law only goes so far, the same is true of the laws surrounding social values. Going beyond them is a matter of ethical and responsible choice.

Governance – the 'g' in ESG – is about acting transparently and with integrity, and being sure to account for a representatively diverse range of voices and points of view in your business. How you govern a construction project is important, too, affecting your contracts or other arrangements to design, build, operate and maintain aspects of your built asset.

Many organisations have diversity targets for gender, ethnicity and people who are differently abled either physically or cognitively. At their best, these targets reflect a genuine desire and conscious intent to listen and be socially inclusive. They understand that value comes from difference and there is a business case for diversity.

Many funders demand that you demonstrate performance on ESG factors before they will invest, and there are certification schemes to help you to achieve it.

<sup>21</sup> Howard-Grenville (2021) ESG Impact is hard to measure but it's not impossible <https://hbr.org/2021/01/esg-impact-is-hard-to-measure-but-its-not-impossible> [accessed 11 June 2022]

# Digital information and its management

Adopting digital approaches to creating and managing information about both the project and the resulting asset – sometimes known as BIM<sup>22</sup> (building information modelling) – has substantial benefits for you, especially if you have an interest in the asset's management over its whole life.

## Advantages of digital information

Digital information has numerous well-known advantages over hard copy. Its storage, ability to be shared, searchability, and retrieval is easier, faster, and more flexible (especially when using the cloud), making its management more cost-effective. Also, digital technologies allow you to avoid duplicating effort by capturing information once but re-using it many times, which of course is useful, for example, when coordinating design information developed by different teams of people.

To take full advantage of these benefits requires careful planning and agreement on standards between relevant people on the project team. For example, to enable painless sharing, there must be an agreed format and structure for project data, and you must have protocols in place to record versions and to control when information is issued.<sup>23</sup>

A standard structure and format for your data allows it to be interrogated and checked by different software applications, addressing the challenge of interoperability. This has immeasurable value during a project and beyond. Provided information handed over on completion is properly structured and formatted, it has the potential to be automatically imported into your facilities management and asset management systems, benefitting future users who are far removed (technically and/or contractually) from the project supply chain. This, of course, will minimise your and future owners' ongoing operating and maintenance costs and use of resources.

There is a cost to organising project information into standardised data structures and so there must be a trade-off: not all information generated merits that treatment. Digital information that sits outside these structures – as pdfs or image files, for example – is certainly less useful but still much more so than if they only existed as hard copies. Another advantage of adopting a digital information management strategy is that it facilitates unambiguous audit trails. Digital systems can automatically record all the steps and exchanges that led to the final versions of project information, invaluable to project managers for many reasons, not least for resolving disputes about who was responsible for what and when.

## Implementation of a digital information approach

Successfully applying a digital information management approach depends on certain prerequisite conditions to do with you and your project team's existing capabilities and competence. Getting everyone up to speed will require an investment of time and money in some or all of the following:

<sup>22</sup> According to the relevant ISO 19650 standards, BIM is about getting benefit through better specification and delivery of just the right amount of information concerning the design, construction, operation and maintenance of buildings and infrastructure, using appropriate technologies.

<sup>23</sup> Rather than invent project-specific standards, you are encouraged to adopt the formal, internationally agreed, published ISO 19650 family of standards.

- **Upskilling** to acquire knowledge and understanding about digital techniques, the appropriate management processes, and how they affect project management in general
- **Documentation standards** to define the processes and procedures that project teams will need to use to produce, share, deliver and check digital information successfully
- **Information technology** to have the necessary hardware and software available not just to your team but throughout the supply chain. This includes the technologies to store and manage the information as well as to produce the information
- **Time** to allow you and the supply chain to properly consider the range of information that needs to be produced, and to plan in detail how, when and by whom it will be developed

If it makes sound strategic sense for information produced during your project to be re-used in your asset's operational phase then you must ensure close collaboration between your eventual facilities and asset management team and your project management team. (See also section on **Design management and soft landings**.)

## The future of building information management

The long-term industry goal for BIM is for critical data about both the process of producing the asset and especially the asset itself to be seamlessly reusable, interoperable, and up to date, from the 'identify' stage through to the 'retire' stage. This ambition is summed up in the 'golden thread of information' concept coined by Dame Judith Hackitt in her report on regulations and safety in the construction industry.<sup>24</sup>

The principles and practices of creating and maintaining the golden thread are enshrined in the BS EN ISO 19650 series of standards<sup>25</sup> for managing information over the whole life of the built asset. Sitting at the heart of the UK BIM Framework,<sup>26</sup> these standards place key accountabilities on project clients and asset owners/operators, including the establishment of information management resources for the project team and to define the contractual information requirements against which their supply chains will deliver.

The UK BIM Framework focuses on public procurement, requiring public projects to adopt the Information Management Mandate published in the influential Transforming Infrastructure Performance: Roadmap to 2030,<sup>27</sup> and heavily referenced in the Government's Construction Playbook.<sup>28</sup>

<sup>24</sup> Hackitt, J. (2018) 'Building a safer future: independent review of building regulations and fire safety'. Crown Copyright.

<sup>25</sup> Published by British Standards Institute, the ISO 19650 series concerns the organisation and digitisation of information about buildings and civil engineering works, including building information modelling (BIM):

- Part 1 is about the design phase
- Part 2 is about the delivery phase
- Part 3 is about the operational phase
- Part 4 is about information exchange
- Part 5 is about information security

<sup>26</sup> The UK BIM Framework is a national industry campaign to implement BIM using the ISO 19650 series: UK BIM Framework – BIM Standards, Guides & Resources

<sup>27</sup> See Transforming Infrastructure Performance: Roadmap to 2030 - GOV.UK ([www.gov.uk](http://www.gov.uk))

<sup>28</sup> The Construction Playbook sets out key policies and guidance for how public works projects and programmes are assessed, procured and delivered: [The Construction Playbook - GOV.UK \(www.gov.uk\)](http://www.gov.uk)

Although beyond the scope of this guide, the field of digital information technology is full of potential benefits for you and well worth exploring further. Originating from the UK Government's Transforming Construction Challenge,<sup>29</sup> examples include digital twin technology, where a digital model communicates with its physical twin for better monitoring and pre-emptive risk avoidance, and digital tools to help with regulatory compliance.

## Responsibilities for information management

You are accountable for information management and for accepting information management deliverables. However, you will likely want to appoint specialists to help you to fulfil these duties.

If you opt to apply the BS EN ISO 19650 series for managing information on your project, the best outcomes arise if it is used across all the project's life cycle stages.

Each time you issue a tender or request for proposal for a new appointment, you should document the detailed information management requirements (typically called exchange information requirements or EIRs) for that appointment. That way you will be able to assess responses on comparable grounds.

## Design management and soft landings

The 'design' stage includes many activities other than conventional design that help you to avoid problems later. It pays to be aware of the pitfalls and consider ways to avoid them during your planning and in your choice of partners to work with.

### Integration with information management

Your information management systems should ensure that the design is fully documented to the extent that not only the construction of the asset but also its commissioning, handover, use, maintenance and subsequent refurbishment, repurposing or retirement can be managed safely, efficiently, and effectively.

For it to work, though, the information you require from the project team must be clearly specified before work starts, and controls put in place to validate that requirements have been met at relevant points (see the section on **Digital information and its management**). You are always accountable for this work.

### Integration with Design for Manufacturing and Assembly (DfMA)

It is increasingly common for built assets to be created using a delivery approach incorporating off-site manufacture and on-site assembly of some items with on-site construction of others. These techniques are referred to as 'modern methods of construction' (MMC), and have the potential to bring significant safety, cost, and sustainability benefits.

Because largish elements of the build are made off site, they must be designed with that in mind. This concept is wrapped up in the shorthand 'design for manufacture and assembly', or DfMA. Unlike conventional design, the focus of DfMA extends to efficient manufacturing, eliminating waste, and ease of assembly.

<sup>29</sup> [Transforming construction challenge – UKRI](#)

Design considerations for DfMA include:

- Using common parts and materials
- Reducing quantity of component parts
- Reducing carbon footprint
- Simplifying part design
- Designing within known capabilities for assembly
- Mistake-proofing assembly (impossible to assemble incorrectly)
- Reducing flexible parts and interconnections
- Manufacturing for modular assembly
- Adopting automated assembly where practicable

## Soft landings

'Soft landings' is a concept in design and construction concerned with 'starting with the end in mind.' The idea is to focus on use, maintenance and eventual retirement of the asset rather than just the build. This has countless practical benefits, and of course complements both Hackitt's 'golden thread' idea and society's ambitions for environmental sustainability. It therefore holds great promise for your business case.

Applying it depends heavily on leadership from the most important decision-maker on any project – the client. If you want the design to work as designed, you must involve the end-users and eventual operators early on. After all, their needs, wishes, and practical insights are not necessarily evident to designers at the start of a project.

More information on soft landings can be found in Guidance Note 10 in the Code of Practice for Project Management for the Built Environment, 6th edition and in 'Soft Landings Framework: six phases for better business' published by the Building Services Research and Information Association (BSRIA).<sup>30</sup>

## Design

You must be aware of the fundamentals of good design and ensure they are achieved. They include:

- **Safety:** designing in compliance with relevant regulations, including but not limited to CDM 2015 – see section on **Health and Safety**
- **Meeting the brief:** design management is not just about a competent design process but about designing to deliver the best outcomes possible for the investment. You should encourage your project team to challenge the brief constructively for better solutions or ways of working
- **Whole-life perspective:** when reviewing designs, you should keep in mind the needs of the building over its entire life beyond completion by putting yourself in the shoes of the end-users and eventual operator, which of course might be you

<sup>30</sup> Agha-Hosseini, M. (2018) "BG54 Soft Landings Framework: six phases for better buildings" Building Services Research and Information Association.



- **Innovation:** innovation leads to better outcomes, but only if the opportunities are captured early and the risks are managed – late changes lead to delay and expense
- **Design once – use many times:** repeating features in a build (such as doors in a hospital) are an opportunity to achieve economies by reusing a standardised design rather than designing each one afresh. This does not mean that repeated features should not vary but if they do, the variation should be properly justified
- **Information:** information is the currency of any project, especially during the design stage. Ensure that you specify and control the delivery of all information assets

## Design control over time

Once the design has been signed off, ensure that any changes or variations are strictly controlled. This will safeguard mission-critical factors such as quality, time, cost, benefits and/or stakeholder alignment.

For change control to be effective, all pieces of information (for example, reports, drawings, or models), and every version of those pieces, must be uniquely identified so that there can be no confusion during change evaluation.

Be aware of the potential for error and rework in allowing late changes, some clients prefer not to change a design once it has been completed and signed off. This has the added benefit of emphasising the need to get an agreed set of requirements in early life cycle, which is especially important when designing for offsite manufacture. The only changes that would be approved in this scenario would be where there is a safety or other regulatory issue to resolve.

Of course, there are downsides to this approach. It closes down opportunities to add value in response to changing externalities that affect your business case, for example.

## Health and Safety

Clients are accountable for managing the project and making decisions about how health and safety matters will be managed.

Most of your decisions regarding health and safety require compliance with regulations and their accompanying guidance, including (in the UK) the Construction (Design and Management) Regulations 2015 (CDM 2015), the Health and Safety at Work etc. Act 1974, and the Management of Health and Safety at Work Regulations 1999.

**This section focuses specifically on UK regulations that affect the management of construction work. Where the project is being undertaken in a different jurisdiction, you should, of course, seek advice on how to comply locally.**

### CDM 2015

The main piece of legislation affecting the management of construction projects is CDM 2015. Regulated by the Health and Safety Executive (HSE),<sup>31</sup> it aims to improve health and safety in the construction industry by helping you to:

<sup>31</sup> [Construction - Construction Design and Management Regulations 2015 \(hse.gov.uk\)](https://www.hse.gov.uk/construction/)



- Sensibly plan the work so the risks involved are managed from start to finish
- Have the right people for the right job at the right time
- Cooperate and coordinate your work with others
- Have the right information about the risks and how they are being managed
- Communicate this information effectively to those who need to know
- Consult and engage with workers about the risks and how they are being managed

### Accountability

Under CDM 2015, people in the client role (e.g. you) have regulated duties. Although you can engage a competent professional to carry out the day-to-day tasks associated with your duties, ultimate responsibility for carrying them out remains yours.

The extent to which you delegate authority for compliance must be specified in the contracts between you and the people you appoint to help, such as a delivery partner, project manager or CDM advisor. It is also helpful to record these arrangements in a CDM Plan or Project Plan for assurance purposes.

### Managing and documenting multiple clients

Where there is more than one client for a project (as sometimes happens), you must all agree in writing who is to adopt the client role for the purposes of CDM 2015. This person (i.e. individual or organisation) is then responsible for discharging the client duties.

Note, however, that those clients who have not been identified as the client for the purposes of CDM 2015 still have duties to:

- Provide any information in their possession that may be relevant to help the nominated client to pull together the Pre-Construction Information
- Cooperate with other duty-holders involved in the project. (Other duty-holders include designers, contractors, the principal designer, and the principal contractor.)

### Notification of the project to the Regulator

For larger projects (more than 30 working days and with more than 20 workers working on the site simultaneously or involving more than 500 person-days), you are required to notify the Regulator (i.e. the HSE) using their online F10 notification form.

Notification must be made early, certainly well before the construction phase begins, and updated periodically, as necessary.

You must display an up-to-date copy of the F10 notice in the construction site office so it is accessible and easily understood to everyone working on the site. You can either do this yourself or ask the principal contractor or contractor to do so on your behalf.

### Suitable arrangements for managing projects

The duties apply to projects. In most cases it will be clear what is meant by 'projects'. In others, it may need to be defined. For instance, a routine programme of maintenance work could be classed as a project rather than a series of separate projects.

## General requirements

One of your key duties is to make 'suitable arrangements' for managing your project. These arrangements need to be confirmed in writing.

A possible technique is to establish a CDM Plan for the project. While it is not specifically required by CDM 2015, it is nonetheless a practical means of demonstrating compliance for audit and/or assurance purposes.

## Suitable arrangements

You must make the following arrangements:

- Assemble the project team by appointing designers (including, if necessary, a principal designer<sup>32</sup>) and contractors<sup>33</sup> (including, if necessary, a principal contractor)
- Ensure the roles, functions and responsibilities of the project team are clear – this is usually defined in the contracts between the client and the project team and often clarified in a RACI matrix<sup>34</sup>
- Ensure sufficient resources and time are allocated for every stage of the project
- Ensure effective mechanisms are in place for members of the project team to communicate and cooperate with each other and coordinate their activities – this could be in progress meetings and by sharing contact details
- Take reasonable steps to ensure that the principal designer and principal contractor comply with their separate duties – this could take place at progress meetings or in written updates
- Set out the means to ensure that the health and safety performance of all designers and contractors on the project is maintained throughout – this could take place at project progress meetings or in written updates
- Ensure that the contractor or principal contractor provides site workers with suitable welfare facilities for the duration of construction work – a written confirmation from them is adequate
- Establish the expected standards for health and safety (including for safe working practices) and the means by which these standards will be maintained throughout – this could be by requiring compliance with specific procedures for the site/s in question
- Establish what the steps designers must take to ensure as far as reasonably practicable their designs manage foreseeable risks during the construction phase and when maintaining and using the structure once it is built – this is generally achieved by asking designers to provide a written strategy for eliminating, mitigating or accepting risks in line with the Principles of Prevention<sup>35</sup>
- Set out specific arrangements for operatives working on or about your project work site
- Set out procedures for handing over the site to the principal contractor so that building work can start

<sup>32</sup> A principal designer is a designer who is an organisation or individual (on smaller projects) appointed by the client to take control of the pre-construction phase of any project involving more than one contractor.

<sup>33</sup> A principal contractor is the contractor with control over the construction phase of a project involving more than one contractor. They are appointed in writing by the client (commercial or domestic) to plan, manage, monitor and coordinate health and safety during this phase.

<sup>34</sup> RACI stands for 'responsible, accountable, consulted, informed'; a RACI matrix is a handy way to clarify project team obligations.

<sup>35</sup> <https://www.legislation.gov.uk/uksi/1999/3242/schedule/1/made>

- Establish the arrangements for commissioning the new structure and handing it over to the client

### Client Brief and reviewing arrangements

A client brief provides useful means of communicating these arrangements to other duty-holders both as part of the appointment process and during the project. You must review your arrangements throughout the project to ensure that they remain relevant and are updated where necessary.

### Pre-construction information

You must produce the pre-construction information (PCI),<sup>36</sup> which must be provided as soon as practicable to every designer (including the principal designer) and contractor (including the principal contractor) that is bidding for work on the project or has already been appointed.

For projects involving more than one contractor, the principal designer must help the client to compile the PCI and provide it to the designers and contractors involved (including the principal contractor). Before the principal designer is appointed, however, you must prepare initial PCI, which the successful appointee then develops.

### Construction phase plan

You must ensure that a construction phase plan (CPP) has been prepared before the construction phase begins. The principal contractor must prepare the CPP unless there is only one contractor on the project, in which case that contractor is responsible.

Clearly, the earlier you appoint them, the more time they have to plan and prepare the CPP.

### Health and safety file

You must ensure that a Health and Safety File (HSF) has been prepared by the principal designer. The HSF is only required on projects where a principal designer has been appointed (i.e. on projects with more than one contractor).

For significant projects with only one contractor involved, you must arrange for an HSF to be prepared – particularly if the information is required for your asset management system.

Where a principal designer's appointment finishes before the end of the project, you must make sure that they pass the HSF to the principal contractor so that they can revise and add to it during the remainder of the project.

### Welfare facilities

Before construction works starts, you must confirm that the contractor or principal contractor has provided the welfare facilities, as set out in CDM 2015 Schedule 2.

If the principal contractor included welfare facilities in the CPP, that would help to give you peace of mind that appropriate welfare facilities are being provided.

### Appointment of the principal duty-holders

<sup>36</sup> Pre-construction information is information relevant to the construction work and is of an appropriate level of detail and proportionate to the risks involved. It includes information about the planning and management of the project, any health and safety hazards, and information in any pre-existing health and safety file.

Where more than one contractor is involved (or is likely to be involved) in your project, you must appoint persons to the roles of principal designer and principal contractor – the principal duty-holders – in writing. If no appointments are made in writing, you take on the roles by default, and their duties become your responsibility.

You must secure acknowledgment of both appointments. This will clarify who is responsible, minimising the potential for disputes later.

## **Satisfying the client that the principal duty-holders have sufficient skills, knowledge, experience and organisational capability**

### **External appointments**

You must take reasonable steps to satisfy yourself that the principal duty-holders on your project have the competence (i.e. skills, knowledge, experience and behaviours) and, where they are an organisation, the organisational capability to carry out the work in a way that secures health and safety. You must also check that your principal duty-holders have enough experience and a good track record of managing the risks involved in projects.

‘Organisational capability’ means having the policies and systems in place to set acceptable health and safety standards which comply with the law, and the resources and people in place to ensure the standards are delivered.

If you have procedures within your own safety management system, you may use them to satisfy yourself of your principal duty-holders’ competence and organisational capability. Alternatively, you can use the standard pre-qualification questions in PAS 91<sup>37</sup> or check that principal duty-holders are appropriately certified on the Safety Schemes in Procurement (SSIP)<sup>38</sup> website.

### **Internal appointments**

You might choose to take on the principal duty-holder roles yourself. If so, you must satisfy yourself that you have sufficient competence and organisational capability to undertake the role on that project using the same assessment criteria as you would for external appointments. You must document your assessment and confirm your decision in writing.

### **Appointment of the principal designer**

You must appoint a principal designer as early as possible, preferably at the ‘define’ stage. This will help you to compile the pre-construction information and identify key risks that are capable of being avoided, eliminated, or reduced early.

The duration of the principal designer appointment must last until the project is handed over to the operator. This is because the principal designer is responsible for the HSF as well as for ensuring all design changes are competently assessed and adopted. Note that it is possible to replace your principal designer mid-way through the project, should the need arise.

### **Appointment of the principal contractor**

<sup>37</sup> PAS 91:2013+A1:2017 on construction prequalification questionnaires (PQQ) contains a standard list of the questions that are typically asked of suppliers at the prequalification stage of construction tendering

<sup>38</sup> SSIP is a body for mutual recognition of all the different types of relevant certifications in the construction industry. You can accept a valid certification based on an assessment by any of the SSIP Forum Member Schemes as having met the core criteria. You should not then require any further evidence at the prequalification stage.

In procuring a contractor, you should specify that the selected organisation will be required to take on the principal contractor role, assuming they are assessed as competent and organisationally capable for the project in question. This information helps the organisation tendering for the work to understand the full scope of the work, assess their competency, and price for that work.

The principal contractor must be appointed early enough in the pre-construction phase to help the client to meet their duty to ensure a CPP is drawn up before the construction phase starts. This also gives the principal contractor enough time to plan their work.

### **Handover arrangements from the principal contractor to the client**

As the project reaches completion, you must review arrangements for formal handover. In some cases, the handover process will be phased, allowing you to accept and take responsibility for parts of the asset before it is wholly completed.

In the event of a phased handover, you must ensure that agreed controls and arrangements are in place to secure the health and safety of people occupying areas that have been handed over.

## **Building Safety Act 2022**

This section provides an overview of what is expected to be required by the UK Building Safety Act when it comes into effect in 2023.

The Building Safety Act 2022 is wide-ranging, amending and extending legislation for many parts of the construction industry. When secondary legislation comes into force, it will give duty-holders clear accountability and new statutory responsibilities for all projects (including those for so-called 'higher-risk buildings'), which apply while buildings are being designed, built, refurbished and occupied.

The new regime is expected to come into force sometime between April 2023 and October 2023. As such, projects being planned now may be impacted by the new regime.

The new duty-holder roles under the Building Safety Act are modelled on those required by CDM 2015, with a renewed focus on duty-holders' competence (i.e., skills, knowledge, experience and behaviours) set out in a new standard.<sup>39</sup> However, whereas CDM 2015 addresses health and safety risks, the new legislation addresses compliance with relevant requirements, which includes the Building Regulations.

Although the Building Safety Act received royal assent on 28th April 2022, the secondary legislation and accompanying guidance have yet to be finalised and, as such, the reader should refer to the government, HSE and CIOB websites for the most up-to-date information.

<sup>39</sup> The new fast-track standard sets the core principles of competence for all clients and all other duty-holders. Its scope includes leading and managing safety, communicating safety, delivering safety, risk management, regulations and processes, building systems, ethics, and fire/life safety. BSI Flex 8670 v3.0:2021-04 | 30 Apr 2021 | [BSI Knowledge \(bsigroup.com\)](https://www.bsigroup.com)

# Transitioning from design and construct to use and maintain

As your project transitions from design and construct through the 'validate' stage and into the 'operate' stage, the focus changes to readying for handover to you and your asset management team. The process will go more smoothly if you have adopted a 'soft landings' approach – see **page 29**.

## Tracking performance

Your project team will have compiled a Health & Safety File for the assets. It defines the specification, maintenance requirements, and expected performance of the asset(s) as designed and built. Your client project manager will hand over the performance monitoring baseline and data from commissioning to the operator, along with outstanding requirements for seasonal commissioning. This information is likely to include performance measures relating to:

- Business performance, e.g. user satisfaction, operating costs and benefits realisation
- Design evaluation, e.g. maintenance costs, energy and water usage, effectiveness of space planning, lighting and aesthetics

In short, the information should include data on the key aspects of the asset that matter to stakeholders, and should allow you to track the asset in use against the estimates for operational costs and benefits realisation in the original business case. Any lessons learnt should be shared and exploited for continual improvement.

## Performing maintenance

There are two ways to maintain an asset: reactively in response to things needing resolution, or preventatively according to a plan. You will need both.

Preventive tactics range from something as simple as keeping stocks of spare parts through to purchasing maintenance agreements with third-party contractors.

Plans for preventive maintenance must minimise disruption to operations by ensuring resources are ready to carry out the work efficiently and effectively, and is justified when the risk of relatively high-impact and/or high-cost breakdowns on balance outweigh the cost of preventive measures.

Knowing what to do requires you to understand what can go wrong, the frequency and/or regularity of such breakdowns, and the impact of the breakdowns on asset performance.

## Monitoring obsolescence

When your best maintenance strategy can no longer keep up with user needs, there is a risk that the asset is becoming obsolete.

The gap between user needs and asset performance can arise in several ways. It isn't just to do with physical condition. It can also be related to users' physical or psychological well-being, the asset's environmental performance, or economic factors such as running costs or productivity.



You can minimise this gap to some extent by adjusting your maintenance strategy but, particularly where sociological and technological factors are at play, the adjustment may not be enough. Another strategy is to upgrade the asset by investing further capital and so extend its working life. However, the business case for this upgrade might not stack up, in which case it might be time to retire the asset, either by selling it or changing its use. You should monitor this performance gap and have a plan in place to identify when your maintenance strategy or capital investment might be triggered. Similarly, you should have a plan for the end of the asset's life.

## Bringing it all together

As this guide shows, construction projects have many moving parts and require considerable management over the entire life cycle of the asset.

Your influence is most relevant in the early stages of the project when decisions are being made about needs and benefits, and when deciding on the feasibility of options and the chosen option to invest in.

However, you remain accountable throughout the life cycle for all decisions. Your client project manager, working with the supply chain of consultants and contractors, and with representatives of end users, is responsible for ensuring that realistic and resourced plans are in place for each stage of the life cycle. They are also responsible for ensuring that performance is monitored against those plans so that suitable decisions can be made within each stage before moving on to the next.

Overall, you have enormous influence on the success of outcomes and so the better you engage, the better the result.

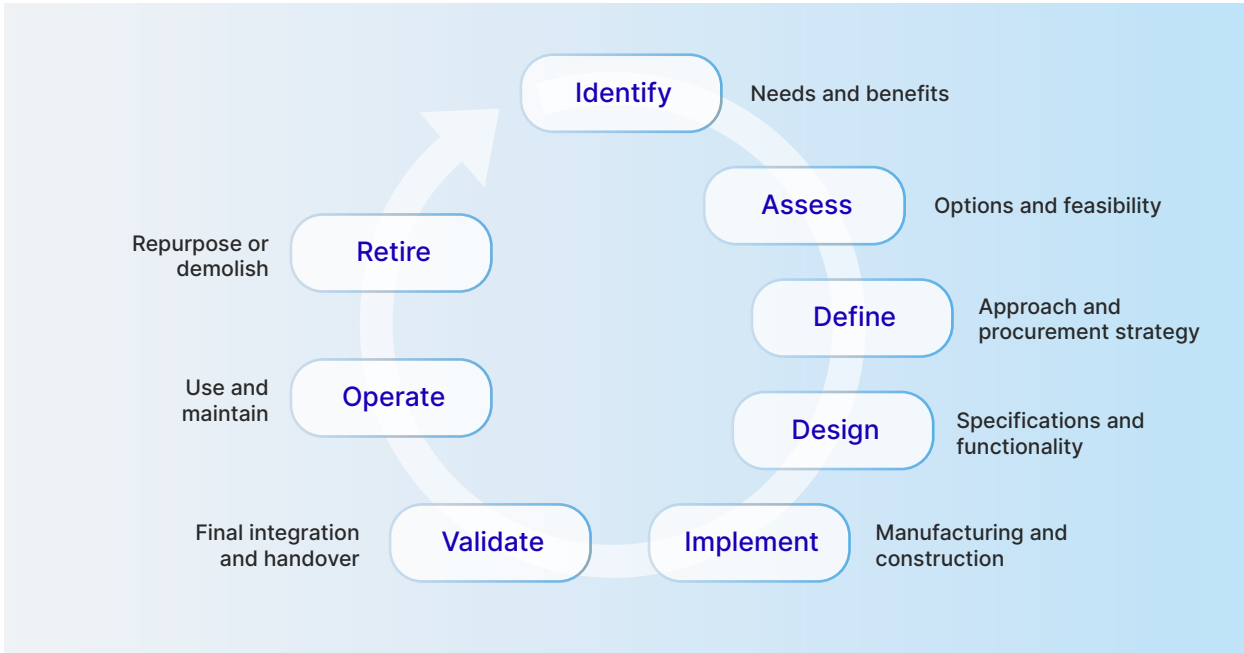


Figure 1.1 Project life cycle (for reference only; identical to Figure 1.0)

To help you to bring it all together, here is a handy summary of the decisions you own as the project progresses from stage to stage.

### Before moving from 'identify' to 'assess'

Ensure that the following are recorded in writing:

1. Your appetite for risk in strategic, regulatory, commercial and reputational objectives.
2. The needs of key stakeholders, noting that for some projects this information may be informed by a wider programme or portfolio.
3. Which existing assets are to be modified, recycled or retired – whether in whole or in part – by your new project.
4. Your key governance targets and priorities, combined with a responsibility matrix.
5. What funding is in place for the next stage, with a clear line of sight and heads of terms between contracted entities, of how the whole project will be funded.
6. Known external dependencies, constraints, and risks in the wider context, for example, matters related to planning consents.
7. Principles and strategies for quality, health and safety, sustainability, innovation, leadership, supply chain collaboration, information and knowledge management, and risk management.
8. Agreed scope of work and contracted resources for the 'assess' stage.

### Before moving from 'assess' to 'define'

Ensure that the following are recorded in writing:

1. The options you considered and the reasons they were rejected.
2. Stakeholder support for the chosen option spanning funding and implementation.
3. Known external dependencies, constraints, and risks in the wider context for the intermediate business case.
4. Specific criteria and priorities for quality, health and safety, sustainability, innovation, productivity, leadership, supply chain collaboration, information and knowledge management, and risk management.
5. Agreed scope of work and contracted resources for the 'define' stage.

### Before moving from 'define' to 'design'

Ensure that the following are recorded in writing:

1. The delivery approach and procurement strategy, reflecting market availability of resources and desired levels of collaboration and risk-sharing.
2. The project execution plan (PEP) for the design phase in detail and the rest of the project in outline, ensuring specific criteria and priorities for quality, health and safety, sustainability, innovation, productivity, leadership, supply chain collaboration, information and knowledge management, and risk management are addressed.
3. The intermediate business case reflecting the PEP.
4. Detailed process and controls for considering, justifying, and documenting variations from the approved business case and PEP.

5. Engagement and communication plans for stakeholders.
6. Agreed scope of work and contracted resources for the 'design' stage, noting that the team size will significantly increase at this point and that design activities are regulated by the current version of the CDM 2015<sup>40</sup> and will soon also be affected by secondary legislation under the Building Safety Act 2022.

## Before moving from 'design' to 'implement'

Ensure that the following are recorded in writing:

1. How the asset as designed will meet your needs and secure the targeted benefits in accordance with all relevant internal policies and strategies and external standards and regulations.
2. Verification of the correctness, completeness, and consistency of design information.
3. Changes to the PEP and business case to reflect the design and any implications for the rest of the asset's life cycle.
4. Any changes to your appetite for risk or financial contingencies arising.
5. Verification of engagement and effective communication with stakeholders.
6. Agreed scope of work and contracted resources for the 'implement' stage, noting that the team size will increase further at this stage and that construction activities are regulated by the current version of the CDM 2015 and will soon also be affected by secondary legislation under the Building Safety Act 2022.

## Before moving from 'implement' to 'validate'

Ensure that the following are recorded in writing:

1. The asset as built is complete and implements the design, conforms to all current and relevant internal policies and strategies and external standards, and complies with regulations.
2. Verification of the correctness, completeness, and consistency of information from the 'implement' stage.
3. Updates to the PEP and business case to reflect the build, the work needed to integrate systems and handover to operations, and the implications for the rest of the asset's life cycle.
4. Any changes to your appetite for risk or financial contingencies arising.
5. Verification of engagement and effective communication with stakeholders.
6. Agreed scope of work and contracted resources for the 'validate' stage.

## Before moving from 'validate' to 'operate'

Ensure that the following are recorded in writing:

1. The asset as built and all associated information are validated and perform as designed, meeting the needs and benefits of the client, operator and end users.

<sup>40</sup> Health and Safety Executive (2015), The Construction (Design and Management) Regulations 2015. Available at <http://www.hse.gov.uk/construction/cdm/2015/index.htm> [accessed 17 October 2022].

2. The need for any seasonal commissioning or post-occupancy evaluation.
3. Requirements for operating the asset, noting that the client may operate the asset themselves directly or via a third party, or may divest the asset.
4. Changes to the PEP and business case to reflect the build and any implications for the rest of the life cycle.
5. Any changes to your appetite for risk or financial contingencies arising.
6. Verification of engagement and effective communication with stakeholders.
7. Agreed scope of work and contracted resources for the 'operate' stage.

## Before moving from 'operate' to 'retire'

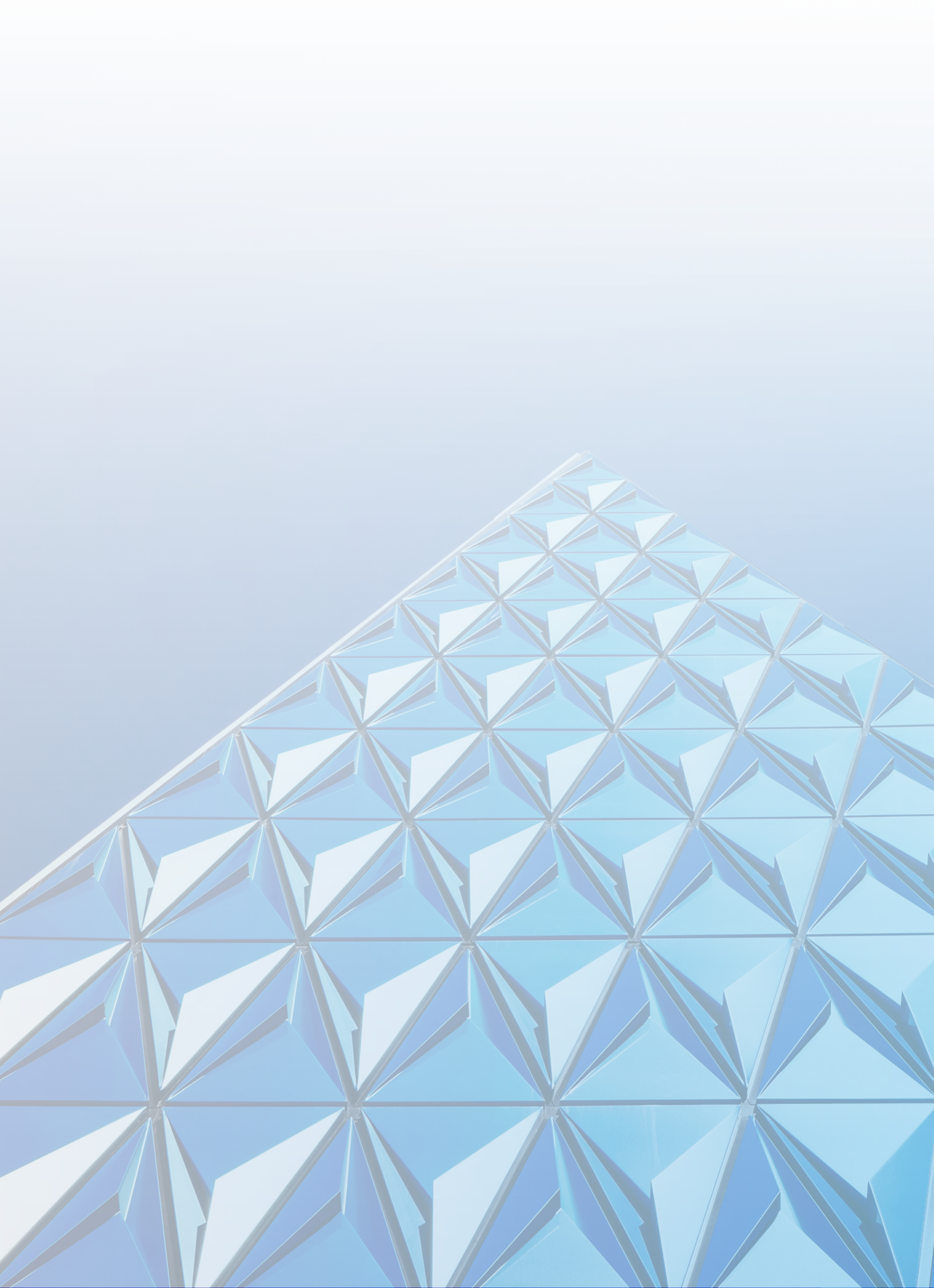
Ensure that the following are recorded in writing:

1. The condition of the asset and confirmation that further investment cannot be justified and the asset needs to be retired.
2. Verification of the correctness, completeness, and consistency of asset information from operations.
3. Agreed scope of work and contracted resources for the 'retire' stage, noting that this will likely trigger a new project, either to change the asset's use or to demolish, dispose, or divest the asset.

## Additional Reading

1. Code of Practice for Project Management for the Built Environment, 6th edition
2. Code of Practice for Programme Management in the Built Environment (note, the 2nd edition is due to be published in 2024)
3. CIOB Planning Protocol 2021 (CIOB PP21) <https://www.ciobacademy.org/product/ciob-planning-protocol-2021-ciob-pp21/>
4. RIBA Plan of Work 2020 <https://www.architecture.com/knowledge-and-resources/resources-landing-page/riba-plan-of-work>





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