RIBA
Plan of Work 2020
Overview

RIBA
Plan of Work

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Published by RIBA, 66 Portland Place, London, W1B 1AD.

Foreword

Since 2013, when the RIBA Plan of Work had its first major overhaul in its 57 year life, the RIBA has been gathering feedback from the construction industry.

As with anything that has undergone significant change, the RIBA Plan of Work 2013 needed to be used and evaluated, and we have been listening to users to inform how we modify the core guidance to even better meet the needs of project teams. We see this update as a clarification of the 2013 structure but with a closer, more contemporary, fit.

In June 2019 the UK Government committed to be net zero carbon by 2050, and the RIBA, along with a large proportion of the construction industry, believe that to meet this target we must design and construct new projects and undertake refurbishments that do not need to be retrofitted again before 2050. The RIBA have set a deadline of 2030 to do this, and for this to be successful the industry must be attempting it on all projects now.

The biggest addition to the new RIBA Plan of Work comes in the form of the new sustainably project strategy. This challenges design teams to design with a focus on sustainable outcomes from the outset of the project. These outcomes and associated targets should be defined and agreed with the client during Stage 1 briefing, reality-checked throughout the design and construction process, and finally verified in Stages 6 and 7 post occupancy evaluation. The definition of sustainable outcomes and associated metrics, together with current tools for measurement and verification, are included in the RIBA Sustainable Outcomes Guide.

In addition to the sustainability changes, this update has concentrated on improving the guidance in relation to the planning process, procurement and information requirements at each stage. Most importantly we have set out detailed stage descriptions and new guidance on core project strategies which can be found in chapter 6.

The RIBA Plan of Work is still the definitive design and process management tool for the UK construction industry and is gaining traction internationally too. This update brings into focus the trends and innovations that are changing the construction industry and provides space for these to thrive on our projects while ensuring a simple and robust framework remains in place.

My thanks go to those named at the end of this publication that have dedicated their time as volunteers over the past few years to produce this new and indispensable guide.

A. Jones.

Professor Alan M Jones
RIBA President 2019-21

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Introduction

The RIBA Plan of Work was initiated in 1963 to provide a framework for architects to use on projects with their clients, bringing greater clarity to the different stages of a project. It has evolved over the years to reflect changing trends in project approaches and has become an industry-wide tool.

The RIBA Plan of Work received its first major overhaul in 2013. It was updated to be suitable for use with any form of procurement, reflecting its primary role in mapping the design process between briefing and construction. The core design stages remained fundamentally intact, but were supplemented by a Stage 0, acknowledging the need for greater strategic consideration at the start of a project, and Stage 7, to reflect the use and life span of a building. A (Town) Planning task bar was created for dealing with the planning process, a Programme task bar acknowledged that some stages might need to overlap, depending on the procurement route, and a Procurement task bar set out tendering tasks during the design process would be necessitated by the choice of procurement route.

The past five years have seen further changes in the construction industry. Digital innovation continues to transform many aspects of project workflow, arguably moving towards a paradigm shift rather than a tweaking of more traditional ways of working. Modern methods of construction, including volumetric modular, are transforming the residential sector, pointing to new future business models. Changes in project drivers – ranging from delivering best value to an increased awareness of ethics – continue to add to the complexities of maintaining a coherent and consistent approach to the project process. Sustainability, including the rise of circular economy considerations, continues to grow in importance. A core challenge for the design team is how to meet changing client requirements while navigating this wide range of topics – from compliance with regulations, to clearing the increasingly important ethical bar, through to global best-in-class approaches.

Alongside the complexity of absorbing and responding to this diverse range of topics, project teams must deliver their projects as they have always done. They must first set the strategic scene, then apply the management overlay for the project, covering the development of the brief, the design of the building in response to the brief (including engineering and specialist inputs) and coordination of information before the process of manufacturing and construction commences. They must work as a team to deliver on time and to budget through to handover, when the baton in taken over by those dealing with maintenance or tasked with resolving users' day-to-day issues.

Adding to the complexity of this process, the rate of technological change is accelerating, requiring ongoing reviews and incremental improvements in the way that projects are undertaken. As we enter an era of continuous innovation, a core challenge for project teams is the need to constantly hone their ways of working, to maintain both their competitiveness and the quality of their design output.

The RIBA Plan of Work is not intended to be a contractual document. It defines what outcomes the project team should achieve at each stage, but it does not define who should undertake the core tasks. Project specific contractual documents are required to bring clarity and consistency to the issues of what information is required, who will produce it and when it needs to be extracted from the design process for use in procurement or discussions with stakeholders.

Despite the ongoing transformation in how buildings are designed, built, maintained and used, the RIBA Plan of Work continues to be a resilient and relevant process map. It remains applicable to a wide range of project approaches and project scales. However, feedback from various clients and project teams has shown a need for greater clarity on how and when a number of aspects of the RIBA Plan of Work are applied to projects. Consistent use of the RIBA Plan of Work across different projects will help to provide everyone in the industry with confidence that their workflow will be robust as they move from one project to the next. Of course, any client is welcome to interpret the RIBA Plan of Work in their own way and to set their own overlay of tasks or documents. In a world of continuous change, bringing clarity to each stage allows everyone involved to develop their own innovations, without the perpetual need to discuss the strategic aspects of who should do what when.

PART 1

Background

1 CHAPTER ONE

What is a plan of work?

In many countries there is no formal set process for designing a building. 'The way to do it' is unwritten and unrecorded, with informal processes handed down from one generation of professionals to the next. Regardless of where in the world a building is required, the core tasks are broadly the same:

- Agree appointments with the professional team
- Develop a brief with the client
- Create concept designs options
- Coordinate the design
- Prepare a planning application
- Apply for planning consent
- Develop a set of construction information
- Prepare a tender
- Obtain consents required prior to construction
- Award a Building Contract
- Construct the building
- Inspect the construction as it progresses
- Hand over the building.

When buildings are designed using repeatable, consistent and intuitive processes, this informal approach works – for example, when a clear process for briefing and design is aligned to a consistent means of obtaining statutory consents and where a single procurement route is consistently used. As the design process becomes more complex, influenced by many factors – such as new forms of procurement, modern methods of construction or new drivers, for example sustainability and maintainability – this approach becomes unsustainable. Without a process map, different members of the project team will have different versions of the 'right way to do it', making it inevitable that the project will be undertaken inefficiently.

There are several design process maps, or plans of work, used throughout the world to guide clients through briefing, design and construction, handover and beyond. In most countries, the process maps are set by the professional institutes or by sector bodies. Figure 1 illustrates some of these. Some have pre-design stages, some do not. Some go beyond completion of construction, others do not. All have construction as a single stage.

There are several key differences between these international plans of work:

- Some incorporate tendering stages, while others are procurement agnostic, focusing on the design rather than procurement process.
- The number of design stages varies from two to four. This underlines the challenges in the design process and the need to divide design into a number of coherent stages, each with a clearly defined purpose, prior to construction commencing.
- Few consider the importance, and benefit, of good briefing, including identifying the need for a building at the outset and how to use feedback from previous projects to inform the brief.

- Not all consider the life of the building beyond construction. However, some are beginning to address this, and how the design process and the building's handover processes impact on a building's performance.

Although each of these plans of work is different, they all have the same goals: to provide the project team with a road map for promoting consistency from one stage to the next, and to provide vital guidance to clients undertaking perhaps their first and only building project.

	Pre-Design		Design				Construction	Handover	In Use	End of Life
RIBA (UK)	0	1	2		3	4	5	6	7	
	Strategic Definition	Preparation and Brief	Concept Design	NOT USED	Developed Design	Technical Design	Construction	Handover & Close Out	In Use	NOT USED
ACE (Europe)	0	1	2.1	2.2	2.3	2.4	3		4	5
	Initiative	Initiation	Concept Design	Preliminary Design	Developed Design	Detailed Design	Construction	NOT USED	Building Use	End of Life
AIA (USA)			–		–	–	–			
	NOT USED	NOT USED	Schematic Design	NOT USED	Design Development	Construction Documents	Construction	NOT USED	NOT USED	NOT USED
APM (Global)	0	1	2		3	4	5	6	7	
	Strategy	Outcome Definition	Feasibility	NOT USED	Concept Design	Detailed Design	Delivery	Project Close	Benefits Realisation	NOT USED
Spain			–			–	–	–		
	NOT USED	NOT USED	Proyecto Básico	NOT USED	NOT USED	Proyecto de Ejecución	Dirección de Obra	Final de Obra	NOT USED	NOT USED
NATSPEC (Aus)		–	–	–	–	–	–		–	
	NOT USED	Establishment	Concept Design	Schematic Design	Design Development	Contract Documentation	Construction	NOT USED	Facility Management	NOT USED
NZCIC (NZ)		–	–	–	–	–	–		–	
	NOT USED	Pre-Design	Concept Design	Preliminary Design	Developed Design	Detailed Design	Construct	NOT USED	Operate	NOT USED
Russia			–	–	–	–	–			
	NOT USED	NOT USED	AGR Stage	Stage P	Tender Stage	Construction Documents	Construction	NOT USED	NOT USED	NOT USED
South Africa		1	2	3	–	4	5			
	NOT USED	Inception	Concept and Viability	Design Development	NOT USED	Documentation	Construction	Close Out	NOT USED	NOT USED

Figure 1: Comparison of international plans of work

2 CHAPTER TWO

The changing nature of the project team

The relationship between the client team and the design team has become more complex over recent years, as the industry wrestles with different ways to improve procurement. The interface between the design team and the construction team has also become more complex, as aspects of building design are increasingly being carried out by specialist subcontractors. The harnessing of modern methods of construction is complicating this crucial project relationship further. These increasing complexities add to the burden of work for the lead designer, requiring greater management of issues outside the boundaries of the design team.

The client team might comprise an individual or, on the largest of projects, several practices and individuals. The client team are not responsible for undertaking any design work, but must compile the **Project Brief** and review the design during and at the end of each stage. Many client teams employ external professional advisers, others have in-house teams to guide them through each project stage.

The design team has not fundamentally changed over the years, comprising the architect, structural and building services engineers and the cost consultant, although it is commonplace for other specialist consultants, such as acousticians or fire engineers, to contribute to the development of the design.

The construction team are responsible for manufacturing, assembling or constructing a building, including the logistics and contractual relationships connected with this.

Although the composition of the project team has remained broadly unaltered over the years, there are various ways in which the members can be connected contractually. This is shaped by the **Procurement Strategy**. Ultimately, there is no right or wrong approach to procurement. Each client must assess the pros and cons of different procurement strategies and decide which one will work best for them.

The client team

The client is the commissioning entity for a project. Without a client there is no project. Clients come in many forms, ranging from consumers who want to convert their attics, to developers with billion-pound estates and who commission major buildings on a regular basis. When considering who might be in the client team, it is essential for the client to consider that – regardless of their experience, the project size or the business sector – the client team will have to undertake the following broad tasks:

- Set out the **Client Requirements** and consider whether a building project is the best means of achieving the **Client Requirements**
- Develop the **Project Brief**, including functional requirements, the **Project Budget** and **Project Outcome**s
- Agree on the most appropriate **Procurement Strategy**, and when the construction team will join the project team
- Appoint the design team, with appropriate knowledge, skills and experience

- Establish the **Project Programme**
- Review and comment on key aspects of the design as it progresses, including signing-off finishes and fittings to be used in the project
- Sign off the **Stage Report** at the end of each stage
- Make payments to the design team, construction team and any client team members as the project progresses, in line with the relevant contracts
- Manage stakeholder relationships and **Project Risks**

The client is central to the decision making process at every stage, but the extent to which they are involved is a matter of preference.

Some clients like to be central to the decision-making process, including the nitty-gritty decisions. Others are happy to delegate decision making and to follow the recommendations of their professional advisers or construction teams. The client will need to consider their role in decision-making when assembling the client team to ensure they have the expertise required.

An RIBA Client Adviser might assist the client in the early project stages, to give them impartial advice and to help them frame the **Project Brief** and select the design team.. Each client needs to determine what roles will be required to assist them through each project stage. In order to have the requisite skills to carry out the core tasks set out above, the client team might comprise the following roles:

- RIBA Client Adviser
- project manager
- client representative
- cost consultant
- contract administrator (employer's agent)
- information manager
- Plan for Use / Soft Landings champion
- additional client monitoring team

The client may also employ other specialist consultants into the client team to provide focused advice on a particular area. These may include:

- health and safety adviser
- sustainability adviser
- legal adviser
- financial adviser
- representatives from funders
- security adviser
- construction advisers
- operational adviser
- asset information adviser
- BREEAM adviser

This list is not exhaustive and will vary from client to client and from project to project, depending on the unique drivers and risks associated with each site and brief. The crucial difference between these advisers and those in the design team, is that these advisers have no design responsibilities though they may have design skills. While they may set constraints or strategies, it is ultimately the role of the design team to produce a design that meets the requirements set by the client team, unless agreed otherwise.

RIBA Client Advisers

RIBA Client Advisers are selected by the Royal Institute of British Architects from its membership for their all-round procurement expertise, design experience, business knowledge and track-record of delivering results in construction projects. A RIBA Client Adviser is usually an experienced architect and professional practitioner (but not the one designing the building) working in the client team, independent of the design team, monitoring and helping the client to follow a robust decision making process from the very start and throughout the project.

www.architecture.com/working-with-an-architect/client-adviser

The design team

The design team are responsible for the design of the building and for producing the information required to manufacture and construct it. The design team is led by the lead designer, who is responsible for coordinating the inputs and information from each team member. Anyone who designs, engineers or contributes advice or information that will be used as part of the design process needs to be in the design team. However, this does not include the preparation of the **Client Requirements** or **Project Brief** which are developed by the client team. On smaller projects some designers may start in the client team to help develop the **Project Brief** then become part of the design team.

The core members of the design team typically comprise:

- lead designer
- principal designer (usually a sub-function of the lead designer role)
- designers: architect, interior designer and landscape architect
- engineers: civil and structural and building services engineers
- cost consultant
- construction advisor
- specialist consultants

Many specialist consultants – with detailed knowledge and experience of a particular subject – may be involved in the design of a building. The need for their input will depend on the **Project Brief** and the experience and skills of the core design team members. Specialist consultants might include:

- fire engineer
- acoustic consultant
- security consultant
- façade engineer
- sustainability consultant
- specification consultant
- BIM consultant

Not every member of the design team is a designer, but all design team members actively contribute to the development of the design. For example:

- the cost consultant's advice shapes the development of the design
- the sustainability consultant might determine the energy source for the project
- the fire engineer's calculations might dictate how the design of an atrium space is developed
- the acoustic consultant might help to determine the specification for glazing adjacent to a railway
- the security consult might configure the arrangements in an entrance hall

Principal Designer

In the UK, the principal designer is a statutory role under the Construction (Design and Management) Regulations 2015. The principal designer's role is to plan, manage, monitor and coordinate health and safety in the pre-construction phase of a project. The intent of the Health and Safety Executive (HSE) is for designers to take responsibility for the health and safety aspects of their design, including any implications for maintenance and operation, and to ensure that a Principal Designer takes responsibility for coordinating health and safety in the design process.

The RIBA Plan of Work includes the need to prepare a Health and Safety Strategy. This is the responsibility of the principal designer (usually the lead designer), although they may be supported by a health and safety adviser.

See HSE publication L153: *Managing Health and Safety in Construction* (HSE Books, 2015) for more information.

The construction team

The construction team are contracted under the **Building Contract** to undertake the construction works.

In the past, construction teams would directly employ the labour required to build a project. Most building contracts are now let to teams who manage the construction process using limited or no direct labour. Building work is subcontracted in packages to subcontractors experienced in particular aspects of the project, for example for cladding, partitions, electrical or landscaping work. As the industry shifts towards the manufacturing and assembly of modular components, or sub-assemblies, new tasks are required of the construction team.

The role of the construction team includes the following tasks:

- Ensure that the building is constructed safely, with health and safety at the heart of the process.
- Secure the site and arrange shared items of plant, such as craneage or hoists.
- Liaise with the statutory authorities in relation to temporary requirements, such as for cranes, office accommodate and site welfare facilities, and seek approval for these as required.
- Prepare the **Construction Programme**.

- Divide the work into packages (considering any interfaces) and tender it to the most appropriate subcontractors and specialist subcontractors.
- Procure the work of subcontractors and specialist subcontractors.
- Manage and coordinate the construction work of the different subcontractors.
- Deliver the completed project in line with the time, cost and quality requirements of the **Building Contract**, as well as meeting all statutory requirements
- Assess and manage construction risks.

The construction team need a range of skills additional to those of the subcontractors, to assist with procurement, to manage construction and to facilitate logistics. Roles within the construction team might include:

- principal contractor
- commercial team
- procurement team
- package managers
- design manager
- information manger
- construction programmer
- construction managers
- logistics team.

Stakeholders

Project Stakeholders are any party outside the project team who might influence the direction of the design or create a project constraint. Both the client team and design team may need to engage with different **Project Stakeholders**. Stakeholders might include:

- planning departments
- building control teams
- utilities companies
- community groups
- environmental bodies
- specialist interest groups
- insurance and warranty providers

They generally have no contractual relationships with the project team. As such, anticipating, managing and responding to the range of opinions or requests can be challenging. Preparing a **Project Stakeholder** plan can help to: clarify who the key stakeholders are; how they are being managed, who is the key contact within the project team; whether information is required for sign-off or consent; and how constraints or risks are to be managed. In certain instances, the client might include key **Project Stakeholders** as project partners or develop another means of better manging their involvement and contributions.

Industry Feedback on the RIBA Plan of Work

3 CHAPTER THREE

Industry feedback on the RIBA Plan of Work

Following the substantial update of the RIBA Plan of Work in 2013, the RIBA maintained a schedule of common queries arising from its use. The schedule recorded the day-to-day enquiries and issues encountered in the application and interpretation of the RIBA Plan of Work. Comments were received from a wide range of users, including clients, industry bodies, other designers and, of course, architectural practices.

This intelligence-gathering and listening exercise revealed several areas where tweaks to the Plan and the accompanying guidance were deemed necessary, to bring greater clarity to certain topics and resolve ambiguities about how the Plan of Work is used. In most instances, more detailed guidance on these topics is available from other sources; however, these sources are not as widely used as the RIBA Plan of Work. In response to this feedback, this publication provides comprehensive guidance on the application of the RIBA Plan of Work, to ensure there is consistency across the construction industry.

This chapter presents the key observations arising from the feedback received on the use of the RIBA Plan of Work. Some of the trends observed – for example, the scheduling of specialist subcontractors' design work at Stage 5 – are a consequence of the RIBA Plan of Work 2013 being interpreted differently than intended. Others – such as submitting a planning application at the end of Stage 2 – have required additional guidance for clients, to make sure the best project outcomes can still be achieved when industry deviates from the RIBA Plan of Work core tasks.

This chapter has been placed towards the beginning of this publication to allow these key observations to be understood, and so make it clear why the RIBA Plan of Work has been updated. It is essential that those who have been using the RIBA Plan of Work read this chapter to see where they may have misinterpreted the Plan and what measures they might take if they are not using it as intended.

Stage 0

Stage 0 is about determining the best means of achieving the client's requirements. An open mind is required because a building might not be the most appropriate solution.

Common misapplication 1

Certain clients use Stage 0 to prepare a detailed brief.

Recommendation

Stage 0 should be strategic in nature, defining the **Business Case** and **Client Requirements**. Depending on the circumstances, the stage can range from being a very quick review to being a long and protracted process involving many consultants. For Stage 0 to deliver the best outcome for the client, the crucial consideration for the client is what skills need to be brought to the client team. Different projects, each with a unique site and brief, bring different challenges and so require different skills. Developing the **Business Case** might require strategic thinking, management consulting expertise, whole life analysis, sustainability guidance, financial modelling or design thinking. Selecting the right team to deal with the strategic considerations is crucial. Once the outputs from the stage proceed to Stage 1, a building project has been set up and different skills will be needed.

Common misapplication 2

Design team services regularly commence at Stage 0.

Recommendation

The Stage 0 team should be very different in composition to the Stage 1 team. The design team should not generally be appointed until Stage 2 as design work does not commence until then. On some projects, however, design thinking might be required to help address strategic considerations. If the client needs design thinking to unlock a project's strategic challenges, they might consider employing an RIBA Client Adviser to provide strategic advice, to help them navigate the early stages and provide continued support throughout the project.

Common misapplication 3

In many scenarios, high-level spatial requirements are set that are not affordable within the envelope of the **Project Budget**.

Recommendation

It is important that the **Client Requirements** are aligned with the **Project Budget** during this stage. If the likely accommodation required to deliver the outcomes is unaffordable, there is no point in proceeding to Stage 1.

Stage 1

Stage 1 is about developing the detail of the brief and making sure that everything needed for the design process is in place before Stage 2. This includes ensuring that the brief can be accommodated on the site.

Common misapplication 1

Feasibility Studies undertaken at Stage 1 are seen as the start of the design process.

Recommendation

Feasibility studies are carried out as part of the briefing process to verify whether a site can accommodate the client's needs, or to test a particular aspect of the brief, allowing the brief to be honed as required. Where a number of options demonstrate that a number of approaches are feasible for a given site, they should not be narrowed down or appraised at this stage. Instead, the feasible options should be subjected to the more detailed rigor of the design process that commences at Stage 2. If the client has appointed an RIBA Client Adviser, they will be able to carry out the **Feasibility Studies**. This creates a cleaner boundary between the client team's work at Stage 1 and the commencement of the design work at Stage 2. If the client team does not have the skills required to conduct **Feasibility Studies**, they might consider appointing a designer early, to carry out the **Feasibility Studies**, as part of the client team. This can bring continuity to Stage 2. While design thinking may be applied at Stage 1, this is not in the creation of the design of the building; that starts at Stage 2.

Common misapplication 2

The briefing process is often rushed, to allow Stage 2 to commence earlier.

Recommendation

An inadequate briefing process can result in delay during Stage 2, as the design team will have to undertake additional iterations of the design to tease out and resolve briefing issues. It is usual for the brief to iterate at Stage 2, in response to the design proposals. However, it is essential that, at the end of Stage 1, the brief covers any topics that the client wishes the design team to consider, including **Project Outcomes**, exemplar projects, **Spatial Requirements** and how these link to the **Project Budget**, and any topic or objective that would better inform the design process. The better the brief, the more engaged the design team can be in developing the best solution. RIBA Client Advisers can support the client in developing a clear and robust **Project Brief** in Stage 1, that will provide the design team in stage 2 with all the project requirements.

Common misapplication 3

Clients are framing information requirements for projects around traditional 2D deliverables. Increasingly, this adds waste to the design process and may discourage design teams from leveraging more value from their federated model or other innovative ways of working.

Recommendation

The new challenge for Stage 1 is to define the **Information Requirements** for each project stage. This includes considering the use of new digital survey techniques that might assist the design process, the need for **Asset Information** at handover, and how new technologies might create better and faster design processes. Experienced clients might have the skills to set these new deliverables themselves. Less experienced or one-off clients can look to the design teams bidding for the project to suggest optimum proposals or might appoint the lead designer, an RIBA Client Adviser or an information manager to assist them during the development of the brief. As digital transformation takes hold in the construction industry, there is no right or wrong approach. However, if this topic is not considered at the start, the design process can easily become inefficient and less productive than traditional ways of working, when the converse should be true.

Stage 2

Stage 2 is about getting the design concept right and making sure that the look and feel of the building is proceeding in line with the client's vison, brief and budget. The key challenge of this stage is to make sure that the tasks that are undertaken are geared to meeting the stage objectives. Going into too much detail too early can pivot the design team's effort away from setting the best strategy for the project; but if there is too little detail, Stage 3 becomes inefficient.

Common misapplication 1

An increasing number of private sector clients are submitting planning applications near the beginning of Stage 3; developers often need to understand at an early stage what the costs of developer contributions required from the local authority will be - as they may affect the viability of a project.

Recommendation

While submitting an early planning application may bring clarity regarding developer contributions including section 106 or community infrastructure levy obligations, it creates several **Project Risks**. The RIBA recommends this approach is only followed by experienced clients who are aware of the risks and can manage them effectively.

Common misapplication 2

Focus has been on what level of detail is required in the BIM (building information modelling) model during this stage, rather than on the tasks required to underpin the detail in the model.

Recommendation

Determining where the boundary between Stages 2 and 3 lies is one of the most complex tasks for a project team. The RIBA Plan of Work requires a robust **Architectural Concept** to be produced. However, this can be done in different ways. A core challenge at Stage 2 is determining what tasks and **Information Requirements** are required to achieve the stage outcomes. In some instances, the intuitive skills of the designer will be enough to develop an **Architectural Concept**. In other situations, a detailed analysis may be required to test the design that has been produced. For example, some clients may be satisfied by 'rule of thumb' calculations for the stairs and toilets of an office building and for light touch engineering inputs. Others may wish greater certainty in the design, requiring detailed calculations for these elements. There is no right or wrong approach. It is essential that the lead designer focuses the design team on the tasks that support and underpin the stage goals and which will make the design as resilient as possible as it progresses into Stage 3, when the level of work by the engineering teams and any specialists needs to accelerate.

Common misapplication 3

Many clients request comprehensive BIM models, along with detailed 2D information and other data-driven outputs, during this stage, without considering whether it is the right information to deliver the stage outcomes.

Recommendation

Clients need to consider what information is required to deliver the stage outcomes. Will their outcomes be best served by the production of large quantities of 2D information during this stage? 3D technologies, including VR and augmented reality, are no longer gimmicks. They are valid ways of undertaking **Design Reviews** and their use should be considered alongside the need for traditional deliverables. Part 4, chapter Nine: *Setting Information Requirements* looks at the complexities of defining what information should be produced for each project stage.

Stage 3

The purpose of Stage 3 is to spatially coordinate the design before the focus turns to preparing the detailed information required for manufacturing and constructing the building. The information at the end of this stage needs to be coordinated sufficiently to avoid all but the most minor of iterations at Stage 4 and to make sure that the planning application is based on the best possible information.

Common misapplication 1

It is commonplace for the concept design to continue to be iterated during Stage 3. This diverts the design team from undertaking the core tasks for the stage.

Recommendation

The **Architectural Concept** should be concluded and signed off at Stage 2, along with the **Project Brief**. The project should not proceed to Stage 3 if any **Spatial Requirements** or room adjacencies remain inconclusive. During Stage 3, **Change Control Procedures** should be used to manage functional changes to the **Project Brief** and the **Architectural Concept**. Minor aspects of the scheme may need to be adjusted in response to the design tasks being undertaken. For example, a core might have to be rearranged to suit the final toilet and riser layouts.

Common misapplication 2

It is common to start Stage 4 before the design **is Spatially Coordinated**; for example, where the engineering design is one step behind the architect's information.

Recommendation

The Stage 3 design needs to be **Spatially Coordinated** to allow each design team member to work independently at Stage 4, or for the design of specialist subcontractors to be integrated into the coordinated design. Similarly, all of the **Project Strategies** and any other project information should be coordinated.

Common misapplication 3

The number of specialists being used on projects is increasing, but in many instances the timing of their contributions are not timed properly. The right contributions are produced, but at the wrong stage.

Recommendation

The majority of **Project Strategies** (produced by specialist consultants) should be coordinated and concluded by the end of Stage 3, ready to be embedded into the Stage 4 design information. Allowing work on **Project Strategies** that do not require further development for construction or **Facilities Management** purposes to stray into Stage 4 can be disruptive to the Stage 4 design process. The lead designer should review the schedules of services for specialist consultants and comment on what tasks are proposed and when these will be undertaken, being alert to any tasks that may disrupt the Stage 4 design process.

Common misapplication 4

Under some procurement routes, Stage 3 deliverables are being used for tender purposes. However, while this information is coordinated, it is unlikely to contain sufficient detail to allow robust tenders to be prepared. For example, specifications will not be ready, the scope of work might be incomplete and detailed drawings will not have been prepared.

Recommendation

The project team should consider what adjustments to the design process, including the early delivery of Stage 4 information, might improve the design team's effectiveness for procurement purposes. For example, being able to provide the scope for a particular work package or the detail design for a complex aspect of the project, such as the cladding, will reduce the contractor's need for assumptions, providing a more accurate tender return.

Stage 4

Stage 4 is about developing the information required to manufacture and construct the building. This requires information from the design team and the specialist subcontractors employed by the contractor, regardless of which procurement route is used.

Common misapplication 1

There is a tendency for design work by specialist subcontractors to be allocated to Stage 5, including any reviews of this information by the client team.

Recommendation

Specialist subcontractors' design work should be allocated to Stage 4. The intention of the RIBA Plan of Work is that Stage 5 comprises solely the manufacturing and construction of the building, along with any associated inspections and reporting and the resolution of **Site Queries**. On the majority of projects, Stage 4 and Stage 5 will run concurrently and a contractual 'firewall' will occur midway through Stage 4. For example, on a two-stage design and build project, the client may be content to sign the **Building Contract** after the major packages have been secured; however, on a traditional project, the design team's work should be substantially complete prior to the **Building Contract** being signed, with the specialist subcontractor design completed after the contractor has been appointed. By keeping all design work within Stage 4, the lead designer is able to prepare a Stage 4 Design Programme that covers all elements of the design team's and specialist subcontractors' design work.

Common misapplication 2

Setting boundaries between the design team's and the specialist subcontractors' design responsibilities is not considered at the outset. As a result, there may be ambiguities in what the design or construction teams have allowed for in their pricing.

Recommendation

Where to position the interface between the design team and the specialist subcontractors is a core project decision. However, this is not the same as selecting the procurement route and the two must not be confused. It is possible for a traditional project to include a number of performance-specified (descriptive) elements, as opposed to the more expected prescriptive specification on traditional projects, and for a design and build project to have predominately descriptive specifications. The value brought by the design team delivering **Prescriptive Information** will vary depending on the building type and the outcomes the client is seeking to achieve. Many clients will prefer products visible on completion to be specified by the design team, allowing others to be selected by the contractor. Many specialist subcontractors have design skills beyond those of traditional designers and so can add value to the design process. With this in mind, the **Responsibility Matrix** needs to be set up at Stage 1, acknowledging that it can be updated if necessary as the design progresses.

Common misapplication 3

The use of offsite manufacturing and other modern methods of construction is only being considered first at Stage 3 or even Stage 4.

Recommendation

The RIBA is witnessing an increased interest in offsite manufacturing and other modern methods of construction. However, these technologies need to be considered at Stage 2 and be embedded into the design from the outset. The RIBA recommends that if a client wishes the design team to embrace a specific modern method of construction, this should be implicit in the **Project Brief**. Where this is not a specific requirement, the RIBA suggests that the design team, perhaps in consultation with a construction adviser, considers different ways of building when preparing the Stage 2 **Construction Strategy**.

Stage 5

Stage 5 is when the building is manufactured and constructed.

Common misapplication 1

Design activity undertaken after construction has started is being considered Stage 5 design activity, or Stage 4 design work is delayed until Stage 5.

What should happen/recommendation

With the exception of resolving **Site Queries**, there is no design activity at Stage 5. It is likely that Stages 4 and 5 will overlap, as dictated by the **Project Programme** and the **Procurement Strategy**. However, it should be clear in the professional services agreements that the production of information required for manufacturing and constructing the building, including the design work of the design team and the specialist subcontractors (including the review of this information), is a Stage 4 activity.

Common misapplication 2

The information that will be handed over at the end of Stage 5 is not considered at the outset.

Recommendation

The information handed over at the end of Stage 5 is changing. It can now range from 2D general arrangement information (perhaps derived from the design team's latest federated model through to a multi-disciplinary model containing specialist subcontractor information and a wealth of data for asset management, maintenance or in-use purposes. Those setting the **Information Requirements** need to consider what information is required for the effective use of the building. Even the smallest of projects has **Building Systems** that need to be operated effectively to enable the building to perform as expected. It can be difficult to define these **Information Requirements** at the outset, when standards and software are moving at pace, and it may be necessary as the project progresses to check that the contractual commitments will meet the client's information needs.

Common misapplication 3

Although alternative models to traditional procurement model have been in use for some time, they do not necessarily provide clarity on who is to inspect the ongoing construction works.

Recommendation

The client needs to consider how much inspection is required on a project. Exactly who is responsible for inspecting the building for compliance with the **Building Contract** will vary from project to project, as will the need for the design team to respond to **Site Queries**. These relationships need to be properly considered and necessary roles identified during Stage 1.

Stage 6

By Stage 6 the building will be in use and the emphasis of the project team will have switched to closing out any defects and completing the tasks required to conclude the **Building Contract**.

Common misapplication 1

As a project nears completion, there is a tendency for the construction team to be focused on finishing the physical aspects of the building, and on certifying **Practical Completion** in order to conclude Stage 5, possibly at the expense of handover activities to ensure that the client can use the building optimally.

Recommendation

For the handover of the building to be successful, and to ensure that the building performs as planned, the Plan for Use Strategy should be considered in greater detail at each stage. Handover activities set out in the Plan for Use Strategy might occur during Stage 5, to ensure that the objectives are met. The end of Stage 5 continues to be defined as when the **Practical Completion** certificate is issued: the point where the building is legally ready for occupation. However, it is acknowledged that handover activities need to start before this date and continue beyond it. These include activities to help the client move in, such as the preparation of a **Building Manual**. Making sure that the building is performing as anticipated after occupation requires a light touch **Post Occupancy Evaluation** to be undertaken.

Common misapplication 2

Post Occupancy Evaluation come in different guises and the term is being used to describe very different types of activity leading to confusion; collecting feedback from the project team is very different to assessing whether the building's energy performance is as planned.

Recommendation

At Stage 1, the Plan for Use Strategy needs to be clear regarding expectations. Immediately after **Practical Completion**, it is essential to hold a **Project Performance** session with the project team, to gather their views before they disappear to their next projects. The **Aftercare** tasks that will help the building perform as planned have a different timeline – the building needs to have been in use for some time before seasonal **Commissioning** can take place or the data required to analyse performance outcomes can be collated.

Stage 7

This is the period when the building is in use, lasting until the building reaches the end of its life.

Common misapplication 1

It is common to see Stage 7 referenced in professional services contracts. However, by the end of Stage 6, those involving in briefing, designing, manufacturing and constructing the building will have completed their tasks.

Recommendation

The work of the project team concludes with the closing out of the **Building Contract**. If tasks are to be undertaken beyond the end of Stage 6, they need to be properly set out in separate professional services contracts. Appointments to complete the **Aftercare** activities, such as detailed **Post Occupancy Evaluation**, or providing longer term client advice should be in place.

Common misapplication 2

There are different views on how the end of a building's life relates to the circular processes of the RIBA Plan of Work. In certain industries, the work required at the end of a building's life is extensive and prolonged, justifying an additional project stage beyond Stage 7.

Recommendation

When the client is considering what to do when a building no longer fulfils the client's needs or at the end of a building's life, they are, in essence, commencing a new Stage 0 process. For example, the client might first assess whether refurbishment, repurposing or extension of the building is possible. If they conclude that none of these is viable, then the building will be disassembled, with its constitute parts reused or recycled. With the end of Stage 7 in mind, some clients may include relevant considerations in the **Project Brief**. For example, they may ask the design team to produce test fits for other possible uses, or to make sure that the means of disassembling the building are clear in the **Construction Strategy** at Stage 2. These tasks will become more commonplace as circular economy principles take hold in the construction industry.

PART 2

RIBA Plan of Work 2020

4 CHAPTER FOUR

Using the RIBA Plan of Work

The RIBA Plan of Work comprises eight stages, which are designed to act together to inform the briefing, design, construction, handover and use of a building. The RIBA Plan of Work can be used by a client at the outset of a project, to help them set up their project, or by any project team member during the project, as a constant point of reference – to remind them of the core tasks that should be undertaken at any particular stage. In addition to understanding the outcomes of each stage, it is crucial to recognise how the RIBA Plan of Work facilitates the progression of several priorities, defined here as **Project Strategies**, through the RIBA stages.

Part 1 of this publication has expalined the background to the RIBA Plan of Work and outlined some key changes made to the stages in this edition. Part 2 provides more detail on the structure and content of the Plan and the associated **Project Strategies**.

The majority of the RIBA stages work on a standalone basis. However, achieving successful outcomes at one stage relies on achieving successful outcomes at the stage before. It is foolhardy to believe that where the outcomes from one stage are poor, they can be recovered in the next stage. For example:

- a poor **Project Brief** is likely to lead to poor design outcomes
- a poor design will not achieve exemplary **Project Outcomes**
- designs that are not **Spatially Coordinated** in Stage 3 will result in unnecessary iterations in Stage 4
- poor information in Stage 4 will create an unnecessary volume of **Site Queries**
- lack of foresight on maintenance in the early stages will make maintenance difficult.

In many instances, there will be cross-cutting issues that flow from one stage to another, or information produced by one party that is crucial to another at the next stage. In this regard, while each stage acts independently, the RIBA Plan of Work has been constructed as a whole. Anyone using it should be cautious about changing the strategic tasks in any stage as this will potentially have an impact on the outcomes of the next.

Capitalised terms

The RIBA Plan of Work contains a number of capitalised terms. These are the core procedures, processes and tools. As crucial aspects of the RIBA Plan of Work, their intentions and purposes need to be clear – the glossary in Part 4 of this publication defines in greater detail the meaning of each term.

5 CHAPTER FIVE

The RIBA Plan of Work task bars

Running across the RIBA Plan of Work stages are a number of tasks bars that explain the key aspects of each stage.

It should be noted that the **Project Strategies** that need to be worked thorough on most projects are covered in detail in chapter Six.

The RIBA Plan of Work tasks bars now comprise the following.

Stage Outcome

The stage outcomes are high-level statements of the core outcomes to be expected at the end of each stage.

Core Tasks

The core tasks are key activities that should be completed if the stage outcomes are to be achieved. The lists are neither exhaustive nor chronological, but are high-level summaries of the tasks. Supported by the capitalised terms (set out in detail in Part 4), the core tasks explain the thrust of activities that can be expected during each stage.

The tasks in this task bar are undertaken by the project team, having been distributed among the client team, design team or construction team as appropriate, under professional services contracts or the **Building Contract**.

Core Statutory Processes

Any construction project must adhere to statutory requirements set out in planning and health and safety legislation, and the **Building Regulations**. This task bar lists the core statutory tasks that would be expected to be carried out at each project stage. Clients who are undertaking their first construction project will need members of the project team to provide detailed explanations of these requirements.

Crucially, this task bar acts as a reminder that engagement with external stakeholders is a crucial part of the project process. The **Project Programme** needs to be clear regarding any statutory requirements, such as the proposed date for submitting a **Planning Application**.

Procurement Strategy

The **Procurement Strategy** task bar underlines that the RIBA Plan of Work is procurement neutral. There are two reasons for this. First, a number of different procurement routes are followed in the UK: while traditional procurement is still widely used, design and build forms of building contract are common amongst developers. Second, each **Procurement Strategy** engages with the design process differently during Stages 2 to 4.

It is, therefore, not possible to include specific procurement tasks in the RIBA Plan of Work. However, this task bar illustrates strategically when the construction team would be expected to become involved in the project for each typical procurement route. Procurement does not impact on the core tasks that need to be undertaken as part of the RIBA Plan of Work. However, it may require adjustments to the **Information Requirements** and will certainly be influential in determining the **Project Programme**. It can also have a major impact on the **Design Programme** for Stage 4, and how it overlaps with the **Construction Programme** of Stage 5. These topics are all covered in detail Part 3, chapter Nine.

It should be noted that the **Procurement Strategy** also determines how the design team will be appointed. However, the design team always need to be appointed before the start of Stage 2, regardless of the procurement route or who employs them.

Further guidance on the Procurement Strategy is included in chapter Eight.

Information Exchanges

During each stage a large quantity of information will be exchanged between project team members and with external stakeholders. However, a crucial goal at each project stage is to ensure that, at the end of the stage, all information required for a client to sign off a stage is captured properly within a set of documentation. This serves two purposes. First, the information delivered at the end of one stage becomes the basis for the next stage, so it needs to be clear at the end of the stage what information will be used by the relevant project team members at the next stage. Second, the information produced at the end of a stage represents a wide range of decisions, made by the client, that will influence how the next stage progresses. These range from the agreement of the **Procurement Strategy** and determination of the **Information Requirements**, to decisions deriving from **Design Reviews** by the client team or external stakeholders, such as planners. As such, it is crucial that the information exchanged at the end of a stage not only includes the information required for the next stage, but also records the basis on which this information was determined.

Project Strategies

Project Strategies are a crucial component of any project. As well as helping to tease out specific briefing issues, they enable design team members and, where necessary, specialist consultants to contribute effectively to the design process by allowing the lead designer to coordinate their contributions within the development of the broader design. They are an effective way of ring-fencing core aspects of the project, allowing the decision-making processes for each aspect to be clearly defined. **Project Strategies** can be appended to the **Stage Reports**, with a summary included within the main body of the text and, if necessary, a higher level statement in the executive summary.

Project Strategies need to be coordinated with the design work of the design team as a whole. Because of this, most **Project Strategies** need to be concluded at the end of Stage 3. This will allow their contents and recommendations to be absorbed into the Stage 4 information for each **Building System**. However, where specialist consultants have produced such **Project Strategies**, they might still be available to assist in honing the Stage 4 information.

Some **Project Strategies** will continue to evolve through and beyond Stage 4. It is crucial to understand how each **Project Strategy** will be developed during this stage and by whom, noting that the **Procurement Strategy** will determine who employs the design team.

In chapter Six, key tasks relating to the following **Project Strategies** are set out next to the main descriptions of each of the RIBA Plan of Work stages:

Conservation Strategy

For use on conservation projects of any size or complexity the Conservation Strategy helps to map the approach that the project team can take when dealing with historic buildings, with an emphasis on managing the effect of the heritage protection measures that currently apply to 'designated assets', such as listed buildings, buildings in a conservation area and scheduled monuments. Each case and situation will be different and there is no set of hard and fast rules - it is more important to adopt an attitude of respect for the past, based on an open-minded approach to the variety of opportunities and problems that will be encountered.

Cost Plan Strategy

The **Cost Plan** represents the anticipated construction cost of the building and, as such, it represents only a portion of the **Project Budget**. The **Cost Plan** used to be prepared at the end of Stage 2 or Stage 3. At the outset, the **Cost Plan** can be based on industry norms for similar building types adjusted to take account of market conditions, project abnormalities, Project Risks and contingencies. As design information is developed, an elemental **Cost Plan** is prepared. Essentially, this breaks down the cost for the building into the different **Building Systems**.

Fire Safety Strategy

The Fire Safety Strategy forms an integral part of the design and must be integrated from the point at which a building project is identified and will continue though the ongoing **Asset Management** of the building, providing a golden thread of fire safety information. A high-level **Site Appraisal** to determine the fire safety suitability against the **Client Requirements** informs the viability of the project through **Feasibility Studies**. Layers of fire safety are integrated into the design as the project develops then constructed and managed in use in accordance with the Fire Safety Strategy and maintenance requirements.

Health and Safety Strategy

The Health and Safety Strategy needs to be considered early on in the project because it is key to securing the safe construction, occupation, maintenance and future re-use or demolition of the project. The client's role is fundamental to this, to establish and maintain a health and safety-conscious approach to delivery of the project from the outset. The Health and Safety Strategy should set clear health and safety objectives.

Inclusive Design Strategy

Accessibility and inclusion for people with disabilities is a firm policy of Government and the aspirations and expectations of the general public. Its achievement is dependent upon the availability of barrier free environments and supportive mechanisms in delivering content and managing resources. The sooner that inclusion is considered the more effective and more cost effective it becomes. Alongside meeting Part M of the Building Regulations, buildings must also comply with the Equality Act, which gives legal protection from discrimination in the workplace and in wider society, on the grounds of age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, sex, sexual orientation, also known as the protected characteristics. The Inclusive Design Strategy should consider all of these and be developed at the outset and implemented over the building's useful life.

Planning Strategy

Planning legislation, policy and procedure is an ever increasingly complex part of the development process. Good planning is inseparable from good design and vice versa. Assessing planning issues should not be left to Stage 3 but be evaluated from the outset of every commission. For example, will the Client Requirements be acceptable under planning policy? If not, there is no value in developing design solutions for a proposal that is unlikely to gain consent. The Client Team must ensure adequate resources are allocated and appointments ae made to managing planning issues throughout the project. This applies to both pre and post planning submission.

Plan for Use Strategy

Plan for Use is the RIBA's interpretation of the Soft Landings Framework produced by the Usable Buildings Trust and BSRIA. Its aim is to encourage a more outcome-based approach to briefing, design, construction, handover and aftercare throughout the construction industry. The Plan for Use Strategy is central to this focal shift. Plan for Use has three basic components:

- Set realistic and measurable targets
- Complete Plan for Use activities
- Evaluate building performance and feed back lessons learned

Additional guidance on the Plan for Use Strategy can be found in the RIBA Plan for Use Guide (2020), created for this version of the RIBA Plan of Work.

Sustainability Strategy

The Sustainability Strategy acts as a guide to the delivery of sustainable buildings. It provides a framework that can help project teams to take ownership of their buildings' performance. The onus is on project teams to develop targets through the **Sustainability Outcomes** and deliver verified building performance through the Plan for Use Strategy.

This approach embeds key sustainability principles into the overall RIBA Plan of Work, while allowing the targets, benchmarks and **Sustainability Outcomes** to evolve and intensify in their ambition and urgency, as they must over the coming years.

Additional guidance on the Sustainability Strategy and **Sustainable Outcomes** can be found in chapter Seven.

6 CHAPTER SIX

The RIBA Plan of Work Stages and Project Strategies

The eight stages of the RIBA Plan of Work have been devised to help anyone involved in a building project, from an experienced designer through to a client undertaking their first project. While the RIBA Plan of Work acts as the basis for professional services or building contracts, it is not intended to be contractual; it does not set out in detail who does what at each stage, nor does it define the detail around the many topics covered in this publication. However, anyone undertaking a building project should be alert to the strategic aims and broad outcomes of each stage set by the RIBA Plan of Work, which are based on industry consensus.

The RIBA Plan of Work focuses on the briefing, design, manufacturing, construction, handover and use of a building project. However, it is procurement neutral reflecting the diversity of procurement routes used today and acknowledging that procurement requires tweaks, not transformation, of the design process.

The RIBA Plan of Work also acknowledges that tasks undertaken during any stage might have an impact on the performance of the building and on the successful delivery of the requirements set out by the client . For this reason, Stage 7 reflects the activities carried out after the handover of the building and well into a building's life, even though on the majority of projects the Building Contract and the involvement of design team and the contractor will have concluded at the end of Stage 6. Stage 7 is arguably the most important stage in a building's life. During this stage, its performance impacts on whole life costs and, importantly, on the environment. The performance of future buildings can only be improved if feedback is gathered from buildings in use. Regardless, the project team designing and constructing the project increasingly need to deliver information for asset or facilities management purposes.

While the RIBA acknowledges that major transformations in the way buildings are briefed, designed and constructed are upon us, it is not anticipated that future innovations will alter the RIBA Plan of Work methodology. The RIBA Plan of Work is proving resilient to the changes happening around it. The refinements made in this version make the stages clearer and, regardless of the innovation happening around it, the RIBA Plan of Work will continue to be an invaluable tool for those involved in the briefing, design, manufacturing, construction, maintenance and use of buildings.

There is no standard timescale for a project and project teams will need to set out a project programme appropriate to the scale and complexity of the project. Figure 2 below illustrates a timeline of the stages and likely overlaps of certain stages, this should be read in conjunction with the RIBA Plan of Work 2020 Template which sets out when the tendering activities take place on deferent procurement routes. In this example the planning application takes place at the end of stage 3 and work has paused during this process.

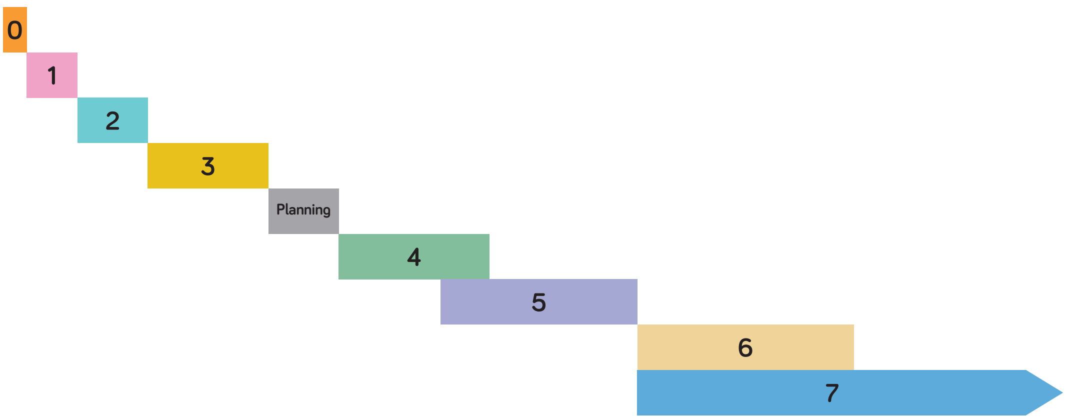

Figure 2: Example Project Programme for each stage of the RIBA Plan of Work 2020

RIBA Plan of Work 2020 Template

RIBA Plan of Work 2020

The RIBA Plan of Work organises the process of briefing, designing, delivering, maintaining, operating and using a building into eight stages. It is a framework for all disciplines on construction projects and should be used solely as guidance for the preparation of detailed professional services and building contracts.

Stage Boundaries:

Stages 0-4 will generally be undertaken one after the other.

Stages 4 and 5 will overlap in the **Project Programme** for most projects.

Stage 5 commences when the contractor takes possession of the site and finishes at **Practical Completion**.

Stage 6 starts with the handover of the building to the client immediately after **Practical Completion** and finishes at the end of the **Defects Liability Period**.

Stage 7 starts concurrently with Stage 6 and lasts for the life of the building.

Planning Note:

Planning Applications are generally submitted at the end of Stage 3 and should only be submitted earlier when the threshold of information required has been met. If a **Planning Application** is made during Stage 3, a mid-stage gateway should be determined and it should be clear to the project team which tasks and deliverables will be required.
See *Overview* guidance.

Procurement:

The RIBA Plan of Work is procurement neutral – See *Overview* guidance for a detailed description of how each stage might be adjusted to accommodate the requirements of the **Procurement Strategy**.

ER Employer's Requirements

CP Contractor's Proposals

	0 Strategic Definition	1 Preparation and Briefing	2 Concept Design	3 Spatial Coordination	4 Technical Design	5 Manufacturing and Construction	6 Handover	7 Use
		Projects span from Stage 1 to Stage 6; the outcome of Stage 0 may be the decision to initiate a project and Stage 7 covers the ongoing use of the building.						
Stage Outcome at the end of the stage	The best means of achieving the **Client Requirements** confirmed If the outcome determines that a building is the best means of achieving the **Client Requirements**, the client proceeds to Stage 1	**Project Brief** approved by the client and confirmed that it can be accommodated on the site	**Architectural Concept** approved by the client and aligned to the **Project Brief** The brief remains "live" during Stage 2 and is derogated in response to the **Architectural Concept**	Architectural and engineering information **Spatially Coordinated**	All design information required to manufacture and construct the project completed Stage 4 will overlap with Stage 5 on most projects	Manufacturing, construction and **Commissioning** completed There is no design work in Stage 5 other than responding to **Site Queries**	Building handed over, **Aftercare** initiated and **Building Contract** concluded	Building used, operated and maintained efficiently Stage 7 starts concurrently with Stage 6 and lasts for the life of the building
Core Tasks during the stage **Project Strategies** might include: – **Conservation** (if applicable) – **Cost** – **Fire Safety** – **Health and Safety** – **Inclusive Design** – **Planning** – **Plan for Use** – **Procurement** – **Sustainability** See *RIBA Plan of Work 2020 Overview* for detailed guidance on **Project Strategies**	Prepare **Client Requirements** Develop **Business Case** for feasible options including review of **Project Risks** and **Project Budget** Ratify option that best delivers **Client Requirements** Review **Feedback** from previous projects Undertake **Site Appraisals** No design team required for Stages 0 and 1. Client advisers may be appointed to the client team to provide strategic advice and design thinking before Stage 2 commences.	Prepare **Project Brief** including **Project Outcomes** and **Sustainability Outcomes**, **Quality Aspirations** and **Spatial Requirements** Undertake **Feasibility Studies** Agree **Project Budget** Source **Site Information** including **Site Surveys** Prepare **Project Programme** Prepare **Project Execution Plan**	Prepare **Architectural Concept** incorporating **Strategic Engineering** requirements and aligned to **Cost Plan**, **Project Strategies** and **Outline Specification** Agree **Project Brief Derogations** Undertake **Design Reviews** with client and **Project Stakeholders** Prepare stage **Design Programme**	Undertake **Design Studies**, **Engineering Analysis** and **Cost Exercises** to test **Architectural Concept** resulting in **Spatially Coordinated** design aligned to updated **Cost Plan**, **Project Strategies** and **Outline Specification** Initiate **Change Control Procedures** Prepare stage **Design Programme**	Develop architectural and engineering technical design Prepare and coordinate design team **Building Systems** information Prepare and integrate specialist subcontractor **Building Systems** information Prepare stage **Design Programme** Specialist subcontractor designs are prepared and reviewed during Stage 4	Finalise **Site Logistics** Manufacture **Building Systems** and construct building Monitor progress against **Construction Programme** Inspect **Construction Quality** Resolve **Site Queries** as required Undertake **Commissioning** of building Prepare **Building Manual** Building handover tasks bridge Stages 5 and 6 as set out in the **Plan for Use Strategy**	Hand over building in line with **Plan for Use Strategy** Undertake review of **Project Performance** Undertake seasonal **Commissioning** Rectify defects Complete initial **Aftercare** tasks including light touch **Post Occupancy Evaluation**	Implement **Facilities Management** and **Asset Management** Undertake **Post Occupancy Evaluation** of building performance in use Verify **Project Outcomes** including **Sustainability Outcomes** Adaptation of a building (at the end of its useful life) triggers a new Stage 0
Core Statutory Processes during the stage: Planning Building Regulations Health and Safety (CDM)	Strategic appraisal of **Planning** considerations	Source pre-application **Planning Advice** Initiate collation of health and safety **Pre-construction Information**	Obtain pre-application **Planning Advice** Agree route to **Building Regulations** compliance Option: submit outline **Planning Application**	Review design against **Building Regulations** Prepare and submit **Planning Application** See ***Planning Note*** for guidance on submitting a **Planning Application** earlier than at end of Stage 3	Submit **Building Regulations Application** Discharge pre-commencement **Planning Conditions** Prepare **Construction Phase Plan** Submit form F10 to HSE if applicable	Carry out **Construction Phase Plan** Comply with **Planning Conditions** related to construction	Comply with **Planning Conditions** as required	Comply with **Planning Conditions** as required

Procurement Route	0	1	2	3	4	5	6	7
Traditional	Appoint client team	Appoint design team			Tender; Appoint contractor			Appoint **Facilities Management** and **Asset Management** teams, and strategic advisers as needed
Design & Build 1 Stage					ER; CP; Appoint contractor			
Design & Build 2 Stage			ER	Pre-contract services agreement	CP; Appoint contractor			
Management Contract / Construction Management			Appoint contractor					
Contractor-led			ER	Preferred bidder	CP; Appoint contractor			

	0	1	2	3	4	5	6	7
Information Exchanges at the end of the stage	**Client Requirements** **Business Case**	**Project Brief** **Feasibility Studies** **Site Information** **Project Budget** **Project Programme** **Procurement Strategy** **Responsibility Matrix** **Information Requirements**	**Project Brief Derogations** Signed off **Stage Report** **Project Strategies** **Outline Specification** **Cost Plan**	Signed off **Stage Report** **Project Strategies** Updated **Outline Specification** Updated **Cost Plan** **Planning Application**	**Manufacturing Information** **Construction Information** **Final Specifications** Residual **Project Strategies** **Building Regulations Application**	**Building Manual** including **Health and Safety File** and **Fire Safety Information** **Practical Completion** certificate including **Defects List** **Asset Information** If **Verified Construction Information** is required, verification tasks must be defined	**Feedback** on **Project Performance** **Final Certificate** **Feedback** from light touch **Post Occupancy Evaluation**	**Feedback** from **Post Occupancy Evaluation** Updated **Building Manual** including **Health and Safety File** and **Fire Safety Information** as necessary

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Core RIBA Plan of Work terms are defined in the *RIBA Plan of Work 2020 Overview* glossary and set in **Bold Type**.

Further guidance and detailed stage descriptions are included in the *RIBA Plan of Work 2020 Overview*.

Stage 0: Strategic Definition

Outcome: The best means of achieving the **Client Requirements** confirmed.

The primary goal of Stage 0 is strategic – to ratify that a construction project, or otherwise, is the best means of achieving the **Client Requirements**. For example, a client wishing to expand its workforce has a range of options for accommodating the additional staff, including implementing new ways of working, adopting a more efficient space plan, subleasing premises or desk spaces close by, carrying out a refurbishment, building an extension or commissioning a new building.

Stage 0 is not about design or the practical details. It focuses on making the right strategic decisions and capturing them in a **Business Case**. The stage involves considering the pros and cons, **Project Risks** and **Project Budget** for a range of options and, where necessary, carrying out **Site Surveys** and corresponding planning appraisals, before undertaking a comparative analysis and recommending and ratifying the best option for delivering the **Client Requirements**.

The **Project Risks** consider any circumstances which would affect the delivery of the **Client Requirements** for each option, taking into account that, beyond this stage, substantive costs could be incurred. Examples might include onerous stakeholder constraints that could delay the delivery date, or a costly services diversion that could make an option unviable. The **Project Budget** – the funds the client has available for all aspects necessary to achieve the **Client Requirements** – will need to be considered for each option. This will include professional fees and, where relevant, land acquisition costs. The high-level **Spatial Requirements** relevant to any option may need to be determined as these can significantly influence the estimated construction cost, rents or other costs.

Increasingly, Stage 0 is about gleaning **Feedback** from previous similar projects and gathering insight from **Project Stakeholders**, making sure that lessons are learned. Knowledge gained in this way can help the briefing process, improve design quality and make the building perform better.

Stage 0 should not be regarded only as a first step – it is also the logical next step after Stage 7 in the circular RIBA Plan of Work process. When the end of a building's life is reached, it must be refurbished, repurposed for another use or deconstructed.

Detailed tasks for Stage 0 need to align with the complexity of the challenge and the diversity and demands of the options being considered for the **Business Case**.

Who: Only the client team is involved at this stage. The client team may seek advice from a wide range of professional advisers, such as RIBA Client Advisers to help them develop the **Client Requirements** and **Business Case** that will achieve these.

Recommendations: The process of developing the **Client Requirements** and the corresponding **Business Case** should involve all key **Project Stakeholders** within the client body.

Stage 0: Strategic Definition
Project Strategies Tasks

Conservation	Identify **Project Outcomes** and define **Client Requirements** in relation to conservation. (e.g. minimising harm to historic fabric, preservation or conservation or bring into active use). Begin initial **Site Appraisals** including investigations and research, to identify significance, sensitivity, and conservation-related **Project Risks** (for example, protected wildlife, materials containing lead and asbestos) which may affect the delivery of the **Client Requirements**. This may include establishing historic status (conservation area, listed building or scheduled ancient monument), meeting statutory authorities and reviewing the existing conservation management plan. Define whether any specialist conservation expertise is needed in the client team.
Cost	Prepare a rough order of cost estimate, which captures a very high-level calculation of the **Project Budget** to meet the **Client Requirements** including high level **Spatial Requirements**, taking into consideration any **Project Risks**. The estimated construction cost might only be stated in terms of estimated cost per square metre or by reference to the estimated cost of a functional type (school place, bed space, etc.) and taking account of **Feedback** from previous similar projects. The estimated construction cost may be used to form the initial **Project Budget** figure as part of the **Business Case**, with the addition of professional fees and land acquisition costs. Define whether any specialist cost consultancy expertise is needed in the client team.
Fire Safety	Undertake **Site Appraisals** to determine the high level fire safety suitability of the site against the **Client Requirements** including high level **Spatial Requirements**, particularly in relation to access and facilities for the fire service and means of escape. Identify relevant current and emerging global, European, national and local fire-related trends, policy and legislation. Review **Feedback** from previous projects. Define whether the client team require any specialist fire safety expertise.
Health and safety	Gather existing health and safety information about a site or existing building, including relevant information from the **Health and Safety File** for existing buildings, to identify any significant risks to health and safety (e.g. the presence of asbestos or confined spaces). Take account of client duties under the Construction (Design and Management) Regulations 2015 (CDM Regulations) and their essential role in securing the safe delivery of a project to ratify the best means of achieving the **Client Requirements**. Review **Feedback** from previous projects (e.g. the efficacy of the cleaning and maintenance strategy or provisions for work at height). Define whether any specialist health and safety expertise is needed in the client team.

Inclusive design	Identify **Project Outcomes** and **Client Requirements** in relation to inclusive design. Undertake an access and inclusion audit of the existing site or environment to identify any **Project Risks** which may affect the delivery of the **Client Requirements** for inclusive design. Identify relevant current and emerging global, European, national and local inclusive design-related trends, policy and legislation. Review **Feedback** from previous projects. Define whether any specialist inclusive design expertise is needed in the client team.
Planning	Undertake a strategic planning appraisal of the site and its immediate and wider context, identifying the planning policy context, site designations, site history, an existing building's listed or scheduled status and related **Project Risks** which may affect the acceptability and viability of the **Client Requirements** including high level **Spatial Requirements** to **Project Stakeholders** including the planning authority and statutory consultees. Review **Feedback** from previous Planning history (i.e. any previous applications, refusals and approvals). Define whether any specialist planning expertise is needed in the client team to provide strategic advice on planning considerations.
Plan for Use	Explore opportunities for links to other projects or programmes to achieve economies of scale and improve efficiency, and review the implications for the scope of the **Client Requirements** and the **Business Case**. Review opportunities and **Project Risks** associated with potential future changes of use, operating hours and specific user or tenant requirements that might affect in-use performance. Review **Feedback** from previous or similar projects or the existing asset. Integrate operation, maintenance and whole life cost considerations into both the **Client Requirements** and the **Business Case**.
Sustainability	Develop high level, measurable, ambitious and unambiguous project **Sustainability Outcomes** to define the **Client Requirements**, following initial consultation with internal **Project Stakeholders**. Undertake a **Site Appraisal** of sustainability opportunities and constraints of potential sites and building assets. Identify relevant current and emerging global, European, national and local sustainability-related policy and legislation. Review relevant **Post Occupancy Evaluation Feedback** from previous projects (e.g. energy use). Review whether development is necessary to deliver the **Client Requirements** as one of the **Business Case** options considered.

Stage 1: Preparation and Briefing

Outcome: **Project Brief** approved by the client, and confirmed that it can be accommodated on the site.

If Stage 0 has determined that a building project is the best means of achieving the **Client Requirements**, the client team begin the briefing process during Stage 1. The **Client Requirements** for the project are considered in more detail, in connection with a specific site or sites, and the outcomes recorded in the **Project Brief**.

The **Project Brief** will contain guidance on the **Project Outcomes**, **Sustainability Outcomes** and **Quality Aspirations**. These may influence how the client, design and construction teams are assembled to form the project team, as part of the **Procurement Strategy**, and may dictate the core milestones in the **Project Programme**. Some clients give detailed, prescriptive briefing guidance, while others leave such considerations to the design team.

This stage is about developing the information that the design team will need to commence the design process at Stage 2. **Feasibility Studies** might be required in order to tease out the full range of briefing considerations and to demonstrate that the **Spatial Requirements** can be accommodated on the site. In some instances, several options might be prepared, but these options should not be vetted and appraised at this stage. **Feasibility Studies** are not part of the design process. For example, illustrative masterplan visions might be prepared in order to determine and shape the brief, and to tease out decisions that will be required on certain topics, but they are not part of the design process itself. As there is a direct correlation between cost and a building's area, the **Spatial Requirements** do need to be tested against the **Project Budget**.

The design team, with appropriate knowledge, skills and experience to deliver the **Project Outcomes**, needs to be selected, ready for Stage 2 to commence. On smaller projects, this team may already have been appointed to develop the **Project Brief**.

As the construction industry uses more digital tools and nudges towards greater uptake of whole life considerations, the information landscape is becoming more complex. The **Information Requirements** are therefore set at Stage 1, including whether the design team will deliver **Prescriptive Information** or **Descriptive information** in Stage 4. A **Responsibility Matrix** also needs to be prepared so that it is clear what tasks will underpin the production of information and who will undertake them. The matrix needs to focus on the boundaries between Stage 2 and Stage 3 tasks, and between the design team and any specialist subcontractors at Stage 4. A **Project Execution Plan** should be prepared, and a **Digital Execution Plan** will allow the design team to set out how they will produce the information.

A comprehensive set of **Site Information** needs to be sourced, including **Site Surveys**, ready for Stage 2 to commence.

Who: Stage 1 involves only the client team. The skills required will vary depending on the specific needs of the client and the project. Developing the Project Brief and the other outputs of this stage are skills that can be provided by specialists, such as RIBA Client Advisers who can also assist on selecting the design team. The Feasibility Studies might need architectural skills, and engineers or surveyors may be necessary to assess key Project Risks

Recommendations: It is important to recognise that Stage 1 is not a design stage. This stage is about layering detail and requirements into the Project Brief, before the design process commences at Stage 2.

Stage 1: Preparation and Briefing
Project Strategies

Conservation	Undertake specialist **Site Surveys** and appraisal of conservation area and research historic **Site Information** and assess the building's listed or scheduled status. Identify specialist conservation **Project Stakeholder** interest, undertake consultation and respond to **Feedback** in the **Project Brief**. Use **Feasibility Studies** to test the **Client Requirements** in relation to conservation and discuss options with the local authority, Historic England and amenity societies. Assess the impact of the project on significance and draft a statement of significance to inform the **Quality Aspirations**, **Project Brief**, **Procurement Strategy** and **Project Programme**. Identify the conservation knowledge, skills and experience required in the design team (e.g. conservation architect), include it within the **Responsibility Matrix** and appoint specialist consultants.
Cost	Prepare order of cost estimates to test the feasibility of achieving the emerging **Project Brief** including the **Quality Aspirations** and **Project Strategies** when carrying out **Feasibility Studies**. Breakdown the cost of elements or categories to highlight any areas which may cause significant cost-related **Project Risks**. (e.g. likely foundation type) and consider the risk profile of potential market changes and inflation impact. Agree the **Project Budget**. Identify the cost consultant expertise required in the design team, include it within the **Responsibility Matrix** and appoint consultants.
Fire Safety	Identify **Project Stakeholders** including building users, residents, building managers and facilities managers and seek **Feedback** on access requirements, occupant behaviour, and building use and maintenance requirements to inform the development of the Project Brief (as well as technical requirements to qualify for insurance and warranties). Develop overarching fire safety requirements to inform the **Project Brief**, including initial fire safety measures such as access and facilities for the fire service, and the number and location of cores. Source **Site Information** relating to fire safety including fire strategies for existing buildings (e.g. existing compartmentation arrangements). Use **Feasibility Studies** to confirm that the Project Brief can be accommodated on the site in accordance with the overarching fire safety requirements. Identify whether specialist fire safety expertise is required in the design team, include it within the **Responsibility Matrix** and appoint consultants.
Health and safety	Research and communicate Health and Safety **Site Information** (e.g. asbestos) and coordinate it with **Feasibility Studies**. Initiate the collation, review and distribution of **Pre-Construction Information**, and establish design risk management processes. Define health and safety aspirations and incorporate these objectives within the **Project Brief**. Agree resource requirements, including time, fees and competence for CDM duty holders, and appoint the designers and the principal designer. Identify whether specialist health and safety advice is required in the design team, include it within the **Responsibility Matrix** and appoint consultants.

Inclusive design	Identify Inclusive design needs from **Project Stakeholders**, consultation groups, site audits, design standards and obligations from legislation and incorporate these into the **Project Brief**. Source **Site Information** including **Site Surveys** relevant to inclusive design (e.g. topography, historic building). Use **Feasibility Studies** to verify that the inclusive design needs can be accommodated on the site within the **Project Budget**. Identify whether specialist inclusive design expertise is required in the design team, include it within the **Responsibility Matrix** and appoint consultants.
Planning	Undertake a **Site Appraisal** (urban design analysis or character appraisal as appropriate). Source pre-design **Planning Advice** to identify local planning policy **related Project Risks** to be considered in **Feasibility Studies**. Use **Feasibility Studies** to test the **Project Brief** against the planning constraints of the site and to verify that **Quality Aspirations** can be achieved. Confirm the requirement for, and scope of, an Environmental Impact Assessment, listed building consent, required consent formats (outline or full), and appropriateness of a planning performance agreement. Develop a planning brief incorporating planning policy principles, the planning strategy, and **Project Stakeholder** consultation methodology, to inform the **Project Brief**. Identify planning expertise required (e.g. planning consultant, landscape architect, ecologist, archaeologist, transport consultant), include it within the **Responsibility Matrix** and appoint consultants.
Plan for Use	Incorporate **Feedback** from lessons learned on previous projects or from the existing building's **Facilities Management** team into the **Project Brief**. Establish measurable targets for environmental performance, amenity and comfort in the **Project Brief** (e.g. metered energy and water consumption). Set out the requirements for **Post Occupancy Evaluation**, handover and **Aftercare**, maintenance and **Facilities Management** within the **Project Brief**, taking whole-life costs into consideration. Agree a schedule of **Project Stakeholder** engagement for Stages 2 and 3, as part of the **Project Execution Plan**. Identify a consultant within the **Responsibility Matrix** to take on the role of Plan for Use champion to maintain the focus on **Project Outcomes** throughout the project.
Sustainability	Use **Feedback** from **Post Occupancy Evaluation**, precedent review data, **Site Surveys**, and past experience of the client's **Facilities Management** team (if applicable) to state clear, deliverable and ambitious **Sustainability Outcomes** in the **Project Brief**. Use **Feasibility Studies** to verify that the **Sustainability Outcomes** can be achieved on the site within the **Project Budget**. Verify local authority sustainability requirements (e.g. enhanced regulatory requirements or assessment methods to be used). Define certification requirements, including timetable for assessor appointments and early stage client actions. Identify sustainability expertise required, include it within the **Responsibility Matrix** and appoint consultants.

Stage 2: Concept Design

Outcome: **Architectural Concept** approved by the client and aligned to the **Project Brief**.

Stage 2 sets the **Architectural Concept** for a project. Proposals that align with the **Site Information** and the **Project Brief**, including the **Spatial Requirements**, are prepared. Regular **Design Reviews** are used to seek comments from the client and other **Project Stakeholders** and the design is iterated in response. Any **Project Brief Derogations** are agreed, or the **Project Brief** is adjusted to align with the **Architectural Concept**.

The **Architectural Concept** proposals must also be iterated to accommodate inputs from the design team and from specialist consultants, including the **Strategic Engineering** requirements (building services, civil and structural engineering). The proposals must also be coordinated with the **Project Strategies**, and everything captured in a **Stage Report**. The **Cost Plan** should demonstrate that the proposals and **Outline Specification** are aligned to the **Project Budget**.

A core challenge is to determine what detailed tasks need to be undertaken at this stage. Although Stage 2 is more about rules of thumb than detailed analysis, calculations may be required to progress specific aspects, such as calculating stair or riser sizes. However, if the **Architectural Concept** is not certain, or does not have sufficient buy-in from the client, carrying out detailed supporting tasks now can result in abortive design work. There is no right or wrong approach. A pragmatic review of what tasks should be undertaken to make the **Architectural Concept** as robust as possible before Stage 3 commences is required.

The proposals should demonstrate that the **Spatial Requirements** are being achieved, along with any adjacency requirements. Any non-briefed areas, such as cores, must be developed sufficiently to coordinate with the **Architectural Concept**. Externally, the building must meet the vision of the client, as well as the demands of the local context and environment. The client may seek pre-application **Planning Advice** on the suitability of the initial proposal from a planning adviser or the relevant planning department. The **Architectural Concept** must also be reviewed against the **Quality Aspirations**, and the route to **Building Regulations** compliance needs to be clarified and agreed.

A Stage 2 **Design Programme** must be prepared, in line with the **Project Programme** and **Responsibility Matrix**, to guide the design process and to ensure that the **Information Requirements** are included in the **Stage Report** signed off by the client.

Who: The client team and the design team are the key players in this stage, along with any specialist consultants, whose contributions are required to achieve an Architectural Concept that is both robust and aligned with the Project Brief. Under some procurement routes, the construction team may also be engaged in this stage.

Recommendations: The crucial consideration at this stage is to determine which tasks and Project Strategies will contribute to the development of the Architectural Concept. The extent and nature of the tasks to be undertaken, and who should undertake them, will vary from project to project and from client to client.

Stage 2: Concept Design Project Strategies

Conservation	Evaluate **Site Information** to date the historic fabric and identify sensitivity, significance, condition and threats. Produce measured and condition surveys, and historic development drawings, and develop an historic building analysis to inform the **Architectural Concept**. Review the **Architectural Concept** options and **Outline Specification** against the statement of significance, conservation management plan, input from specialist consultants and **Feedback** from the client and other **Project Stakeholders**, using formal Design Reviews where appropriate. Source pre-application **Planning Advice** including on **Conservation Area** and listed building consent. Establish required specialist subcontractors', conservators' and suppliers' capabilities and associated lead-in times.
Cost	Prepare an initial formal **Cost Plan**, which takes account of initial design parameters established by the **Architectural Concept** and **Strategic Engineering** requirements, and which includes an elemental analysis of the various significant elements of cost and initial bulk quantities of key items set out in the Outline **Specification**. Review the cost implications of iterations of the **Architectural Concept**, taking into account the **Project Outcomes**, the **Procurement Strategy**, **Project Programme** implications and **Project Risks**. Demonstrate that the **Architectural Concept** and **Outline Specification** are aligned to the **Project Budget** in the **Cost Plan**.
Fire Safety	Develop the **Architectural Concept** to align with the fire safety strategy and the **Project Brief**, incorporating input from Project Stakeholders (end users, facilities managers, specialist consultants, building control bodies and the fire and rescue authority where appropriate), to identify and address the fire safety measures relating to means of warning and escape, external fire spread and access and facilities for the fire service. Include a record of key fire safety design decisions in the fire safety strategy as part of the **Stage Report**.
Health and safety	Implement design risk management processes: identify, record and analyse significant and/or unusual foreseeable health and safety hazards (e.g. electricity and chemicals). Eliminate or reduce health and safety risks if possible, or record control measures, and coordinate matters relating to health and safety in the **Architectural Concept** and **Outline Specification**, aligned with the other **Project Strategies** and the **Project Brief**. Update **Pre-Construction Information** in line with relevant design development of the **Architectural Concept**. Initiate the **Health and Safety File**, and update the design risk management process if necessary. Include a record of key health and safety design decisions as part of the **Pre-Construction Information** in the **Stage Report**.

Inclusive design	Develop the inclusive design concept and review against the **Project Brief**, input from specialist consultants, **Project Stakeholder** consultation **Feedback** and local planning authority accessibility needs. Incorporate the inclusive design concept into the **Architectural Concept** and **Outline Specification**, and **Strategic Engineering** requirements. Include a record of key inclusive design decisions in the **Stage Repor**t.
Planning	Obtain pre-application **Planning Advice** on the suitability of the initial proposal from a planning adviser or the relevant planning department. Consult **Project Stakeholders** and use **Design Reviews** (as appropriate to the scale, complexity and sensitivity of the project) to seek comments on the **Architectural Concept** proposals, including the impacts on immediate neighbours, the local context and environment. Iterate the **Architectural Concept** proposals to accommodate inputs from specialist consultants (e.g. transport/highways consultant, ecologist, archaeologist). Draft a design and access statement (if required), and assess possible section 106 contributions and community infrastructure levy requirements. Option: Submit an outline **Planning Application** to establish whether the scale and nature of the proposed development would be acceptable to the local planning authority before a fully detailed proposal is put forward.
Plan for Use	Undertake a **Feedback** exercise to gather lessons learned from key **Project Stakeholders** and produce a record of performance risks. Finalise requirements for **Post Occupancy Evaluation**, handover and **Aftercare**. Review the **Architectural Concept** against end-user, operation and maintenance building performance requirements and whole-life costs. Align the Plan for Use Strategy with the Sustainability Strategy, **Cost Plan**, metering, site waste and other **Project Strategies**. Confirm that **Facilities Management** plans are in place, appropriate to the project.
Sustainability	Consider benchmarking and quality assurance requirements in initial design work. Incorporate lessons learned from **Post Occupancy Evaluation Feedback** and the review of precedents in developing the **Architectural Concept**. Carry out sufficient energy and other modelling to test and refine the **Architectural Concept**, Sustainability Strategy and delivery of **Sustainability Outcomes**. Review the **Architectural Concept** against the intended **Sustainability Outcomes** and report and mitigate any deviations. Include a record of key design decisions to deliver the **Sustainable Outcome**s in the **Stage Report**.

Stage 3: Spatial Coordination

Outcome: Architectural and engineering information **Spatially Coordinated**.

Stage 3 is fundamentally about testing and validating the **Architectural Concept**, to make sure that the architectural and engineering information prepared at Stage 2 is **Spatially Coordinated** before the detailed information required to manufacture and construct the building is produced at Stage 4.

Detailed **Design Studies** and **Engineering Analysis** are undertaken to ratify the assumptions made during Stage 2 and to layer more detail onto the design. Stage 3 is not about adjusting the **Architectural Concept**, which should remain substantially unaltered, although detailed design or engineering tasks may require adjustments to make sure that the building is **Spatially Coordinated**. Changes to the **Architectural Concept**, for whatever reason, should be agreed via the **Change Control Procedure**.

Design Studies should be aligned to **Cost Exercises** and the development of the **Outline Specification** – iterations of the design may be required to ensure the **Cost Plan** aligns with the **Project Budget**. Product suppliers and specialist subcontractors might be consulted to test or conclude specific aspects of the design. A **Spatially Coordinated** design allows each designer, including specialist subcontractors, to finalise their information at Stage 4 (except for minor tweaks at interfaces) without further major iterations of the design.

The **Project Strategies** need to be updated and additional detail added, and a **Building Regulations** review undertaken. A Stage 3 **Design Programme** is created to make sure that the right tasks are undertaken at the right time. At the end of Stage 3, once the client has signed off a **Stage Report** that captures all the design development work undertaken during the stage, a **Planning Application** can be submitted.

NOTE: When a **Planning Application** before the end of Stage 3 is being considered, it is important to set a mid-stage gateway and focus on the tasks necessary to ensure that the threshold of information required for an application is achieved, and that the design is robust enough for development once planning consent has been obtained.

NOTE: On some projects, **Employer's Requirements** might be issued at the end of Stage 3 rather than in Stage 4. This documentation may require some elements of the design to be drawn to a higher level of detail, or require schedules or detailed specifications to be produced, to help remove risk from the procurement process and set the **Quality Aspirations**. This is a drawdown from Stage 4 activity, and might be undertaken at the end of Stage 3, after the **Stage Report** has been signed off.

Who: The lead designer and design team are key to this stage. The client team are involved where Stage 3 coordination requires client decisions. The construction team may also be involved if the selected procurement route requires early contractor or specialist subcontractor inputs.

Recommendations: Stage 3 results in a **Spatially Coordinated** design. It is crucial that the client team and design team understand the stage outcomes and the tasks required to achieve them, as well as the impact that preparing **Employer's Requirements** or a **Planning Application** might have on the **Information Requirements** and tasks to be undertaken.

Stage 3: Spatial Coordination
Project Strategies

Conservation	Undertake **Design Studies** and **Engineering Analysis** to test technical solutions for building conservation (e.g. to minimise harm to historic fabric), informed by specialist subcontractors and conservators, analysis, surveys and theory, and develop the building conservation aspects of the design in more detail. Undertake a **Building Regulations** review and recognise any **Building Regulations** exemptions. Integrate building conservation principles into a **Spatially Coordinate**d design aligned to **Project Stakeholder** consultation Feedback. Identify and record any risks to significance, sensitivity, and conservation principles and mitigate any deviation from the conservation **Project Outcomes** (e.g. to accommodate inclusive design requirements). Establish the input and responsibilities of specialist subcontractors and conservators required, and the availability and lead-in times of specialist materials, to inform the **Procurement Strategy**. Prepare and submit a **Planning Application** and application for listed building or scheduled monument consent at the end of Stage 3.
Cost	Carry out **Cost Exercises** to allow more detailed aspects of the design, **Project Strategies** and **Outline Specification** to be tested, using **Design Studies** and involving suppliers or specialist subcontractors if necessary to determine affordability, and taking into consideration the cost implications of achieving the **Project Outcomes** including compliance with statutory requirements. Update the formal **Cost Plan** iteratively with increasing levels of cost certainty as greater detail of the architectural proposal is developed to align with the **Project Budget**; greater certainty allows any cost increases to be balanced by reductions in the project contingency.
Fire Safety	Undertake **Design Studies** and **Engineering Analysis**, with input from end users, facilities managers, specialist consultants (e.g. access consultant, subcontractors and the contractor if appointed, to test the design for fire safety and develop the fire safety measures in more detail). Undertake a **Building Regulations** review of Part B, Part A, Part M and Regulation 7 requirements, with input from the building control body and fire rescue authority where appropriate. Integrate the fire safety measures into a **Spatially Coordinated** design, aligned to **Feedback** from the fire service, and building insurers if required. Identify and record any risks to fire safety and mitigate any deviation from the Fire Safety Strategy and include key design decisions relating to fire safety in the **Stage Report**. Establish the input and responsibilities of specialist subcontractors required (e.g. fire stopping) to inform the **Procurement Strategy**.
Health and safety	Undertake **Design Studies** and **Engineering Analysis** to eliminate or reduce residual and additional risks to health and safety, informed by specialist subcontractors and the contractor if appointed. Integrate design risk management considerations into a **Spatially Coordinated** design, record control measures and update **Pre-Construction Information** in line with relevant design development. Include **Pre-Construction Information** in the **Stage Report**. Establish the input and responsibilities of specialist sub-contractors required (e.g. façade access and maintenance) to inform the **Procurement Strategy**.

Inclusive design	Undertake a review of Part M of the **Building Regulations** and the Equality Act. Undertake **Design Studies** and **Engineering Analysis** to test and develop the inclusive design requirements in more detail with input from **Project Stakeholders** (e.g. end users and access consultants). Integrate inclusive design considerations into a **Spatially Coordinated** design aligned to **Project Stakeholder** consultation **Feedback**. Identify and record any **Project Risks** to inclusive design and mitigate any deviation from the Inclusive Design Strategy for inclusion in the **Stage Report**. Prepare and submit the design and access statement as part of the **Planning Application** at the end of Stage 3.
Planning	Undertake a **Building Regulations** review of the **Spatially Coordinated** Design before submitting a **Planning Application**. Undertake **Design Studies** to test in more detail the impacts of the proposals on immediate neighbours, the local context and environment - informed by specialist consultants as required (e.g. transport/highways consultant, ecologist, archaeologist). Integrate pre-application **Planning Advice** into a **Spatially Coordinated** design aligned to other **Project Strategies**, **Project Stakeholder** consultation **Feedback** and information produced by specialist consultants. Prepare the environmental impact assessment, heritage statement, design and access statement (if required) and supporting planning documents. Establish likely **Planning Conditions**, including pre-commencement and post completion operational **Planning Conditions**, and confirm section 106 contributions and community infrastructure levy requirements with planning consent. Submit the **Planning Application** once the design is **Spatially Coordinated** sufficiently for development, with only minor iterations required once planning consent has been obtained.
Plan for Use	Undertake **Design Studies** and **Engineering Analysis** to test the building performance requirements and conclude **Design Reviews** with input from end users, facilities managers, specialists, design consultants and the contractor (if appointed), to ratify the design from an end-user perspective. Integrate the building performance requirements into a **Spatially Coordinated** design aligned to **Project Stakeholder** consultation **Feedback**. Embed the requirements for **Post Occupancy Evaluation**, handover and **Aftercare** in the Procurement Strategy. Update the record of performance risks to inform Stage 4 tasks and deliverables.
Sustainability	Undertake **Design Studies** and **Engineering Analysis** to test the **Sustainability Outcomes**, including carrying out a building performance assessment following **Plan for Use** protocol, and develop the design in more detail. Submit a **Building Regulations Application** and any interim certification applications (e.g. BREEAM). Integrate **Sustainability Outcomes** into a **Spatially Coordinated** design aligned to **Project Stakeholder** consultation **Feedback**. incorporating lessons learned from **Post Occupancy Evaluation Feedback** and the review of precedents, and record new lessons learned. Identify and update record of performance risks to inform Stage 4 tasks and deliverables, and mitigate any deviation from the **Sustainability Outcomes**. Embed the requirements for **Post Occupancy Evaluation** in the **Procurement Strategy**. Include a record of key design decisions to deliver the **Sustainable Outcomes** in the **Stage Report**.

Stage 4: Technical Design

Outcome: All design information required to manufacture and construct the project completed.

Stage 4 involves the preparation of all information required to manufacture and construct a building. The core documents at the start of Stage 4 are the **Responsibility Matrix**, the **Information Requirements** and the Stage 4 **Design Programme**, which is heavily influenced by the **Procurement Strategy**.

The **Responsibility Matrix**, produced in Stage 1, defines whether the design team will deliver **Prescriptive Information** or **Descriptive Information** (including **Final Specifications**) for each **Building System**. **Prescriptive Information** can be used for construction purposes, with **Descriptive Information** issued where a specialist subcontractor will design a **Building System** for manufacturing and/or construction. While the **Procurement Strategy** influences who takes ultimate responsibility for **Manufacturing Information** and **Construction Information**, it is a common misconception that it also determines who is to produce it. However, a client on a design and build project may wish the design team's information to be as prescriptive as possible, keeping the need for specialist subcontractor design of **Building Systems** to a minimum. Conversely, a client using traditional procurement may require several specialist subcontractors to design **Building Systems**.

The **Procurement Strategy** does, however, influence when the **Building Systems** will be designed, dictating how the Stage 4 **Design Programme** will be structured. The **Procurement Strategy** might require Stage 4 to be undertaken in two parts. For example, on a traditional project, specialist subcontractors will design **Building Systems** after the **Building Contract** has been awarded.

The **Procurement Strategy** may also influence the structure of the project team. For example, the design team may be novated to the construction team. With this is mind, it is important that the **Procurement Strategy** is clear about project roles, including who will direct the work of the design team and who will review the design work of specialist subcontractors.

A **Building Regulations Application** should be made during Stage 4, before work commences on site. It will also be necessary to discharge any pre-commencement **Planning Conditions**.

Cost control measures applied during this stage will vary from project to project. These might include the preparation of an updated **Cost Plan**, bills of quantities or pricing schedules, as defined by the **Procurement Strategy**. The **Building Contract** needs to be agreed and signed at some point during the stage, to allow Stage 5 to commence. The majority of **Project Strategies** developed by the design team will be embedded in the **Manufacturing Information** and/or **Construction Information**, but some will continue into this stage and beyond. It is not usually necessary to produce a **Stage Report** for Stage 4.

Who: The design team and the specialist subcontractors employed by the contractor complete the design in this stage. Under some forms of procurement, a client monitoring team may be appointed to review the information that is produced.

Recommendations: All the design work required to manufacture and construct the building is undertaken in Stage 4, regardless of the Procurement Strategy. It is crucial to review the Responsibility Matrix before Stage 4 commences so it is clear who will be producing the Manufacturing Information and Construction Information and whether the design team will produce Prescriptive Information or Descriptive Information.

Stage 4: Technical Design
Project Strategies

Conservation	Complete practicable intrusive surveys, and identify future surveys necessary. Undertake technical design, including **Final Specifications** and material sourcing, for building conservation. Prepare and coordinate specialist subcontractors' and conservators' information including **Final Specifications**, embedding the Conservation Strategy. Discharge any pre-commencement listed building consent and **Planning Conditions** (e.g. submit a conservation method statement), and submit a **Building Regulations Application**, recognising any exemptions. Include the conservation requirements in tender information or **Employer's Requirements** and review tender returns or **Contractors Proposals**, including any alternatives proposed to reduce costs, and against Conservation Strategy outcomes. Identify **Project Risks** and uncertain areas of work where provisional sums are required (e.g. when it has not been possible to fully analyse the structure or building fabric).
Cost	Update the formal **Cost Plan** iteratively – to a level of detail defined by the Procurement Strategy – with a detailed elemental analysis of cost, together with a full bills of quantities, unit cost items or pricing schedules; the final **Cost Plan** becomes a pre-tender cost estimate. Review tender returns or **Contractors Proposals**, including any alternatives proposed to reduce costs, against the **Cost Pla**n, **Quality Aspirations**, **Building Regulations** and **Project Strategies**. Monitor and report the cost of any variations to the technical design between the point that the tenders are invited and up to the point that the contractor has been appointed. Identify **Project Risks** and uncertain areas of work where provisional sums are required.
Fire Safety	Undertake technical design, including **Final Specifications**, to manufacture and construct a fire safe building, including passive and active fire protection measures, means of warning and escape, and access and facilities for firefighting. Prepare and coordinate fire safety technical design information including **Final Specifications** required to manufacture and construct the building, and review against any insurer/warranty provider requirements, and building use, management and maintenance requirements. Identify and contact suitable contractors, and name or nominate specialist fire protection and fire safety subcontractors. Include the fire safety requirements in tender information or **Employer's Requirements** and review tender returns or **Contractors Proposals**, including any alternatives proposed to reduce costs, against fire safety outcomes. Close down design risks in relation to the fire safety in use by the end of Stage 4. Address **Building Regulations** Part B, Part A, Part M and Regulation 7 requirements in full and submit a **Building Regulations Application**.
Health and safety	Identify, record and analyse, and eliminate or reduce, any Stage 3 or final residual risks to health and safety in undertaking the technical design. Integrate information identifying residual risks and record control measures in the final **Pre-Construction Information** handed over to the principal contractor. Include health and safety requirements in tender information or **Employer's Requirements** and review tender returns or **Contractors Proposals**, including any alternatives proposed to reduce costs, against the requirement to secure the health and safety of any person affected by the project. Prepare the **Construction Phase Plan**, and update the **Health and Safety File**. Submit Form F10 to the HSE if required.

Inclusive design	Undertake technical design, including **Final Specifications**, to manufacture and construct an inclusive building. Coordinate design team and specialist subcontractors' **Manufacturing Information**, **Construction Information** and **Final Specifications**, embedding the inclusive design requirements and other **Project Strategies**. Include the inclusive design requirements in tender information or **Employer's Requirements** and review tender returns or **Contractors**, including any alternatives proposed to reduce costs, against inclusive design outcomes. Address the Equality Act (2010) and **Building Regulations** Part M requirements and submit a **Building Regulations Application**.
Planning	Develop and prepare any necessary supplementary design information to confirm details required before the planning permission can be implemented (e.g. large scale construction details) and submit an application to discharge any pre-commencement **Planning Conditions**. Negotiate and prepare any applications for non-material or minor material amendments if required, submit to the local planning authority; submit a new **Planning Application** if material amendments are required. Include list of **Planning Conditions** in tender information/**Employer's Requirements** and review tender returns/**Contractors Proposals**, including any alternatives proposed to reduce costs, against the **Planning Conditions**.
Plan for Use	Regularly review the record of performance risks against the technical design with the design team, design out or control as many performance risks as possible, and identify strategies for managing those that remain. Include appropriate instructions for **Plan for Use** activities for the remaining stages in tender information or **Employer's Requirements**, including a handover strategy and Aftercare plan, and a requirement for **Facilities Management** information to operate the building effectively and enable it to perform as expected. Review tender returns or **Contractors Proposals**, including any alternatives proposed to reduce costs, against the record of performance risks, **Project Outcomes** and **Sustainability Outcomes**. Coordinate design team and specialist subcontractors' **Manufacturing Information**, **Construction Information** and **Final Specifications** with the record of performance risks.
Sustainability	Undertake technical design, including **Final Specifications** and material sourcing, to manufacture and construct the building to achieve the target **Sustainability Outcomes**. Coordinate design team and specialist subcontractors' **Manufacturing Information**, **Construction Information** and **Final Specifications**, embedding the target **Sustainability Outcomes** and the Plan for Use Strategy. Update any target commitments (e.g. to reduce carbon, energy or water use, and improve health and wellbeing). Include the Sustainability Strategy in tender information or **Employer's Requirements** and review tender returns or **Contractors Proposals** – including any alternatives – against **Sustainability Outcomes**. Mitigate or control as many building performance and climate change impact **Project Risks** as possible and identify strategies for managing those that remain. Address the **Sustainability Outcomes** targets – and Part F, G and L **Building Regulations** requirements – and submit a **Building Regulations Application**.

Stage 5: Manufacturing and Construction

Outcome: Manufacturing, construction and **Commissioning** completed.

Stage 5 comprises the manufacturing and construction of the **Building Systems** in accordance with the **Construction Programme** agreed in the **Building Contract**. Increasingly, digital technologies are being used to rehearse different construction activities, allowing Stage 5 to be faster and safer. As the construction industry moves towards greater uptake of offsite manufacturing, greater emphasis is also placed on the logistics of getting materials and large-scale components to site on time, and on the management of supply chain partners.

It should be clear from the outset who is responsible for responding to **Site Queries**, for regularly reporting on **Construction Quality**, for inspecting the works and monitoring progress, and for producing the **Defects List** prior to **Practical Completion** being certified. This may be the design team, who have produced the Stage 2, 3 and 4 information, or it may be a separate standalone role or client team. A separate team may have delivered the Stage 4 information, and the design team members might be allocated different roles at Stage 5. There is no right or wrong way to assemble the project team at this stage. However, which options have been chosen and who is responsible for what require clarification in the **Responsibility Matrix**.

Stage 5 concludes with the issue of a **Practical Completion** certificate, which allows a building to be handed over. The Plan for Use Strategy requires several tasks and activities to be undertaken before and after **Practical Completion**. Approaching **Practical Completion**, the construction team are focused on completing the manufacturing and construction of the project, so it is important that a project team member is allocated the role of planning for handover at Stage 6. On larger projects, a team might be formed to focus on the tasks that will deliver effective performance and operation of the building in use, rather than on completing the construction works.

Preparations for handover will include compilation of the **Building Manual** and the completion of **Verified Construction Information**, and maybe the delivery of **Asset Information**. Even the simplest of projects requires a **Building Manual**. For example, on a residential project, information on how to use appliances or set thermostats to operate effectively needs to be provided. What information will be required to use and operate the building needs to be considered at the outset, so that it can be collated at each project stage. The requirements can, however, be reviewed closer to completion, to make sure the client team receive the best possible information for the effective performance and management of their asset.

> **NOTE:** It is likely that Stages 4 and 5 will overlap. The extent of overlap will be dictated by the **Procurement Strategy** and the **Project Programme**.

Who: The construction team take centre stage at Stage 5. The contributions from the client team and design team will depend on the Procurement Strategy, and on how the client decides to review Construction Quality as construction progresses.

Recommendations: It is crucial that it is clear who is to inspect **Construction Quality**, so that the client can be sure the building will be delivered in line with the requirements of the **Building Contract**.

Stage 5: Manufacturing and Construction Project Strategies

Conservation	Implement any requirements for protecting the historic or sensitive building fabric during construction including temporary works and commissioning of the building. Undertake building conversation works; inform operatives of the building's significance, and work to specialists' and conservators' requirements, refined through samples and exemplars. Record and manage discoveries and resolve **Site Queries**. Inspect the **Construction Quality** of the building conservation works and quality of materials regularly (e.g. by through samples and examples). Comply with and discharge **Planning Conditions** related to conservation works, and listed building consent conditions (e.g. replace or conserve and element of the fabric as set out in a conservation method statement). Produce the conservation **Defects List** prior to **Practical Completion** being certified. Update the conservation management plan.
Cost	Monitor and report the cost of any variations to the **Building Contract**, against the relevant sections and/or individual items of cost using the **Cost Plan** control document as the basis of the contractor's pricing document, based on the expected out-turn cost, agreed and anticipated changes, and the release strategy for any contingency funds. Prepare and issue interim valuations for payment for works completed as agreed in the **Building Contract**. Manage the cost of items outside the **Building Contract** which form part of the overall project (e.g. furniture, fittings and equipment).
Fire Safety	Manufacture and construct fire safety measures, informing operatives of the importance of proper workmanship, regularly inspecting the **Construction Quality**; insurers/warranty providers may be required to review and validate the works. No fire safety measures should be outstanding in the **Defects List** prior to **Practical Completion** being certified. Resolve fire safety **Site Queries**. Undertake **Commissioning** of fire protection and life safety systems, including fire detection, alarm and ventilation systems. Update fire safety information for inclusion in the **Building Manual**, including fire safety specific **Commissioning** and **Facilities Management** requirements (e.g. testing of ventilation systems).
Health and safety	Install welfare facilities according to the **Construction Phase Plan**. Manufacture, construct and commission the building in accordance with the **Construction Phase Plan**, and involve operatives in developing, promoting and checking the effectiveness of measures to ensure health, safety and welfare. Resolve **Site Queries**, and update information for inclusion in the **Health and Safety File**, including relevant specific commissioning and **Facilities Management** requirements. Complete the **Health and Safety File** and include it in the **Building Manual**.

Inclusive design	Manufacture, construct and commission inclusive design measures, informing operatives of the importance of proper workmanship, regularly inspecting the **Construction Quality**. Resolve inclusive design **Site Queries**. Prepare appropriate access information for end users and occupiers for inclusion in the **Building Manual**.
Planning	Submit information needed to comply with any **Planning Conditions** relating to any restrictions on the work/**Site Logistics** before work commences on site (e.g. details of cabin and hoarding layouts or procedures for washing down trucks before they leave site). Manufacture and construct the building to comply with the planning permission and any **Planning Conditions**. Inspect **Construction Quality** for compliance with **Planning Conditions**. Prepare and submit applications to discharge remaining **Planning Conditions**, and provide the client with copies of any consent notices.
Plan for Use	Manufacture, construct and commission the building to deliver effective performance and operation of the building in use. Commission the equipment required for monitoring energy, water consumption and building comfort and other **Project Outcomes**, and check that data being received in the correct format as defined during Stage 3. Consider the impacts of any variations to the design or **Specification** on building performance and whole life cost. Review and update the record of performance risks on site, and use it to identify and avoid potential defects. Plan for a smooth handover through careful planning of pre-completion activities, to focus the client, contractor and facility managers on the tasks that will deliver effective performance and operation of the building in use. Compile the **Asset Information** and data required for the effective performance and management of the building for the **Building Manual** (e.g. the Part L log book).
Sustainability	Manufacture, construct and commission the building to meet the target **Sustainability Outcomes** (e.g. to reduce carbon, energy or water use, and improve health and wellbeing). Commission all the equipment required for monitoring the **Sustainable Outcomes**. Review any construction stage changes, and report and mitigate any deviation from the **Sustainability Outcomes**. Compile construction stage information required for certification and demonstrate compliance with the **Sustainability Outcomes**. Submit final information for statutory approval and certification, and performance in use verification. Review and update the record of performance risks on site, and use it to identify and avoid any defects. Implement handover and **Aftercare** procedures, as outlined in the Plan for Use Strategy. Compile the **Asset Information** required for the effective performance and management of the building for the **Building Manual**.

Stage 6: Handover

Outcome: Building handed over, **Aftercare** initiated and **Building Contract** concluded.

Stage 6 starts with the building being handed over to the client, with **Aftercare** initiated and the **Building Contract** concluded.

After the building has been handed over, the construction team rectify any residual defects as promptly as possible. Usually twelve months after **Practical Completion**, the **Final Certificate** will be issued, which concludes the contractual involvement of the design and construction teams. Although Stage 6 commences after the building has been handed over, several tasks may need to commence during Stage 5 to ensure that the handover of the building is as efficient and effective as possible, such as training the users on how to use the **Building Systems**.

In addition to the core contractual obligations to rectify **defects**, certify **Practical Completion** and close out the **Building Contract**, other tasks need to be undertaken. A **Project Performance** session needs be facilitated, so that the project team can share their experiences for the benefit of future projects.

Initial **Aftercare** tasks need to be initiated and completed. The project team will be interested in the **Feedback** from a light touch **Post Occupancy Evaluation**, conducted once any seasonal **Commissioning** has been completed, so they can understand how the building is performing and whether the building and its systems are being used as planned. Client, design and construction teams undertaking repeat building types can gain enormously from this process, by identifying trends across several projects.

Who: The construction team and those responsible for administrating and closing out the Building Contract complete the project in Stage 6. The project team will be required for a Project Performance session.

Recommendations: Make sure that any Feedback on Project Performance is sought as soon as possible after Practical Completion, before the project team move on to new projects and knowledge is dissipated and lost. Do not underestimate the value of Aftercarein achieving successful building performance.

Stage 6: Handover
Project Strategies

Conservation	Label spare materials and store scheduled historic pieces suitably in situ. Update the conservation management plan. Gather information for reports, archives, specialist journals, amenity societies or dossiers, where appropriate/required. Compile surveys and records of discoveries and works to include in the **Building Manual**. Hand over the updated conservation management plan to the client and **Facilities Management** team, including maintenance and training requirements. Implement any requirements for protecting the historic or sensitive building fabric during any **Seasonal Commissioning**. Undertake a review of **Project Performanc**e and a light touch **Post Occupancy Evaluation**, and revise or improve master conservation specifications based on lessons learned from the **Feedback** gathered.
Cost	Calculate and agree the adjusted contract sum as a progression from the **Cost Plan** control document/contractor's pricing document and original contract sum at the end of the defects period to settle the final account and allow the **Final Certificate** to be issued. Undertake a **Project Performance** session so that the final cost information can be used as **Feedback** for benchmarking the estimating and planning of costs on future projects.
Fire Safety	Hand over the fire safety information in the **Building Manual** to the client. Review **Project Performance** to learn lessons on design and construction for fire safety from the **Feedback** gathered (e.g. on the management of fire information between members of the project team). Identify relevant fire safety training and maintenance requirements, and provide induction and training of building users and facilities managers. Close out any new defects that arise during the defects liability period as they relate to fire safety. Undertake an initial fire risk assessment to gather **Feedback** on the operation of fire safety design measures and management systems, and building user behaviour.
Health and safety	Initiate **Aftercare** for the health and safety of **Facilities Management** team and building users. Hand over the **Health and Safety File** to the client. Identify relevant health and safety training and maintenance requirements, and provide induction and training of building users and **Facilities Management** team. Review **Project Performance** to learn lessons on design and construction for health and safety from the **Feedback** gathered (e.g. the efficacy of the cleaning and maintenance strategy). Identify relevant health and safety training and maintenance requirements, and provide induction and training of building users and facilities managers. Close out any new defects that arise during the defects period in accordance with the arrangements for managing health and safety on the project. Undertake **Seasonal Commissioning** of the new building in accordance with the arrangements for managing health and safety on the project. Gather **Feedback** on how **Facilities Management** and building maintenance is being undertaken in accordance with the Health and Safety file, and update information as required.

Inclusive design	Hand over the inclusive design information in the **Building Manual** to the client including the inclusive design principles and measures (e.g. the requirement to maintain and retain manifestation, materials, lighting or signage). Review **Project Performance** to learn lessons from **Feedback** gathered on design and construction to meet the needs of all building users. Provide induction and training for building users and **Facilities Management** team with reference to the inclusive design strategy, including disability awareness and access auditing. Close out any new defects that arise during the defects period relating to inclusive design. Undertake light touch **Post Occupancy Evaluation** to gather **Feedback** on the how the building is performing to meet the needs of all building users.
Planning	Discharge any pre-occupation **Planning Conditions** before handover. Provide the client with copies of any **Planning** consent notices and advise of any specific in use restrictions. Hold a **Project Performance** session with the project team to gather their views on the planning process for the benefit of future projects.
Plan for Use	Complete an effective transfer to **Facilities Management**, including user training, a user friendly **Building Manual** and any outstanding **Asset Information**. Hold a **Project Performance** session with the project team to gather their views on the handover and integrating **Facilities Management** thinking from the start for the benefit of future projects. Review the progress of defect rectification, maintenance and energy monitoring at periodic **Aftercare** meetings with the design team, contractor and **Facilities Management**. Begin gathering **Feedback** through light touch **Post Occupancy Evaluation** of the **Project Outcomes** in use. Hand over the **Building Manual** to users. Calibrate the as-built energy model with the commissioned building. Fine tune operational systems during **Seasonal Commissioning**, with reference to the **Sustainability Outcomes**. Close out any new defects that arise during the defects period relating to achieving the **Sustainability Outcomes**.
Sustainability	Hold a **Project Performance** session with the project team to gather their views on the process of embedding the **Sustainability Outcomes** in briefing, design and construction and handover for the benefit of future projects. Provide induction and training of building users and facilities managers, with reference to the Sustainability Strategy. Begin gathering **Feedback** through light touch **Post Occupancy Evaluation** of the **Sustainable Outcomes** in use.

Stage 7: Use

Outcome: Building used, operated and maintained efficiently.

On the majority of projects, the design team and construction team will have no Stage 7 duties to undertake. However, both teams will be interested in receiving ongoing **Feedback**, to help them understand how they might improve the performance of future buildings.

Post Occupancy Evaluation services are commissioned to determine how the building is performing in use to help fine tune the building and inform future projects.

Some client teams will continue to be closely involved during the life of a building, implementing **Facilities Management** or **Asset Management** strategies over the course of the building's lifetime. **Asset Information**, the **Building Manual** and these strategies may be updated on a regular basis. In the future, a **Digital Twin** might be used to optimise the operation and maintenance of the building and to compare predicted performance with actual performance.

In some **Building Contracts**, maintenance obligations might extend beyond Stage 6. Where this is not the case, a new standalone maintenance contract might be set up. This would require continuity of knowledge about how the building operates, therefore the **Asset Information** would need to be kept live and relevant throughout the life of the building.

At the end of a building's life, Stage 0 commences again. In line with circular economy principles, a refurbishment might prolong the life of the building or facilitate a new use. Where neither is possible, the deconstruction of the building will be undertaken after a new use for the site, and perhaps a new building, has been commissioned. Regardless of the outcome, the circular process of the RIBA Plan of Work moves the site towards its next meaningful use.

NOTE: Stage 7 starts concurrently with Stage 6.

Who: Those involved in ongoing **Asset Management** and **Facilities Management** will support the users of the building. The design team and construction team will no longer be involved, but design team members may be appointed separately to carry out **Post Occupancy Evaluation** tasks and some clients may require longer term strategic advice from specialists such as RIBA Client Advisers.

Recommendations: Handing over a building is just the beginning for those responsible for ensuring its successful operation and maintenance, that it performs as intended and achieves optimal outcomes for its users until the end of its life.

Stage 7: Use
Project Strategies

Conservation	Put in place appointments to maintain historic fabric and execute conservation management plan. Complete obligations under licences (e.g. bat licence). Carry out ongoing quadrennial and quinquennial inspections as required. Carry out regular maintenance of the building fabric. Review and update the conservation management plan and continue monitoring repairs and survey requirements. Retain a conservation lead or team (e.g. surveyor to the fabric or cathedral architect).
Cost	Embed final cost data from the completion of the construction phase into a **Facilities Management** operating model, for use in building maintenance, repair or renewal, as required. Identify cost for any necessary detailed diagnostic or forensic **Post Occupancy Evaluation** services. Monitor operational costs for inclusion in whole life cost assessment and provide **Feedback** on in use costs as part of **Post Occupancy Evaluation** undertaken.
Fire Safety	Implement **Facilities Management** of building as set out in the Fire Strategy. Undertake regular fire risk assessments to gather **Feedback** on the operation of fire safety measures and management systems, and building user behaviour, to inform any subsequent management, maintenance or refurbishment works. Review and update the **Fire Safety Information** to reflect any management, maintenance and refurbishment works and updates to the fire risk assessment.
Health and safety	Implement the management and maintenance of the building in a way that secures the health and safety of **Facilities Management** team and building users Undertake **Post Occupancy Evaluation** of the health and safety of maintaining and using the building. Review and update the **Health and Safety File** throughout the life of the building and pass the file on to subsequent building owners.
Inclusive design	Implement the management and maintenance of the building in a way that meet the needs of all building users. Identify and implement any adjustments or improvements required to the building, day-to-day operations or policies to meet the needs of all building users. Undertake **Post Occupancy Evaluation** of inclusive performance and review the asset in operation for inclusivity needs.
Planning	Comply with **Planning Conditions** on use as required (e.g. operating hours or use of external space)

Plan for Use	Implement **Facilities Management** or **Asset Management** in accordance with the Plan for Use Strategy over the course of the building's lifetime. Implement the findings of the light touch **Post Occupancy Evaluation**, to fine-tune **Building Systems** and **Facilities Management** to optimise comfort and performance. Undertake more detailed **Post Occupancy Evaluation** as required, after putting in place separate professional services contracts. Compare predicted performance with actual performance to optimise the operation and maintenance of the building. Disseminate findings of **Post Occupancy Evaluation** activities in electronic format to the client, users, design and construction team members and, where possible, the wider construction industry. Maintain live **Asset Information** for **Facilities Management**, including regularly updating the **Building Manual**, throughout the life of the building.
Sustainability	Comply with in use **Planning Conditions** in relation to sustainability (e.g. meeting ongoing renewable energy use requirements). Use observations from the light touch **Post Occupancy Evaluation** to fine tune and improve and **Sustainable Outcomes** performance against the **Sustainability Outcomes** targets, and keep the **Building Manual** up to date. Undertake more detailed **Post Occupancy Evaluation** as required, after putting in place separate professional services contracts, to test delivery of the in use **Sustainability Outcomes**. Report and mitigate any deviation from the **Sustainability Outcomes**. Share **Feedback** from lessons learned with the client, users, design and construction team members and with **Project Stakeholders**.

7 CHAPTER SEVEN

Sustainability Strategy – detailed tasks

Climate change is the greatest challenge facing us. We are likely to reach an average global temperature increase of 1.5°C by 2030. To avoid exceeding this (relatively) 'safe' upper limit, the Intergovernmental Panel on Climate Change (IPCC) stated in its report *Global Warming of 1.5°C* (2019) that this would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings) and industrial systems.

Buildings and construction contribute 40% of all carbon dioxide emissions. In the past 40 years, there has been a 60% decline in animal populations across the planet. According to the Living Planet Index, habitat loss, pollution and climate change have been key to this reduction.

The construction industry generally, and the architectural profession in particular, is in a key position to reduce further contributions to the causes of climate change and to mitigate its impacts. We are in the grips of an environment and climate emergency and our profession must do all it can to reduce the impact of the built environment. It is in this context that the Sustainability Strategy for the RIBA Plan of Work is written.

The **Sustainability Strategy** does not provide targets in itself. It is neutral in terms of methodologies, assessment tools and certification types, as it must work for all scales of project, all types of client and all levels of expertise.

The Sustainability Strategy acts as a guide to the delivery of sustainable buildings, to help deliver buildings that both meet clients' requirements and address the climate and biodiversity emergency. It provides a framework with actions, checks and stage outcomes, that can help project teams to take ownership of their buildings' performance. The onus is on project teams to develop targets through the **Sustainability Outcomes** and deliver verified building performance through the **Plan for Use Strategy**.

This approach embeds key sustainability principles into the overall RIBA Plan of Work, while allowing the targets, benchmarks and **Sustainability Outcomes** to evolve and intensify in their ambition and urgency, as they must over the coming years.

The eight **Sustainable Outcomes** are taken from the *RIBA Sustainable Outcomes Guide (2019)* when guidance can be found on setting measurable targets, designing to meet these targets and evaluating them in use buy undertaking **Post Occupancy Evaluation**.

0 Strategic Definition

Actions

Develop high level, measurable, ambitious and unambiguous project **Sustainability Outcomes** to define the **Client Requirements**, following initial consultation with internal **Project Stakeholders**.

Undertake a **Site Appraisal** of sustainability opportunities and constraints of potential sites and building assets.

Identify relevant current and emerging global, European, national and local sustainability-related policy and legislation.

Review relevant **Post Occupancy Evaluation Feedback** from previous projects (e.g. energy use).

Review whether development is necessary to deliver the **Client Requirements** as one of the **Business Case** options considered.

Delivering outcomes

– refer to the *RIBA Sustainable Outcomes Guide*

(Net zero) Operational Energy and CO_2
(kWh/m^2/year and $kgCO_2/m^2$/year)

Review options for formal assessment of sustainability and/or energy performance.

Asses implications of net-zero carbon target, in line with the UK government's 2050 commitment and the RIBA 2030 Climate Challenge.

Assess the climatic context and consider passive potential for conditioning strategies

(Net zero) Embodied Energy and CO_2
(kWh/m^2/year and $kgCO_2/m^2$/year)

Prioritise total or partial reuse of existing facilities, buildings, components or materials.

Consider the scope of new build elements and set ambitious embodied energy targets. Be mindful of the relationship between operational and embodied energy.

Sustainable Connectivity and Transport
($kgCO_2e$/km/person/year)

Prioritise proximity to public transport when selecting a site.

Create a comprehensive green travel plan in response to an assessment of existing conditions.

Sustainable Water Cycle
(litres/person/day)

Define storm water management and site discharge requirements.

Develop strategies to minimise potable water use.

Explore on-site water recycling through rain, grey and black water harvesting.

Sustainable Land Use and Biodiversity
(increase in species)

Prioritise brownfield site selection and sustainable remediation of any site pollution.

Integrate aims for biodiversity, sustainable land use, improved ecological value and habitats into the **Project Brief.**

Good Health and Wellbeing
(various)

Identify and understand final occupants' needs to help to establish appropriate health and wellbeing metrics.

Consider connection to external spaces, occupancy, daylight and thermal comfort, air quality (including healthy materials), user needs and operational energy when selecting the site or developing the **Project Brief**.

Sustainable Communities and Social Value
(various)

Identify opportunities to enhance existing social and community structures through the development. Including place making, community involvement, amenity and opportunities for meanwhile use in the developing design.

Sustainable Life Cycle Value
(£/m^2)

Develop high level whole life **Cost Plan** incorporating the value of **Sustainability Outcomes**.

Consider building longevity in the context of climatic and functional adaptability. Prioritise passive design principles.

Set responsible sourcing agenda for all materials.

Stage outcome

A sustainability champion is in place and a Sustainability Strategy relevant to the **Client Requirements** is integrated into the **Business Case** and **Project Brief**, which includes ambitious and unambiguous targets for each of the **Sustainability Outcomes**.

1 Preparation and Briefing

Actions

Use **Feedback** from **Post Occupancy Evaluation**, precedent review data, **Site Surveys**, and past experience of the client's **Facilities Management** team (if applicable) to state clear, deliverable and ambitious **Sustainability Outcomes** in the **Project Brief**.

Use **Feasibility Studies** to verify that the **Sustainability Outcomes** can be achieved on the site within the **Project Budget**.

Verify local authority sustainability requirements (e.g. enhanced regulatory requirements or assessment methods to be used).

Define certification requirements, including timetable for assessor appointments and early stage client actions.

Identify sustainability expertise required, include it within the **Responsibility Matrix** and appoint consultants.

Delivering outcomes

– refer to the *RIBA Sustainable Outcomes Guide*

(Net zero) Operational Energy and CO_2
(kWh/m^2/year and $kgCO_2/m^2$/year)

Operational energy use and CO_2 targets should include regulated and unregulated energy.

Use predicted in-use energy calculations (such as TM54) alongside compliance assessment.

Define seasonal climatic design energy strategies, prioritising passive principles.

Include options for renewables and implications on building and site design (e.g. form, orientation, façade details, control strategies and likely plant space).

(Net zero) Embodied Energy and CO_2
(kWh/m^2/year and $kgCO_2/m^2$/year)

Assess site or existing buildings for reusable parts or components.

Define embodied energy and carbon target outcome, including the boundaries of the assessment with regard to net-zero carbon and certification methodologies.

Consider the relationship between embodied and operational energy.

Sustainable Connectivity and Transport
($kgCO_2e$/km/person/year)

Create a comprehensive green travel plan in response to an assessment of existing conditions.

Define outcome targets for connectivity and transport, including active travel, minimising car-use and encouraging walking and cycling.

Sustainable Water Cycle
(litres/person/day)

Define water use target outcomes, including potable, rain and recycled water targets.

Define sustainable drainage and surface water retention requirements.

Explore on-site water recycling through rain, grey and black water harvesting.

Outline implications for the design, including tank sizes, permeable surfaces, fittings, etc.

Sustainable Land Use and Biodiversity
(increase in species)

Commission necessary surveys to understand existing ecology.

Develop strategies to enhance biodiversity and create new habitats.

Consider diversification of land use, meanwhile uses and productive landscaping.

Good Health and Wellbeing
(various)

Include requirements for internal environmental conditions, including thermal comfort and overheating, visual and acoustic comfort, spatial needs, ventilation type, control strategies and relationships to external environments.

Consider health and wellbeing alongside the energy strategy.

Include an approach to active circulation.

Sustainable Communities and Social Value
(various)

Consider place making, privacy, social interaction, mixed use places, community, amenity, involvement and inclusion. Plan for community consultation.

Include outcome targets for social value in the **Project Brief**.

Sustainable Life Cycle Value
(£/m^2)

Define an outcome target for life cycle value for key **Building Systems**.

Determine scope of life cycle assessment.

Specify measurable outcomes and targets for whole life carbon, whole life costs, building life span, refurbishment rates, end of life and circular economy.

Develop responsible sourcing targets.

Consider strategies for climate and functional adaptation.

Stage outcome

A site specific Sustainability Strategy is included in the **Project Brief**.

Sustainability Outcomes are defined, ambitious and measurable and are shared across the project team.

Requirements for **Post Occupancy Evaluation** and handover and **Aftercare** defined.

2 Concept Design

Actions

Consider benchmarking and quality assurance requirements in initial design work.

Incorporate lessons learned from **Post Occupancy Evaluation Feedback** and the review of precedents in developing the **Architectural Concept**.

Carry out sufficient energy and other modelling to test and refine the **Architectural Concept**, **Sustainability Strategy** and delivery of **Sustainability Outcomes**.

Review the **Architectural Concept** against the intended **Sustainability Outcomes** and report and mitigate any deviations.

Include a record of key design decisions to deliver the **Sustainable Outcome**s in the **Stage Report**.

Delivering outcomes

– refer to the *RIBA Sustainable Outcomes Guide*

(Net zero) Operational Energy and CO_2
(kWh/m^2/year and kgCO_2/m^2/year)

Develop an operational energy strategy, considering the impact of complexity of form on thermal performance, orientation, glazing proportions, airtightness and building physics.

Develop seasonal energy strategies for the site, considering opportunities for passive systems, the impact of complexity of controls and management on energy consumption, comfort and occupant satisfaction.

Check that the materials and construction approach will provide a level of thermal mass that is appropriate to the environmental design strategy.

(Net zero) Embodied Energy and CO_2
(kWh/m^2/year and kgCO_2/m^2/year)

Review the embodied energy and carbon of materials and construction processes in the context of the building's lifespan and operational strategy.

Minimise high embodied energy materials. Prioritise low carbon and recycled materials.

Avoid inefficient/wasteful use of materials. Design out waste where possible.

Sustainable Connectivity and Transport
(kgCO_2e/km/person/year)

Incorporate the aspects of the green travel plan into the emerging design.

Encourage active and low carbon travel. Minimise private car use through connections to public transport and provision of alternatives.

Sustainable Water Cycle
(lites/person/day)

Incorporate water use target outcomes, include potable, rain and recycled water targets.

Maximise storm water attenuation through permeable paving, planted areas and storage and attenuation tanks.

Sustainable Land Use and Biodiversity
(increase in species)

Develop the design against targets, including biodiversity enhancement and linked ecosystems.

Aim for long term diversification of land use, incorporating different functions, green spaces and economic models.

Incorporate water cycle targets into biodiversity strategy where possible.

Good Health and Wellbeing
(various)

Develop a plain English description of the internal environmental conditions and seasonal occupant control strategies.

Review the design against outcomes, including daylight, controls, social spaces and inclusivity.

Sustainable Communities and Social Value
(various)

Incorporate strategies for place making, privacy, social interaction, safety, mixed use places, community involvement, inclusion and amenity and opportunities for meanwhile use into the developing design.

Consider the need for and scale of private, semi-private and public external space.

Sustainable Life Cycle Value
(£/m^2)

Incorporate outcomes for whole life carbon, whole life costs, building life span, refurbishment rates and circular economy principles into the **Architectural Concept**.

Optimise the relationship between operational and embodied energy.

Consider resilience to future changes in climate through adaptation strategies.

Include future deconstruction, disposal and recycling in the design.

Incorporate a strategy to avoid toxic supply chains, practices and pollution.

Stage outcome

The **Architectural Concept** design integrates the Sustainability Strategy with the **Project Brief.**

Sustainability Outcomes are included in the **Outline Specification** and **Cost Plan**.

Actions

Undertake **Design Studies** and **Engineering Analysis** to test the **Sustainability Outcomes**, including carrying out a building performance assessment following **Plan for Use** protocol, and develop the design in more detail.

Submit a **Building Regulations Application** and any interim certification applications (e.g. BREEAM).

Integrate **Sustainability Outcomes** into a **Spatially Coordinated** design aligned to **Project Stakeholder** consultation **Feedback**. incorporating lessons learned from **Post Occupancy Evaluation Feedback** and the review of precedents, and record new lessons learned.

Identify and update record of performance risks to inform Stage 4 tasks and deliverables, and mitigate any deviation from the **Sustainability Outcomes**.

Embed the requirements for **Post Occupancy Evaluation** in the **Procurement Strategy**.

Include a record of key design decisions to deliver the **Sustainable Outcomes** in the **Stage Report**.

Delivering outcomes

– refer to the *RIBA Sustainable Outcomes Guide*

(Net zero) Operational Energy and CO_2
($kWh/m^2/year$ and $kgCO_2/m^2/year$)

Audit design against operational energy outcome target, including seasonal conditioning strategies, form and orientation and details for airtightness, continuity of insulation.

Assess coordinated consultant information, including any subcontractor packages.

(Net zero) Embodied Energy and CO_2
($kWh/m^2/year$ and $kgCO_2/m^2/year$)

Use embodied energy and carbon assessment to test relative impacts of design options as part of whole life costs.

Prioritise low carbon materials.

Consider the relationship between embodied and operational energy and carbon emissions.

Create a baseline carbon budget as an outcome target.

Sustainable Connectivity and Transport
($kgCO_2e/km/person/year$)

Incorporate the aspects of the green travel plan into the emerging design.

Encourage active travel, including walking and cycling. Coordinate space for deliveries, car clubs and connections to public transport.

Sustainable Water Cycle
(litres/person/day)

Coordinate design to deliver outcomes for reduced water use, recycled waste water and incorporated sustainable drainage.

Coordinate the sustainable drainage with the biodiversity strategy where possible.

Sustainable Land Use and Biodiversity
(increase in species)

Consider ecological health in procurement strategy to help avoid toxic supply chain practices, air, water and soil pollution.

Include biodiversity design enhancements to local eco-systems, habitat and productive landscaping in design documentation.

Good Health and Wellbeing
(various)

Coordinate proposals to deliver **Sustainability Outcomes** for health and wellbeing including daylighting, indoor air quality (including healthy materials), responsive controls and visual, thermal and acoustic comfort.

Consider the artificial lighting and daylighting strategy. Review environmental controls, ensuring that they are simple and intuitive and supportive of the wider Sustainability Strategy and **Sustainability Outcomes**.

Encourage active circulation and travel.

Sustainable Communities and Social Value
(various)

Coordinate proposals to deliver **Sustainability Outcomes** for social and economic aims, including place making, privacy, social interaction, safety, mixed use places, community involvement, inclusion and amenity and opportunities for meanwhile use in to the developing design.

Sustainable Life Cycle Value
(£/m^2)

Review the expected building lifespan against capital and operational energy, carbon and financial costs.

Check the environmental and human impacts of materials and the **Construction Strategy**.

Consider risks of short and long term damage to retained traditional building fabric.

Refine the climate adaptation strategy and make provision for future climatic and functional adaptations.

Stage outcome

Spatially coordinated design checked against the **Sustainability Outcomes.**

Services, structural and architectural design coordinated with the Sustainability Strategy, which is made explicit and included in **Statutory Submissions** and the **Stage Report**. Include a plain English description of the internal environmental conditions, seasonal control strategy and systems.

Sustainability Outcomes included in the **Cost Plan**, **Planning Application** and **Outline Specification.**

Actions

Undertake technical design, including **Final Specifications** and material sourcing, to manufacture and construct the building to achieve the target **Sustainability Outcomes**.

Coordinate design team and specialist subcontractors' **Manufacturing Information**, **Construction Information** and **Final Specifications**, embedding the target **Sustainability Outcomes** and the Plan for Use Strategy.

Update any target commitments (e.g. to reduce carbon, energy or water use, and improve health and wellbeing).

Include the Sustainability Strategy in tender information or **Employer's Requirements** and review tender returns or **Contractors Proposals** – including any alternatives – against **Sustainability Outcomes**.

Mitigate or control as many building performance and climate change impact **Project Risks** as possible and identify strategies for managing those that remain.

Address the **Sustainable Outcomes** targets – and Part F, G and L **Building Regulations** requirements – and submit a **Building Regulations Application**.

Delivering outcomes

– refer to the *RIBA Sustainable Outcomes Guide*

(Net zero) Operational Energy and CO_2
($kWh/m^2/year$ and $kgCO_2/m^2/year$)

Illustrate how the Sustainability Outcomes will be delivered for operational energy through drawings, details, specifications and strategy drawings. Detail seasonal strategies, passive and active measures and controls. Include details for continuity of insulation, mitigation of point and linear cold bridges and airtightness.

Include in subcontractors' packages and in the **Building Manual**.

(Net zero) Embodied Energy and CO_2
($kWh/m^2/year$ and $kgCO_2/m^2/year$)

Integrate and communicate detailed design strategies to deliver outcomes for embodied energy and carbon. Include materials, construction, manufacturing and supply decisions. Describe the relationship with operational energy and conditioning strategies.

Update the carbon budget and included in the specification.

Sustainable Connectivity and Transport
($kgCO_2e/km/person/year$)

Coordinate aspects of the green travel plan into the technical design.

Confirm measures to encourage active travel in the specification and the **Building Manual**.

Sustainable Water Cycle
(litres/person/day)

Coordinate technical design to deliver outcomes for reduced water use, including fittings and appliances and recycled waste water, and incorporating sustainable drainage. Integrated into biodiversity strategy where possible.

Leak detection and other technical requirements coordinated.

Sustainable Land Use and Biodiversity
(increase in species)

Integrate and communicate detailed design strategies to deliver sustainable land use outcomes, including diversification and meanwhile uses.

Integrate actions for avoiding toxic supply chain practices and air, water and soil pollution. Specify enhancements to local biodiversity and productive landscaping.

Good Health and Wellbeing
(various)

Illustrate how the proposals deliver **Sustainability Outcomes** for health and wellbeing, including daylighting, indoor air quality (through healthy materials and other means), responsive controls and visual, thermal and acoustic comfort.

Develop the **Building Manual**, illustrating user interaction with the building.

Sustainable Communities and Social Value
(various)

Integrate social and economic aims into the technical design, including outcomes for place making, privacy, social interaction, safety, mixed use places, community involvement, inclusion and amenity, and opportunities for meanwhile use.

Sustainable Life Cycle Value
(£/m^2)

Integrate and communicate strategies to deliver the expected building lifespan, incorporating capital and operational costs, material use, operational and embodied energy and environmental impacts.

Develop specification of sustainable materials and products that balances life cycle assessment, maintenance regime, durability, adaptability and cost.

Integrate responsible sourcing strategy into developing specification.

Adaptation strategy included in the **Building Manual**.

Stage outcome

The Sustainability Strategy and verified **Sustainability Outcomes** are included in **Manufacturing Information** and **Construction Information**, including specification, drawings and the **Sustainability Outcomes** performance parameters.

5 Manufacturing and Construction

Actions

Manufacture, construct and commission the building to meet the target **Sustainability Outcomes** (e.g. to reduce carbon, energy or water use, and improve health and wellbeing).

Commission all the equipment required for monitoring the **Sustainable Outcomes**.

Review any construction stage changes, and report and mitigate any deviation from the **Sustainability Outcomes**.

Compile construction stage information required for certification and demonstrate compliance with the **Sustainability Outcomes**.

Submit final information for statutory approval and certification, and performance in use verification.

Review and update the record of performance risks on site, and use it to identify and avoid any defects.

Implement handover and **Aftercare** procedures, as outlined in the Plan for Use Strategy.

Compile the **Asset Information** required for the effective performance and management of the building for the **Building Manual**.

Delivering outcomes

– refer to the *RIBA Sustainable Outcomes Guide*

(Net zero) Operational Energy and CO_2
(kWh/m^2/year and kgCO_2/m^2/year)

Visit the site to check that **Construction Quality** meets with **Sustainability Outcomes** for operational energy.

Review testing and monitoring of construction, particularly airtightness and continuity of insulation.

(Net zero) Embodied Energy and CO_2
(kWh/m^2/year and kgCO_2/m^2/year)

Update embodied energy and carbon assessment.

Review impact of the construction process against the carbon budget.

Sustainable Connectivity and Transport
(kgCO_2e/km/person/year)

Check the green travel plan is implemented during the construction process and that site-based transport measures are implemented.

Sustainable Water Cycle
(lites/person/day)

Check installations meet sustainable water cycle outcomes.

Include measures to reduce water use, including fittings and appliances, recycling grey and rainwater, and sustainable urban drainage.

Sustainable Land Use and Biodiversity
(increase in species)

Check that quality and installation are in line with **Sustainability Outcomes** for sustainable land use and biodiversity, including, air, water and soil pollution, enhancing and creating habitats and productive landscaping.

Good Health and Wellbeing
(various)

Check that quality and installation are in line with **Sustainability Outcomes** for health and wellbeing, inclusivity and accessibility.

Include visual, acoustic and thermal comfort measures. Verify location, type and function of controls and M&E installations.

Sustainable Communities and Social Value
(various)

Check the sustainable communities strategy is delivered on site, including place making, privacy, social interaction, safety, mixed use places, community involvement, inclusion and amenity.

Sustainable Life Cycle Value
(£/m^2)

Prepare for commissioning of controls to meet operational energy and comfort outcomes.

Monitor waste, energy and water use on site and update life cycle assessment to incorporate construction stage changes.

Stage outcome

Interim testing and monitoring used to verify the **Sustainability Outcomes.**

Any deviation from the **Sustainability Outcomes** reported and mitigated.

Check that adequate commissioning and maintenance contracts are in place. Identify **Aftercare** representative(s) and when they will be available on site. Complete the plain English **Building Manual**, setting out the Sustainability Strategy.

Asset Information, including Sustainability Strategy and **Building Manual**, complete and disseminated.

Actions

Hold a **Project Performance** session with the project team to gather their views on the process of embedding the **Sustainability Outcomes** in briefing, design and construction and handover for the benefit of future projects.

Provide induction and training of building users and facilities managers, with reference to the Sustainability Strategy.

Begin gathering **Feedback** through light touch **Post Occupancy Evaluation** of the **Sustainable Outcomes** in use.

Delivering outcomes

– refer to the *RIBA Sustainable Outcomes Guide*

Assess **Sustainability Outcomes** by undertaking light touch **Post Occupancy Evaluation**

(Net zero) Operational Energy and CO_2
(kWh/m^2/year and $kgCO_2/m^2$/year)

Review the seasonal **Commissioning** process and assess the **Sustainability Outcomes** for operational energy use using in use data. Begin collection of in-use data for initial light touch **Post Occupancy Evaluation**.

(Net zero) Embodied Energy and CO_2
(kWh/m^2/year and $kgCO_2/m^2$/year)

Assess the **Sustainability Outcomes** for embodied energy and carbon through final assessment of the **Asset Information** model to compare to initial carbon budget.

Sustainable Connectivity and Transport
($kgCO_2e$/km/person/year)

Support the assessment of the **Sustainability Outcomes** for sustainable transport and connectivity.

Sustainable Water Cycle
(lites/person/day)

Assess the **Sustainability Outcomes** for sustainable water cycles using in use data.

Sustainable Land Use and Biodiversity
(increase in species)

Support the assessment of the **Sustainability Outcomes** for sustainable land use.

Observe new green spaces and planting, mixed uses and productive landscaping.

Good Health and Wellbeing
(various)

Support the assessment of **Sustainability Outcomes** for wellbeing, including assisting with user training and dissemination of the Building Manual.

Sustainable Communities and Social Value
(various)

Support the assessment of **Sustainability Outcomes** for social value. Ensure aspects of place making, space for social interaction, inclusion, etc are in place.

Sustainable Life Cycle Value
(£/m^2)

Support the assessment of the **Sustainability Outcomes** for life cycle value.

Review controls and adaptable aspects.

Review seasonal performance and update the **Building Manual** to reflect any changes.

Stage outcome

Induction and training of building users and managers with reference to the Sustainability Strategy.

Building Manual issued to facilities managers and building users.

Aftercare including light touch **Post Occupancy Evaluation** carried out as per Plan for Use protocols.

Project Feedback gathered and reported to project team to help improve their organisational performance on future projects.

7 Use

Actions

Comply with in use **Planning Conditions** in relation to sustainability (e.g. meeting ongoing renewable energy use requirements).

Use observations from the light touch **Post Occupancy Evaluation** to fine tune and improve and **Sustainable Outcomes** performance against the **Sustainability Outcomes** targets, and keep the **Building Manual** up to date.

Undertake more detailed **Post Occupancy Evaluation** as required, after putting in place separate professional services contracts, to test delivery of the in use **Sustainability Outcomes**.

Report and mitigate any deviation from the **Sustainability Outcomes**.

Share **Feedback** from lessons learned with the client, users, design and construction team members and with **Project Stakeholders**.

Delivering outcomes

– refer to the *RIBA Sustainable Outcomes Guide*

Evaluate **Sustainability Outcomes** and building performance using diagnostic (and forensic) **Post Occupancy Evaluation** and **Feedback** provided to client and **Facilities Management** team.

(Net zero) Operational Energy and CO_2
(kWh/m^2/year and $kgCO_2/m^2$/year)

Gather **POE** data to evaluate the energy use for the building.

Disaggregated energy data used where possible for zone-by-zone and/or system-by-system analysis of energy use and CO_2 emissions.

(Net zero) Embodied Energy and CO_2
(kWh/m^2/year and $kgCO_2/m^2$/year)

Gather **POE** data to evaluate, for example, the appropriateness of thermally massive elements.

Sustainable Connectivity and Transport
($kgCO_2e$/km/person/year)

Gather **POE** data to evaluate, for example, the expected levels of car use and bicycle storage and use. Occupant survey can gather information on transport choices.

Sustainable Water Cycle
(litres/person/day)

Gather **POE** data to evaluate the use of potable water, **Sustainable** recycling and reuse rates and attenuation.

Sustainable Land Use and Biodiversity
(increase in species)

Gather **POE** data to evaluate the establishment of ecosystems and success of new biodiversity.

Good Health and Wellbeing
(various)

Gather occupant **Feedback** data to measure subjective aspects. Monitoring equipment used for quantitative metrics, such as daylight.

Sustainable Communities and Social Value
(various)

Gather **POE** data to test the social value performance. The Social Value Toolkit or similar can be used to quantify efficacy of measures.

Sustainable Life Cycle Value
(£/m^2)

Gather operational cost data to assess life cycle value and consider life cycle impacts (costs, resource use, etc) of services and fabric maintenance and repair regimes.

Sound outcome

POE derived lessons learned fed back to all stakeholders.

Knowledge shared and performance outcomes published where possible.

Feedback used to drive performance in use improvements to optimise building performance.

Any deviation from the **Sustainability Outcomes** reported and mitigated.

8 CHAPTER EIGHT
Procurement Strategy

The **Procurement Strategy** needs to be considered from an early stage in a project as it has a fundamental impact on how a project is organised. The **Procurement Strategy** influences:

- who employs the design team, particularly during Stage 4
- when the construction team are appointed
- when the construction team's involvement begins
- who might inspects the building works as they progress
- how the **Project Programme** is structured and how it manages risk
- who is contractually responsible for **Project Risks**
- who is responsible for the design
- when the specialist subcontractors become involved in the design work
- what information is required for inclusion in the **Building Contract**.

The choice of **Procurement Strategy** does not fundamentally alter the design process during Stages 2 and 3. However, the information that will be produced at each stage needs to be carefully considered to ensure the best value is delivered by the design team and construction team. In particular:

- comprehensive information to minimise the **Project Risks**
- detailed information to lock down key aspects of the design critical to the quality of the outcome before tendering
- a balance of **Descriptive Information** and **Prescriptive Information** to optimise best value: ensuring that the products crucial to the design intent and design quality are specified by the design team, and that the construction team are able to influence the selection of others
- coordination between the different core design disciplines, including the cost consultant
- clear and coordinated **Project Strategies** that explain the background to each aspect of the project and minimise the need for changes at Stage 4.

The choice of **Procurement Strategy** has its biggest impact on Stage 4, as it dictates when specialist subcontractor design work will be undertaken. It can also affect who employs the design team, and whether the design team will be novated to the contractor or the contractor will appoint their own. The impact for each **Procurement Strategy**, including the impact on the **Design Programme**, is as follows:

Traditional

Under traditional **Building Contracts**, the design team's technical design information will be issued for tender to a number of contractors. This will usually comprise **Prescriptive Information**. However, it may also include **Descriptive Information** (often referred to as the Contractor's Design Portion in the **Building Contract**), where specialist subcontractors are to design discrete aspects of the building. Once the Building Contract has been awarded, the construction team can appoint specialist subcontractors to complete their design work, requiring pre- and post-contract **Design Programmes** to be developed. How the design team will manage the design work of specialist subcontractors, including the review of their information and how any tweaks required to the design team's information will be dealt with needs to be clearly defined. This will require the **Change Control Procedures** to be followed and an architect's instruction to be issued.

One-stage design and build

Once the **Building Contract** has been awarded, the lead designer or the contractor's design manager will prepare a **Design Programme** which confirms when the design information from the design team and/or specialist subcontractors will be produced. A core consideration for this type of procurement is the amount of **Manufacturing and Construction Information** that will be produced by the client team as part of the **Employer's Requirements**. There should be sufficient detail to give clarity on areas of complexity, provide an accurate scope of work and define the detail for core aspects of the design and/or the production of **Final Specifications**.

Two-stage design and build

The design team produce a concept design which forms the bases for the **Employer's Requirements** at the end of Stage 2. With the contractor appointed under a pre-contract design services agreement during Stage 3, the lead designer or the contractor's design manager can prepare a single **Design Programme** that confirms when the design information from the design team and/or specialist subcontractors will be produced. The core consideration with this type of procurement is whether this information will be produced before or after the **Building Contract** has been signed. Producing more information beforehand will give the client certainty of the detail, but this requires more time and might delay the start of work on site.

Management contracting

Management contracting achieves the shortest **Project Programme** duration by maximising the overlap between design, procurement and construction. A number of packages for crucial **Building Systems** which need to be designed before work starts on site are likely to have been tendered and contracts awarded earlier in Stage 4. An integrated **Design Programme** can be created that includes the design work of both the design team and the specialist subcontractors. To bridge the gap between the **Design Programm**e and **Construction Programme**, a procurement programme will be created and monitored. The timescale between issuing information for tender and issuing information for manufacturing or construction will be shorter for **Prescriptive Information** than for **Descriptive Information**, because in the latter case a specialist subcontractor is required to produce the information for manufacturing or construction.

Contractor led

Contractors provide a design team to develop then submit their concept design at the end of stage 2 as proposals for the tendering process, typically leading to two teams proceeding to Stage 3. The lead designer or the contractor's design manager will prepare a **Design Programme** that confirms when the design information from the design team and/or specialist subcontractors will be produced. During Stage 3, assessments will be finalised, and one construction team will be appointed preferred bidder. The preferred bidder will continue tendering core packages to finalise their contract sum. A 'shadow' design team may be part of the client team that review this information for compliance with the requirements of the **Building Contract**. The timing of the contract award will depend on the planning process.

Procurement – Stage 5

The complexity of the overlap between Stages 4 and 5 has been considered at Stage 4. For all forms of procurement, awarding the **Building Contract** – so that construction, and therefore Stage 5, can commence – is a priority. However, this is sometimes not feasible, in which case the contractor may be appointed under a pre-contract services agreement. This might be to allow the contract sum or other contractual aspects to be concluded while allowing the design work of core specialist subcontractors to commence, or other aspects, such as **Site Logistics**, to be progressed.

The client team needs to be clear about who will be monitoring **Construction Quality** and progress and producing a regular quality report.

The only other procurement tasks during Stage 5 might relate to tenders for maintaining and/or operating the building before it is handed over. The **Information Requirements** for **Facilities Management** or **Asset Management** might need to be reviewed before tender documents are issued, to make sure that the information scoped at the outset of the project is still aligned with current best practice (the lag between commencing a project and the end of Stage 5 can be a number of years and so technology is likely to have moved on).

Procurement – Stage 6

During Stage 6, the construction team will focus on rectifying any outstanding items on the **Defects List**, with the client team focused on **Aftercare** tasks. The issue of the **Final Certificate** closes out the **Building Contract**, ending the project team's involvement.

Any separate procurement activities required for the **Facilities Management** or **Asset Management** of the building are Stage 7 tasks.

Employer's Requirements (ERs)

The **Employer's Requirements** are contractual. They can range from a copy of the **Project Brief** to a completed **Spatially Coordinated Design** with substantially completed technical design and specification information. They will generally include the professional services contracts of the design team members that will be novated, to ensure that the necessary services are carried out.

Contractor's Proposals (CPs)

The **Contractor's Proposals** are the contractor's response to the **Employer's Requirements**. Where the **Employer's Requirements** consist of only the **Project Brief**, the contractor will need to complete a design, usually in competition with others. At the end of Stage 3 (or early in Stage 4) when more information is included in the **Employer's Requirements**, it is common for the **Contractor's Proposals** to include the same information as the **Employer's Requirements**. However, contractors may propose alternatives (frequently referred to as 'value engineering') in order to arrive at a more competitive tender. The information in the **Contractor's Proposals** supersedes the **Employer's Requirements**, although clauses in the **Employer's Requirements** will remain relevant to cover the final information to be completed by the contractor. A mechanism for reviewing the final **Manufacturing and Construction Information** also needs to be incorporated into the **Building Contract**.

Novation

Under some forms of procurement, the employer of the design team changes from the client to the construction team, using a mechanism called novation. This allows the design team to work directly for the client during Stages 2 and 3 up until a **Spatially Coordinated Design** has been produced, and then for the construction team when preparing the **Manufacturing Information** and **Construction Information** at Stage 4.

PART 3

Changing Processes

9

CHAPTER NINE

Setting Information Requirements

The task of setting the **Information Requirements** for a project is becoming ever more challenging due to changes in the way buildings are briefed, designed, manufactured, constructed and used. The **Information Requirements** for each stage perform two crucial functions. First, they allow the client to review and sign off the design development that has been undertaken during that stage, with an emphasis on capturing the key decisions made. Second, the information produced at the end of one stage drives the activities carried out during the next. Put another way, the **Information Requirements** need to consider not just the outcomes of the stage in which they are produced, but also how successful they will be in delivering the outcomes of the next stage. For example, an inadequate **Project Brief** at the end of Stage 1 may result in a sub-optimal **Architectural Concept** at Stage 2, or poor Stage 4 information might delay or hinder progress on site during Stage 5.

Stage 0: Strategic Definition

The **Information Requirements** for Stage 0 will be dictated by the possible solutions for achieving the **Client Requirements** and the information required to build the **Business Case**. The diversity of options possible these are not considered in this publication.

Stage 1: Preparation and Briefing

It is crucial at Stage 1 to consider the **Information Requirements** for Stages 2 to 5 inclusive, because the professional services contracts and **Building Contract** must clearly define what information the design team and the contractor are required to deliver at the end of each of these stages. This depends on the choice of procurement and planning routes, which might not change who produces the information required but will affect the timing and the contractual chain of responsibility.

Setting the **Information Requirements** is a core Stage 1 requirement, regardless of a project's scale or complexity. The challenge in defining what information is required is becoming ever more complex for a range of reasons:

- The use of digital tools is shifting the balance away from 2D information and towards 3D and data.
- Digital **Site Surveys** can enable 3D working from the outset.
- The timing of the **Planning Application** during Stage 3, and information required to make a submission, can vary.
- Different **Procurement Strategies** will have different **Information Requirements** at different stages.
- Both **Descriptive Information** and **Prescriptive Information** can be required at Stage 4.
- Modern methods of construction are changing how buildings are designed, manufactured and assembled.
- Information produced at handover can be used for **Asset Management** or **Facilities Management**

These trends are considered in detail in this chapter of the Overview Guide, along with the factors that are driving further change.

With the range of information possibilities increasing, it is important that the **Information Requirements** are agreed with the client at the outset. On larger projects, the client team needs to set the **Information Requirements**, perhaps with the assistance of an information manager. On smaller projects, clients will rely on their professional advisers to recommend what information will add value to the process, such as a virtual reality model to help the client better understand the concept design.

Site Information

While an Ordnance Survey (OS) map and some site photographs can often provide enough information to allow the design process to begin, digital survey techniques are providing more options for gathering **Site Information**. A wealth of recent innovations, including point cloud surveys, photogrammetry, lidar, the ability to mount cameras on drones, and even city-wide infrastructure models, have made it possible for accurate and detailed 3D **Site Surveys** to be carried out cost effectively on projects of all sizes, from the smallest refurbishment to the largest of greenfield sites. As a result, planning how the project information is set up, and ensuring that everyone will be using compatible digital tools, is becoming of greater importance to the success of projects.

For design teams shifting away from using 2D information, such as OS and topographical surveys, and towards 3D working, there are a number of considerations to be discussed with the client:

- How will the survey information be integrated into a federated model? It is commonplace for surveys to be converted into BIM models by the survey company; however, some will use native survey information which will require some additional resource to convert.
- How accurate does the information need to be? This will be dictated by how the survey information is to be used, and will determine what type of camera needs to be used, the survey time and the data file sizes.
- How extensively will the survey information be used during the design process? For example, will Manufacturing Information and Construction Information that relies on survey information be in 2D or 3D?

3D scans are particularly useful for unlocking the value of BIM on refurbishment projects. However, consideration needs to be given to exactly how **Site Surveys** are to be used. In some instances, survey work may need to be incremental; for example, to record aspects of a building as it is stripped out. On other projects, it might not be necessary to record every detail, such as the ductwork above a ceiling. A listed building may need to be surveyed to a greater level of accuracy, to ensure that key features are captured and to avoid the need for site measurements, such as for cabinetry and other work.

Client considerations in Stage 1

- Deciding whether to adopt a BIM approach or leave the choice of methodology to the design team.
- Requiring access to the model or just the 2D outputs if a BIM approach is to be used,
- Defining which activities will use BIM e.g. site analysis, design, engineering analysis, construction information and asset management.
- Defining the minimum 2D information requirements.
- Identifying responsibility across the client, design and construction teams for for effective information management.
- Identifying any new tools to enable the client to support design team efficiency.
- Determining the value of using digital survey processes and data, and requiring a BIM as a deliverable model, including how accurate the survey information needs to be (e.g. a point cloud,lidar or photogrammetric survey).
- Assessing the BIM competence of the design team e.g. whether they have the experience to use a 3D scan .
- Clarifying whether the contractor can use the design team's information. e.g. for digital fabrication or verified construction information.

The design stages: Stages 2, 3 and 4

Although each stage of the RIBA Plan of Work has its own unique purpose and outcomes, a complexity for setting the **Information Requirements** is that the design process spans three stages. Design work begins at the start of Stage 2, when the initial ideas are created, and runs through to the end of Stage 4, when all of the design information required for manufacturing and constructing the building is completed.

The aim of Stage 2 is to ensure that the **Architectural Concept** is robust, incorporates appropriate **Strategic Engineering** aspects and has been signed off by the client, before the work of the design team and the level of coordination increases in complexity at Stage 3. The RIBA Plan of Work emphasises that Stage 3 is about producing a **Spatially Coordinated** design.

During this period, the project must also be navigated through the planning and procurement processes. The timing for submitting the **Planning Application** and the timing for producing tender information (as determined by the **Procurement Strategy**) will vary from project to project. For this reason, planning and procurement are not included as RIBA Plan of Work stages. It has become common for the terms 'Stage 3 plus' or 'Stage 3 minus' to be used by the construction industry, but the RIBA Plan of Work stages cannot be adjusted in this way and remain consistent. The outcomes for each stage – set out in the Plan of Work Template and Stage Descriptions in Chapter Six – must always be completed and signed off before progressing to the next stage for a project is to be successful. However, these terms do recognise that it is sometimes necessary to extract information from the design process part way through a stage; for example, when submitting a **Planning Application** midway through Stage 3, or when using some technical design information as part of the **Employer's Requirements** (for a one-stage design and build project) at the end of Stage 3.

Extracting information from the design process midway through a stage does not impact on the thrust of the design activity, but it does create risks and needs to be used with caution. While individual elements of information can be extracted during a stage, it is not possible for this information to be fully coordinated with the rest of the design information. Although the information might seem complete, it is likely to require further design iterations, to conclude the engineering aspects (including **Engineering Analysis** in Stage 3), coordinate it with **Project Strategies** and align it with the **Cost Plan**. It is simply not possible for information issued mid-stage to be fully coordinated; any client using such information needs to be aware of this.

In defining the information for a mid-stage gateway, it needs to be clear what information is to be produced, what tasks will underpin it and for what purposes it is required. Crucially, using information mid-stage does not remove the need to conclude the formal stage milestone, which is required to deliver the stage outcome before progressing to the next stage.

The **Project Programme** is a crucial tool for determining when **Information Requirements** are required outside the formal stage gateways. Once these mid-stage gateways are understood, the **Information Requirements** for each can be developed, the risks associated with issuing information early determined, and any mitigation measures put in place.

Stage 2: Concept Design

There are no fixed **Information Requirements** for Stage 2. The specific **Information Requirements** need to be determined by the project team. These will vary depending on the complexity and scale of the project, the challenges of the brief and site, the views of the client team and, of course, what information most efficiently conveys that the stage outcome has been achieved.

The information challenge at Stage 2 is determining the contents of the **Stage Report**. Traditionally, a set of general arrangement drawings (plans, sections and elevations of the building at an appropriate scale) would be created to support the **Stage Report**; usually appendices in PDF format. With the use of BIM becoming more prevalent a new approach is being employed to produce Stage **Reports**: using 3D images (including 3D visualisations), cutaways and extracts derived from the BIM model to explain design decisions, and 2D views to demonstrate how the **Spatial Requirements** are being achieved.

Some architects may still work traditionally and wish to use sketches to convey the **Architectural Concept**. Others may wish to use virtual reality to walk the client around the proposals, and to issue a video of what the client has agreed to – as the core deliverable. The amount of supporting information required from other design team members will depend on the size and scale of the project. However, the **Stage Report** can be used to corral everyone's efforts, and to record the decision making that has influenced this information.

A core task during Stage 2 is to undertake **Design Reviews**. It is important that these involve all **Project Stakeholders**, so that their views are incorporated into the **Stage Report**. The **Project Strategies** set out in chapter Six provide more detail on how **Design Reviews** can be used to engage **Project Stakeholders** on key issues.

Stage Report

The **Stage Report** records all of the relevant decision making during the stage for the future. On larger projects it is not uncommon for project team members to come and go, and for new team members to question the basis of the design. The **Stage Report** acts as a reminder of what decisions were made in relation to the design and the Project Strategies, why they were made and who was party to them, recording what options that were examined and why one was chosen over another. For example, if the sign-off process includes a formal **Design Review**, the **Stage Report** might include a section recording any comments made and the design team's responses, so that everything is captured in the single document.

The sign-off period can be standalone, or it might occur in parallel with the start of the next stage. On larger projects, it may be inefficient to stand down a large design team between stages, while waiting for the **Stage Report** to be signed off. The client and design teams should therefore agree if any work should progress into Stage 3 before the Stage 2 **Stage Report** is signed off. .

A **Stage Report** is not usually produced at the end of Stage 4. However, some clients may request or require a report to record the decisions made during the stage.

Tasks

Information is only as good as the data and tasks that underpin it. Failing to undertake certain tasks during Stage 2 can make Stage 3 more difficult. Conversely, undertaking too many tasks (which is easy to do) can divert effort away from achieving the stage outcomes. The tasks required at Stage 2 to underpin the **Information Requirements** should be clear in the **Responsibility Matrix** developed at Stage 1. These tasks should ensure that the **Architectural Concept** is as robust as possible and is aligned to the Cost Plan.

It is beyond the remit of this Overview Guide to consider what these tasks might be. A core consideration is whether rules of thumb can be used rather than detailed calculations. For example, a practice which has delivered many office buildings might not need to calculate stair sizes or toilet numbers as they can draw on their experience to determine what is likely to be required. They may also be able to take a view on likely riser sizes and plant locations, and have an understanding of structural grids that work, requiring fewer contributions from engineers and less BIM information as a result. Conversely, a client may wish these matters to be unambiguous and require the architect to calculate stair sizes and toilet numbers, and the engineers to confirm column sizes, bracing strategies and plant room and riser schedules, underpinned by calculations. There is no right approach. However, it is important that the project team understands the basis of the concept design information and the tasks underpinning it, and that the lead designer is confident that the tasks being undertaken are sufficient to deliver the stage outcomes.

Specialist Consultants

The increasing number of specialist consultants involved in projects, including acoustics, fire and façade engineers, further complicates the challenge of task setting, A range of industry innovations, including the circular economy, lifecycle costing and offsite construction, now require new expertise within the team. It is therefore important for designers to identify when they are at the limit of their expertise in a particular area and when additional experts are required, either as specialist consultants or as new/newly trained staff within design consultancies.

Determining the need for specialist consultants is a key task at Stage 1. For example, the appointment of an acoustician might be essential for a school next to a railway line.

At Stage 2, specialist consultants should develop their **Project Strategies**, focusing on, as a minimum, any aspects impacting on the **Architectural Concept** or the **Cost Plan**.

Information Requirements and the Procurement Strategy

The **Procurement Strategy** determines when the contractor will become involved in the project and who employs the design team. It has no impact on the Stage 2 **Information Requirements**, which confirm that the **Architectural Concept** meets the requirements of the **Project Brief**. However, on some projects, information confirming buildability, **Site Logistics** and other construction-related matters, such as the adoption of modern methods of construction in the **Construction Strategy**, will be more comprehensive and robust if the contractor is appointed and involved at Stage 2.

Client considerations in Stage 2

- Deciding whether the client or design team will determine how tasks are split between Stage 2 and Stage 3
- Determining how innovative the workflow will be – whether it will be ground breaking or traditional - and how experienced the design team are in new ways of working,
- Establishing whether 2D and/or 3D information formats are required to inform client decision-making.
- Determine the need for specialist consultants on the project and whether light touch or comprehensive involvement is required.
- Identifying what tasks are needed to ensure the **Architectural Concept** is coordinated with the **Strategic Engineering** requirements and aligned with the **Cost Plan**.
- Deciding who will produce the **Construction Strategy** at Stage 2.

Stage 3: Spatial Coordination

The focus for Stage 3 information, after the **Architectural Concept** is approved by the client, pivots towards **Engineering Analysis** – developing the detail of the architectural proposal via **Design Studies**, developing the **Project Strategies** and testing the **Cost Plan** further. At this stage, the engineering output is geometric, such as column and beam dimensions or ductwork sizes, and calculations or analyses are not usually required.

The **Planning Application** is usually submitted at the end of this stage, based on **Information Requirements** set by the local authority. The timing of the **Planning Application**, particularly where this is undertaken using information from a mid-stage gateway is one the main information considerations at Stage 3 Another key consideration is whether the **Procurement Strategy** needs **Employer's Requirements** to be produced and, possibly, some technical design information to be created in tandem, as part of this documentation.

Submitting a Planning Application during Stage 3

The optimal time for submitting a **Planning Application** is at the end of Stage 3, once design information is **Spatially Coordinated** and at the level of detail expected by a planning authority, the **Stage Report** has been signed off and the **Planning Application** documents have been prepared. A comprehensive and coordinated application will facilitate an efficient planning process. At the end of Stage 3, For example, energy analysis, daylighting calculations and other aspects, such as plant room requirements, will be coordinated.

It is common for **Planning Applications** to be submitted midway through Stage 3, in order to gain early clarity on a proposal's feasibility, including the scope of any section 106 contributions. When a **Planning Application** is being submitted at a mid-stage gateway, there are a number of questions that need to be considered:

- What **Design Studies** need to be completed? For example, detailed studies of the elevations.
- What **Engineering Analysis** might be required to underpin the proposal? For example, an energy strategy.
- What contributions from specialist consultants are required? For example, from a sustainability adviser.
- How will the increasing amount of multi-disciplinary information required be integrated into the Stage 3 **Design Programme**?
- How does the mid-stage **Planning Application** submission date relate to the completion of Stage 3 in the **Project Programme** when the assembling of information may take some time?

A poorly managed mid-Stage 3 **Planning Application** can result in amendments being required later in the **Project Programme**, after Stage 3 is completed. This option is therefore only recommended for experienced clients who know what information is required, and for seasoned design teams who know empirically what design development needs to be undertaken. Ultimately, a mid-Stage 3 design is not **Spatially Coordinated**, and while risks to the deliverability of the project can be mitigated, they cannot be eliminated entirely.

Client considerations in Stage 3

- Establishing whether the cost circumstances or programme certainty requiring a **Planning Application** to be submitted before the end of Stage 3.
- Determining whether the project team have the experience necessary to submit a mid-stage **Planning Application** and to split the Stage 3 tasks accordingly.
- Identifying which tasks need to be undertaken and information gathered to provide a robust **Planning Application**.
- Establishing how the **Procurement Strategy** influences the interface between Stages 3 and 4, how this is defined in the **Project Programme**, and whether any early **Information Requirements** are clear.

Stage 4: Technical Design

Although the Stage 4 outcome is clear and unambiguous (i.e. all design information required to manufacture and construct the project completed), this stage presents the biggest information challenges. There are a number of complexities that need to be considered when defining the Stage 4 **Information Requirements**:

- Will the design team produce **Descriptive Information** or **Prescriptive information**?
- What modern methods of construction will be used?
- How will the shift towards digital design impact on the information required?
- How will the **Procurement Strategy** impact on the **Design Programme**?

Prescriptive Information vs Descriptive Information

As the design information develops, the level of **Prescriptive Information** increases as shown in Figure 3 below. During Stage 4, the design team must produce **Prescriptive Informatio**n for use in construction on site, or **Descriptive Information** for use by specialist subcontractors in the design and manufacturing or construction of particular **Building Systems**. When deciding whether the design team should deliver **Prescriptive Information** or **Descriptive Information** for a particular **Building System**, the following factors should be taken into account:

- **Descriptive Information** is already industry standard for many **Building Systems** (including piling and aspects of building services, such as building management systems).
- **Prescriptive Information** is essential where the contractor must adhere to a specific design, perhaps as a requirement of a **Planning Condition** (such as the use of a specific brick or window system) or because the client and/or design team wish to determine design quality (for example, the balustrading, doors and finishes in an entrance lobby).
- Some **Building Systems** tend towards **Descriptive Information**, including façades and mechanical services, to allow a specialist subcontractor to generate an innovative solution.
- There are a small number of **Building Systems** where the design team produce **Prescriptive Information**, but where the **Manufacturing Information** then needs to be produced by a supplier. For example, the architect might specify and set out the cubicles in a toilet, with the supplier requiring shop drawings for the elements of the cubicles to be made.

- For some **Building Systems** for which **Prescriptive Information** has traditionally been used, **Descriptive Information** can also be issued at Stage 4. This provides the contractor with a degree of flexibility within clear quality and safety parameters when determining the final product supplier.

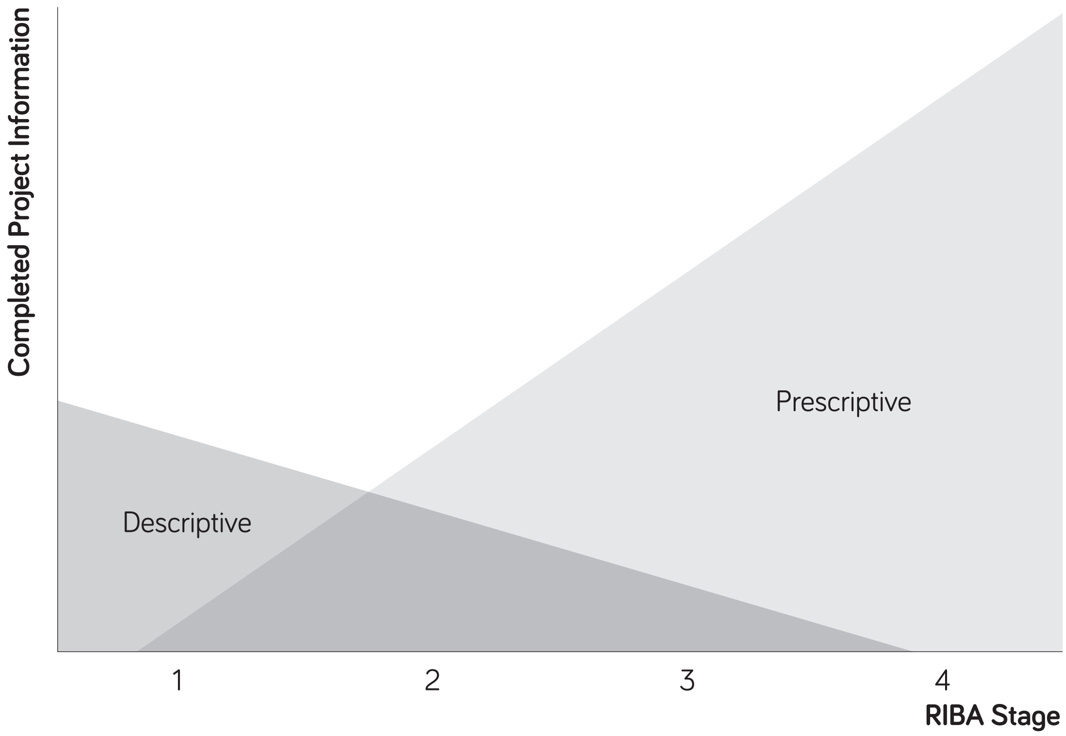

Figure 3 Descriptive and prescriptive information

Guidance on **Information Requirements** for structural engineering is being developed by the Institution of Structural Engineers. For building services engineering, BSRIA has produced a comprehensive document, BG 6: *A Design Framework for Building Services* (5th edition, 2018), that sets recommendations for level of design detail for each stage of the RIBA Plan of Work. There is currently no authoritative guidance on the use of descriptive specifications in architecture.

A common misconception is that **Descriptive Information** is used by the design team to limit workload. This may be the case where the design team's commission ends at a particular stage. However, where the design team are appointed through all of the design stages the decision to produce **Descriptive Information** is likely to be time neutral. This is because the scope for the specialist subcontractor's design needs to be defined, interfaces drawn and a specification produced. Furthermore, meetings must be held with those tendering for the work, workshops conducted with those who are successful, and the designs of the successful tenderer reviewed. However, the use of **Descriptive Information** will increase the challenge of coordination for the lead designer, particularly if two descriptive packages interface with each other. The specialist subcontractors' design costs, which will be built into their tender returns, also need to be considered.

Transforming construction

As contractors increasingly adopt modern methods of construction, Stage 4 deliverables are changing. Some of the more progressive new methods, such as volumetric modular, need to be embedded into the design and transform **Information Requirements** from Stage 2. The RIBA Plan of Work acknowledges this shift by encouraging the preparation of a **Construction Strategy** at Stage 2. This allows the design team to consider at an early stage which modern methods of construction will be appropriate for the project, given that, in many instances, the contractor may not be part of the project team until a later stage.

Many clients are embracing design for manufacture and assembly (DfMA). Organisations such as the Supply Chain Sustainability School are sharing knowledge and skills across the industry to those who are interested in this methodology.

See: https://www.supplychainschool.co.uk/topics/offsite/design-manufacture-assembly/

Changing deliverables

Stage 4 is set to evolve over the coming years – the project team needs to be alert to the depth and breadth of the disruption that will occur. In the future, the core decisions around Stage 4 **Information Requirements** will shift beyond the 2D/3D debate and setting the **Construction Strategy**. The construction industry is starting to use programme approaches drawn from the manufacturing industries geared towards repetition, including different software and more stringent change control processes and product lifecycle management. This way of working is starting to be used for manufacturing whole **Building Systems**, not just individual construction products, leading to increased standardisation and repetition in large parts of buildings, although not in every sector. The increasing use of robotics for assembling buildings, both in factories and on site, also raises new considerations and information requirements, including the kinematic studies required to analyse robotic assembly.

Client considerations in Stage 4

- Defining which **Building Systems** will be specified by the design team to **Descriptive Information** and which to **Prescriptive Information**.
- Determining the most appropriate modern methods of construction for the project and establishing who has the experience to advise on and/or determine which should be adopted.
- Establishing what type of information is required: traditional 2D details and setting out, or 3D data-rich information?

Stage 5: Manufacturing and Construction

Handover information

One of the biggest transformations driven by BIM level 2 has been the ability to extract data that can be used for maintaining and operating an asset from the **Manufacturing Information** and **Construction Information**. This has primarily been driven by the Construction Operations Building information exchange (COBie) schema, which sets the data attributes for each project stage. Further developments in using data for **Asset Management** are transforming project handover information well beyond the traditional 'as-constructed' information and the health and safety file and fire safety information required to comply with CDM and Building Regulations.

Project team members must now consider what **Asset Information** is required at handover; those receiving it are not always ready to use it effectively, and those delivering the information required to construct a building often do not have expertise in providing the information that will transform **Asset Management** or **Facilities Management**. Information deliverables must therefore be defined at the outset, so that the relevant information can be incrementally developed as the project progresses. The information produced at the end of the design and construction process can provide significant benefits throughout the period the building is in use. However, in order to achieve the outcomes required, the delivery requirements for **Asset Information** need to be defined accurately and specifically.

Information Requirements in the RIBA Plan of Work at Stage 5 include:

Building Manual

A **Building Manual** provides the means for a building's owner and/or user to maintain the building effectively and safely. It might include guides to using equipment effectively; for example how to operate the heating system and any energy devices, such as photovoltaics. By law, it must include the **Health and Safety File** and **Fire Safety Information**.

Health and Safety File

The preparation of a **Health and Safety File** is a requirement under CDM 2015 that must be handed over to the client before the client occupies the building. It must contain relevant information about the project which should be taken into account when any construction work is carried out on the building after the current project has finished. Information included should only be that which is needed to plan and carry out future work safely and without risks to health. See the Health and Safety Executive's guide to CDM L153 for more information: https://www.hse.gov.uk/pubns/books/l153.htm

Fire Safety Information

Under Regulation 38 of the Building Regulations, **Fire Safety Information** must be handed over to the responsible person not before the completion of the construction work, or the date of occupation of the building or extension, whichever is the earlier. This information relates to the design and construction of the building or extension, and the services, fittings and equipment provided in or in connection with the building or extension which will assist the responsible person (owner client) to operate and maintain the building or extension with reasonable safety.

Verified Constructed Information

A complete set of the **Manufacturing Information** and **Construction Information** is not typically issued at handover, instead, the design team issues **Asset Information** (sometimes known as 'as-constructed' information) for the building. This comprises the last set of information that the design team issued to the contractor for construction. 'As-constructed' information is a misleading term as it is unusual for the information issued to have been verified against what was actually built on site, covered up works in particular. Floor area is sometimes checked post-handover in the commercial sector, so that the surveyors' measurements can be used to calculate the rent to be charged to tenants. Laser measurement devices allow these spot checks to be undertaken easily, and point cloud surveys can be used to compare the completed building against what should have been built.

Inspections throughout Stage 5 are required to confirm that the contractor is meeting **Construction Quality** requirements. At the end of Stage 5, there are a number of means of verifying construction information, including a visual inspection to determine that the building has broadly been built as per the last set of information issued, a dimensional survey to ratify that it has been constructed as modelled (this might necessitate adjustments to the model if this is not the case), through to a 3D laser scan that can be compared with the federated model. Clearly, the costs associated with the different options vary and each client needs to determine how accurate they need this information to be, and who will undertake the work. Circular economy principles point towards more information being required at the end of a building's life, so that its **Building Systems** can be repurposed effectively.

CAFM Systems

Computer-aided facilities management (CAFM) systems allow those responsible for the maintenance of a building to manage maintenance and repairs, both reactively and pre-emptively. Many CAFM systems are not currently capable of managing BIM information, but this will happen in time. CAD information derived from the model can be used to manage changes to the building, such as partition alterations or furniture moves. To be effective, this information needs to be updated as changes are made. Clients need to consider who will provide this resource during the life of the building.

Asset Management information

In CAFM systems, building assets need to be tagged to record the information required to manage them, ranging from serial numbers through to manufacturers' maintenance cycles. It is crucial for the client to consider which building assets need to be tagged, and whether a particular classification or referencing system will be used, perhaps to align with an existing estate.

Digital Twin

A **Digital Twin** is a digital replica of a building or part of a building, that can mirror the way the actual building performs. A **Digital Twin** might can be a simple a model of the electrical or mechanical systems that can be digitally tested or could be a complete working digital building. A **Digital Twin** should be updated over the course of a building's life, whenever changes are made to the building – perhaps to enable new uses or in line with **Asset Management** tasks. The core goal of a **Digital Twin** is to enable the actual performance of the building to be assessed against the predicted performance, allowing **Building Systems** to be honed appropriately or **Feedback** to be provided for future projects. Predictive analytics can be used to determine when plant is operating poorly, allowing pre-emptive maintenance. Gathering data from a number of **Digital Twins** allows connected networks to be considered, enabling broader networks to be improved and allowing design criteria to be adjusted for future projects across a programme or estate.

Client considerations in Stage 5:

- Considering how the building will be maintained and operated.
- If so, determining what **Asset Information** needs to be delivered at Stage 5 in order to do so.
- Deciding whether data is required for **Asset Management** or **Facilities Management** or to demonstrate that better outcomes have been achieved.
- Establishing what data is required at the handover of the project.

Beyond level 2: from BIM to digital

It was always anticipated that once level 2 BIM had been assimilated and absorbed, the next target, level 3, would be conceived by the UK government, creating a new objective for the construction industry to work towards.

However, as level 2 BIM matures, the UK government has moved it's support away from the concept of BIM level 3 to enabling a Digital Built Britain. The Centre for Digital Built Britain has identified a number of digital construction technologies and processes beyond BIM such as AI, the Internet of Things, **Digital Twins** and offsite manufacturing initiatives as future trends to be investigated. As these technologies mature at their own pace, clients will need to keep abreast of developments to understand how to define the workflow of the design team and contractors , and use their asset efficiently. (www.cdbb.cam.ac.uk/).

The design team are also innovating. The use of virtual reality during Stage 2 to review design ideas and processes is becoming business as usual, reducing the requirement for 2D information as a contractual deliverable. The use of parametric and generative design is increasing, allowing options to be tested more rigorously, with rules-based design becoming more commonplace. Those undertaking the lead designer role are shifting away from clash detection, towards using digital for proactively coordinating the design. The planning system still requires **Planning Applications** to include traditional 2D deliverables, but this too may change in time.

As many in the industry contemplate how to embrace and adopt these transitions from traditional design and construction processes, the next wave of technologies is already upon us. The challenge for those considering how to incrementally develop their workflow in future will be in determining which of the many digital tools and technologies will be most appropriate for how they want to work. Rates of innovation and adoption will vary between project and design team members. Not every architect wants to leverage the power of parametric modelling and not every client requires **Asset Information**; although every client would welcome better performance of their buildings.

As the choice increases, the challenge will be to select the tools that will create the most immediate - and whole-life - benefits for those involved in the process. At some point, disruption will occur. Every other industry has seen pending disruption drive greater urgency in developing new business models to unlock value from new processes.

It is likely that the coming change will be focused around the following technologies:

- **Rules-based design**
  Design automation is possible where detailed rules for spaces, adjacencies and building systems can be determined by repeat clients. If designers can conceive how to utilise this technology for faster and smarter design processes, the efficiency gains may be

returned to design teams, allowing them to invest resources in providing more valuable outcomes-focused advice to their clients.

- **Generative design**
  By using complex coding scripts, it is possible to generate a multitude of design options instantly. The challenges when using this approach are how to develop software that considers the correct project drivers and quality aspirations, and how to filter a potentially infinite number of design options down to a handful, that can then be developed and concluded using a traditional design workflow.
- **4D**
  Today, 4D (3D plus time) tools are primarily being used by contractors during the tender process to unlock the most efficient way of manufacturing and constructing the building, giving them an edge over their competitors. 4D tools also enable contractors to convince the client team that their proposals are robust and realistic. It is likely that as lower cost 4D software becomes available, 4D reviews will be commonplace at Stage 2, at the point when the design team can demonstrate how their proposals can be constructed. How procurement reacts to this change will be central to unlocking the value of contractors and their supply chains..
- **5D**
  5D enables the addition of the cost dimension to 4D information. Although BIM has shifted Cost Plans towards a revival of bills of quantities (generated from the federated model), a more manufacturing-based workflow points to a future where bills of materials can also be extracted from the federated model.
- **Integrated system analysis**
  At present, one of the biggest challenges for the lead designer is the time lag between the current design proposals and some aspects of engineering analysis. For example, daylighting and energy calculations cannot provide real-time feedback from the architect's model. When available, engineering analysis software that provides real-time contributions to the architectural development will make the design process more accurate, saving design time and, crucially, allowing design decisions to be based on high-quality data.
- **Manufacturing workflow**
  Designing for manufacturing and assembly (DfMA) is rapidly being seen by clients as the way to transition towards faster and more effective ways of making buildings, and by contractors as a way to lower the costs of delivery and reduce risks. However, construction has many years of momentum behind it, being underpinned by suppliers and product manufacturers who have evolved together over a long period of time. Shifting towards greater use of manufacturing requires suppliers to consider the products of the future, designers to look at manufacturing-oriented tools and software and consider transformative design workflows, and clients to be open to innovation, before a track record of case studies exists.
- **Artificial intelligence**
  Artificial intelligence (AI) is unlikely to drive disruption in building construction in the short term due to the disaggregation of information. Machine learning in particular, needs huge volumes of information to detect patterns for supervised learning. Holding large databases of projects will enable clients or designers to begin to use their models and information more effectively, but consistent classification and other factors will be crucial in making AI work. In the long term, it is inevitable that AI will drive new ways of designing, and of making the connections necessary to drive better client outcomes.

Other technologies, such as blockchain, are also emerging as innovations that will transform how the industry will work in the future. However, if new solutions simply continue to be plugged into traditional design and procurement models, disruption is unlikely. Disruption requires a step change in how project teams brief, design and make their building, resulting in better outcomes, such as faster design, faster manufacturing and construction, smarter ways of designing and better information at all project stages.

Everyone in the project team needs to be alert to the trends and nascent technologies that will result in better **Project Outcomes**. Determining when a technology or tool is sufficiently robust to be used is a core challenge, as it is difficult to integrate new tools into live projects. At the start of a project, it is worth considering how new tools or technologies might improve the **Information Requirements** for each stage. A training programme might be required to bring everyone up to speed before Stage 2 commences, but the time needed for this will be offset by better **Project Outcomes**.

Towards a Transformed Construction Industry: Programmes, Practice and Research, by Dale Sinclair

10 CHAPTER TEN

Towards a Transformed Construction Industry: Programmes, Practice and Research, by Dale Sinclair

As clients become better informed – as a result of the UK government's level 2 BIM strategy, the world wide web and in house experts to deal with sustainability or modern methods of construction – their expectations are also increasing. Although the RIBA Plan of Work was established to make individual projects more effective, professional clients now expect greater consistency of outcomes between one project and the next by using programme approaches to drive further efficiencies where required, such as on reducing energy costs or improving the user experience.

The demands of the well-informed client are compounded by a wave of new trends and innovations gathering momentum by the day.

In this context, those who fail to undertake **Research and Development** initiatives to enable them to embrace innovations – to transform their design process, become more efficient or build their knowledge base – risk finding it increasingly difficult to compete against peers who are transforming the way they work.

The wide range of trends currently influencing the design of buildings that project teams should be abreast of include:

- **Post Occupancy Evaluation** and the need to improve building performance
- the circular economy and the drive to minimise the use of the planet's resources
- DfMA and other modern methods of construction that are transforming traditional construction methodologies
- BIM, which is progressing beyond a narrow focus on the geometry in the federated model towards the use of digital tools that will leverage data more effectively as part of an evidence-based design process
- new information focused on the more effective operation, maintenance and use of buildings
- parametric and generative design processes driven by the scripting skills of many recent graduates to develop new ideas for their projects
- ethical project considerations which might range from the source of construction materials to ensuring that the local community is properly engaged on a project from the start
- the myriad of digital trends , including artificial intelligence in its various guises, such as machine learning.

The breadth and depth of knowledge required to keep up with these trends can require **Research and Development** resources and initiatives. But when the market for fees is competitive and client expectations are high, it is difficult to allocate the resource for **Research and Development** at the same time as improving design efficiency and the bottom line – even though it might be the differentiator that wins more work. The commitment to **Research and Development** requires a leap of faith.

Practices and clients must consider the following aspects of **Research and Development** carefully:

- Which trends are client groups interested in?
- How can these be incorporated into proposals?
- What digital tools can add value to the design process and how might they be used on specific projects?
- Are new skills required in the practice to increase knowledge or promote the use of state-of-the-art tools?

Deciding whether investment in **Research and Development** should be made on- or off-project is a core consideration. Introducing innovation into projects can help to offset investment costs. However, the demands of delivering designs, and the corresponding information, to the required **Construction Quality** and to increasingly fast-paced **Project Programmes** can mean that the time and resources for **Research and Development** activity must be undertaken and resourced outside projects.

Trends that clients and practices might consider from a programmatic perspective are detailed below.

Project Outcomes

Buildings have been delivered for clients for centuries, but the process and focus has evolved over time. Design teams were formed in the early twentieth century as **Building Systems** became more complex. Project managers brought greater focus on the **Project Programme** at the end of the last century and, at the beginning of the twenty-first century, BIM placed greater emphasis on improving **Asset Management** and **Facilities Management** outcomes. Now, the overarching focus for building projects is better **Project Outcomes;** that is how buildings perform for their users – making people happier at home, achieving better exam results in schools or facilitating faster recoveries in hospitals.

See the *RIBA Sustainable Outcomes Guide* for further advice on building performance related **Project Outcomes**.

At this point in time, **Building Contracts** are framed around the delivery of the physical work. However, the increasing focus on **Project Outcomes** suggests that, in future, obligations to meet key metrics for the building, such as improving on a specified energy target, may be included.) In the future, if rent is calculated, not by the square metre, but by how building performance enhances productivity then client's may pass this requirement down to the project team in their contracts. **Project Outcomes** will increasingly blur the contractual boundaries between handover and the effective use and positive impact of a building on its users.

Quality Aspirations

The three principles of procurement have always been time, cost and quality. Convention has always dictated that two of these drivers can be delivered by the **Procurement Strategy**, but not all three. The ability of design and build forms of procurement to deliver favourable time and cost outcomes is now a deep-rooted belief for many clients. One issue is that the definition of quality covers a wide range of factors from the materials and

Building Systems that shape the look and feel of building, to ensuring that the construction has been carried out in accordance with the relevant standards and codes, and ensuring that the building performs as required. Who is responsible for each aspect of design quality is a key consideration. A number of recent project failures, including the Edinburgh schools failures and the Grenfell Tower tragedy, have brought the quality agenda back into sharp focus and there is an urgent imperative to achieve better **Quality Aspirations** with all forms of procurement.

The following measures for the project team to improve **Quality Aspirations** are currently under consideration:

- establishing a 'golden thread' that runs through the whole design process so that it is clear who is responsible for each aspect of the design and for the **Final Specifications** for each **Building System**
- considering the use of **Prescriptive Information** for core quality aspects to avoid any ambiguities in relation to quality and safety, particularly for core **Building Systems** (this may need to be a contractual requirement in any case to ensure that materials scheduled in the **Planning** consent are used)
- reviewing and commenting on the design work of the construction team, including the **Final Specifications** of products
- undertaking inspections of construction throughout the duration of the project
- defining quality beyond the constraints of cost, to encompass sustainability and health and safety considerations.

Project Programme

One of the four core goals of Construction 2025, the UK government's Industrial Strategy for Construction, was to reduce the time taken to deliver projects by 50%. This target is difficult to achieve with current design and construction workflows and current planning processes. However, it may be possible to reduce **Project Programme** timescales by implementing the following measures while carefully considering their risks:

- The timescale for achieving the **Planning** consent necessary to allow a start on site can be in excess of six months from submission of a **Planning Application**. A means of giving clients greater clarity regarding the acceptability of the proposals prior to achieving consent needs to be found to reduce these timescales. For example, agreement in principle to the proposals for the site (including areas and uses) and to the level of developer contributions would offer the client greater certainty in commissioning the design team to prepare more detailed information or allowing enabling works to commence.
- Ways to reduce the number of iterations of the design team's model by better integrating the federated model with **Engineering Analysis** software must be developed. The development of software may also allow more accurate data to be produced at Stage 2, rather than relying on information generated by rule of thumb, further reducing Stage 3 timescales as a result.
- A reduction in Stage 4 timescales could also be made possible by a shift towards object-based modelling or the ability to integrate construction and/or fabrication information into the model at an earlier stage. Clients therefore need to consider how the effective application of more accurate information might improve the procurement process.

- The shift from construction towards manufacturing-based processes has the potential to significantly reduce the overall project programme, especially on groups of projects, but will require new, larger sub-assemblies to be conceived and the existing off-site industry provision to be scaled up.

There are no right or wrong approaches to reducing **Project Programmes**; however, these measures do require design and construction teams with the right collaborative behaviours and willingness to reduce project timescales.

Design Programme

Design Programmes will evolve in the future to reflect improvements in the integration of the design team's digital information as more effective **Design Review** processes, geared to real-time viewing of the design team's model, make the design process more efficient.

Workflow geared towards a more effective synthesis of **Engineering Analysis** software with the architect's model will reduce the number of design iterations, for example, by allowing architects to make more accurate and earlier judgements on the requisite percentage of glazing. Object-based modelling will transform the way in which projects are integrated into workflow.

Digital Execution Plan (DEP)

The **DEP** represents an evolution of the BIM execution plan (BEP) promoted by UK BIM level 2. The **DEP** is the core document for setting out how the design team will use digital tools on a project. A BEP has two focal points: first, it allows the design team to demonstrate that they have the relevant experience, skills, software and hardware to produce the **Information Requirements**; and second, it sets out how they will use these tools to undertake the project, including details on collaborative workflow and file naming.

The **DEP** begins to consider issues beyond the modelling strategies, looking at the connectivity of all of the software used on projects, including that employed in **Engineering Analysis**. The ultimate goal for the lead designer is to reach the point where **Engineering Analysis**, or other software used by the design team, is integrated seamlessly into the federated model, giving real-time feedback on proposals as they are developed.

Significant benefits will result as the design team improve the connectivity of their models and their software packages. It is also crucial for the client and construction teams to consider how they might change their working methodologies to make the project workflow more efficient. For example, the client team might undertake **Design Reviews** using 3D rather than 2D information, which would require training in how to use new tools. Many construction teams are ahead of the digital curve but, given the current speed of change, more can always been done; for example including using new software tools to allow setting-out dimensions to be taken directly from the design team's model (avoiding the need for dimensions to be added onto a separate 2D layer), or employing robotics for use cases, such as demolition, MEP first fix or setting out of partitions.

Critically, no one in the project team will be immune to the extensive changes that will take place in the future, although some clients may fight to keep existing processes in place until more pilot projects or processes have been tested and verified. This underlines the increasing need to agree the **DEP** at the outset of a project so that it is clear which digital tools will be used, allowing workflow diagrams to be created to inform all parties.

Construction Strategy

While many infrastructure and public sector clients are leveraging the benefits of early contractor engagement, private sector clients tend to value the benefits for the **Quality Aspirations** of managing the design team and the design process through Stages 2 and 3 until Planning consent is secured. This approach allows different construction teams to tender on the basis of one- or two-stage design and build tenders, bringing value to a number of **Building Systems**, where they might have a technical advantage over their competitors, or can bring more effective logistics that will reduce the **Construction Programme**, without diminishing quality and performance.

With greater uptake of modern methods of construction, a core future dilemma for clients will be determining the most appropriate form of construction. For example, volumetric construction requires early decisions and discussions with potential fabricators who may have manufacturing constraints such as wall thicknesses or unit sizes. Similarly, the increasing use of offsite manufacturing points to larger sub-assemblies being used on buildings in the future, from the increased use of toilet pods to pre-manufactured building services modules. Where a specialist subcontractor is required to develop these aspects, a 'chicken and egg' scenario is created: the design team is unable to complete their **Architectural Concept** until the fabricator is known and the client team is not prepared to enter into a **Building Contract** until the **Architectural Concept** has been concluded. Finding an effective means of resolving this sequencing conundrum will be crucial to the future of procurement.

There are major challenges to be overcome in creating the construction materials of the future. Many architects are looking to use new materials on their projects to deliver better performance or a new design language. However, under a design and build contract, the construction team may be unwilling to take responsibility for a new and untested material. **Research and Development** must be undertaken to develop a new generation of materials that are lighter, have good insulating properties yet are resistant to heat absorption, are safe to install and maintain and resistant to fire while proving, that they will remain robust for the life of the building.

Cost Plan

Most design teams are well versed in producing a federated model of projects but, for some reason, the uptake of 5D BIM (cost) linked to these models has been slow. Those undertaking the lead designer and cost consultant roles need to consider how to use the data from the federated model more effectively in creating the **Cost Plan**. A core issue with 5D BIM is that any software tools can only read the data from the aspects of the project that have been modelled. In the short term, until workflow incorporating 5D BIM is better established, those wishing to use such technologies will need to consider how the Cost Plan, federated model, **Outline Specification** and the modelling of the different **Building Systems** can best work together as the design progresses.

Outline Specification

An **Outline Specification** fulfils a number of purposes. First, it conveys to the client team the quality of the proposed finishes, presented via sample boards at a client's Design Review. Second, it allows the cost consultant to align the **Cost Plan** with the level of specification appropriate to the design team's **Quality Aspirations** for each **Building System**.

Many **Building Contracts** have been shifting away from **Prescriptive Information** and towards **Descriptive Information** in recent years. This approach offers the construction team maximum flexibility in determining the products to be used on a project and how these products can be brought together. Conversely, it pushes a great deal of coordination work to the end of the design process. The client therefore needs to be certain that the construction team has the requisite experience to specify products that will meet the demands of the **Descriptive Information**; for example, the compatibility of a fire door with its specified ironmongery.

As designers begin to use object-based modelling more and more widely, a return to **Prescriptive Information** in specifications is emerging. This programmatic and pragmatic approach to specification can be effectively leveraged by repeat clients and design teams alike. Consistent use of products from one project to the next has the following advantages:

- allows greater cost certainty
- minimises interface issues between different **Building Systems**
- ensures that the best possible digital information can be leveraged from the outset
- reduces time spent researching materials for individual projects
- reduces maintenance issues due to **Feedback**
- minimises the possibility of errors when materials are used together for the first time.

Once the comprehensive specification work has been undertaken and the right products with the optimum balance between cost, aesthetics, sustainability, safety, buildability and maintainability have been chosen, they can be locked down and specified at an earlier stage. 5D technologies can schedule quantities earlier than industry norms, giving clients a clear understanding of costs earlier in the process. This approach raises the question of who takes responsibility for the products – the design team on the project or those who have developed the programme-wide library of products? Clients need to consider whether the benefits of repeatable and consistent products outweigh the benefits of the construction team specifying later in the design process, paying particular attention to where whole life criteria such as better safety, energy use and maintenance, as well as the visible products on a project, would take precedence over reducing capital costs.

Building Systems

The architecture of any project focuses on a building's spaces and how they effectively come together to form a cohesive whole that delivers the best functional relationships and, in due course, the best **Project Outcomes**. While certain **Building Systems**, such as wall linings, ceilings and lighting systems are easily visible, many **Building Systems**, usually building services such as ducts, risers and major elements of plant, are unseen by a building's user. Those easily visible systems will likely need an enhanced level of detail if a client is reviewing a concept design in a virtual reality walkthrough in Stage 2. Some **Building Systems** can be designed independently; others have numerous interfaces and relationships with other **Building Systems**. Some can be designed in isolation; others require iterations of the architecture and **Engineering Analysis**; for example, the building façade design and the specification and percentage of glazing can require a number of iterations to balance energy needs with aesthetics and fire safety.

Facilities/Asset Management

Bridging the gap between information used for construction and the information required for **Facilities Management** or **Asset Management** purposes has proved challenging, with

COBie, an American schema, used as a short term vehicle to secure a consistent structure and attributes for this data. However, software systems are now creating more seamless systems to allow information to progress from its project-related (manufacturing and construction) purposes to fulfil **Asset Management** functions. Crucially, these systems now allow both geometry and data to be integrated within a single system. Furthermore, the advent of the **Digital Twin** is not far away. **Digital Twins** have been used in a number of advanced manufacturing industries for several years and allow project simulations for energy performance purposes, and other factors, for comparison with live 'in use' information. These real time feeds allow those using the building to understand where a building's performance is deviating from what was planned, permitting adjustments to be made. In addition, this feedback loop allows designers to gain a clearer understanding of how their buildings are working in practice, and to hone the design process accordingly. Crucial building maintenance, aligned to predictive analytics, can be undertaken proactively rather than allowing a sub-par item of building plant to underperform until failure.

Conclusion

By understanding the **Project Documents** and **Project Strategies** that are core to the RIBA Plan of Work, it is possible for client, design and construction teams to consider ways of developing templates for these documents that can be rolled out from one project to the next. At present, a core challenge is the pace of change. Many clients have their own **Responsibility Matrix** or **Information Requirements**, but at what point would they be comfortable changing the balance of **Descriptive** or **Prescriptive information** provided by the design team and when might they shift away from 2D deliverables to place greater emphasis on the model and its data? Clients can draw the line on how progressive they seek to be, design teams can choose how far to push and promote their innovative workflow and construction teams can feel confident that modern methods of construction will be embraced by the project team.

Innovation can only be fostered if the construction industry shares experiences, both good and bad, with illustrative case studies to promote the ever changing line that indicates best practice as more design automation takes place and technologies such as machine learning become more prevalent.

The notion that we will reach a new steady-state environment in the future is ill-founded. The breadth and depth of the trends that will influence the future point to an era of continuous improvement. Improvements to the project process and information deliverables that bring about true step changes in how buildings are designed, manufactured and constructed. Improvements to design that result in better outcomes for users. **Research and Development** will be crucial in this era of whole life learning. Those who acknowledge these facts will prosper. Those who strive to maintain the status quo, without making significant efficiency improvements elsewhere, will find it difficult to engage with new initiatives.

In this environment, the RIBA will continue to monitor how the RIBA Plan of Work is being used. The RIBA believes that this updated version of the Plan of Work will bring greater consistency of use on current projects, while allowing clients and practices to focus on the efficiency improvements that will gradually result in a transformed construction industry.

Dale Sinclair, Director – Architecture, Technical Practice, AECOM

PART 4

Glossary

Glossary and guidance on RIBA Plan of Work terms

Term/task	**Definition** (guidance is included in grey boxes)
Aftercare	Initiatives aimed at making the use of the building, or subsequent buildings, more effective, including improving the performance of the **Building Systems**. Tasks may include gathering **Feedback** on **Project Performance** and building performance from **Post Occupancy Evaluations**.
Approved Plans	Plans of a building that have been approved as part of a **Building Regulations Application**.
Architectural Concept	The architectural vision for the project, developed in Stage 2, which may start as several options that are tested against the **Project Brief**. As the initial ideas solidify, following **Design Reviews** with the client and other stakeholders, **Strategic Engineering** aspects are incorporated into the **Architectural Concept** before it is concluded and forms part of the **Stage Report** at the end of Stage 2.
	The **Architectural Concept** is the backbone of the Stage 2 design process. The architect conceives and creates ideas in response to the **Project Brief**, according to the **Project Budget** and the demands of the site, including its setting, topography, ecology, shape and historic context. These ideas, which might comprise a number of options, need to be tested at **Design Reviews** with the client and developed by the design team in parallel. Once an idea begins to solidify, engagement with other **Project Stakeholders** can commence. However, the **Architectural Concept** cannot exist in isolation. It must incorporate **Strategic Engineering** considerations, respond to **Project Strategies** and be tested against the **Project Budget** by producing a **Cost Plan**. The lead designer must strike a balance between the need to have an **Architectural Concept** that is acceptable to the client and other **Project Stakeholders** while coordinating the **Strategic Engineering** aspects or a **Project Strategy** that impacts on the development of the **Architectural Concept** or the **Cost Plan**.
Asset Information	Information that can be used for **Asset Management** and/or **Facilities Management** purposes.
	Traditionally, information provided by the design team to the contractor has been solely for the purposes of manufacturing and constructing a building. However, in order to maintain their asset, the client team requires further information that covers many different aspects, such as product numbers and manufacturers' details, replacement procedures and timing, serial numbers of air handling units or specifically allocated asset numbers. The most effective means of collating this information is to make sure that the BIM model includes the relevant data structure from the outset and that the information is added as the design progresses. However, some of this information may not be obtained until Stage 5, as subcontractors complete their installations. The client needs to clearly specify their requirements so that the necessary data are compiled as the design and construction phases progress.

Term/task	**Definition** (guidance is included in grey boxes)
Asset Management	The process of developing, operating, maintaining, upgrading and disposing of an asset using the most efficient and effective means. **Asset Management** provides a further overlay to **Facilities Management**, formalising the maintenance regimes for the building. To achieve this, some of the components of the **Building Systems**, such as doors and items of plant, are given asset tags and unique identifiers, allowing maintenance planning to be optimised. Examples of asset management in practice include identifying when smoke seals on doors need to be inspected or when the batteries in escape signage need to be replaced, as well as recording when the requisite work was undertaken.
Building Contract	The contract between the client and the contractor for the construction of the project. In some instances, the **Building Contract** may contain design duties for specialist subcontractors and/or design team members. On some projects, more than one **Building Contract** may be required – for example, one **Building Contract** for shell and core works and another for furniture, fitting and equipment (FF&E) aspects.
Building Manual	A summary of all key information about a building, including the **Health and Safety File** and **Fire Safety Information**, which are regulatory requirements. The **Building Manual** is used to ensure that **Asset Management** and **Facilities Management** are effectively implemented and might contain tasks that the users must consider in order to get the most out of the building. Historically, the **Building Manual** was produced in response to statutory requirements and the need to produce an Operations and Maintenance Manual. Typically, this comprised a large amount of design information, supplemented by information added by the specialist subcontractors responsible for designing the various **Building Systems**, compiled in various volumes and handed over to the client. In many instances, this information was unwieldy or poorly structured and difficult to use. Digital approaches allow the creation of a **Building Manual** that can offer links to information on all of the incorporated products and **Building Systems**, providing useful information on how to maintain them and how to source replacement parts. The client needs to consider what the **Building Manual** should look like and what information will be required beyond the statutory requirements. The design and construction teams must consider how this information can be effectively accessed and stored using digital tools.
Building Regulations	Minimum standards for design, construction and alteration of buildings. See www.legislation.gov.uk/uksi/2010/2214/contents/made.
Building Regulations Application	An application to a building control body (local authority or approved inspector) to check that the proposals for a building meet the requirements of the **Building Regulations**.

Term/task	Definition (guidance is included in grey boxes)
Building Systems	The constituent parts of a building, including, but not limited to, structural systems, mechanical and electrical systems, façade, ceiling, floors and wall systems.
	At Stage 4, the emphasis shifts from the building as a whole to the information required to define each **Building System**. Every building is composed of a series of building systems, each allocated to a member of the design team in the **Responsibility Matrix**. The role of the lead designer involves ensuring that this information is coordinated by directing the Stage 4 design and reviewing and coordinating the work of the design team. On some projects, the design team will issue their **Building System** information as a whole. On others, the construction team will break this information down into 'packages', with a number of **Building Systems** tendered together. In Stage 4 the contractor also sends out tenders to subcontractors as packages, which broadly follow the **Building Systems'** breakdown. Some may be amalgamated, others let as a single item. The design team might issue the 'packages' as a whole or in line with a tender event schedule, which should be clearly set out in the **Responsibility Matrix**. The interfaces between the **Building Systems** will be defined by the contractor. See Uniclass 'Systems' (SS) table for a list of many Building Systems: www.thenbs.com/our-tools/uniclass-2015
Business Case	The rationale behind the initiation of a new building project. The **Business Case** examines and appraises possible approaches or options against the **Project Outcomes** (social, environmental and economic considerations) defined in the **Client Requirements**. On a small project, the **Business Case** might comprise a few pages; however, on larger projects it can run to several comprehensive volumes, prepared by a wide range of consultants and advisers. On some larger projects, the **Business Case** is reviewed and updated beyond Stage 0 until the project is given final approval.
	It is necessary to understand the client's **Business Case** for a project, because **Feasibility Studies** may identify several possible approaches in response to a client's needs. For example, a client may want to increase the desk count in their existing buildings, but studies may show that space rationalisation, an extension or a combination of the two options is more effective than relocating to a new-build project. Conversely, undertaking a financial appraisal to obtain site values may conclude that a new building is a justifiable business approach, although this may conflict with the Sustainability Strategy. The **Business Case** should tease out the pros and cons of different approaches, considering the **Project Risks** and **Project Budget** of each. The criteria for selecting the most appropriate way forward must be considered and different topics might be weighted differently depending on the **Client Requirements**. For example, on one project, adhering to the **Project Budget** might be the overriding criterion, while, on another, design quality might outweigh other considerations.

Term/task	**Definition** (guidance is included in grey boxes)
Change Control Procedures	Procedures for controlling changes to the design and construction following the sign-off of the Stage 2 **Concept Design** and the final **Project Brief**.
	During Stage 3, the design continues to be developed with **Design Studies**, **Engineering Analysis** and **Project Strategies**. This work is termed 'design development' and might involve tweaks to the **Architectural Concept**. Functional changes – for example, relocating a space or changing its size – are not design development and should be dealt with under the **Change Control Procedures**. The RIBA Plan of Work recommends that **Change Control Procedures** formally commence at the start of Stage 3. This allows any proposed changes to the **Architectural Concept** to be properly considered before they are implemented, noting that changes can impact different members of the design team in different ways. It should also be noted that any substantive changes to the **Project Brief** during Stage 2 also require client instructions. Examples of substantive changes would be increasing the area of office space required by 20% or adding a new lecture theatre to the **Project Brief**. The impact of these changes, including the need for additional fees or an extension to the Stage 2 **Design Programme**, will depend on when they are instructed and how significantly they impact on the design work undertaken to date. As the project progresses into Stage 4 and towards construction at Stage 5, the cost of change increases as more design information needs to be updated and, ultimately, there is a point where change impacts on work that is under way on site, as figure 4 illustrates.

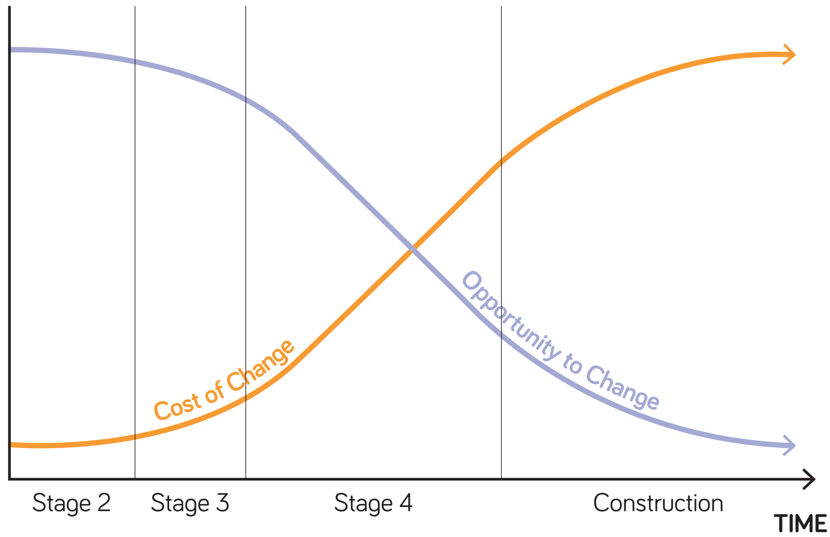

Figure 4 Cost and opportunity for change

Term/task	Definition (guidance is included in grey boxes)
Client Requirements	A statement or document that defines the **Project Outcomes** and sets out what the client is seeking to achieve. It is used to develop the **Business Case**, which examines any viable options that meet the **Client Requirements**.
	The **Client Requirements** set out what the client is trying to achieve. For example, two residential clients might have the same **Spatial Requirements** (say, a new kitchen and an extra bedroom); however, one might be about to sell their property and is looking to increase its sale price while the other has a new baby and wants to consolidate their position close to good local schools. While the **Spatial Requirements** for both clients are the same, it is unlikely that their desired **Project Outcomes** will be the same, so a different **Business Case** and **Project Budget** is required for each. The **Client Requirements** allow the project team to explore viable options, determine the pros and cons for each and, ultimately, recommend the option best suited to deliver the **Client Requirements**. When this recommendation constitutes a building project, and it is signed off by the client, the more nuanced and detailed **Project Brief** can be prepared.
Commissioning	A number of **Building Systems** will need to be commissioned before the building can be handed over. **Commissioning** involves calibrating and adjusting the relevant systems until they are working as specified, with test results reviewed to confirm that they are satisfactory.
	Prior to **Commissioning**, the work of a number of subcontractors might have to be completed; for example, controls systems are normally installed separately from the mechanical systems they regulate. A crucial consideration is the time frame available. It is common for **Commissioning** to be delayed for various reasons, resulting in pressure on commissioning engineers to undertake their work quickly. **Commissioning** is increasingly becoming a requirement for every building. For example, as residential projects incorporate more complex **Building Systems**, from photovoltaics to integrated sound systems, it is important to ensure that these all function as planned. Seasonal **Commissioning** can take be undertaken during Stage 6 to help bed in the mechanical **Building Systems**, allowing them to work more efficiently throughout the year.
Construction Phase Plan	A statutory requirement under the CDM Regulations. The **Construction Phase Plan** must set out the arrangements for securing health and safety during the construction phase (the period that construction work is carried out). See HSE publication L153: *Managing Health and Safety in Construction* (HSE Books, 2015) for more information.
Construction Information	Information used to construct the **Building Systems** on site. This information can be prepared by the design team or by a specialist subcontractor and must comprise **Prescriptive Information**.

Term/task	Definition (guidance is included in grey boxes)
Construction Programme	The period specified in the **Project Programme** and the **Building Contract** during which **Building Systems** can be manufactured and the project will be constructed, commencing on the site mobilisation date and ending at **Practical Completion**.
	Construction Programmes differ from **Project Programmes** and **Design Programmes**. The **Construction Programme** is a detailed and granular programme that sets out when each **Building System** will be constructed. The high-level **Construction Programme** can be distilled into a programme for each 'package' to inform subcontractor tenders. It also highlights the critical path for the project Increasingly, 4D BIM (time) tools are used to link the design team's federated model to the **Construction Programme**. This improves health and safety and programme outcomes by allowing a number of options to be rehearsed in good time before work begins on site. As more modern methods of construction exert an increasing influence on how buildings are made, it is likely that these tools will be used earlier and earlier in the design process, making concept designs more robust from a construction perspective. The critical path indicates the optimum methodology for constructing a building, where the immediate impact of a delay to one task is a delay to the next. Achieving the fastest **Construction Programme** requires the critical path to be determined and optimised.
Construction Quality	The quality of workmanship (and other factors, such as tolerances) defined in the **Employer's Requirements** and/or **Final Specifications** and **Building Regulations** that the construction team must comply with. To confirm that the contractor is meeting these **Construction Quality** requirements, it is common for regular inspections to be carried out.
	A regular (usually monthly) report on **Construction Quality** might be produced for the client team, detailing whether the ongoing manufacturing and construction on the project are compliant. Appropriate inspection requirements need to be clearly determined at the outset of a project and the appropriate fees included in the **Project Budget**. Inspections should be undertaken by individuals with experience of similar construction technologies. If the design team remains with the client, its members are the most likely candidates to conduct these inspections. However, if the design team is novated to the contractor, a shadow design team may be appointed to monitor construction. In addition to 'walking the site' to inspect the ongoing works, those undertaking this role typically produce a monthly quality report to record issues identified and to monitor progress. While the contractor might produce their own report, it is prudent and commonplace for the client team to review progress against the **Construction Programme**. The increasing use of digital surveying tools allows real-time comparisons of actual progress against planned progress, providing indisputable and granular information. On smaller projects, a more hands-on approach might be required with frequent site visits and immediate identification of areas where **Construction Quality** is not being achieved.

Term/task	Definition (guidance is included in grey boxes)
Construction Strategy	A strategy that considers specific aspects of the design that may affect the buildability or logistics of constructing a project or that may impact health and safety aspects.
	The **Construction Strategy** comprises items such as the craneage strategy, site access and accommodation locations, reviews of the supply chain and sources of materials, and specific buildability considerations, such as the choice of frame (steel/concrete) or the installation of larger items of plant. On a smaller project, the **Construction Strategy** may be restricted to the location of site cabins, welfare provisions and storage, and the ability to transport materials up an existing staircase. However, health and safety considerations should still be applied in full.
Cost Exercises	Exercises used to develop the **Cost Plan** and to verify that the **Outline Specification** for the **Building Systems** meets the available **Project Budget**.
	The goal at Stage 3 is to carry out **Cost Exercises** that allow more detailed aspects of the design to be tested. **Design Studies** are a good means of developing specific aspects of **Building Systems** and determining their affordability. In some instances, suppliers or specialist subcontractors might get involved in conversations and, indeed, this dialogue will be vital to certain procurement routes. The **Outline Specification** and **Project Strategies** can also be tested further during Stage 3. Although these exercises might result in increased costs, these should be balanced by a reduction in the project contingency included in the **Cost Plan** as greater certainty regarding the detail allows the contingency to be reduced accordingly.
Cost Plan	The estimate of the construction, or capital, costs for a building, aligned with the **Project Budget**, unless otherwise agreed with the client team. The **Cost Plan** may also include, or be linked to, whole life cost information.
	When undertaking cost estimating and cost planning at any Stage of the project, due reference should be made to the high-level cost classification system set out in the International Construction Measurement Standards (ICMS) (https://icms-coalition.org) and the provisions of the RICS Professional Statement on Cost Prediction, which provides a combination of best practice guidance and rules in respect of initial cost estimating (prediction) and subsequent cost planning. See section Seven: *Project Strategies* – Cost Plan Strategy for guidance on how the **Cost Plan** develops during each stage.
Defects List	A list of items that do not comply with the requirements of the **Building Contract** when the **Practical Completion** certificate is issued.
	A building should be free of defects when it is handed over. However, the majority of clients do not wish minor defects to delay handover and it is therefore common for a **Defects List** to be appended to the **Practical Completion** certificate to allow the building to be used. These defects are rectified as quickly as possible during Stage 6.

Term/task	Definition (guidance is included in grey boxes)
Descriptive Information	The means by which the design team describes a **Building System** in a manner that allows a specialist subcontractor to design the system. **Descriptive Information** is issued by the design team to allow a specialist subcontractor to prepare **Manufacturing Information** for a **Building System**. **Descriptive Informative** is commonly referred to as 'design intent' as it frames the scope of work, describing what is required and any specific details that must be adhered to, and includes a performance specification that specifies the standards that must be met. See chapter Nine: *Setting Information Requirements* for more guidance on **Descriptive Information**.
Design Programme	The duration of the design tasks of each member of the design team, overseen by the lead designer and usually agreed before each design stage commences. The **Design Programme** is derived from the **Project Programme**. **Design Programmes** vary substantially from **Project Programmes** or **Construction Programmes**. With the views of clients, and other stakeholders, difficult to predict and the complexity of projects creating new dynamics involving topics or interfaces that may not have been encountered before, it is essential that the lead designer creates a simple, flexible **Design Programme** that works alongside other design management tools. A detailed **Design Programme** is doomed to fail unless key **Project Stakeholders** agree with the design approach from the outset. The following points are vital to a successful **Design Programme**: • a clear understanding of the key dates for the client's **Design Reviews** (there is little point in developing a design if the client will be away when it needs to be approved) • considering when key **Project Stakeholders** might engage with the design process (noting that meetings could take months to arrange) • establishing a strategy for developing key **Strategic Engineering** aspects and coordinating them with the **Architectural Concept** • considering when key **Project Strategies** might be developed for discussion with the client. Crucially, the lead designer needs to use their experience to decide when each team member should become more involved in the design process. Too many tasks undertaken too early in the process can result in abortive design work. Conversely, tasks tackled too late in a stage can result in iterations of the design that impact on an **Architectural Concept** that the client has already approved. The *Lead Designer's Handbook: Managing design and the design team in the digital age* (RIBA Publishing, 2019) contains tips and tools that can be used by design teams to progress the design from its early, embryonic stages to the final set of information for manufacturing and construction purposes and beyond, into the in-use stage for **Asset Management** or **Facilities Management** purposes.

Term/task	**Definition** (guidance is included in grey boxes)
Design Reviews	Reviews of the **Architectural Concept** by the client and other **Project Stakeholders** to obtain comments and determine whether it meets the requirements of the **Project Brief**. More experienced clients may also review the **Strategic Engineering** aspects or the **Project Strategies** and, during Stage 3, the outputs from **Design Studies** or **Engineering Analysis**. Design is not a linear process in which one task flows naturally from another. The design process is influenced by many different aspects. In the early project stages, **Design Reviews** by **Project Stakeholders** might be a primary driver for refining, or iterating, the design. However, as the building services and structural engineers and other specialist consultants progress their work, the design will be iterated on a regular basis until it is complete. **Design Reviews** are an essential part of the design process. At Stage 2, **Design Reviews** are likely to focus on the client's review of the **Architectural Concept**. A core challenge in developing the **Design Programme** during the early design stages is determining when the client team is able to meet for **Design Reviews** with a broad range of **Project Stakeholders**. As well as the more obvious and design-oriented aspects of the design process, the client may wish to understand the engineering aspects or **Project Strategies** in detail. The lead designer and client team need to determine the level of detail that the client team wish to review so that the **Design Reviews** for these aspects can be incorporated into the **Design Programme**.
Design Studies	Detailed studies that develop aspects of the building further during Stage 3. For example, looking at the façade of the building in greater detail or developing the detail of a core space, such as the entrance lobby. **Design Studies** consider how the engineering aspects (for example, lighting and structural options for the entrance lobby) can be successfully coordinated into the design. The **Design Studies** undertaken at Stage 3 represent the next stage in the development of the **Architectural Concept**. They might comprise detailed studies of a façade system, an atrium roof or a key area of a building, such as a loading bay. On larger projects, **Design Studies** might be undertaken by multidisciplinary teams which analyse all aspects of a specific topic. For example, for an atrium roof the team would scrutinise fire engineering, structural solutions, acoustics, heat gain and glare as well as access and maintenance, testing the assumptions made in the **Architectural Concept**. **Design Studies** are not intended to change the **Architectural Concept**. They focus on developing greater detail to inform the **Cost Plan** and to allow more comprehensive and in-depth coordination exercises to be undertaken.
Digital Execution Plan (DEP)	A document (also commonly called the BIM execution plan) that sets out how the design team will deliver the **Information Requirements** for the project, considering the tools to be used at each stage. The construction team might prepare a separate **DEP** to confirm how the **Asset Information** and **Verified Construction Information** will be produced.
Digital Twin	A digital representation (replica/model) of a building that allows simulations of its predicted performance to be reviewed against the actual performance, and its operation and maintenance to be optimised. A **Digital Twin** provides useful **Feedback** on areas where a building is not performing as planned, facilitating the process of optimising both the current building's performance and future projects.

Term/task	Definition (guidance is included in grey boxes)
Employer's Requirements	A description of the **Client Requirements** with the specific purpose of providing the basis for tender of a **Building Contract**. See chapter Eight: Procurement Strategy for more information.
Engineering Analysis	The detailed calculations and analysis required to progress each engineering aspect of the project. During Stage 3, this analysis needs to focus on ensuring that the building is **Spatially Coordinated** by the end of the stage. Where **Engineering Analysis** does not impact on the Stage 3 design, it can be undertaken at Stage 4, when each **Building System** is detailed. Once the **Architectural Concept** has been signed off, the engineering teams can begin more detailed calculation and analysis exercises at Stage 3, confident that the direction of design travel is robust. With the increasing complexity created by topics such as the circular economy and growing demands to reduce buildings' contributions to climate change, it is useful for the design team to have a space in which to undertake their work, confident that a further iteration of the design will not require calculations to be reworked or strategies to be revised. In addition, the increasing numbers of specialist consultants on a project require the lead designer to oversee a large number of **Project Strategies**, many of which have overlapping themes, and coordinate everyone's efforts for the **Stage Report**. In this sense, Stage 3 is the lead designer's space. Any client involvement should be minimal, with an emphasis on the **Design Reviews** generated by the **Design Studies**, as the design team bridges the gap between the **Architectural Concept** and the production of **Manufacturing Information** and **Construction Information** at Stage 4.
Facilities Management	The tasks undertaken to enable the effective running of a building. Every building needs some form of **Facilities Management**. For example, residential buildings must accommodate recycling facilities, provide somewhere for mail to be delivered and meters to be inspected or read, as well as considering how cisterns, rainwater pipes and other items will be accessed for repairs or replacement over the life of the building. On larger projects the principles are the same; however, the tasks will be more comprehensive and may be carried out by a third party. They are typically divided into hard or soft **Facilities Management**. Hard **Facilities Management** relates to the building itself, including maintenance of the façade, lighting, mechanical, plumbing and fire safety aspects. Tasks include regular replacement of items, such as bulbs in light fittings or filters in air handling units, as well as scheduled and recommended maintenance. One current trend in **Facilities Management** is predictive analytics, in which the data from key items of plant is used to determine when plant is underperforming and likely to need attention ahead of schedule. Soft **Facilities Management** relates more to the functionality of the building, providing the interface between the building and the user experience; for example, manning the reception desk, window cleaning, day-to-day cleaning, mail and waste management or catering.

Term/task	**Definition** (guidance is included in grey boxes)
Feasibility Studies	Studies undertaken to test the feasibility of the **Client Requirements** and emerging **Project Brief** against a specific site/context, and to consider how to deal with site-wide issues. Producing a **Project Brief** can sometimes be counterproductive if it is not tested against the constraints of a particular site. The RIBA recommends that, where making the brief fit a given site might be challenging, **Feasibility Studies** are undertaken to prove that the **Spatial Requirements** can be accommodated. **Feasibility Studies** can benefit from the skills of a designer, but this exercise is purely to test the potential project's fit. It is not meant to be the beginning of the design process, which commences at Stage 2. Where a number of options are proposed, these should not be assessed or vetted except to inform the briefing process or this exercise may risk undermining the start of the design process. **Feasibility Studies** might also include engineering aspects; for example, undertaking searches for utilities or considering the stability of an existing building. This work might help to inform and test the **Project Budget**. The **Feasibility Studies** should also consider the **Project Risks** and any issues likely to result in abnormal costs, such as high utility costs. It is always possible that, as the **Project Brief** is developed, a situation arises that prevents the project from progressing. This is, of course, best discovered before design work commences.
Feedback	Knowledge derived from previous similar projects, often used to inform dialogue at Stage 0. **Feedback** might comprise **Post Occupancy Evaluation** feedback, building visits, case study information or discussions with the project teams involved. **Feedback** from previous projects is an essential part of the briefing process and can help to inform the **Client Requirements**. **Feedback** can relate to any aspect of a previous project, such as energy performance, how a specific space in the building performed or other functional features or it might cover the structure of the team, the information provided or a specific aspect of the design process. Increasingly, the core goal of Stage 6 is to make a building work as efficiently as possible – e.g. the building services working optimally and consuming the minimum amount of energy. Comparison of the planned with the actual energy and water use is a good starting point. Seasonal **Commissioning**, undertaken before closing out the **Building Contract**, also helps to bed in the mechanical **Building Systems**, ensuring that they work efficiently throughout the year. However, it is not just the building's consumption of resources that can offer scope for improvement. The building's use and maintenance can be observed. For example, are blinds included to reduce heat gain and glare? Are resource-saving devices being used as planned, such as low flush devices on toilets? Is the waste strategy working? Examining these items might point to the need to train and educate users in how they can refine the way in which the building is used, improving outcomes for all.
Final Certificate	A contractual document that formally concludes the **Building Contract** and Stage 6, winding up the construction team's involvement in the building's life. Many professional services contracts are aligned with the **Building Contract**, meaning that the issue of this document also concludes the work of the design team, except where a separate appointment requires **Aftercare** activities beyond the end of Stage 6.

Term/task	**Definition** (guidance is included in grey boxes)
Final Specifications	The specifications issued at Stage 4 by the design team. These specifications can be descriptive or prescriptive. The **Final Specification** for each **Building System** is produced by the design team and sets the contractual requirements, directing the subcontractors employed by the contractor in terms of the products to be used, confirming workmanship, tolerances or other aspects that must be adhered to. The **Final Specification** can include **Descriptive Information** or **Prescriptive Information**. The contents of the **Final Specifications** might be influenced by which party is employing the designer creating them.
Fire Safety Information	Information relating to the design and construction of the building or extension, and the services, fittings and equipment provided in, or in connection with, the building or extension, which will assist the Responsible Person (under the Regulatory Reform (Fire Safety) Order 2005) to operate and maintain the building or extension with reasonable safety. It must be handed to the client prior to occupation, as required by Regulation 38 of the Building Regulations 2010.
Health and Safety File	All project information that may be relevant to any subsequent work on the building to ensure the health and safety of any person. It must be handed over to the client at the end of the project and passed on to any subsequent owners as required by the Construction (Design and Management) Regulations 2015. See L153: Construction (Design and Management) Regulations 2015. Guidance on Regulations for more guidance: https://www.hse.gov.uk/pubns/books/l153.htm
Information Requirements	The formal issue of information for review and sign-off by the client at key stages of the project. The project team may also have additional formal information exchanges as well as the many informal exchanges that occur during the iterative design process. See chapter Nine: *Setting Information Requirements* for more guidance.
Manufacturing Information	Information prepared for the manufacture of **Building Systems** during Stage 4. This detailed information will usually be prepared by a specialist subcontractor using **Descriptive Information** from the design team with the resultant **Manufacturing Information** submitted for comment and approval prior to manufacturing. **Manufacturing Information** feeds into computer-aided design and manufacturing (systems in factories to facilitate effective manufacturing processes. See chapter Nine: *Setting Information Requirements* – Prescriptive Information vs Descriptive Information for more guidance on **Manufacturing Information**.
Outline Specification	Sufficient information to allow the client to understand what is proposed for each **Building System**. The **Outline Specification** might include, for example, the door or floor finishes, the extent or specification of the engineering **Building Systems** or the type of frame proposed. The **Outline Specification** also assists in the preparation of the **Cost Plan**. See chapter Nine: *Setting Information Requirements* for guidance on **Outline Specifications**.

Term/task	**Definition** (guidance is included in grey boxes)
Planning Advice	Early advice sought to determine any planning risks, such as policy constraints or height restrictions. Advice can be obtained from architects, planning advisers or the local planning authority, although this may incur a fee. **Planning Advice** obtained during Stage 1 will be more strategic in nature, and during Stage 2 might comprise a **Design Review** to inform the project team about the suitability of the proposals being developed. The local planning authority is a key **Project Stakeholder** on any project. Its opinions and approaches are outside the control of the project team and therefore planning represents a core **Project Risk**. Pre-design **Planning Advice** helps to manage this risk by allowing the early views of the planners to inform the briefing and/or design process and can be invaluable in shaping the direction of the design. During Stage 2 and into Stage 3 it may be prudent to obtain formal pre-application **Planning Advice** on the **Architectural Concept** as it develops and matures. This advice might come from an architect, a planning consultant or might be sourced directly from the relevant planning department. Planning departments have recognised the value that these meetings can add to the process and many have started to charge pre-application fees, formalising these early engagements to allow them to be recognised as part of the planning process. On larger projects it may also be prudent to arrange a community consultation or to undertake a formal **Design Review** as part of the design process. The project team need to consider the scale and location of project and any specific sensitivities that are likely to influence the choice of the most appropriate way forward. Ultimately, the planning risk cannot be considered resolved until a **Planning Application** has been submitted and approved.
Planning Application	An application to the local authority for permission to erect a particular building on a specific site. The RIBA Plan of Work recommends that the **Planning Application** be submitted at the end of Stage 3. A set period after Stage 3 is completed might be specified in the **Project Programme** to allow the final assembling of the planning information prior to submission of the **Planning Application**. The increasing complexity of these submissions, covering detailed topics such as energy use and accessibility, makes the end of Stage 3 the optimal point for submission. This timing allows a number of the **Planning Application Information Requirements** to be absorbed into the Stage 3 **Design Programme**.

Term/task	**Definition** (guidance is included in grey boxes)
Planning Conditions	A set of conditions attached to a planning consent that must be met. Many conditions must be discharged prior to work commencing or the building being occupied. Other conditions apply for the life of the building. Planning consent is likely to come with a number of **Planning Conditions**, which could require supplementary information to be submitted and approved, such as more detailed information on the façades. This might involve the production of additional Stage 4 information or, if this information has been pre-emptively prepared, revision of the information. Similarly, it is likely that the contractor will have to submit information before work commences on site (for example, details of cabin and hoarding layouts or procedures for washing down trucks before they leave site). The **Project Programme** must include sufficient mobilisation time to allow the appointed contractor to meet these conditions. In addition, the **Planning Conditions** might include ongoing obligations for the contractor, such as limiting the timing of the works or setting maximum permitted noise levels. The client must ensure that these requirements are embedded into the **Building Contract**. In addition, the client team may wish to monitor whether the contractor is adhering to the requirements.
Post Occupancy Evaluation (POE)	Evaluation undertaken once the building is occupied to determine whether the **Project Outcomes** and **Sustainability Outcomes** set out in the **Project Brief**, or later design targets for **Building Systems**, have been achieved. There are three progressive levels and the RIBA recommends that all **POE** starts with the first level: • Light touch **POE**: Simple but meaningful rapid evaluation undertaken post occupancy, before the **Building Contract** is concluded. This information may not reflect the final building performance due to seasonal **Commissioning** being incomplete or other **Building Systems** not being fully bedded in. However, it can provide useful insights for the client and act as **Feedback** for other projects. • Diagnostic **POE**: **Feedback** from light touch **POE** might identify the need for more detailed evaluation. This may be undertaken by independent evaluators during the second year of occupation, to verify performance and review any issues discovered, including those identified in the light touch **POE**. • Detailed (forensic) **POE**: Investigations, if necessary, by independent evaluators, to identify and, where possible, resolve any significant and persistent performance issues. These can start at any time but should ideally be completed by the end of the third year of occupation.
Practical Completion	The point in the process when the construction work is certified as practically complete under the **Building Contract**. A **Practical Completion** certificate may be used as a contractual document that allows the client to take possession of and to use a building. It requires the **Building Contract** administrator to confirm that the building has been completed in accordance with the **Building Contract**, including the issue of any information for **Asset Management** or **Facilities Management** as well as the **Building Manual** and any **Verified Construction Information**. It may also be necessary to consult with **Project Stakeholders** to confirm that the building meets with the relevant standards and is suitable for occupation.
Pre-construction Information	A statutory requirement under the CDM Regulations for health and safety information in the client's possession or which is reasonably obtainable by or on behalf of the client, which is relevant to the construction work and is of an appropriate level of detail and proportionate to the risks involved. See HSE publication L153: *Managing Health and Safety in Construction* (HSE Books, 2015) for more information.

Term/task	Definition (guidance is included in grey boxes)
Prescriptive Information	Complete, instructive information used to manufacture and construct the **Building Systems**, produced by the design team or the construction team. See chapter Nine: *Setting Information Requirements* for guidance on **Prescriptive Information**.
Procurement Strategy	The strategy that sets out the process for tendering and entering into a **Building Contract** with the contractor. On certain projects, this will include early contractor involvement. See chapter Eight: **Procurement Strategy**.
Project Brief	Detailed requirements for the design and management of the project, included in design team professional services contracts, to enable the design team to begin design work in Stage 2. An effective **Project Brief** is crucial for the efficient design of any building. It is a tool to that helps to take the **Client Requirements** to the next level of detail and includes the following elements: • **Project Outcomes** – Defining **Project Outcomes** is still a relatively new briefing topic. However, determining these at an early stage can provide a useful tool for the design team. The challenge for the design team is how to obtain the information necessary to achieve the **Project Outcomes** and, more importantly, how success can be measured. This requires objective data, but any information-gathering exercise is likely to yield highly subjective responses. Nevertheless, regardless of how **Project Outcomes** are measured, they are a useful briefing tool that provide a focus beyond the provision of the **Spatial Requirements**. • **Sustainability Outcomes** – The client's wishes with regard to their building's level of sustainability need to be clearly conveyed to the design team. A client may wish simply to comply with the **Building Regulations** or they may want to achieve a particular BREEAM award rating. They may also wish to embrace specific subjects, such as circular economy principles, create a zero carbon building or use specific materials. These objectives need to be teased out during the briefing process. • **Quality Aspirations** – Quality comes in many guises. It can relate to the building, a space, or materials and finishes or to the quality of construction. Some clients base their **Quality Aspirations** on value. Regardless of the client's particular views on the subject, it is a crucial briefing topic. **Quality Aspirations** can be conveyed by written statements but are better expressed using images from similar exemplar projects. • **Spatial Requirements** – Defining the spaces in the **Project Brief** is a useful way of setting out precisely what is required on a project. Establishing the **Spatial Requirements** gives the architect the necessary information to start the design process and allows the **Project Budget** to be meaningfully tested. It is important that any **Spatial Requirements** are tested against industry norms or client expectations and that allowances for circulation and plant spaces are included

Term/task	Definition (guidance is included in grey boxes)
Project Brief Derogations	A record in the **Stage Report** of Stage 2 used to identify and agree where aspects of the design do not need to comply with the **Project Brief**. As the **Architectural Concept** is developed, it is sometimes necessary to revisit the **Project Brief**. For example, the design team might identify a better way of achieving the end result or the massing might dictate a change in the size of a number of spaces. In some sectors, such as healthcare, where briefing guidance documents exist, it is customary to agree derogations from these standards. In other sectors, it is more common to update the **Project Brief** so that it is aligned with the **Architectural Concept** at the end of Stage 2. On a design and build project, the **Stage Report** at Stage 2 and the **Project Brief** might be issued as **Employer's Requirements** and it is preferable to avoid any contradictions. On a smaller project, the **Project Brief** might be superseded as soon as the **Architectural Concept** is produced, having served its purpose to kick-start the design process. The RIBA Plan of Work advocates that the project team should consider how the **Project Brief** and Stage 2 **Stage Report** need to interact, if at all, and set tasks accordingly. The briefing process is concluded at the end of Stage 2 as the design process enters a more detailed phase. The **Project Brief** is superseded by the **Architectural Concept** as it moves into Stage 3. However, some **Procurement Strategies** may require the **Project Brief** to form part of the **Employer's Requirements**, to reinforce aspects that are required in the **Building Contract** but have not yet been designed. In these circumstances, the **Project Brief** will remain a live project document and all members of the project team should regularly confirm that any **Building Contract** documentation is checked against its requirements.
Project Budget	The client's budget for the project, which includes the construction cost, the cost of the professional services and the cost of certain items required post completion and during its operational use. A crucial task at Stage 1 is determining the **Project Budget**. This must be based on the **Spatial Requirements** set out in the **Project Brief** and needs to take into account the **Quality Aspirations** of the client, which may dictate a high level of specification for fittings and finishes. The **Project Budget** should also allow for professional fees and, where a construction project is proposed, financing or land costs, planning and **Building Regulations** submission costs, contingencies and any other anticipated project costs.
Project Execution Plan	The plan, produced with contributions from the project team, that sets out the processes and protocols to be used during each stage of the project. As project teams transition from traditional ways of working to more digitally integrated working methods, the **Project Execution Plan** becomes a core project tool. It allows the project team to agree how they will communicate with each other, what tools will be used for **Design Reviews**, how information will be transmitted, how queries will be raised and monitored, and other day-to-day considerations. Consider the case of a client who is not keen on using technology working with a progressive digital design team, or vice versa, and it is easy to understand why the **Project Execution Plan** is an essential project document. There is a correlation between the **Project Execution Plan** and the **Information Requirements**, as well as with the BIM execution plan or **Digital Execution Plan** that specifically sets out how the design team will work together.
Project Outcomes	The desired outcomes for the project, including **Sustainability Outcomes**, set out in Stage 0 to inform the **Client Requirements**. For a hospital, a reduction in recovery times might be a key **Project Outcome**. The outcomes may include operational aspects, as well as a mixture of subjective and objective criteria, and will influence the preparation of the **Project Brief**.

Term/task	Definition (guidance is included in grey boxes)
Project Performance	The performance of the project process and project team, determined using **Feedback** following completion of a building. The RIBA Plan of Work is a circular process and at the end of each building project cycle it is recommended that a **Feedback** exercise is undertaken with the project team to gather lessons learned on **Project Performance**. With the majority of the project team leaving the project prior to, or at the end of, Stage 5, the timing for undertaking this needs to be carefully considered.
Project Programme	The overall period for the briefing, design, manufacturing, construction and post-completion activities of a project. Setting the **Project Programme** is a crucial project task and one of the biggest challenges for the client team. The programme determines the time required for each project stage as the brief is prepared, the design developed and manufacturing and construction undertaken. These periods vary depending on the size and complexity of the project. The timing of the **Planning Application** needs to be considered, along with how the **Procurement Strategy** will shape the programme. Key drivers of the durations for the **Project Programme** include the following: • The complexities of the briefing process at Stage 1 – speeding up these activities can prove counterproductive. • The need, at Stage 2, to create the **Architectural Concept**, incorporate **Strategic Engineering** aspects and undertake **Design Reviews** with key **Project Stakeholders**. • The complexities of coordination at Stage 3. • Deciding when to submit a **Planning Application** and the period for determining the application. • The timing of Stage 4 design, as dictated by the **Procurement Strategy**. • The impact of modern methods of construction. • The timing and process of a **Building Regulations** application. At present, with traditional design and construction models still prevalent, there are limited opportunities to shorten the **Project Programme** timescales. BIM has not delivered faster projects because it is still plugged into traditional methods of designing. At present, there are only two ways to reduce time: by compressing the time allocated to a stage or by overlapping stages. Either strategy creates risk to the project and, while that risk may be contractually accepted by one party, compressing time does make it less likely that the project team will be able to deliver the **Project Outcomes** that the client is seeking to achieve.

Term/task	**Definition** (guidance is included in grey boxes)
Project Risks	Issues that cannot be fully determined at a particular time/stage that may impact on the design, cost or delivery of a project. Lack of clarity regarding **Project Risks** can necessitate a redesign or result in cost overruns or programme delays.
	Some **Project Risks** may be deal-breakers that prevent the project from proceeding past the end of Stage 0. For example, the costs of providing energy to the building, the risk of failing to obtain planning consent for the areas required to make the scheme viable or a key **Project Stakeholder** who is unlikely to support the proposals. Determining the **Project Risks** at Stage 0 is therefore a crucial task. Should the project proceed, identified risks should be actively managed throughout each project stage, with each risk allocated to, and managed by, a member of the project team.
Project Stakeholders	Parties outside the project team that may have an influence on the design development. **Project Stakeholders** include any party with a vested interest in a project, such as local authorities, planning departments, statutory consultees, non-statutory consultees, specialist amenity groups, building users, local community groups, neighbours, utility companies and transport bodies.
	Project Stakeholders might include, for example, a local community that may have concerns about parking or amenity spaces, utility companies that can provide information on their networks' ability to accommodate a new building or a conservation group that might have specific comments in relation to how a building sits in its context. As it can take time to arrange meetings with some **Project Stakeholders**, the project team need to consider each **Project Stakeholder** individually and determine when an approach might be appropriate, although this can be a difficult task when the design process has just started and the issues and challenges have yet to be identified. Discussing a design which has not been sufficiently developed can be counterproductive and, conversely, discussions entered into too late in the design process may result in significant iterations of the design. The project team need to be alert to the risks posed by **Project Stakeholders**. At the commencement of a project it is important to map out who those stakeholders are. On larger projects it is common to have a stakeholder engagement plan or to include the risks flagged in early discussions with each stakeholder in a record of **Project Risks**.

Term/task	Definition (guidance is included in grey boxes)
Project Strategies	Strategies to support the design process, generally developed in parallel with the design stages (Stage 2-3) and to respond to the **Business Case** or **Project Brief** before they are concluded or support the use of the building. These strategies typically include the following: • Conservation Strategy • Cost Strategy • Fire Safety Strategy • Health and Safety Strategy • Inclusive Design Strategy • Planning Strategy • Plan for Use Strategy • Procurement Strategy • Sustainability Strategy. These strategies are usually prepared in outline at Stage 2 and in detail at Stage 3, with the recommendations absorbed into the technical design and information exchanges. The strategies are not typically used as **Construction Information** but may inform the construction process. Guidance and stage specific tasks for the above **Project Strategies** are covered in detail in chapter Six.
Quality Aspirations	The objectives that set out the quality aspects of a project. The objectives may comprise both subjective and objective aspects. **Quality Aspirations** can relate to the building, a space, or materials and finishes or to the quality of construction. Some clients base their **Quality Aspirations** on value. Regardless of the client's particular views on the subject, it is a crucial briefing topic. Quality Aspirations can be conveyed by written statements but are better expressed using images from similar exemplar projects.
Research and Development	Project-specific **Research and Development** in response to the **Project Brief** or the Concept Design as it is developed.
Responsibility Matrix	A matrix determining who is responsible for the different tasks to be undertaken at each stage. It can set out which project team member should lead on each task and who should provide support. It can be broken down by **Building System** and will be closely aligned to the **Information Requirements**. This document sets out the extent of any performance specified design. The **Responsibility Matrix** is created at a strategic level at Stage 1 and fine tuned in response to the **Architectural Concept** at the end of Stage 2 in order to ensure that there are no design responsibility ambiguities or omissions at Stages 3 and 4. A robust **Responsibility Matrix** is a core project document. It ensures that everyone is aware of what they have to do and the stage during which they have to do it, allowing those tendering for professional services to set their fees appropriately. A **Responsibility Matrix** can work at project level, bringing clarity to the tasks to be undertaken by the client, design and construction teams. It can also be used to assign design responsibility for the different **Building Systems** to members of the design team – and for determining whether the design team will prepare **Descriptive Information** or **Prescriptive Information** at Stage 4, establishing the boundary between the design team and any specialist subcontractors. A key challenge is who should set the **Responsibility Matrix**. In the case of a client who is appointing the design team independently, the client would be responsible for preparing the document, However, if the client is appointing the whole design team as a single entity, the **Responsibility Matrix** might be set by the lead designer in response to the **Information Requirements**.

Term/task	**Definition** (guidance is included in grey boxes)
Site Appraisal	A review of the site or potential sites, which may include an existing building or collection of buildings, to determine the viability of the **Client Requirements**.
Site Information	Specific project information in the form of surveys or reports relating to the particular site/context for a project, including **Site Surveys**. See chapter Nine: *Setting Information Requirements* for guidance on **Site Information**.
Site Logistics	Site and construction supply chain management items prepared by the contractor for consideration as part of a tender and, if successful, prior to starting on site. **Site Logistics** may include the following aspects: • Understanding how materials will arrive and be unloaded on site. A small residential site down a narrow lane will have different issues to a city centre site where just-in-time deliveries are required. • How to move materials around the site, including the use of cranes, hoists and other mechanical equipment. • Location of site cabins providing management and welfare facilities for site operatives. • Fencing to mark the boundaries of the site, for security and health and safety purposes. • Measures to minimise issues with neighbours; for example, where generators might best be positioned or how the wheels of trucks are to be washed before leaving site.
Site Queries	Questions directed to the design team by the contractor (sometimes more formally called 'a request for information') to clarify information in the **Building Contract** documentation or requesting information that was not complete when the **Building Contract** was agreed. Construction on site using **Prescriptive Information** from the design team commonly generates **Site Queries**. While it is usual for the designer responsible to respond to such queries, this designer may not be part of the construction team, or the contractor might wish to handle queries in a different way. The design team should be clear about any ongoing commitments when they submit their proposals. Similarly, the client may wish to establish who will deal with **Site Queries** as this may impact **Construction Quality**. The frequency of site visits should also be considered. Although it is possible to deal with **Site Queries** remotely, in many instances there is no substitute for communicating directly with the construction team on site.
Site Surveys	Surveys of sites carried out before design work starts. As the construction industry moves towards more 3D, data-centric methods of working, it is becoming common for 3D **Site Surveys** to be undertaken. Point cloud or photogrammetric surveys are the most common types. Some surveys might need to be converted into a model that can be used by the design team. The type of survey undertaken is determined by how the information will be used and the level of accuracy required.
Spatial Requirements	A schedule of rooms and/or spaces that will achieve the **Client Requirements**. The **Spatial Requirements** for the building as a whole are set at Stage 0. By the end of Stage 1, the **Spatial Requirements** will have been developed in detail and incorporated into the **Project Brief**.

Term/task	**Definition** (guidance is included in grey boxes)
Spatially Coordinated	Design in which the client's **Spatial Requirements** and the spaces required for any **Building Systems** – such as structural and building services engineering aspects, including grids, risers and plant rooms – have been determined and fixed to allow Stage 4 to progress without any further iterations.
	Stage 3 provides a bridge between the strategic outputs of Stage 2 and the significant detail produced at Stage 4. During Stage 3, further layers of detail are added to the design. The core goal of Stage 3 is a design that is **Spatially Coordinated**. This stage has two key aims. First, it allows each **Building System** to be developed independently at Stage 4. Second, a **Planning Application** can be made with the certainty that changes will not be required once planning consent has been granted. Coordination is a continual process throughout all of the design stages. This might involve coordinating the client documents with the emerging design; for example, adjusting the **Project Brief** to align with an aspect of the design. However, **Spatial Coordination** principally relates to the ongoing coordination of the design by the lead designer, and includes the tasks of coordinating the **Project Strategies** and designs of the different design team members. The lead designer needs to coordinate design efforts and the direction of the design team throughout every design stage, and individual designers must also coordinate their own efforts. For example, at Stage 4, the building services engineer must ensure that the various services installed above the ceilings have been correctly coordinated in the zone set out for all services during Stage 3 as part of the **Engineering Analysis** contributions. Defining **Spatially Coordinated** is difficult; however, it is fundamentally about ensuring that every space in a building is conclusively defined, from the client's functional spaces, such as living rooms, classrooms, operating theatres or departure lounges, to the spaces required for building services including plant rooms and risers. Simply put, if all of a building's spaces are not determined during Stage 3 it can cause a great deal of disruption during Stage 4, as designers discover that areas of a building are in a state of flux precisely when they are undertaking the detailed design of every **Building System**.
Stage Report	A report produced at the end of Stage 2 and Stage 3 to capture decision making during the stage and record the outcome of the design process as reviewed by the client. The **Stage Report** will also contain the **Project Strategies** and other useful project information. The **Stage Report** is signed off by the client at the end of the stage.
	For more information on the **Stage Report**, see chapter Nine: *Setting Information Requirements*.

Term/task	**Definition** (guidance is included in grey boxes)
Strategic Engineering	Engineering information which is crucial to the development of the **Architectural Concept**, including plant room or riser information, or required to develop the **Cost Plan** or for the consideration of **Project Risks**. During Stage 2, a core challenge for the civil, structural and building services engineers is to refrain from undertaking detailed **Engineering Analysis** and instead to provide more general, 'rule of thumb' **Strategic Engineering** contributions to the development of the **Architectural Concept**. Aspects to consider include agreeing the floor-to-floor heights, the structural grid, the locations of plant rooms or risers and any issues that might influence the **Cost Plan**, from the need for new road junctions or new utility connections to the complexity of the energy strategy. The depth of engineering contributions at Stage 2 will depend on the robustness of the **Architectural Concept**. There is a great deal to be gained by ensuring that any proposed options are robust and considered. In addition, some engineering aspects will be capable of development in isolation. For example, developing an energy or security strategy. It is crucial that everyone in the project team understands that there is no point in dogmatically adhering to a **Design Programme** if the **Architectural Concept** is still undergoing iterations in response to conflicting and contradictory comments from the client team and other **Project Stakeholders**.
Sustainability Outcomes	**Project Outcomes** related to sustainability. These start as the client's aspirations for sustainability, then will be developed into detailed target metrics as the design progresses. The Sustainability Strategy is prepared in response to the **Sustainability Outcomes.** See section Seven – Sustainability Strategy and the *RIBA Sustainable Outcomes Guide* (2019) for more advice on **Sustainability Outcomes**.
Verified Construction Information	An option for enhanced **Asset Information** based on post construction surveys of the works. If this information is required, the project team must determine what tasks are required during Stage 5 to generate the specific **Verified Construction Information** needed for each project. More information on **Verified Construction Information** can be found in section Eight: *Setting Information Requirements*.

Acknowledgements

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The RIBA wishes to thank the working group named above and the members of the RIBA Expert Advisory Groups for their support and the following people for providing detailed advice on the Project Strategies:
Ashely Bateson, Hoare Lea
Dieter Bentley-Gockmann, EPR Architects
Bill Bordass, Usable Buildings Trust
Rod Bunn, UCL
Paul Bussey, AHMM
Michael Chater, Hampshire County Council
Paul Chatham, Peregrine Bryant Architects
Gary Clark, HOK
Ben Derbyshire, HTA, RIBA President 2017-19
Hugh Feilden, Feilden+Mawson
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Jane Simpson, Jane Simpson Access
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Copy editor: Alasdair Deas
Design: Darkhorse Design

RIBA Plan of Work 2020

The RIBA Plan of Work organises the process of briefing, designing, delivering, maintaining, operating and using a building into eight stages. It is a framework for all disciplines on construction projects and should be used solely as guidance for the preparation of detailed professional services and building contracts.

Stage Boundaries:

Stages 0-4 will generally be undertaken one after the other.

Stages 4 and 5 will overlap in the **Project Programme** for most projects.

Stage 5 commences when the contractor takes possession of the site and finishes at **Practical Completion**.

Stage 6 starts with the handover of the building to the client immediately after **Practical Completion** and finishes at the end of the **Defects Liability Period**.

Stage 7 starts concurrently with Stage 6 and lasts for the life of the building.

Planning Note:

Planning Applications are generally submitted at the end of Stage 3 and should only be submitted earlier when the threshold of information required has been met. If a **Planning Application** is made during Stage 3, a mid-stage gateway should be determined and it should be clear to the project team which tasks and deliverables will be required.
See *Overview* guidance.

Procurement:

The RIBA Plan of Work is procurement neutral – See *Overview* guidance for a detailed description of how each stage might be adjusted to accommodate the requirements of the **Procurement Strategy**.

ER Employer's Requirements

CP Contractor's Proposals

Projects span from Stage 1 to Stage 6; the outcome of Stage 0 may be the decision to initiate a project and Stage 7 covers the ongoing use of the building.

	0 Strategic Definition	1 Preparation and Briefing	2 Concept Design	3 Spatial Coordination	4 Technical Design	5 Manufacturing and Construction	6 Handover	7 Use
Stage Outcome at the end of the stage	The best means of achieving the **Client Requirements** confirmed If the outcome determines that a building is the best means of achieving the **Client Requirements**, the client proceeds to Stage 1	**Project Brief** approved by the client and confirmed that it can be accommodated on the site	**Architectural Concept** approved by the client and aligned to the **Project Brief** The brief remains "live" during Stage 2 and is derogated in response to the **Architectural Concept**	Architectural and engineering information **Spatially Coordinated**	All design information required to manufacture and construct the project completed Stage 4 will overlap with Stage 5 on most projects	Manufacturing, construction and **Commissioning** completed There is no design work in Stage 5 other than responding to **Site Queries**	Building handed over, **Aftercare** initiated and **Building Contract** concluded	Building used, operated and maintained efficiently Stage 7 starts concurrently with Stage 6 and lasts for the life of the building
Core Tasks during the stage **Project Strategies** might include: – **Conservation** (if applicable) – **Cost** – **Fire Safety** – **Health and Safety** – **Inclusive Design** – **Planning** – **Plan for Use** – **Procurement** – **Sustainability** See *RIBA Plan of Work 2020 Overview* for detailed guidance on **Project Strategies**	Prepare **Client Requirements** Develop **Business Case** for feasible options including review of **Project Risks** and **Project Budget** Ratify option that best delivers **Client Requirements** Review **Feedback** from previous projects Undertake **Site Appraisals** No design team required for Stages 0 and 1. Client advisers may be appointed to the client team to provide strategic advice and design thinking before Stage 2 commences.	Prepare **Project Brief** including **Project Outcomes** and **Sustainability Outcomes**, **Quality Aspirations** and **Spatial Requirements** Undertake **Feasibility Studies** Agree **Project Budget** Source **Site Information** including **Site Surveys** Prepare **Project Programme** Prepare **Project Execution Plan**	Prepare **Architectural Concept** incorporating **Strategic Engineering** requirements and aligned to **Cost Plan**, **Project Strategies** and **Outline Specification** Agree **Project Brief Derogations** Undertake **Design Reviews** with client and **Project Stakeholders** Prepare stage **Design Programme**	Undertake **Design Studies**, **Engineering Analysis** and **Cost Exercises** to test **Architectural Concept** resulting in **Spatially Coordinated** design aligned to updated **Cost Plan**, **Project Strategies** and **Outline Specification** Initiate **Change Control Procedures** Prepare stage **Design Programme**	Develop architectural and engineering technical design Prepare and coordinate design team **Building Systems** information Prepare and integrate specialist subcontractor **Building Systems** information Prepare stage **Design Programme** Specialist subcontractor designs are prepared and reviewed during Stage 4	Finalise **Site Logistics** Manufacture **Building Systems** and construct building Monitor progress against **Construction Programme** Inspect **Construction Quality** Resolve **Site Queries** as required Undertake **Commissioning** of building Prepare **Building Manual** Building handover tasks bridge Stages 5 and 6 as set out in the **Plan for Use Strategy**	Hand over building in line with **Plan for Use Strategy** Undertake review of **Project Performance** Undertake seasonal **Commissioning** Rectify defects Complete initial **Aftercare** tasks including light touch **Post Occupancy Evaluation**	Implement **Facilities Management** and **Asset Management** Undertake **Post Occupancy Evaluation** of building performance in use Verify **Project Outcomes** including **Sustainability Outcomes** Adaptation of a building (at the end of its useful life) triggers a new Stage 0
Core Statutory Processes during the stage: Planning Building Regulations Health and Safety (CDM)	Strategic appraisal of **Planning** considerations	Source pre-application **Planning Advice** Initiate collation of health and safety **Pre-construction Information**	Obtain pre-application **Planning Advice** Agree route to **Building Regulations** compliance Option: submit outline **Planning Application**	Review design against **Building Regulations** Prepare and submit **Planning Application** See ***Planning Note*** for guidance on submitting a **Planning Application** earlier than at end of Stage 3	Submit **Building Regulations Application** Discharge pre-commencement **Planning Conditions** Prepare **Construction Phase Plan** Submit form F10 to HSE if applicable	Carry out **Construction Phase Plan** Comply with **Planning Conditions** related to construction	Comply with **Planning Conditions** as required	Comply with **Planning Conditions** as required
Procurement Route								
Traditional	Appoint client team	Appoint design team			Tender / Appoint contractor			Appoint **Facilities Management** and **Asset Management** teams, and strategic advisers as needed
Design & Build 1 Stage					ER / CP / Appoint contractor			
Design & Build 2 Stage			ER	Pre-contract services agreement	CP / Appoint contractor			
Management Contract / Construction Management			Appoint contractor					
Contractor-led			ER	Preferred bidder	CP / Appoint contractor			
Information Exchanges at the end of the stage	**Client Requirements** **Business Case**	**Project Brief** **Feasibility Studies** **Site Information** **Project Budget** **Project Programme** **Procurement Strategy** **Responsibility Matrix** **Information Requirements**	**Project Brief Derogations** Signed off **Stage Report** **Project Strategies** **Outline Specification** **Cost Plan**	Signed off **Stage Report** **Project Strategies** Updated **Outline Specification** Updated **Cost Plan** **Planning Application**	**Manufacturing Information** **Construction Information** **Final Specifications** Residual **Project Strategies** **Building Regulations Application**	**Building Manual** including **Health and Safety File** and **Fire Safety Information** **Practical Completion** certificate including **Defects List** **Asset Information** If **Verified Construction Information** is required, verification tasks must be defined	**Feedback** on **Project Performance** **Final Certificate** **Feedback** from light touch **Post Occupancy Evaluation**	**Feedback** from **Post Occupancy Evaluation** Updated **Building Manual** including **Health and Safety File** and **Fire Safety Information** as necessary

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Core RIBA Plan of Work terms are defined in the *RIBA Plan of Work 2020 Overview* glossary and set in **Bold Type**.

Further guidance and detailed stage descriptions are included in the *RIBA Plan of Work 2020 Overview*.

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