GIRI Design Guide
at a glance

The GIRI Design Guide
establishes a series of good-practice recommendations to address construction errors that are rooted in project formation and the design processes. By adopting these recommendations, project teams can avoid error throughout the delivery of a project.

The GIRI Design Guide is a comprehensive guide. It is broken down into several themes which are relevant whatever your role in construction.

This 'at a glance' guide has been created to support people in specific roles in using the Guide:

- Clients & Stakeholders
- Project Managers
- Consultants
- Contractors & Subcontractors

The 'at a glance' guide separates the initial stages of a construction project into:

- Project Objectives & Brief Definition
- Design Development
- Preparation of Information & Tender

Under each section, the reader can explore the key activities and deliverables that are relevant to their role and project stage with links straight to the relevant Design Guide recommendations for further explanation.

We encourage all readers to review the whole 'at a glance' guide for a complete understanding of recommended approaches to reducing error in construction.

START

Your role

Client/ Stakeholder

You are commissioning a project, or commissioning the project on behalf of the client

Project Manager

You are acting as the client's representative for the day-to-day running of the project
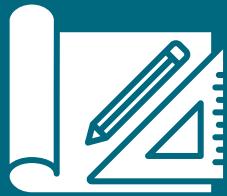
Consultant

You have been appointed by the client to perform direct services for the project

Contractor/ Subcontractor

You have been appointed to carry out contractor or subcontractor roles on the project

What stage are you at?

PROJECT START

1 Project Objectives & Brief Definition

Define brief, stakeholders and appoint consultant team who will take the development forward

2 Design Development

Develop a robust design which fulfils the requirements of the brief

3 Preparation of Information & Tender

Prepare robust information representing the signed off brief and design for tender

CONSTRUCTION

Project stage

Key activities and deliverables

For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

1 Project Objectives & Brief Definition

2 Design Development

3 Preparation of information & Tender

Referenced sections of the GIRI Design Guide

Robust approach

Culture

Investing in design

Collaboration

Brief

Stakeholder management

Project & Brief Development

- Assign client representative with authority to make informed project decisions and sign-off
- Define key project stakeholders within the client organisation
- Establish external stakeholders who will have project engagement
- Define roles and responsibilities of the key project team
- Establish project brief requirements
- Review whether a vision statement is necessary
- Define project budget and consider adequate consultant fees

Forming the consultant team

- Appoint an individual or team to manage the project at the earliest opportunity
- Appoint specialist consultants, who will develop the design and brief
- Take into consideration appointing consultants with similar values

Mobilisation period

- Define format and platform for exchanging information
- Arrange project introduction workshops for all consultants and stakeholders
- Encourage collaboration via a transparent, open and honest environment to share knowledge

Project stage

Key activities and deliverables

For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

Opening the Design Process

- Regularly review the brief via reviews and stakeholder engagement sessions
- Regularly review the developing design at the agreed milestones to ensure that it is fit for purpose
- Regularly review budget against developing design to ensure that it is aligned
- If required, appoint a contractor on a consultancy basis to assist the design team during the open design process

Preparation for closing the design process

- Sign off final project brief prior to start of tender / construction phase
- Sign off the developed design to allow for the preparation of information for tender / construction to commence
- Review updated budget aligned with signed off design

Referenced sections of the GIRI Design Guide

Project stage

1 **Project Objectives & Brief Definition**

2 **Design Development**

3 **Preparation of information & Tender**

Referenced sections of the GIRI Design Guide

Robust approach

Culture

Collaboration

Design Gateways

Information

Contractor input

Key activities and deliverables

For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

Preparation of information

- Avoid late changes which can result in additional cost, time and errors

Tender

- Appoint a Contractor with similar values

What stage are you at?

PROJECT START

1 **Project Objectives & Brief Definition**

Define brief, stakeholders and appoint consultant team who will take the development forward

2 **Design Development**

Develop a robust design which fulfils the requirements of the brief

3 **Preparation of Information & Tender**

Prepare robust information representing the signed off brief and design for tender

CONSTRUCTION

Project stage

Key activities and deliverables
For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

1 Project Objectives & Brief Definition

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Project & Brief Development

- Develop plan of work to which the project will be delivered, identifying project milestones, deliverables, review and approval process
- Develop a project programme allowing for sufficient time for design evolution
- Engage with external stakeholders

Forming the consultant team

- Define roles and responsibilities of the whole project team
- Identify a Lead Designer who will manage the design and brief development
- Prepare appointment documents
- Assist client in identifying specialist consultants at the appropriate time to ensure the project is developed successfully

Mobilisation period

- Establish engagement plan which defines sign off, production and checking of information
- Produce and communicate engagement plan to facilitate communication and consultation

Project stage

Key activities and deliverables
For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

1 Project Objectives & Brief Definition

2 Design Development

3 Preparation of information & Tender

Referenced sections of the GIRI Design Guide

Robust approach

Brief

Stakeholder management

Planning the design work

Guiding the design team

Opening up & closing down

Contractor input

Opening the Design Process

- Ensure that sufficient time is provided for the 'opening up' design stage to avoid late changes
- Monitor whether additional specialist consultants are required during the design opening-up process to avoid errors and late changes
- Ensure that all stakeholders and the client are engaged in reviewing the developing brief and design as per the engagement plan
- Ensure that regular workshops are carried out between the appointed consultants to aid coordination and collaboration
- Monitor evolving designs and interfaces to avoid scope gaps and errors
- Assist in establishing when and if contractor's engagement on buildability is required prior to closing the design process to reduce post-tender design changes and avoidable errors as well as unnecessary waste
- Regularly review the project programme, plan of work and budget against the developing design and brief and report back to the client and design team

Preparation for closing the design process

- Ensure that the agreed engagement plan is being followed and the appropriate information is issued to the relevant parties for review and sign off
- Verify that the designs meet the requirements of client brief and that the consultants have fulfilled their duties as described in their scope of services

Project stage

1 Project Objectives & Brief Definition

2 Design Development

3 Preparation of information & Tender

Preparation of information

- Discourage late changes which can result in additional cost, time and errors
- Monitor that the appropriate change control process is being implemented if any changes are required

Tender

- Ensure that all information required for tender is passed onto the tendering parties to prevent errors and scope gaps

Referenced sections of the GIRI Design Guide

Robust approach

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Information

Contractor input

What stage are you at?

Consultant

PROJECT START

1 **Project Objectives & Brief Definition**

Define brief, stakeholders and appoint consultant team who will take the development forward

2 **Design Development**

Develop a robust design which fulfils the requirements of the brief

3 **Preparation of Information & Tender**

Prepare robust information representing the signed off brief and design for tender

CONSTRUCTION

Project stage

Key activities and deliverables

For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

1 Project Objectives & Brief Definition

2 Design Development

3 Preparation of information & Tender

Referenced sections of the GIRI Design Guide

Robust approach

Culture

Investing in design

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Brief

Stakeholder management

Project & Brief Development

- Contribute to development of a plan of work to which the project will be delivered
- Review and input on project programme
- Review and input on key deliverables, milestones, project programme, design gateways
- Develop the brief, using standard model forms for guidance as appropriate

Forming the consultant team

- Review the project team and roles and responsibilities to ensure there are no scope gaps and that services and appointments are aligned and consistent
- Assist in establishing key external stakeholders

Mobilisation period

- Identify key organisational team members with relevant skills and experience
- Agree format and platform for exchanging information
- Review communication and engagement strategy

Project stage

1 **Project Objectives & Brief Definition**

2 **Design Development**

3 **Preparation of information & Tender**

Referenced sections of the GIRI Design Guide

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Opening up & closing down

Contractor input

Key activities and deliverables

For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

Opening the Design Process

- Lead designer to undertake client and stakeholder engagement to further develop the brief
- Regularly review and test the developing design against the brief, report outcomes to the client and stakeholders
- Ensure that designs do not proceed beyond a milestone until all relevant checks have been carried out and relevant consultants and stakeholders have provided feedback
- Regularly attend workshops to coordinate the developing design with all consultants. Review and report if there are any scope gaps
- Agree a process for issuing information, ensuring the recipient understands it, and reviewing outputs to confirm they follow the agreed process for creating and communicating information

Preparation for closing the design process

- Complete design development in good time ahead of preparation of production for information
- Review the developed design against the final client brief
- Ensure that the developed design and brief are clearly communicated to the relevant parties to achieve sign off

Project stage

Key activities and deliverables
For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

1 **Project Objectives & Brief Definition**

2 **Design Development**

3 **Preparation of information & Tender**

Preparation of information

- Prepare information to clearly communicate the signed off brief and design
- Ensure the information is developed to the agreed level of detail, is coordinated, complete and free of errors and scope gaps

Referenced sections of the GIRI Design Guide

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Contractor input

What stage are you at?

PROJECT START

1 Project Objectives & Brief Definition

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Project stage

Key activities and deliverables
For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

1 **Project Objectives & Brief Definition**

2 **Design Development**

3 **Preparation of information & Tender**

Dependant on when the Contractor is appointed and project role, refer to Project Objectives & Brief Definition sections under Client/Stakeholder, Project Manager and Consultant for relevant guidance

Referenced sections of the GIRI Design Guide

Robust approach

Culture

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Planning the design work

Guiding the design team

Opening up & closing down

Contractor input

Project stage

1 Project Objectives & Brief Definition

2 Design Development

3 Preparation of information & Tender

Key activities and deliverables

For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

If early contractor/subcontractor input is required on buildability

- Input on design for construction in line with brief, budget, project programme and aspirations
- Assess designs against delivery, buildability and construction consideration

Referenced sections of the GIRI Design Guide

Robust approach

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Contractor input

Key activities and deliverables

For more information select the relevant statement which will take you to the corresponding section of the GIRI Design Guide

Tender, where contractor has not been involved at previous stage

- Review and input on key deliverables, milestones, project programme, design gateway
- Highlight scope gaps if such are found during the review process
- Assess designs against delivery, buildability and construction considerations

Tender, where contractor was involved at previous stage

- Ensure key project and design information is effectively handed over to the appointed contractor

Client/
Stakeholder

Project
Manager

Consultant

Contractor/
Subcontractor

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Overview
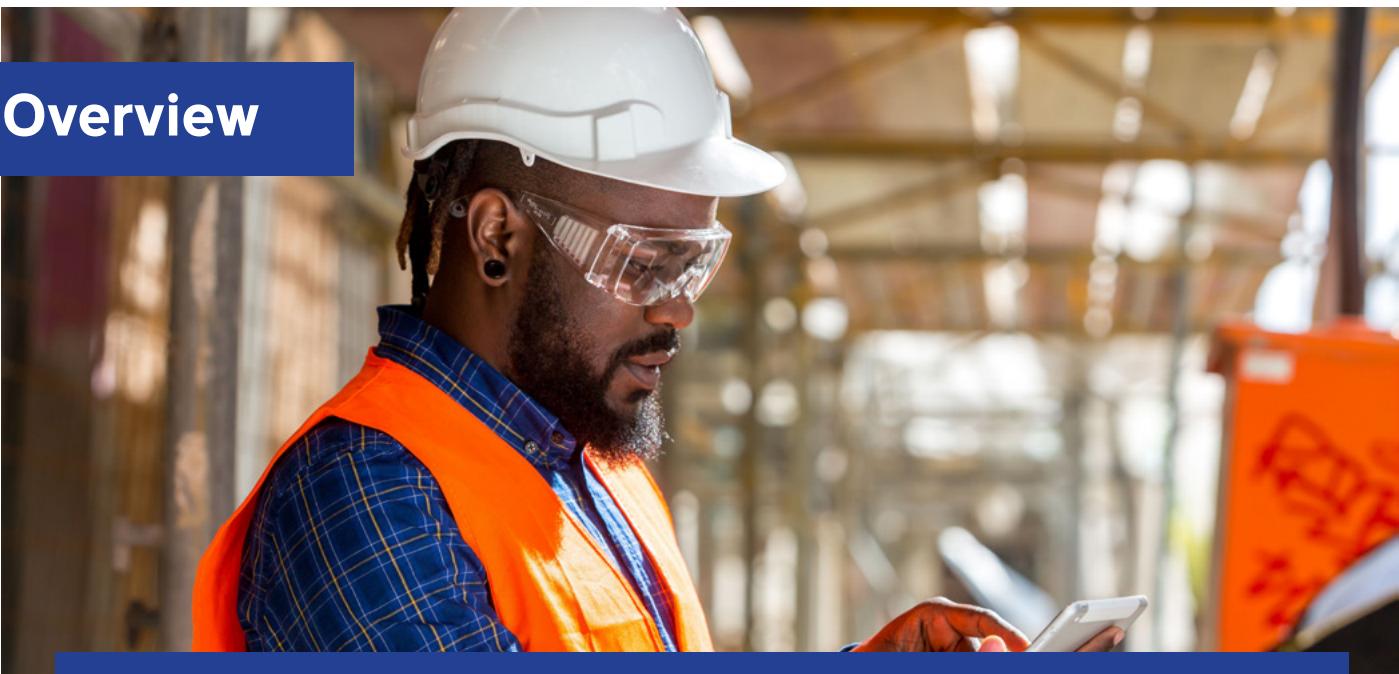
The GIRI Design Guide: advocating a robust approach to the design process

What is the purpose of the GIRI Design Guide?

Research by the Get It Right Initiative established that a significant proportion of the failings that lead to errors in construction are rooted in the project formation and design processes.

The GIRI Design Guide shares a series of good-practice recommendations to address these root causes and have a significant impact on the avoidance of error throughout the delivery of a project.

Why is it important to get design right first time?

We asked six experts to share their thoughts – watch our video to see what they said.
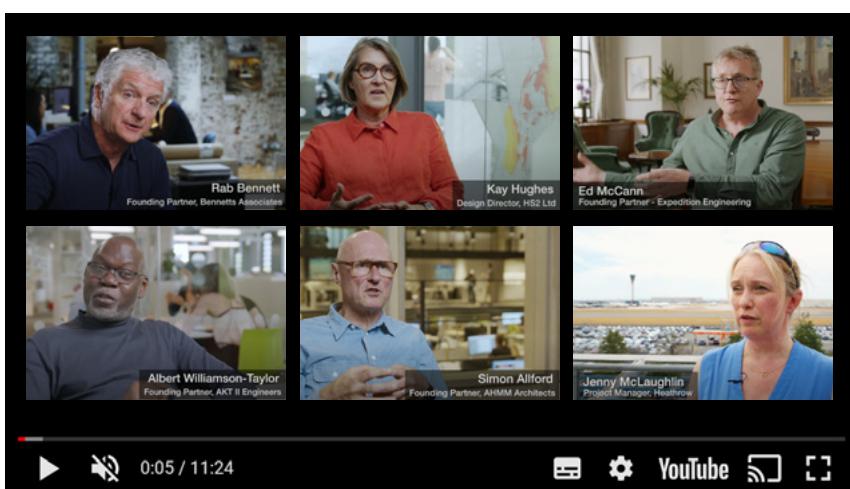
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Who is the GIRI Design Guide for?

The Design Guide is not just for those who carry out design; its recommendations have implications for everyone involved in the construction industry, from building and infrastructure clients to contractors and their supply chains.

All parties have a role to play in reducing design process error – whether that is in ensuring design information is correct and submitted to the relevant parties in a timely manner; in providing designers with the necessary resources to carry out their work effectively, or by simply establishing and supporting a culture that gives people the confidence to challenge things that could lead to errors.

Everyone will benefit from the guide in one way or another – it can serve as an introduction for those who are new to the industry, or have limited experience in commissioning, or as a reminder of best practice for those with many years of experience.

All parties gain a greater understanding of how the establishment of a cohesive, collaborative team can lead to improved project outcomes. The guide identifies the crucial benefits of early investment in design and promotes wider awareness of best-practice processes.

For **architects and consulting engineers**, the Design Guide offers a reminder of best practice through all stages of a project, including the crucial design decisions that need to be made at the outset. They will also gain an understanding of the challenges faced by other parties in the project team. The guide provides a platform through which the crucial aspects of early stage engagement with the client, contractors and supply chain can be raised and discussed.

For **clients, developers and asset owners**, the guide sets out the key activities that need to be undertaken at the beginning of a project and the critical watchpoints through the design and construction process.

Contractors and subcontractors benefit from the guide as a means of demonstrating how early contractor involvement, and an emphasis on collaborative culture can improve project outcomes. For subcontractors with design responsibilities under a contractor's design portion or similar, the guide offers a means of demonstrating how earlier involvement in design development reduces the risk of errors occurring later in the project.

Similarly for **specialist supply-chain companies**, the Design Guide offers a way of demonstrating how early involvement can reduce the risk of late changes, as procurement proceeds and alternatives are considered.

Overview

What does the guide recommend?

Key GIRI Design Guide recommendations are broken down into a number of themes; full details can be accessed by clicking on the titles or visiting the relevant page from the drop-down menu on the top right:

Robust approach

GIRI research established that many of the weaknesses in design which lead to errors in construction are rooted in a failure to properly define and agree the design process at the outset, as well as a failure to rigorously apply it throughout the project.

A clearly-defined and well-managed design process should be established at the start of a project with the involvement of all key members of the team. Having agreed the process, the team must then apply it rigorously.

Culture

Delivery of construction projects is improved, and the number of errors reduced, when the right working culture exists; one that encourages collaboration, adaptive behaviour, inclusivity, leadership and good communication.

Investment

Providing sufficient resources – not just fees but also time – to do the design properly is crucial. Early investment in design will more than repay itself by eliminating errors that could create problems later in the project.

Collaboration

A collaborative working environment establishes a teamwork approach to getting things right, and is inextricably linked to culture. Team members do their best to help others to fulfil their responsibilities, and are open about areas where they themselves need help.

Planning the design work

The project team should agree a framework for planning the design work and coordination of information, and the execution of the project should be developed on this basis. It is important to ensure that all parties are fully aware of the framework and its requirements.

Brief

A well-prepared brief minimises design changes, and so reduces the knock-on construction errors and the associated cost increases and delays.

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Overview

Information

Good quality, complete design information together with the clear communication of this information between all parties is an key part of any successful project.

Stakeholder management

Engaging with and managing all stakeholders is integral to the successful design and delivery of all projects.

Opening up and closing down

The concept of 'opening up' and 'closing down' a design enables all creative thinking and key decision-making to be completed in good time, ahead of production information being prepared, eliminating or at least minimising subsequent changes.

Contractor input

All projects benefit from tapping into a contractor's knowledge of delivery, buildability and construction techniques before design options are closed down. As a minimum the client should appoint a suitable contractor or specialist on an informal basis to consult with as the design develops.

Design gateways

If a comprehensive set of information is produced, reviewed and communicated effectively at established gateways, then the design is less likely to be misinterpreted and the potential for errors reduced.

Guiding the design proces

Adopting a structured approach for the design process, from start to finish of the project, greatly reduces the risk of design errors. An individual with the authority to make informed decisions based on and aligned with cost and programme considerations should be assigned to manage the process.

What is the Get It Right Initiative

The Get It Right Initiative is a not-for-profit membership organisation that is using a multi-disciplinary approach to tackling avoidable error in the construction industry. GIRI's early research identified the main types of errors, their causes, and their costs, so that effective methods could be developed to avoid errors and minimise their consequences.

Visit the GIRI website to find out more.

Overview

The Design Guide builds on the GIRI Guide to Improving Value by Reducing Design Error.

Endorsements

The GIRI Design Guide has received endorsement from the Institution of Civil Engineers, the Institution of Structural Engineers, and the Royal Institution of Chartered Surveyors as best practice in driving the elimination of error. Find out more here.

Feedback

We welcome feedback on this document and intend to review it on a regular basis to ensure it continues to be relevant, usable and accessible. Please use this form to submit any feedback.

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Client/
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Robust approach

Establishing a rigorous design process

Introduction

GIRI research established that many of the weaknesses in design which lead to errors in construction are rooted in a failure to properly define and agree the design process at the outset, as well as a failure to rigorously apply it throughout the project.

A clearly-defined and well-managed design process should be established at the start of a project with the involvement of all key members of the team. Having agreed the process, the team must then apply it consistently.

Why is it important?

GIRI has identified a series of key issues relating to the design process which, if properly established and maintained, can significantly reduce project error.

The main priorities are to recognise the importance of a rigorous design process, and for the client with the support of the lead designer, to ensure that such a process is established at the start, understood and agreed by all key parties and implemented throughout the project. (See guiding the design team.)

Action to address any issues that arise must be taken promptly; it is crucial that problems are not ignored because they are considered difficult to resolve.

What are the desired outcomes and how can you achieve them?

The following recommendations can significantly reduce design error, but while they are all accepted as good practice, getting them adopted can be a major challenge.

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Robust approach

Establishing clear roles and responsibilities

The key to eliminating any misunderstandings from the outset is to kick off the project with a team of people who understand their own scope of services, roles and design responsibilities, and who are also clear on the scope of all other team members and disciplines. (See collaboration, culture and guiding the design team.)

Delivering design to an agreed plan of work

The project team should follow an agreed framework, and the execution of the project should be developed on this basis (see planning the design work). It is important to ensure that all parties are fully aware of the framework within which they are delivering their design, and the requirements of that framework – whether RIBA for building, GRIP for rail, PCF for highways or any other client-specific delivery model.

Setting milestones

Milestones are important management tools that can be used to encourage beneficial behaviour across disciplines by carefully working them into professional appointments. (See planning the design work, opening up and closing down, and design gateways.)

Design leadership

Project success relies not only on process, but also on teams having a common collaborative approach to achieving the design objectives. Key to this is strong leadership, which should come from the individual appointed to manage the design process, and be supported by the client. (See guiding the design team.)

Robust brief

The project brief is an evolving document. As a minimum, a design team cannot progress without an outline that can be developed with the client into a project brief before the start of concept design. The brief must be signed off by the client and key stakeholders at the outset and must be used as a control document to refer back to; any changes must be agreed, recorded and signed off by the client. (See brief)

Budget

In establishing the brief it is crucial to set up a process by which the design can be satisfactorily tested against the budget at key milestones. Specialist design input should be obtained at an early stage in order to get robust cost advice; too often this recommendation is ignored because it is commercially sensitive and may be seen as favouring a particular supplier or contractor. However the current practice is simply not working. (See contractor input).

It is crucial to set a realistic budget and employ cost consultants to implement a rigorous benchmarking process.

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Robust approach

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Change control
Clarity is vital when changes are made to the design or brief; they should be managed in a clear and structured way to ensure all parties have understood and assessed the implications of each change before endorsing it, and with client sign-off.

It is probably unrealistic to implement a change control procedure before technical design commences, unless there is a major change to the project; however all changes that significantly affect cost or programme should be considered at the early stages of a project.

Change control should be an agenda item at all design team meetings. (See opening up & closing down, and design gateways.)

Realistic programming
The time allowed for each design stage must be realistic and recognise the complexities of the project and the procurement route. Activities should be planned and discussed by the key members of a project team, taking account of any programme constraints, and an appropriate period must be built in for client review and approval. The individual appointed to manage the design should prepare a design programme at the start of a project, which must be reviewed and agreed by all parties. (See planning the design work.)

Client review and approval
Client review meetings should be scheduled throughout the design stages to validate the design and for the design team, and cost consultant and contractor if appointed, to obtain clear direction from the client.

Establishing such a schedule ensures consistency of input from particular client individuals, which is important if change is to be avoided through different interpretations of the client brief. It eliminates surprises and misunderstandings when the end-of-design-stage information is issued.

Additionally end-of-stage presentations – and interim-stage presentations if required – should be made to the key decision makers , clearly setting out any design or project issues that need to be resolved. (See stakeholder management).

Peer reviews
At appropriate stages in the project it may be beneficial to facilitate design reviews by external parties to check that the design meets the brief and the correct level of detail has been achieved. This could be provided by one organisation or by individual design consultants. (See guiding the design team). Consideration should also be given to engaging with other groups, such as end users or the team that will operate and maintain the asset once occupied. (See stakeholder management).

Robust approach

Digital engineering / BIM

With rapid changes in the way design is carried out, digital engineering and the use of digital models is becoming the norm across all sectors. The efficiencies that arise from being able to visualise, understand and resolve coordination issues in this way are now widely recognised. It is GIRI's view that BIM to Level 2, or equivalent, should be adopted as a minimum, at both the design and construction stages. (See this link for more information about BIM levels).

Designing for construction

Another key finding of GIRI's research is that buildability is rarely given proper consideration during the design development process. This may be due to designers lacking a full understanding of construction processes, or being given insufficient time to develop the design.

GIRI recommends that for any design beyond the concept stage, buildability should be specifically considered as a project requirement and ideally be reviewed by specialist designers and contractors. This could either be by informal consultation, as part of a pre-construction services agreement or as part of the peer review. (See contractor input).

Design interface management

Design issues often arise due to scope gaps between elements of works. These interfaces may be between different works packages – for example infrastructure works and building works – or between different material types, such as the diverse elements of a façade.

It is important to set out where interfaces arise in the scope of packages (often a contractor's responsibility) and to define where design responsibilities begin and end. It is also important to allow enough time for subcontractors with design responsibility to further develop the design interface. (See information and planning the design work).

Key goal

A robust design approach involving key members of the project team should be adopted at the beginning of the project.

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Robust approach

Practical steps

The team should adopt some, or ideally all, of the following points:

Practical step	Purpose	More info
Clearly define roles and responsibilities	To eliminate misunderstandings from the outset	Culture Investing in design Collaboration
Establish an agreed plan of work to which the design will be delivered	To coordinate design activities in accordance with each contributor's individual scope	Planning the design work
Set and agree milestones	To encourage beneficial behaviour across disciplines	Planning the design Opening up and closing down Design gateways
Create the environment to support strong leadership	To encourage a collaborative approach	Collaboration Guiding the design team
Ensure the brief is thorough and well-prepared	To serve as a control document throughout the project	Brief
Seek robust cost advice	To ensure the project is properly budgeted and costs controlled	Investing in the design Contractor input
Implement the appropriate change control process	To ensure all parties have understood and assessed the implications of each change before endorsing it	Opening up and closing down Design gateways
Allow sufficient time for design to evolve	To ensure the time allowed for each design stage is realistic and recognises the complexities of the project and the procurement route	Planning the design
Programme in regular client reviews	To ensure the design is validated, and to allow the design team, cost consultant and contractor, if appointed, to obtain clear direction from the client.	Opening up and closing down Stakeholder management

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Robust approach

Practical step	Purpose	More info
Commission peer reviews and buildability reviews	To check that the design meets the brief and the correct level of detail has been achieved; and to ensure that buildability has been given proper consideration	Contractor input
As a minimum, adopt BIM to Level 2 or equivalent, at both the design and construction stages	To ensure efficient and accurate coordination and communication of design	The NBS
Ensure design interfaces are properly considered and managed	To eliminate the risk of scope gaps arising between elements of works, and leading to design issues	Information Planning the design work

Client/Stakeholder

Project Manager

Consultant

Contractor/Subcontractor

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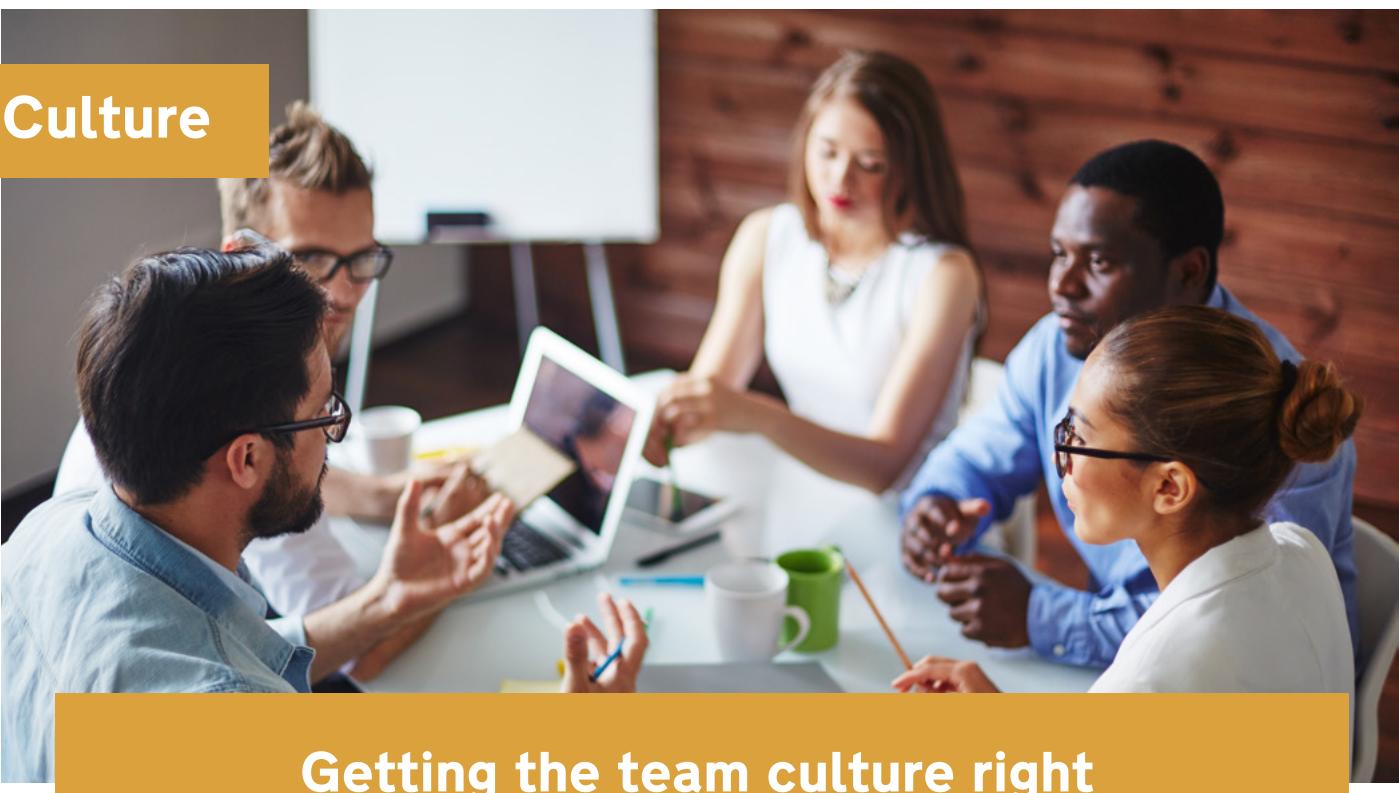
Culture

Getting the team culture right

Introduction

Delivery of construction projects is improved, and the number of errors reduced, when the right working culture exists. The right culture encourages and rewards behaviours such as collaboration, adaptive behaviour, inclusivity, leadership and good communication.

Why is it important?

Would you tell your client that you had doubts about delivering something that was within your brief? How confident would you be that they would accept the position and work with you to find the best solution? Or would you be afraid that they would dispense with your services and appoint someone else? If another supplier had problems which were jeopardising progress on the project, would you offer to help even it meant extra time or cost for you?

Such dilemmas are all too prevalent in the construction industry, but they are less likely to arise, and quicker to resolve within an open and transparent team culture. The right culture makes it acceptable to ask questions; to admit that you don't know something; to criticise (positively) and to make suggestions even if they fall outside your own organisation's brief.

What are the desired outcomes and how can you achieve them?

Establishing and sustaining the right culture
Establishing the appropriate culture is the first challenge. While there is no simple recipe, one essential ingredient is clear leadership and a client who demonstrates a commitment to collaborative working. Choosing people and organisations with similar

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values helps, as does selection of processes and systems that support the culture. Sustaining this ethos is also part of the challenge. People work together and build trust if they are in the right environment, but when staff move on, how can all the important cultural facets of transparency, openness and honesty be retained?

It certainly helps if the culture is embedded within each organisation rather than relying on any one individual. But it needs more than this. Every construction project involves a vast number of organisations, so it is important to create a structure that allows all parties to establish a sense of ownership. In this way, the needs of the project subsume those of the individual organisations.

There is no text book way of achieving this. Contracts determine the nature of projects and certain forms are designed to enhance the right culture, which can help. In spite of the fact that most projects are procured using 'non-collaborative' forms of contract, some are still able to achieve the right culture.

Recognising the hallmarks of good working culture

In its simplest form, the right culture empowers project team members to make decisions and take actions within their own areas of expertise; these must work in unison with the thousands of other decisions and actions taking place across the project. All parties should have a shared vision of the end-state, but be trusted to take decisions within a clear framework.

A change in mindset is needed so that the outcome is all that matters. However faultless the calculations, or beautiful the drawings, unless every element is built and handed over in working order, the project is a failure. This underlines the link to the real world of construction and delivery, and breaks down some of the organisational and contractual barriers that have been identified.

A clearly defined intent outlines what the project wants to achieve and why, and is normally expressed in terms of effects and desired outcomes. It should be written in a language that all members of the team, from directors to operatives, will understand. This binds the entire project team together and forms a benchmark for all subsequent decision making.

Improvements in communication and mutual understanding can be achieved by making it standard practice for team members to conduct back-briefing at an agreed time or stage. The individuals receiving information give a synopsis of the information they have just received, allowing the person who gave the information to ensure that their message was properly understood, and clarify it if not.

Key goal

To create and sustain the right working culture.

Culture

Practical steps

Practical step	Purpose	More info
Establish a clearly defined intent for what the project wants to achieve and why	To bind the entire project team together and form the benchmark for all subsequent decision making	GIRI project workshops
Reinforce the focus on outcomes	To underline the link to the real world of construction and delivery, and break down organisational and contractual barriers	GIRI project workshops
Adopt the process of back-briefing	To improve communication and mutual understanding	Brief

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Investing in design
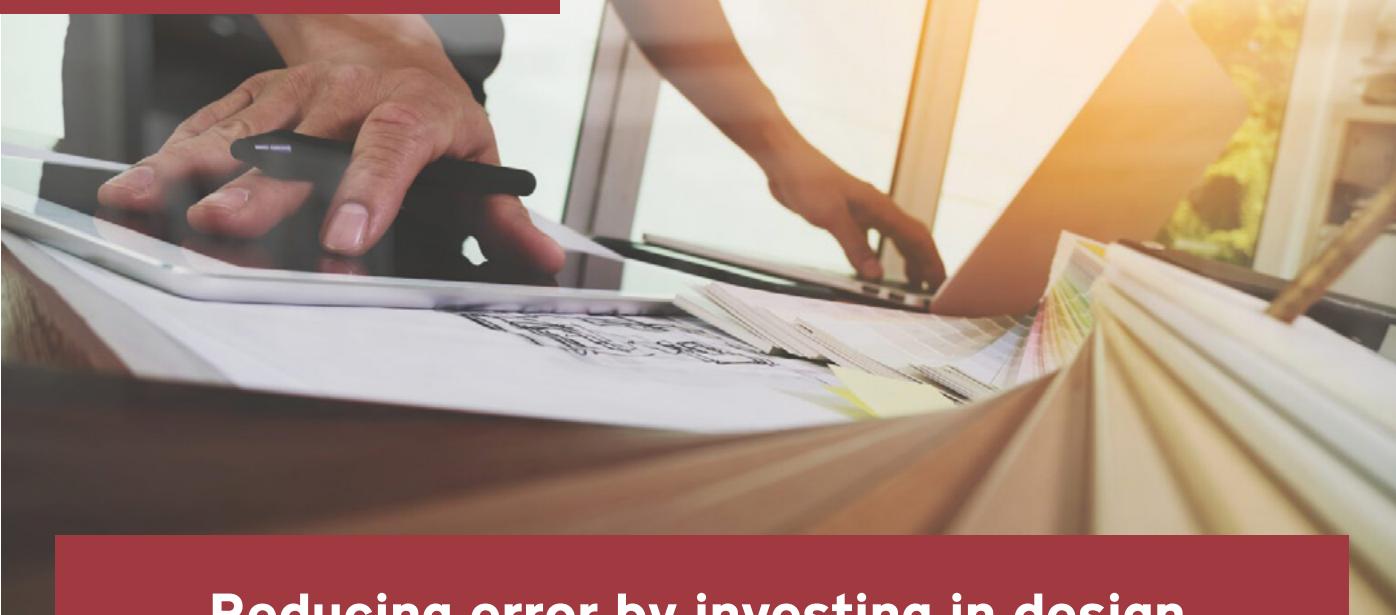
Reducing error by investing in design

Introduction

Delivery of construction projects is improved, and the number of errors reduced, when the right working culture exists. Providing sufficient resources – both time and fees – to do the design properly is crucial. Early investment in design will more than repay itself by eliminating errors that could create problems later in the project; conversely reducing investment in design will almost certainly increase out-turn costs and result in adverse technical outcomes, leading to even greater costs or legal disputes.

Why is it important?

Research by the Get It Right Initiative established that 21% of project cost is wasted on error and that five of the top ten root causes of error relate to design. This loss is not just the cost of correcting an error, but also the delay that results from the process.

Allowing a design error to go uncorrected may eliminate direct costs, but at best it will inflate costs elsewhere on the project or impact on the performance of the completed scheme. At worst, it could lead to a serious failure.

What are the desired outcomes and how can you achieve them?

Design is not only about the project as a finished entity, it is the foundation of every sub-element and component that will be incorporated into the final product. A huge web of inter-related design issues contributes to the overall design of a scheme, so a failure in the design of any component, however small, can have a major impact on the project as a whole.

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Investing in design

Avoid late changes

GIRI's research report concluded that late changes to design are a fundamental root cause of error. Further analysis suggests that changes are made for one of a number of reasons:

- The designers based the design on incorrect assumptions, made errors in the design itself, or changes were made to the design approach so that the initial design has to be amended.

- The client has changed the requirements, either because the design was not meeting expectations, or for political, value or legal reasons.

With sufficient, early investment of time and fees in design, the likelihood of such issues arising will be significantly reduced, and the only justification for late design changes would be political, value or legal reasons.

It is important to emphasise that changes during the development of the design are not errors as such, they are part of an iterative process. Designers must be given adequate time and fee to allow effective design development and ensure designs are buildable ahead of the procurement process. Without this process, the risk of error during the construction process is increased.

Design development versus design change is a key aspect to address and must be managed robustly by the authorised design management individual. (See guiding the design team).

Invest at the right stage

The preparation of a design appointment strategy is encouraged – relevant design consultants and specialist suppliers should be consulted/appointed at the early stages to enable designs to be developed sufficiently with the minimum of error.

A key step to reducing the volume of design-related errors which are creating such large additional costs on construction projects is to invest sufficient resources in the design process.

In almost every case, this means providing sufficient time and resource to get the design right before construction, and allocating more money to the design process.

Benefit from the multiplier effect

Suppose 15% of project cost is spent on design; the cost of error to the same project, according to GIRI's research, will be 21%. The research also showed that a significant proportion of this cost can be traced back to decisions made at the design stage.

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Investing in design

If the investment in design was uplifted by just 10% – to 16.5% of the total cost – and this resulted in a 10% reduction in the cost of error – or 2.1% of the total cost – then it would have more than paid for itself.

In reality the improvement would probably be much greater, producing a return several times the level of the initial investment. This is the multiplier effect.

Key goal

To reduce error by appropriate investment of time and fees in design.

Practical steps

Practical step	Purpose	More info
Discourage late changes to design	To eliminate a fundamental root cause of error	Planning the design
Do not allow design error to go uncorrected	To minimise additional costs and delays elsewhere on the project, or at a later stage	
Invest time and fees at the early stages	To get the design correct before construction starts, maximising the return on investment	
Create and implement a design appointment strategy	To ensure all parties are clear on the scope of the design and all necessary appointments are made	Guiding the design team

Collaboration
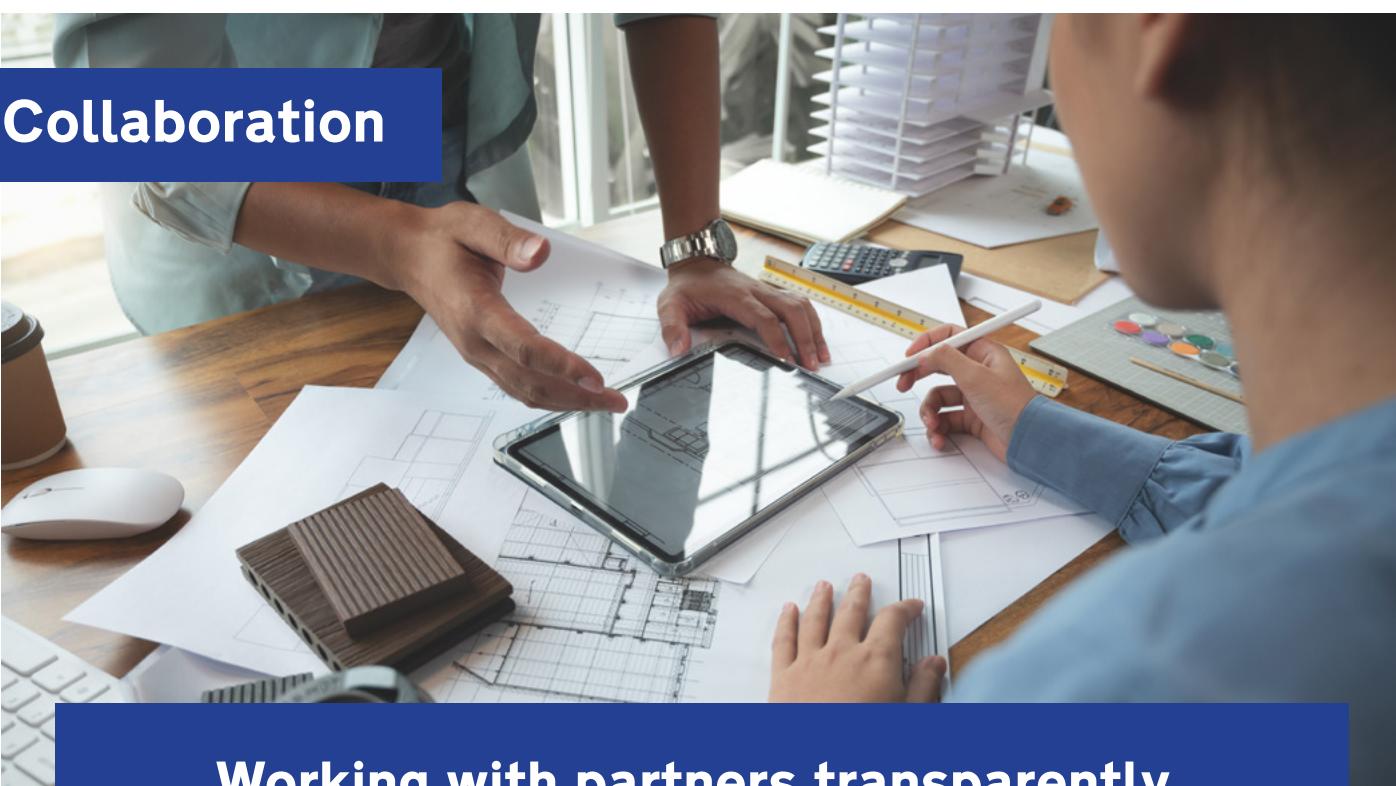
Working with partners transparently, cooperatively and collaboratively

Introduction

A collaborative working environment establishes a teamwork approach to getting things right, and is inextricably linked to culture. Team members do their best to help others to fulfil their responsibilities, and are open about areas where they themselves need help. Every project benefits from collaboration, and collaborative working helps to reduce errors.

Why is it important?

Conventional procurement and its predominantly transactional approach has consistently struggled to deliver satisfactory outcomes; as a result, efficiency and quality of work in the construction industry compare poorly with other industries. This is largely because each party is more focused on protecting its own interests than on the success of the project as a whole.

What are the desired outcomes and how can you achieve them?

Establishing a common objective

Collaboration implies that all parties share a common objective. This requires alignment of project objectives to ensure that successful outcomes for each party will result in a successful project. All parties should also seek to ensure that they have alignment within their own organisations, to eliminate any prospect of conflict between different internal departments.

More often than not, participants have different criteria for success, and therefore the client's brief should clearly set out the requirements and constraints which will define

a successful project. All participants, including third party stakeholders, designers and contractors need to be equally clear as to their measures of success and how they relate to the brief. (See brief and culture).

It does not necessarily follow that parties should be in complete alignment across all areas – as long as it is fully understood how and where objectives differ. Being open and clear about any non-alignment will support the collaborative process.

Participants should discuss and agree how the various success criteria can be aligned if possible. This is where collaboration differs from traditional procurement and it demands a level of trust that is uncommon in hard price, lowest cost contracts.

The alignment process requires a careful analysis of the individual motivations and identification of positive incentives to encourage unity. Again, due to the individual success criteria, the motivations and incentives will be different for each party.

Working collaboratively

Successful collaboration requires, first of all, an appreciation by all parties of the benefits of working collaboratively. Active leadership is the second vital component, and this ideally comes from the client or agents working on behalf of the client. It should be consistent across the supply chain and maintained throughout the project.

There are various ways in which collaborative working may be encouraged, such as the one described below, but all rely on clear and effective communication between all parties. (See information and culture).

Partnering is an approach to the management of construction contracts that encourages collaboration between the parties. The core rationale is to generate co-operation and collaboration so as to engender trust rather than competition between the parties. Partnering arrangements can be put in place so as to impact positively on all parties involved in a project, including the client, contractor, sub-contractors and consultants.

Partnering is sometimes criticised due to the difficulty of establishing common interest between the client and the contractor and other suppliers. While there is some truth in this, it overstates the inevitability of commercial conflict and fails to recognise the behavioural benefits that partnering, and therefore collaborative arrangements can leverage.

The key aspiration is that parties act in the common interests of the project and of each other, discouraging selfish behaviour. At its best, collaboration achieves a result that would not be possible through contract arrangements that characterise projects as a zero-sum game, where one party's gain is another's loss.

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Collaboration

It is possible to agree some partnering obligations that are binding, whilst other provisions may be aspirational. Whatever type of contract is adopted, pre-project workshops between senior representatives as part of the alignment process can establish measures to support partnering – for example a 'project charter' or 'pledge'.

Once in place, the behaviours of the project participants should be reviewed at regular intervals to ensure the desired collaborative culture is being established and is being instilled in new project team members, as well as the supply chain.

As well as helping to achieve a successful project, collaboration enables the formation of strong and long-lasting professional relationships throughout the project and beyond; establishes good practice for future bids; contributes to an organisation's own corporate goals including sustainability and net zero carbon, and above all, helps to reduce site error and improve productivity.

Key goal

Establish a commitment to collaborative working.

Practical steps

Practical step	Purpose	More info
Adopt an appropriate form of contract or consider partnering or a project charter/pledge	To instil the values of collaboration throughout the life of the project	
Introduce pre-stage workshops for senior representatives at the design and construction stages	To align success criteria and reinforce the requirements of the brief and project	Brief
Introduce behavioural reviews at key project milestones	To ensure success criteria are being followed and respected	

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Planning the design work

Creating and agreeing a project-specific plan of design work

Introduction

GIRI research has highlighted the fact that misunderstandings and misaligned expectations about the scope of services can lead to shortfalls both in design and in coordination of information.

This is likely to impact all phases of the project and often results in errors that create re-work, waste, delays and increased costs.

Why is it important?

Clarifying roles and responsibilities has become increasingly important as the number of specialist designers and contractors taking on management roles has risen, and the supply chain has become more engaged in the design process.

Different consultants may be appointed to work on different parts of the design or at different RIBA stages (for buildings), and every part and phase should be designed to deliver the best outcome for the project as a whole.

GIRI research found that the information provided to competing design teams varies considerably: while some project enquiries offer considerable detail, others have very little on which to base fee proposals.

Priced submissions can vary significantly. That staff costs, training, overheads, operating efficiencies and profit margins are broadly comparable between firms of the same design discipline, suggests that the variance in fee comes from the level of service or quality/completeness of design deliverables. Therefore, clarity at this stage is essential.

Planning the design work

What are the desired outcomes and how can you achieve them?

Provide comprehensive and unambiguous information at an early stage
For any construction project the following information should ideally be made available at the beginning of the project

- A short **description** of the scheme, to include its objectives/purpose/use, the client outline brief, the anticipated scope based on financial viability, budget, known constraints and anticipated procurement route

- An outline **programme** of the works showing design stages and construction phase duration

- A draft **design responsibility matrix** (DRM), which sets out the relationship between each design discipline and the responsibility of each designer, and the design interfaces between designer and specialist sub-contractor designer/ installer.

- Proposed **appointment** terms.

- A coordinated **scope of services** document, to include the duties at each stage of the project for each design discipline; the expected level of design by each design discipline; the deliverables and details expected at each design stage milestone; and the format of the design deliverables including CAD and BIM requirements. This document should be made available to all design disciplines at an early stage so that these relationships are understood at the outset.

Set out design responsibilities and roles
Ideally the above information would be readily available, and in part defined with contributions from the design team, but this is unrealistic on most projects. What is essential is that the design team is aligned by a coordinated design responsibility matrix and project-specific plan of work. This is why it is crucial to prepare a project-specific plan of work, which includes scope and deliverables by specialist designers and supply-chain members and, most importantly, is agreed by all parties.

For building services engineering, the BSRIA BG6 document provides exemplar deliverable drawings for each project stage but this is not the case with RIBA and ICE. It is also vital that a relevant person is assigned to manage the design process at each stage.

Key goal

Establish and agree a project-specific plan of work for design, and set out roles and responsibilities across all disciplines before any appointments are made.

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Planning the design work

Practical steps

Practical step	Purpose	More info
Create a comprehensive and project-specific plan of work for design across all disciplines. Key consultants should be involved in developing this, and it should also set out any design responsibilities of supply-chain members.	To eliminate misunderstandings, highlight interfaces, and clarify design responsibilities at all stages of the project.	
Ensure the brief is well-defined and responds to the requirements	To ensure that any project-specific conditions have been given full consideration.	Brief Stakeholder management
Make sure that project enquiries always contain comprehensive and unambiguous information as set out above.	To ensure fee proposals from consultants are directly comparable, and that they reflect the level of service required.	Information
Clearly define the roles and responsibilities of all designers and contractors in a scope of services document, which should be distributed to all designers at the outset.	To eliminate any duplication or omissions in the services priced for and supplied.	
Create and agree a design responsibility matrix	To ensure all parties are clear on their responsibilities and have confirmed their understanding.	
Introduce pre-project commencement workshops on site between senior representatives.	To identify and resolve any potential issues.	Culture Collaboration
Produce an outline project programme	To aid resourcing and fee calculations and to encourage feedback on whether timescales are achievable	Investing in design
Assign an individual to manage the design process	To ensure the process of design is monitored effectively	Investing in design

Establishing a well-prepared brief

Introduction

A well-prepared brief minimises design changes, and so reduces the knock-on construction errors and the associated cost increases and delays which follow.

An effective brief defines project objectives and aspirations and should be supported by a vision statement. The person setting the brief must share all the relevant information they hold, whilst ensuring it remains a strategic document with only sufficient detail to address the key issues and objectives related to the scale and complexity of the project.

Why is it important?

The project brief should set out the client's needs and expectations and inform the design team of the project requirements; in this regard it is the most crucial part of the project process. If the brief does not reflect these considerations then misunderstandings can lead to unnecessary design changes being made further down the line.

Even if the number of items overlooked or not clearly defined in a brief is minimal, these omissions can still lead to errors in the design, with much greater impact on cost and programme at the construction stage because they are often discovered late in the project.

The development and delivery of the brief needs to be appropriately planned, with sufficient time allowed for the client's needs and expectations to be defined in collaboration with all relevant parties. The project team should ensure that the deliverables of the brief reflect, and can adhere to, corporate governance requirements.

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What are the desired outcomes and how can you achieve them?

The brief should define project objectives and aspirations and be clearly communicated to the project team. The briefing process is fundamental in defining the needs and expectations of the client, and requires sufficient time to be completed in collaboration with all relevant parties.

Define the project requirements
The client brief is the question the project has to answer. It should clearly define the project requirements considering all aspects – including for example the use or uses of the project, sustainability goals, or futureproofing considerations – and not be limited to purely cost-focussed targets.

Clients need to accept that the brief will adapt and develop as the project progresses. The designer should assist in the development of the brief to help balance the competing objectives of cost and aspiration to deliver best value.

Agree who will lead the briefing process
On major projects with experienced clients, the client should initiate and lead the briefing process: in other cases the client should encourage the lead designer to do so. In the latter scenario the client will be assisted by the designer's experience, and continuity will be maintained throughout the briefing and design stages.

It is also important at the early stage to define how the brief will be developed, which again will depend on the client organisation. Larger organisations may have a number of stakeholders, and hence require a longer consultation process. It is imperative that the requirements of all parties are recorded and their relevance assessed. Stakeholders need to be identified and engaged in the process of stakeholder management. It is equally important to determine the key individuals and identify who makes the decisions; these should be consistent throughout the briefing and design stages as far as possible. All stakeholders should record a commitment to the brief. (See stakeholder management).

Consider defining a vision statement
It can be useful to define a vision statement at the outset, clearly stating objectives and aspirations. This will ensure that everyone involved in the project understands its goals in culture and collaboration.

Develop the brief
There is a difference between briefing and the product of that process – the former is just as important as the latter, and should unite the client and design team, giving form and structure to what the client wants to achieve.

Brief

Unless there is a comprehensive evaluation of the client's requirements – not just the project itself but also how it will subsequently operate – then the brief will not reflect client expectations. Therefore, it is vital that sufficient time is provided for briefing and the associated evaluation. Input from all parties can help to support a collaborative mindset and collective project ownership.

Do not rely on standard model forms – but use them for guidance

Standard model forms should be used as guidance for developing the brief documents, with a bespoke version created for each project. This reduces the risk that some aspects of the brief may be overlooked.

Regularly review the brief

The brief should be presented to the client at the end of each stage to avoid misinterpretation and make sure expectations are met. It is also an opportunity for the client to reassess their requirements. At the end of the process the client should present the brief back to the project team to ensure that the content is fully understood and correct. (See opening up and closing down).

Test designs against the brief

Design teams have a responsibility to regularly review their designs against the brief and provide constructive input to the briefing process as outlined above. A competent design consultant should have internal processes in place to independently review their understanding of the brief, service provided and value added to the project. If design teams regularly test and review themselves against these considerations, this can help to improve the quality of the work produced in accordance with the client's expectations as well as reinforce relationships. Clients should seek evidence of these processes when selecting members of the design team.

Key goal

To establish a well-defined brief, and ensure the briefing process is carried out comprehensively, within an adequate timeframe and with the involvement of the key members of the project team.

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Brief

Practical steps

Practical step	Purpose	More info
Define the project requirements, and consider if a vision statement is necessary	To ensure all aspects of the project have been considered and defined, including for example the future use of the project, sustainability goals, or futureproofing considerations – and not limiting the brief to cost-focussed targets.	Culture Collaboration
Agree who will lead the briefing process and the form it will take.	To determine the key individuals in the project team and ensure decision-making is consistent throughout the briefing and design stages as far as possible.	Collaboration
Develop the brief, using standard model forms for guidance as appropriate	To ensure that all requirements have been considered and described in the brief	Vision statement model form Consultation meeting model form Briefing contents model form
Regularly review the brief	To confirm that the client's expectations are met and that the brief is clearly communicated and understood.	Opening up and closing down
Test designs against the brief	To improve the quality of the work produced in accordance with the client's expectations, and to strengthen project team relationships.	Opening up and closing down Guiding the design team

Brief

A well-defined brief and comprehensive briefing process are essential for every project. How these are established will be influenced by a number of factors, but the following example can be adapted for any type of project:

1. Initial engagement: determine key individuals within client team and agree consultation process
2. Develop strategic brief: define scope of project which should involve relevant members of the project team
3. Initial project brief: consider and define spatial requirements, project outcomes, site information and budget
4. Final project brief: revisit the brief during this stage of work, update as necessary and sign it off.
5. Project brief update: there may be benefit in revisiting the brief after planning consent, as associated conditions may require changes to the scheme.

Coherent and well-communicated design information

Introduction

Research by GIRI found that missing, wrong, irrelevant or poorly-communicated design information was a major cause of error, compounded by the wide range of sources that are used in the industry today. Simple errors such as a hidden drawing layer, a mis-typed number in a spreadsheet or an ambiguous instruction in a hastily-written email can have a disproportionate impact later down the line. Therefore, good quality design information together with the clear communication of this information between the project team is an integral part of any successful project.

Why is it important?

No construction project can be completed without reliable and timely access to accurate design information; effective communication of this information between all parties is an essential contributor to the success of a project .

Drawings and models may be the standard method of communicating design intent or documenting a design for other project team members, but the many other ways in which information is conveyed are just as important. The compilation and distribution of reports, specifications, notes, emails, text messages and software for managing programmes must all be executed and controlled with similar rigour.

Where the size and complexity of a project merits, the client should consider mandating the use of a digital environment because of the benefits it offers in terms of collaboration and coordination – as long as every party involved in the design process is appointed on this basis. Not only should all parties be involved, but the digital environment and process should meet relevant industry standards.

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Information

Ensuring all design information is correct and clear is a challenge not to be underestimated. Design information must be appropriate for different audiences with different needs.

As a design evolves, multiple updates or revisions will be issued. The planning, production and checking of such information does not always receive the careful attention it deserves, and a more rigorous and methodical approach is recommended. This approach should be agreed at the outset of the project for each stage of planning the design work.

What are the desired outcomes and how can you achieve them?

Make a plan at the outset
A four-step plan – agree, communicate, produce and check – should be introduced at the outset. This will ensure that all design outputs have a strong user focus and will maximise the opportunity to spot design errors in the office or on site before they become construction errors, Designers should seek feedback from clients and construction teams about what works well and adapt their plans and guidelines accordingly.

Agree what information is necessary and when it is required
To establish what information is necessary, identify the audience for that information, confirm why they need it, when it is needed and when it will be issued, as well as where and how the audience will view and interpret the information – in an office or on site, for example.

Establish a protocol for sharing design information
Design information will be shared for different purposes at different stages in the design process and it is important that this is understood by the project team, to ensure that relevant information is produced.

For example, it must be clear whether information is issued for client feedback, procurement, coordination to assess buildability, or for contractors to build from. If information is not correct, or is misused, it has the potential to be a cause of error.

Update design information at key stages
Information must be updated as the design develops and should always be coordinated and correct, both at the end of each stage and at other agreed milestones. A record should be made of any outstanding design issues. Any amendments should be undertaken cautiously to ensure that all related information is reviewed and corresponding amendments carried out.

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Communicate the correct information clearly

Design information should be clearly communicated in a way that is easy to understand, easy to check and hard to misinterpret. Feedback should be sought from those receiving design information to check its clarity. The project team will find it helpful to refer to 'benchmark' drawings, for example those produced by BSRIA (Building Services Research & Information Association) or previous projects to ensure there is a consensus about what is the 'right' level of information at each stage of the design process. This can aid discussions about how to ensure clarity.

Produce the outputs while spotting potential errors/refining the design

Production is an opportunity to spot errors: the process of producing design outputs offers a chance to refine the design and spot potential errors.

When designers produce their own drawings, there is likely to be a deeper understanding of the design intent. Therefore, when technicians perform this role, it is important that they are part of the team rather than a resource shared between projects. Technicians should be briefed carefully and should have the ability to spot potential errors through training, site visits or their experience.

Sufficient fee must be budgeted for designers to undertake full checks covering coordination, interfaces, annotation and so on.

Check that the outputs are coherent with the first two steps

All design team members should agree a checking process as part of the project plan. They should ensure that the information produced matches what was agreed, and has been communicated effectively. Key deliverables at the end of stages or at agreed milestones should be subject to rigorous in-house checking: this may comprise both internal reviews by those part of or removed from the project and external peer-reviews by members of another organisation. (See contractor input and design gateways).

The implementation of digital engineering should make it easier to detect some potential errors, although it is unlikely to be effective at the early stages when the design is not as well-resolved. Finally, the team should agree a definition of 'complete' and ensure everyone understands it.

Key goal

To establish and implement a rigorous process for the production and communication of design information.

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Information

Practical steps

Practical step	Purpose	More info
Agree the correct information (what, who, why, where, when).	To ensure that the right information is issued to the right people at the right time.	
Establish a protocol for issuing information and checking that the recipient understands it.	So that information is communicated clearly and without the risk of misinterpretation.	
Review outputs before they are sent and check that they follow the processes agreed for creating and communicating information.	To create an opportunity for picking up potential errors and/ or to refine the design.	

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Stakeholder management

Managing and informing everyone involved

Introduction

Stakeholder management is the continuous, iterative process of identifying, analysing and engaging those with an interest in the project. It is integral to the design and delivery of all projects and many researchers have cited inadequate stakeholder management as a cause of project failures in other industries as well as construction.

Why is it important?

Successful stakeholder management will build and maintain support for a project provided that the outcomes are clearly explained to, and understood by, the stakeholders. In particular, it will help to eliminate late interventions by stakeholders which are frequently the cause of design changes and associated errors. Time invested in understanding stakeholder needs, as well as the client's sign-off and approval process, is never wasted.

A good stakeholder management procedure is key to ensuring project objectives are achieved. In construction, the full benefits of stakeholder management have yet to be felt, simply because the industry's processes struggle to address issues such as the impact of procurement, internal stakeholder collaboration, responsibility for stakeholder management and project life-cycle.

Even attempting to compile a simple list of construction project stakeholders is challenging, and attempts to do so have been criticised for producing lists which are either too short or too long.

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Stakeholder management

Too long, and the process can become unnecessarily complicated and cumbersome. Too short, and stakeholders are missed out and may 'appear' late in the process with the potential to adversely affect design or construction. If anyone with an interest, real or perceived, is considered an important stakeholder then their involvement should be carefully reviewed and agreed.

What are the desired outcomes and how can you achieve them?

Identification of all internal and external stakeholders
In the early stages of a construction project, it is appropriate to start by considering internal and external stakeholders according to the established definitions.

- Internal stakeholders are part of the client organisation or in legal contract with the client – potentially sub-divided by whether they are demand-side or supply-side. Examples include the client's parent body (if the client is a subsidiary); tenants; members of the organisation's board or department heads.

- External stakeholders have a direct interest in the project though do not necessarily have a contract with the client, and they may be subdivided into public and private sector. These include planning authorities, neighbours, amenity societies and so on.

It is also important to identify all stakeholders in the client's approval process so that someone who must sign off a particular project or element is not forgotten.

Analyse, map/group and prioritise stakeholders
Assess the 'status' of all stakeholders, their concerns, and the associated risks and mitigation actions which might be required. Highlight those stakeholders with less experience of construction projects who may need to be closely managed.

Tools such as a power/interest matrix or a responsibility matrix (RACI or its variants) may be useful. Understand the process used by each stakeholder to review and approve proposals, the level of detail each stakeholder requires, and the time it takes them to reach a decision.

It is particularly important to identify the accountable person who will make a final decision or grant approvals within each organisation.

Design and deliver an engagement plan
Communication and consultation plans informed by analysis, mapping/grouping and hierarchy of individuals or organisations should be produced. Templates and guides linking categories of stakeholders to a method of engagement should be considered, and a single point of contact for each stakeholder should be assigned.

Stakeholder management

Start early and revise regularly

The three steps set out above must be started early enough to ensure communication and consultation is conducted when it is most useful to decision makers. The stakeholder map must be revisited and updated periodically, both to respond to changes to a stakeholder's role as a project proceeds, and to capture personnel changes.

Any external stakeholders with approval rights for specific issues – for example a local authority planning department – should be treated in the same way as internal stakeholders, to ensure appropriate consultation can be facilitated.

Establishing and agreeing a stakeholder management process

Illustrating and agreeing the process with the client should be mandatory at the beginning of a project to ensure that it can be clearly communicated to the whole project team and properly integrated: for example, collaborative planning should be considered. It is also essential to revisit the stakeholder management process as design and construction progress.

A universal process for all construction projects is hard to imagine; hence if a 'standard' process is proposed, it must be applied intelligently. For smaller, simpler projects a less formal, less rigorously documented stakeholder management process led by the design team is likely to be the norm.

In the case of large or complex projects, professional third-party managers or facilitators may be appointed to focus on stakeholder engagement.

The engagement plan needs to be clear on who manages which stakeholders. Too often there is an assumption that the contractor will manage them all when in fact the contractor may not have the authority or influence to do so.

Key goal

To identify, map and prioritise all internal and external stakeholders in a project, and to establish a process for effectively managing and communicating with them.

Stakeholder management

Practical steps

Practical step	Purpose	More info
Identify all internal and external stakeholders relevant to the project.	To eliminate the likelihood of other stakeholders 'appearing' later down the line.	[Brief](#)
Analyse, group and prioritise stakeholders against appropriate criteria.	Identify those who have the greatest influence on the project, and those who may need additional support.	
Produce an engagement plan to facilitate communication and consultation.	Assign a single point of contact for each stakeholder, and identify an appropriate method of communication.	
Review the management process regularly and update as necessary.	To reflect changes in personnel and changes in stakeholder input as the project progresses.	
Identify the accountable person within each organisation who will make the final decision or grant approvals.	To ensure sign-offs are made promptly and by all necessary stakeholders.	[Brief](#)

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Opening up and closing down
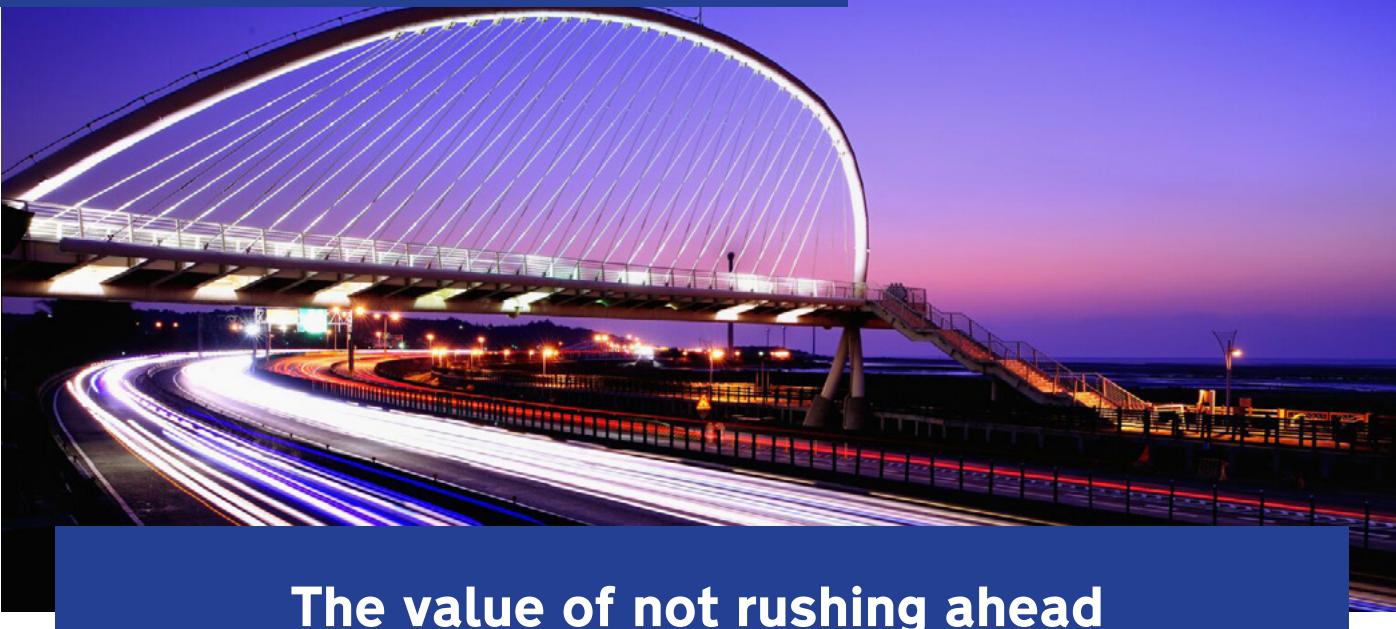
The value of not rushing ahead

Introduction

Changes often become necessary because the important thinking and decision-making processes have not been rigorously applied at the early stages of the design process. The concept of 'opening up' and 'closing down' a design enables all creative thinking and key decision-making to be completed in good time ahead of preparation of production information. This reduces the necessity for change and hence the opportunity for error.

Why is it important?

GIRI research has indicated that in many instances design changes – which can subsequently lead to errors – become necessary because thought processes and decision-making processes have not been rigorously applied at the appropriate stage.

The nature of design is that it evolves as a project progresses. It starts with an idea or concept, followed by an intense period of creative thought by a small design team working closely with the client. This process, which we describe as 'opening up', generates issues for the team to resolve.

The options are then examined and the design honed into a workable solution. Finally, the chosen solution is turned into production information – the 'closing down' process.

What are the desired outcomes and how can you achieve them?

Identify and define the two stages

The difference between the opening up and closing down stages should be recognised and identified. Sufficient time, resources and priority should be attached to each, particularly to the stage of creative thought.

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Opening up and closing down

Opening up

At the start of the opening up process, the client typically assembles a group of experts to prepare a business plan for the proposed scheme. This plan establishes both qualitatively and quantitatively what the client wants to achieve, the aspirations, key risks/opportunities and any high-level assumptions about the proposed scheme.

It should contain sufficient detail to enable executive review, comment and sign-off; it should also demonstrate that it has been tested against the key visions of the project. The business plan will be used to inform the appointment of designers and project team, at which point it can be developed into a suitable design brief.

Ensure options are tested and challenged

It is important that the team has regular dialogue meetings as options are developed. These meetings should test and challenge the brief through positive exchanges and discussion, and the behaviours at dialogue meetings are therefore critical to the success of this process. Participants need to be positive, open minded, appreciative, free-flowing with ideas, questioning, challenging, innovative, explorative and encouraging – reflecting the appropriate team culture.

Closing down

As options are fine-tuned, it is appropriate to begin the process of closing down in order to prepare a robust, buildable and affordable design for submission to planning authorities and the preparation of production information.

Failure to properly carry out and complete these critical stages can, and frequently does, lead to design changes down the line. It can be caused by allocating too little time, money and importance to the early design stages, or not properly concluding and signing off each stage before moving to the next.

For example, during the 'creative thought' phase it is quite natural for unconventional ideas to be generated, most of which will be quickly rejected; but if a bad idea is signed off and its unsuitability is only discovered at detailed design stage, then the scale of change required can be massive.

Key goal

To acknowledge and define the opening up and closing down stages of a project, and ensure they are properly conducted.

Opening up and closing down

Practical steps

Practical step	Purpose	More info
Provide sufficient time, resources and priority for the 'opening up' stage.	To ensure that a concept is sufficiently developed before detailed design begins.	Investing in design
Test the developed design brief against the key visions.	To confirm its suitability before 'closing down'.	
Foster a working culture that enables participants to be positive and open minded.	To encourage concepts to be challenged and questions raised.	Culture

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Contractor input
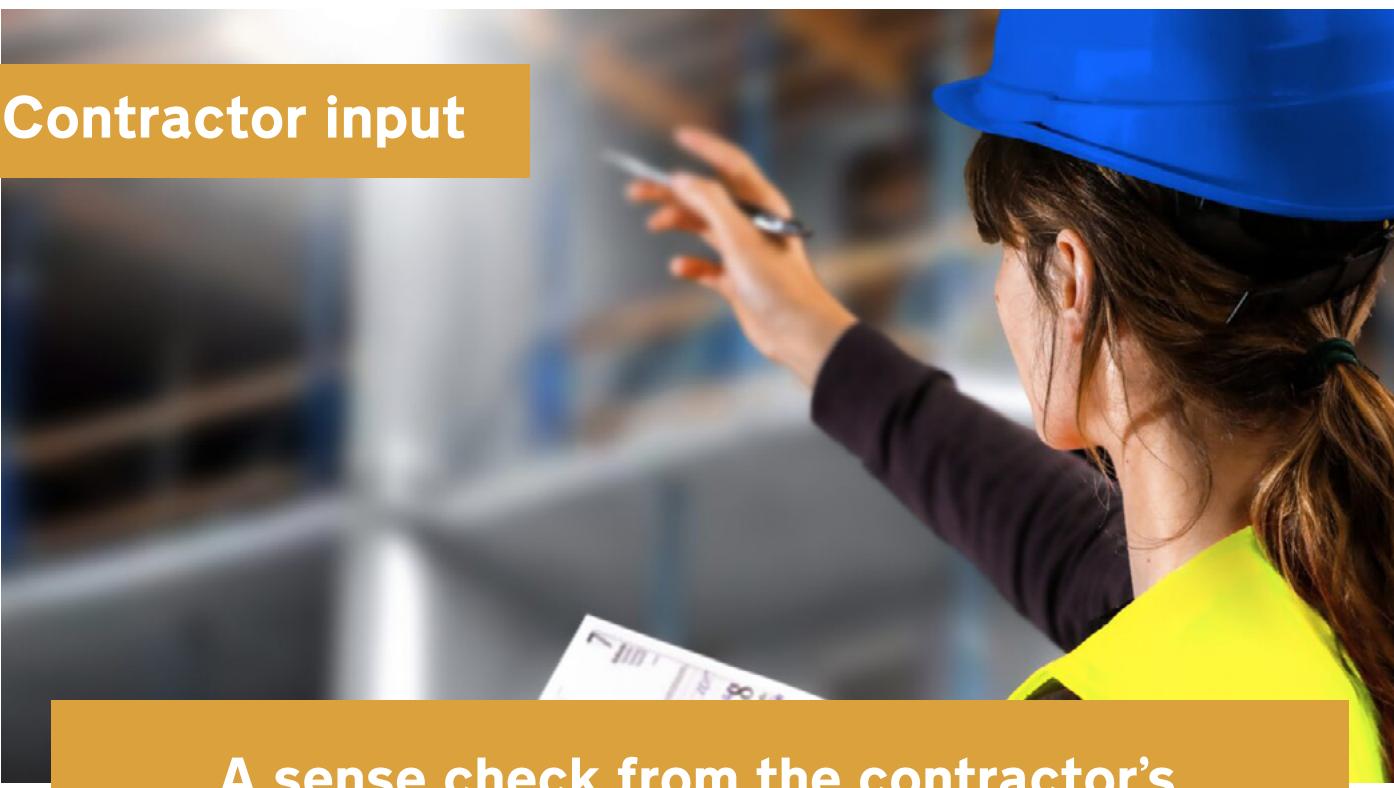
A sense check from the contractor's perspective

Introduction

All projects benefit from tapping into a contractor's knowledge of delivery, buildability and construction techniques before design options are closed down. But this process is often prevented by commercial rules, particularly those that govern the tender process, leading to design changes after tender award, and resulting in avoidable errors as well as unnecessary waste.

Why is it important?

The design process involves the identification and exploration of different options in order to reach the best solution. But often design teams waste time working up options that are subsequently revealed to have fundamental flaws in terms of buildability, delivery or construction.

This issue has been exacerbated by the use of computational design tools. Although digital design makes it easier to explore multiple options, it does not require the designer to establish how the design will be built before committing to a particular solution.

Moreover, fewer designers these days have sufficient experience of construction to make judgements about buildability – partly due to the wider use of design and build procurement and the fact that designers are not always novated. Because of this, time and effort may be wasted on pursuing design options that are subsequently shown to be slow, expensive or impossible to build.

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Contractor input

However it can be very difficult to obtain contractor input at the early stage of the design process. If a contractor is appointed early through some form of 'early contractor involvement' then it can be difficult to ensure that the contractor's price is competitive; and there are concerns that consulting a contractor before tender could create an unfair or uncompetitive tender process.

What are the desired outcomes and how can you achieve them?

Contractors, with their knowledge and experience of delivery, buildability and performance, should be involved in all projects at an early design stage, regardless of the form of procurement. This may involve appointing the main contractor early, to harness their knowledge of construction during the development and refinement of the design, or alternatively appointing a contractor or specialist subcontractor on a consultancy basis to assist the design team.

GIRI recommends that as a minimum the client should appoint a suitable contractor or specialist subcontractor on an informal basis with the appropriate caveats, to consult with as the design develops. The role could include reviewing the design to verify that all designers have fulfilled their duties, in particular in meeting the client's requirements and supplying the specified level of design information. (See planning the design).

Designers' duties as described in their scope of services should be made available to the contractor in order to allow the design to be challenged if it fails to satisfy the agreed requirements at a particular project stage. Whilst this might be controversial, over time it could help regulate the quality of designs, and hence reduce errors. (See guiding the design team).

Key goal

To ensure that concept designs are tested against delivery, buildability and construction techniques in the early stages.

Practical steps

Practical step	Purpose	More info
Appoint a contractor on a consultancy basis to assist the design team.	To ensure the team benefits from those with a detailed knowledge of construction.	
Assess designs against delivery, buildability and construction considerations.	To reduce the likelihood of redesigns for buildability at a later stage.	

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Design gateways
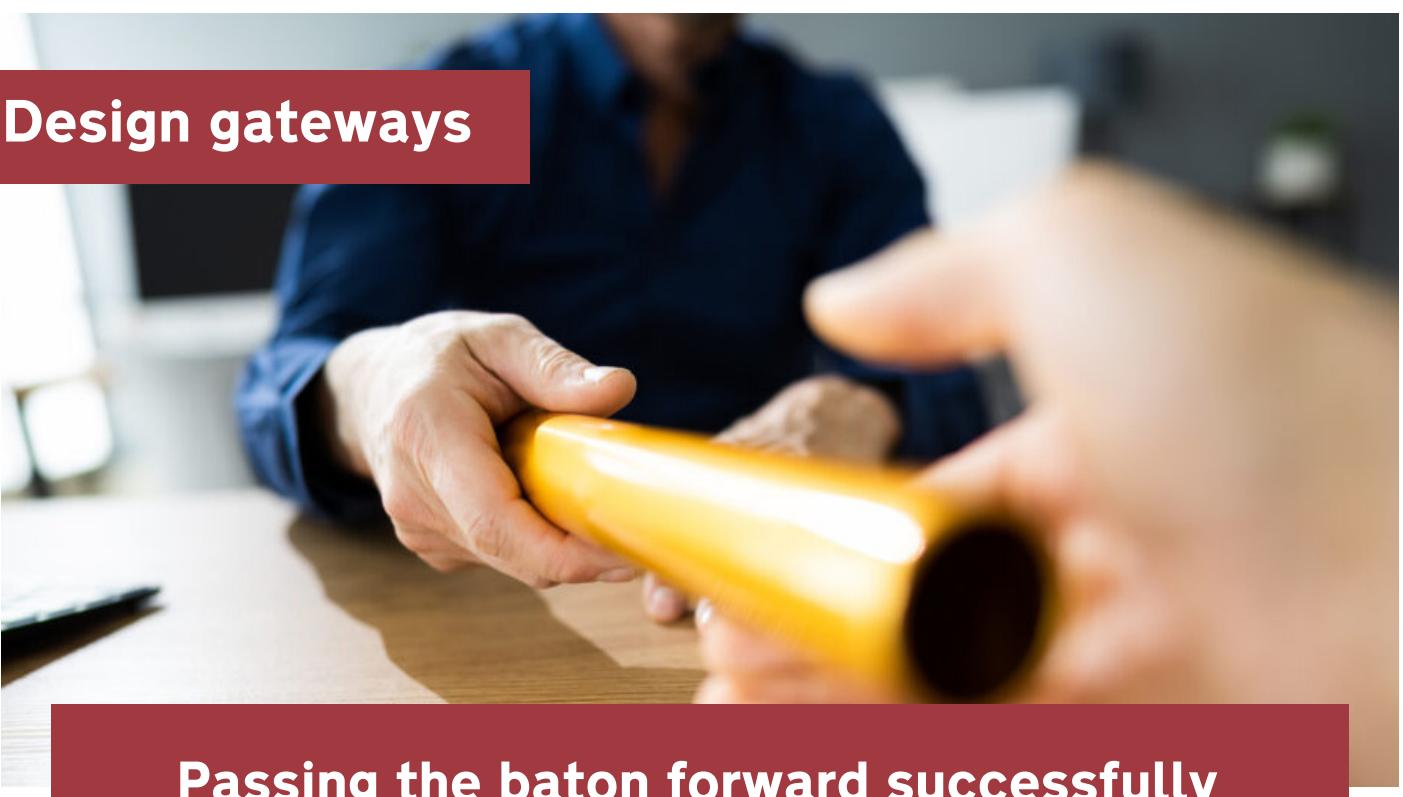
Passing the baton forward successfully

Introduction

Failure to communicate design intent adequately to specialist designers, contractors and sub-contractors can have major consequences. If a comprehensive set of information is produced at each design gateway, and reviewed and communicated effectively, then the design is less likely to be misinterpreted and the potential for errors reduced.

Why is it important?

Even a minor error can have far-reaching consequences at a design gateway stage; whether the information that is being handed over is drawings, specifications, digital models or schedules, designers must ensure that it is both appropriate and correct.

Information is sometimes produced without proper consideration of the intended audience, and without any prior consultation. For example, a drawing to illustrate a design option to a client will not be the same as one for a worker on site.

There needs to be a common understanding within a team about what they are expected to deliver at each stage. Missing, withheld, hard-to-access or difficult-to-interpret information slows down design and delivery, as requests for information – or RFIs – are issued and replied to. This can, and frequently does, result in errors. One of the most valuable resources on a project is time, and wasting time is not only inefficient, it also has a knock-on impact on the programme.

For example, on a design and build contract, digital models are rarely a contractual deliverable and may not be handed over to the contractor, who will then have to recreate the same model from scratch.

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Design gateways

There are several reasons why this might happen:

- the consultant's model does not always align with the specification. The contractor may prefer to start again to ensure the model is correct

- the consultant passes design duties on to the contractor, which requires changes to the design model

- consultants' designs are not coordinated across the various disciplines

- tender designs that are issued for construction may not have been updated with changes that have come about during the negotiation period

- the risk exchange at contractor appointment is such that responsibility for the design already completed requires an entirely contractor-created model

Any deficiencies are likely to prompt the issue of a series of RFIs. But by this time in the project, the design team has often been scaled down, or the design fee depleted, so the time it takes to resolve issues is extended, and the opportunities for error increased.

What are the desired outcomes and how can you achieve them?

Ensure handover information is appropriate and accurate.
Great care must be taken at design gateways to ensure that the information being communicated is clear, accurate and appropriate for the intended audience.

Clarify responsibilities.
All parties must be clear on what they are expected to do at each design gateway. A project-specific plan of work for each discipline should be developed before any design commences. Clarity and a shared understanding of the design responsibilities of the contractor, subcontractors and specialist designers can remove ambiguity. Gaps or duplication can create confusion and generate unnecessary effort. The use of standard forms, such as the BSRIA BG6 matrix for building services, goes some way to preventing such problems.

Design review workshop.
To ensure a successful handover at a design gateway, a design review workshop with those receiving the information, including the supply chain, can assist the effective 'passing of the baton'. It can help to define any outstanding work for the designers to ensure that sufficient resources are made available to complete the duties stipulated.

Key goal

To ensure appropriate design information is efficiently and clearly supplied at each design gateway.

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Design gateways

Practical steps

Practical step	Purpose	More info
Be clear about the purpose of design information when it is issued	To ensure that the information that is issued is suitable for the recipient.	[Information](#)
Carefully and clearly define design responsibilities for all parties	To reduce the chance of duplication or gaps in handover information.	[Planning the design work](#)
Ensure that information is relevant, complete and comprehensive	To eliminate errors caused by omission of necessary information, or inclusion of inaccurate or incorrect information.	
Organise design reviews with specialist designers and subcontractors	To enable an effective handover and identify any outstanding design work	

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Guiding the design team

Value provided by a structured design management approach

Introduction

Adopting a structured approach for the design process, from start to finish of the project, greatly reduces the risk of design errors. An individual who has the authority to make informed decisions based on and aligned with cost and programme considerations should be identified and assigned to manage the design process – this role should not be confused with the lead designer, who is responsible for controlling the design and maintaining design quality.

Why is it important?

Design is typically an iterative process involving a range of communication processes, be they verbal, written, digital or illustrative. While they may be clear to the communicator, they are often open to misinterpretation, and the greater the number of participants or interfaces, the more complex a process becomes. With greater complexity, the probability of misinterpretation increases, and can lead to flawed decisions being made by participants or stakeholders.

It is therefore essential that design decisions are clear, transparent and well-considered; incorrect decisions can lead to adoption of sub-optimal and/or unsafe design solutions.

Design decisions must be validated, particularly those with the potential to have a significant impact, and omissions must be addressed and coordinated.

Control of design and of changes to design were once the responsibility of the lead designer. However, changing roles, increases in complexity and the number of parties

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involved, and the widespread adoption of design and build contracts in the building sector in particular, means that the lead designer is not always able to exercise clear overall responsibility throughout the whole process. An alternative approach would support the team at the early project stages and help reduce the number of design issues which may lead to errors and which may only be discovered at the construction stage.

Too often poor management, or lack of experience or resources by key members of the project team allow decisions to be delayed, never made, or be badly-conceived, consequently leading to error.

What are the desired outcomes and how can you achieve them?

Introduction of a design management plan
It is imperative that the many contributions to and interfaces in the design process are properly managed in order to avoid error.

The adoption of a structured design management approach, typically via a design management plan for larger or more complicated projects, can be used to ensure that design-related information and communications are robust, coordinated, and controlled. Such a structure would also identify gateways or milestones beyond which the design cannot proceed until all of the appropriate checks have been made and decisions have been resolved.

At the briefing stage the design management plan would typically comprise:

- a design responsibility matrix setting out the scope of design responsibility
- definitions of specific gateways and milestones
- gateway programme
- brief

The adopted design management plan would also ensure clear accountability to make sure that the right communications have happened, been demonstrably understood, assumptions have been resolved, and that there are no gaps. This should reduce a very significant risk.

Appointing someone to manage the design
The initial step in implementing the plan is to appoint someone to be responsible for ensuring the design management plan is properly applied. If it is a complex or sizeable project, consideration should be given to making this appointment at the outset. It is critical that the individual has the requisite design management skills and experience to undertake the role and should ideally have the authority to make informed decisions based on and aligned with cost and programme considerations to manage the design process.

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Guiding the design team

Initially a consultant may be appointed to take on the role, with responsibility being assigned to the main contractor later in the process. One of the benefits of early contractor involvement is that a more consistent and effective approach to design management can be achieved.

From the start of the project, the person in this role must have the confidence of the client, the design team, and the main contractor, when appointed, and must be given sufficient authority to act in the best interest of the project. The role **should not be confused with the lead designer**. The lead designer is responsible for controlling the design and the quality of the design.

This structured approach to managing the design process may be challenged by some, clients included, especially if extra fees are necessary to achieve it. However following this route increases the likelihood that all the other recommendations in this document will be implemented. Project risks associated with design error will also be reduced, leading to the potential for lower preliminary costs at the construction tender stage.

Key goal

Introduction of a structured design management plan, overseen by a named individual or team of people with the authority necessary to ensure it is followed.

Practical steps

Practical step	Purpose	More info
Develop a structured design management approach for design development.	To reduce the number of design errors and mitigate their consequences at the early design stages.	Planning the design
Implement the design management process.	To ensure that designs do not proceed beyond a milestone until all relevant checks have been carried out, the right communications have happened and been understood, and there are no gaps.	Design gateways
Appoint an individual or team to manage the design.	To oversee the design management process, and ensure that all other relevant recommendations in this document are followed.	

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Guiding the design team

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Practical step	Purpose	More info
Reassess the design manager appointment when the main contractor is appointed.	To ensure the appropriate person or team is appointed for that stage, and that they have the necessary authority and confidence of the other parties.	
Verify that designs meet the requirements of a particular stage or that designers have fulfilled their duties as described in their scope of services.	To prevent changes being necessary during the construction phase.	

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Endorsements and acknowledgments

The Institution of Civil Engineers

The Design Guide was endorsed by the Institution of Civil Engineers in September 2022 via its Engineering Fundamentals Community Advisory Board.

The Royal Institution of Chartered Surveyors

The Design Guide received official endorsement from RICS in November 2022.

The Institution of Structural Engineers

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