

GIRI

Get It Right Initiative

Working together to eliminate error

A Strategy For Change



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expedition

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Get It Right Initiative

Construction errors cost the UK construction industry billions of pounds every single year. The Get it Right Initiative came out of discussions at the Institution of Civil Engineers Best Practice Panel and has been developed with the single aim of significantly reducing error in construction. The GIRI is currently led by a number of major construction companies and clients and has received welcome support from the CITB through their Growth and Innovation Fund.

Our first piece of work has been to undertake a thorough piece of research to identify both the most economically significant errors and their causes. The results of our research are set out in detail in the Get it Right Initiative Research Report (November 2015).

Key international studies suggest that the measured direct costs of avoidable errors are in the order of 5% of project value. This equates to approximately £5Bn per annum across the sector in the UK and is higher than average profit levels across the industry (around 3%).

When unmeasured and indirect costs are included the situation gets much worse with estimates of total costs ranging between 10% and 25% of project cost or between £10-25Bn per annum across the sector. We estimate that the annual spend due to error is around 7 times the total annual profit of the UK Construction Industry.

Our research identified that the top ten root causes of error were:

- Inadequate planning
- Late design changes
- Poorly communicated design information
- Poor culture in relation to quality
- Poorly coordinated design information
- Inadequate attention paid in the design to construction
- Excessive commercial (financial and time) pressure
- Poor interface management and design
- Ineffective communication between team members
- Inadequate supervisory skills.

We have developed a strategy to address these root causes and this is set out below.

Strategic Aim:

To improve construction productivity and quality by eliminating error.

Goals:

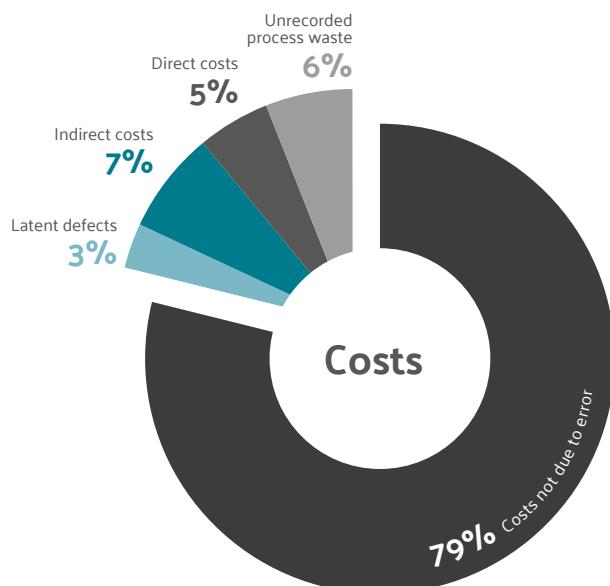
- Create a culture and working environment to get it right from the start.
- Change attitudes and harness leadership responsibility to reduce error and improve quality and productivity.
- Engage all stakeholders in eliminating error from inception, through operation, to completion.
- Share knowledge about error reduction processes and systems.
- Improve skills across the sector creating a positive approach to pre-empting error.

Activities:

- Develop and implement an error reduction skills program across the sector.
- Deliver a strategic awareness campaign to improve sector attitudes to error.
- Develop improvements to processes, systems and technology to remove error.
- Provide opportunities for members to share experience and to network.

The following sections describe the above activities in detail.

The true cost of error



Skills Development Programme

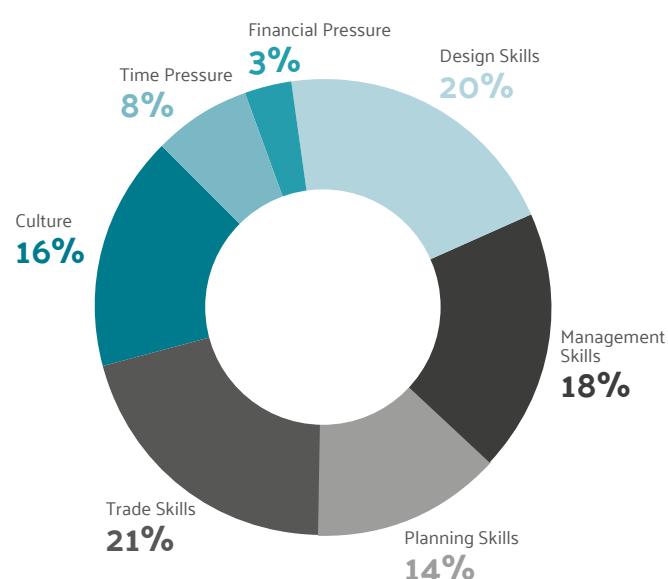
A key finding of our study was that inadequate skills are a major contributor to errors in the construction process. This section sets out what we found and what we suggest should be done.



Skills to focus on

The graph below shows how our study group would distribute expenditure to address the problem of error in construction. There is clearly a keen interest in improving skills as well as creating an appropriate culture in relation to quality and error reduction.

Distribution of spend to reduce error



Detailed discussions with the study group suggest that the skills of most interest are related to planning, communication and supervision. This was true whether we were talking about trade skills or design skills. Discussions with our study group revealed a rich set of competencies that are required and these are summarised below:

- To have and evaluate ideas against appropriate subjective and objective criteria
- To exercise judgement and make good decisions
- To be able to deal appropriately with change
- To communicate effectively using means appropriate to the circumstances
- To form and maintain effective working relationships.

Base knowledge requirements

All of these competencies depend to some extent on having a broad knowledge of the whole process. A common observation was that poor decisions were often made, because of a lack of understanding of the implications. For example: designers who don't know about the construction or commissioning process; buyers who don't understand the implications of substituting one drainage pipe system for another; or contractors who don't understand the significance of overloading a key structural element during installation.

Getting the culture right

As well as better knowledge of the overall process it is important that all concerned develop and exercise respect for the others involved. It is often the case that a lack of knowledge of what others do goes with a lack of respect for them or their role and this greatly impedes effective relations and communication.

It is also critical that people need to want to do the job well. They need to have the right frame of mind and to believe in what they do. This applies equally to the person making sure that the site is a fit place to do the work well by keeping it clean and tidy as to the designer who will want to make sure that his or her details are clear and unambiguous so as to eliminate error.

These themes are common with those found in Cultural Awareness and Behavioural Safety Programmes that are currently used by the Industry. Without wanting to diminish the Safety messages one proposal would be to adapt these programmes to include an approach to quality.

It is important that all concerned develop and exercise respect for the others involved.

Experience in developing a more effective Health & Safety culture has taught us the importance of Clients and Shareholders in creating an environment that requires change led from the top level of construction companies. As such we recommend a programme of briefings targeted at major clients and appropriate industry analysts to raise awareness about the true cost of error.

We know that many people working in our industry take pride in their work and are frustrated when things go wrong. A key objective of the campaign described above is to get people to take pride in their work and to engage with reducing the amount of errors that are made.

We recommend that, as appropriate, we make use of the sort of change management techniques that have been deployed over the last few years in relationship to Health & Safety.

The skills development programme

The points above form the basis for a skills development programme that we believe needs to be implemented across the construction sector.

Recognising the complexity and scale of the sector we propose a two pronged approach:

- a.** New entrants to the construction sector through initial training and qualification
- b.** Existing workers in the construction sector through on the job training or CPD and re-qualification.

For new entrants our proposal is to work with those responsible for the qualification standards to ensure that the required competencies are identified at the correct level.

In relation to trade qualifications this means working with relevant sector skills councils, including Construction Skills, and influencing the National Occupational Standards.

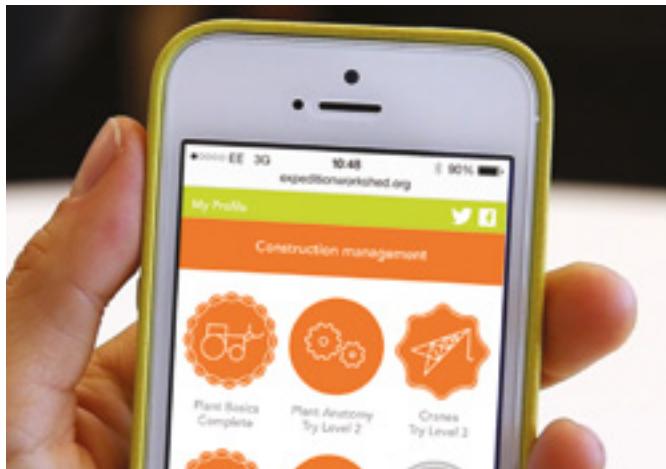
The Trailblazer Apprenticeships are a key entry route to the sector and we would look to work with this programme to ensure that the competencies described above are properly addressed through the apprenticeships.

In relation to Professional Qualifications this means working with the relevant Professional Institutions.

In relation to existing workers we would work with those responsible for requalification or revalidation (ie through carding schemes) or for CPD through the Professional Institutions.

We believe that there will be a significant demand for training and development in this area from major employers and we expect both in-house and external commercial training companies to play a key role in this sort of skills development.

We would also seek to influence those responsible for the provision of skills training to develop a high quality offer in this area. Key players would include the CITB, CECA, FE and HE institutions, and the training arms of the Professional Institutions for example.



The techniques that we should use

In all cases we believe that there is a need for blended learning techniques to be developed and implemented to facilitate efficient and cost effective training. Examples of the more innovative sorts of techniques that we would expect to see are set out below.

To develop broad knowledge of the construction sector we would advocate the use of tools like Engineering Mastermind. This is an online game which helps people to develop a broad knowledge of the construction industry through reward based game play.

Similarly, we would expect construction activity simulators to be used to help develop planning skills. For example Concrete Sim is a concept for an online simulator of concrete pours where the player plans and undertakes a concrete pour in a simulator environment. This is just a simplified version of a flight simulator but would allow the player to develop skills of planning and hone their skills in optimising activities and dealing with unexpected events like a pump failure in the middle of the operation.

Online videos showing key construction activities are already a key resource for construction workers and we advocate the development of a full and kite marked set of online videos for the UK construction industry. These would help in the development of skills both at the time of qualification but also serve as a refresher providing just in time competence!

Similarly, tools such as Student Studio could provide an excellent and cost effective means by which people develop an overview of the whole construction process. Student Studio is an online platform that provides a range of structured role-play-based construction and engineering projects.

Finally, the Constructionarium and the Big Rig are examples of educational techniques that allow the user to develop their construction skills outside the high pressure environment of the construction site.

We believe that the CITB should play a key role in developing such techniques.

studentstudio.co.uk
constructionarium.co.uk
engineeringmastermind.org
thinkup.org/innovation/the-big-rig

Campaign

We propose to develop and implement the “Get It Right” campaign to improve sector attitudes to error so that all involved are committed to eliminating errors and improving the quality of what we do.



Aim:

To change and align attitudes across the sector so that all involved are committed to eliminating errors in what we do.

Audience:

Clients, consultants, contractors, regulators, education and training providers, Professional Institutions and trade bodies.

Messages:**1) Error is a big problem in our industry.**

- It results in wasted materials, energy, time and money.
- The annual cost of error in our industry is estimated to exceed £10Bn. This is enough to build 500 new secondary schools or 100,000 houses a year.
- It damages the reputation and standing of our industry making it more difficult to recruit the skilled people that we need.

2) Take pride in what you do

- What you do matters.
- Do it as well as you can and be proud.
- Imagine yourself standing with your grandchildren in front of something that you have helped to build saying “We did that”.
- You are members of one of the most respected professions.
- Remember that we build and maintain the stuff that makes civilised life possible.

3) Control the controllable and follow the plan

- Errors are nearly always the consequence of deviating from the plan or a failure to comply with the planned process.
- For this reason wherever possible we should follow planned processes.
- If you think of a better way to do something, beware, you may not know all of the potential implications, and check before you revise the process.

4) Plan and re-plan carefully when you need to

- Construction projects happen over relatively long timeframes in complex environments that are difficult to control.
- This means that we have to adapt our processes as we go along more often than industries like car making.
- This isn't an excuse for making mistakes but it means that to avoid errors we have to be better at planning and re-planning as we go along.

5) Respect the others involved in the process and learn about what they do

- Errors are usually the result of bad decisions. Bad decisions are often made because you don't have all of the information or because you don't know about or understand the potential consequences of your decision.
- Construction projects are complex and involve lots of people doing different things for different reasons. Your decision making will be better if you understand who is involved and what they do.

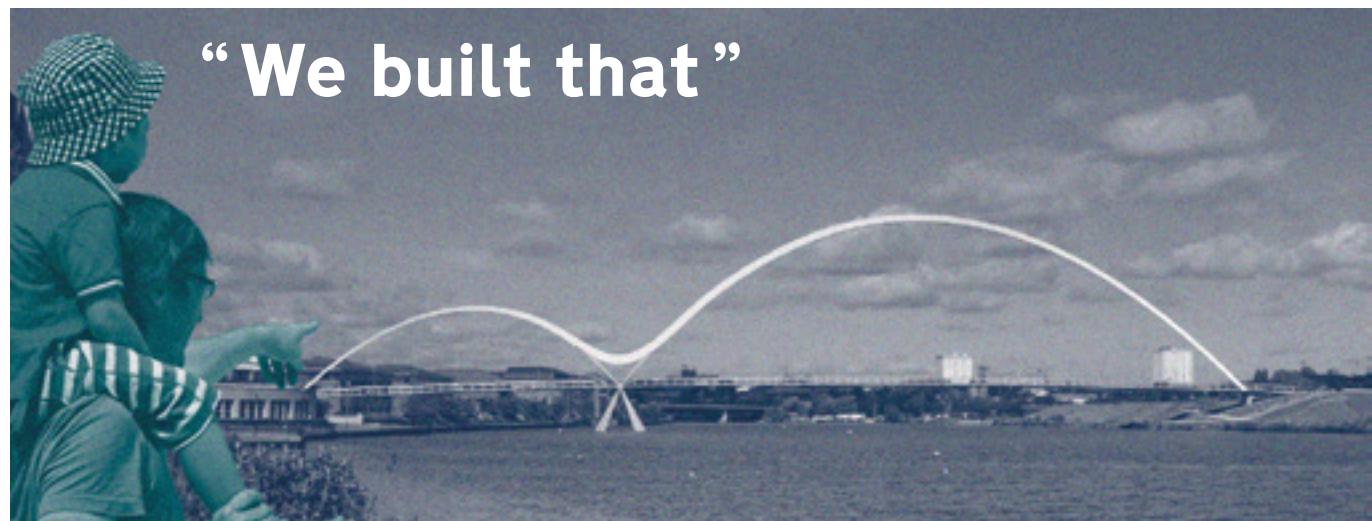
If you are in any doubt then ask.

6) Sometimes it is just better to stop!

- Construction is a “can do” industry. We hate stopping or slowing down and when we encounter a problem we want to solve it and move on.
- Unfortunately, when we don't have all of the information necessary and we don't revise the plan properly, we may just make things worse.
- We never have time to Get it Right. We always have time to put it right.
- So we need to know when we are out of our depth, stop what we are doing and ask for help and guidance. That is what the team is for!

**We never have time to Get it Right.
We always have time to put it right.**

“We built that”



Campaign plan:

The diagram below illustrates how a campaign might be structured.



The campaign must lead to a paradigm shift from:

GET IT DONE → GET IT RIGHT

Improve management processes & systems

Through our research two processes have been identified as the key sources of error when they are poorly implemented:

- Design Management
- Construction Planning

Key issues in this area and our suggestions are set out as follows.



A common language to describe error

Our research showed that there is a general lack of coherence about the way we use and understand terms like: error, defect, cause, effect, direct vs indirect costs, tangible vs intangible impacts for example.

This is important because it impedes effective communication and the development of a shared understanding of the issue. This situation is analogous to the position relating to construction Health & Safety in the 1970s and 1980s before there was a common understanding of terms like risk, hazard, harm, mitigation, and so on.

A common language and understanding around the subject is essential.

In our view, the existence of a common language and understanding around the subject is essential if we are to make progress.

As such we propose producing simple models describing the error process and its consequences using construction appropriate vocabulary for adoption across the sector.

In doing this we advocate careful consideration of the terms already in use and proper reference to other sectors like the automotive industry where they have more formalised and developed approaches to the subject of error.

Identifying errors and the costs of error

Our research reveals that, with a few notable exceptions, relatively little is done to identify and record the costs and causes of error in the construction sector.

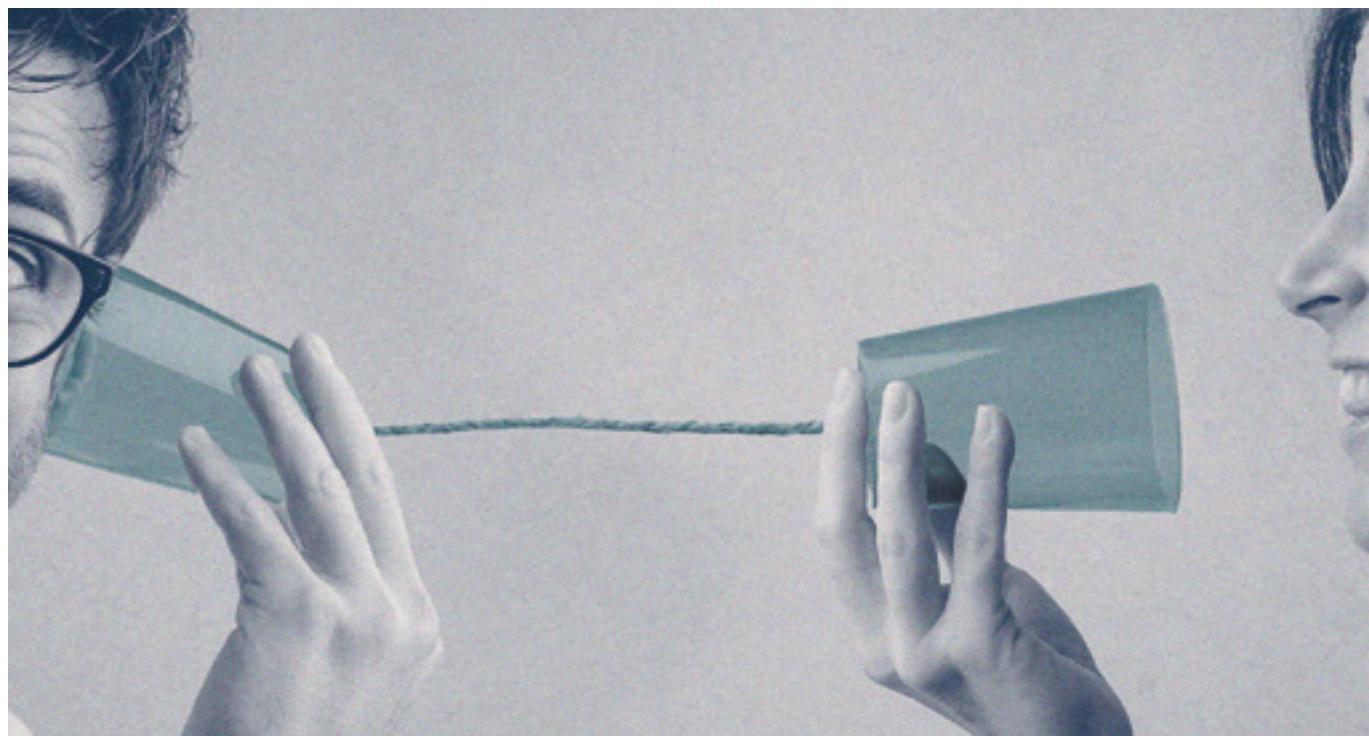
Where data is collected it tends to relate to defects (ie the outcome of errors) at a contractual handover rather than the causes. The data collected usually relates to the number and type of defects with information about cost limited to the main contractor's management costs. We found no evidence that designers were systematically collecting data about errors in their work.

As a result there is very little hard data produced about the costs and causes of error in the UK construction industry.

We agree with the saying that "if you can't measure it you can't manage it" and as such we believe that suitable measurement techniques need to be developed.

However, we consider it essential to avoid the creation of cumbersome, data heavy and ultimately impractical systems.

We believe that our industry can learn from others gathering data from complex systems. For example, in the public health sector indirect or proxy indicators and simple screening checks are used to understand what is happening and assess the health of an individual or group of individuals.



In our sector we use indirect indicators in relation to Health & Safety when we measure the Accident Frequency Rate. In effect we measure the number of "injuries causing greater than seven day absences" and draw conclusions about the overall H&S condition of a project or company. This single measure approach is somewhat simplistic by comparison with the approaches used in the public health sector but is useful nonetheless.

We might consider developing a set of easy to obtain proxy indicators that taken together would provide a reliable indication of the type, frequency and cost of error.

For example, the number and type of Non Compliance Reports or defects on completion may be a reasonable indicator of the error rate. Data on NCRs is already routinely captured. Alternatively there may be more incentive to report the number of inspections passed first time.

Similarly, there was a widely held view in our study group that the quality of "housekeeping" on construction sites was a very good indicator of the quality of construction and the error rate. The Considerate Contractor Scheme provides scores on the quality of housekeeping which may provide proxy indicators of error rate.

There was a view in the study group that features such as contract variations, programme delays, and staff turnover were all correlated with error.

We suggest that work is done to identify suitable indirect indicators of error. This work would involve research looking in detail at error rates on a representative group of projects to establish the most relevant indirect indicators and their relationship to error rates and cost. The indirect indicators could then be adopted more generally across the sector. The data collected would be used by individual organisations, projects or programmes to benchmark their

performance and develop improvement strategies. It is recognised that there is at present a degree of nervousness in going down a route that would ultimately lead to organisations being required to publish data of this nature. This is due to fears that the data will be inconsistent and will therefore not be representative of the true picture. Work needs to be done to ensure consistent and correct reporting.

This is not dissimilar to the issues that were first faced when Health & Safety data was published. In the long run if we are to eliminate error it will be important to find a way of publishing error data in a way that is acceptable to the majority.

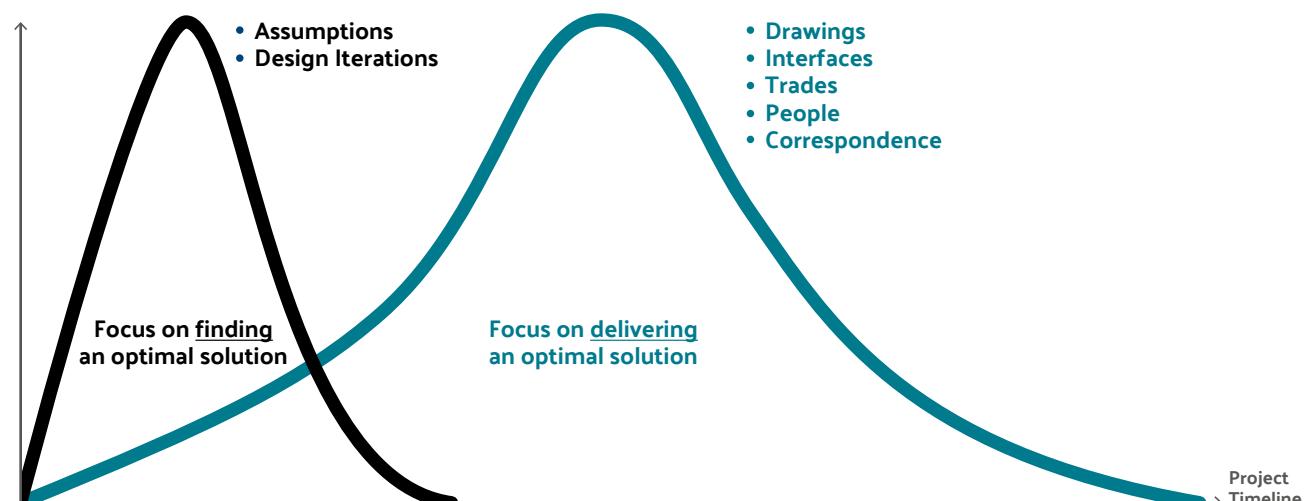
The nature of the design process

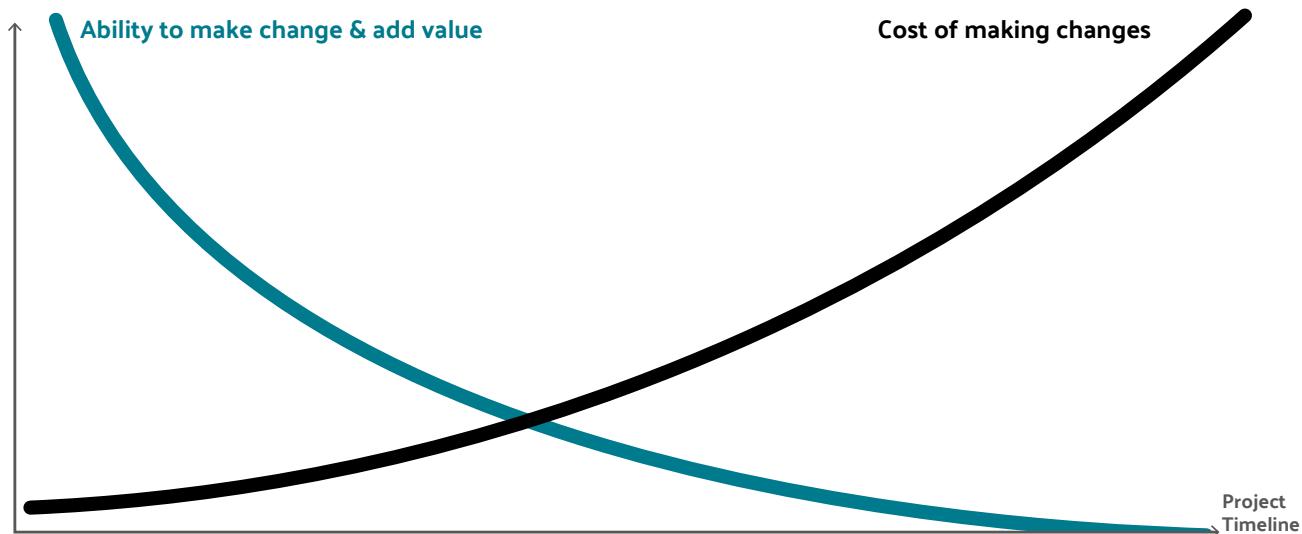
Across the sector there is a surprising lack of a common understanding of the character of the design process. Specifically, design is an intrinsically iterative process where propositions need to be modified as new information or insights occur.

In the early stages of design the iterations are healthy and welcome in the search for an optimal solution. Similarly, in the early stages of the design process information is sparse and many assumptions are made. The design ideas lack detail and design information is coarse. Many contractors fail to understand this fully, believing instead that designers and their clients are indecisive, vague and flaky!

By the construction stage iterations are much less welcome as they can be highly disruptive to the planned construction process and result in delay and increase the chances of error. During construction assumptions are dangerous and detailed information is essential. Many clients and designers fail to realise this believing instead that the contractors are inflexible, demanding and uninterested in the quality of the outcome!

The time for iteration and assumptions





We believe that it would be beneficial to our sector as a whole if all involved were to develop a proper and shared understanding of the real character of the design process. This would make clear that the process is one of refinement where the character of the information produced and levels of certainty are different at different stages of the process.

To this end we suggest the production of a simple but shared model characterising the construction design process which would be adopted in relevant training and educational programmes.

We believe that appropriate investment in the early stages of a project is essential in developing robust proposals which are properly thought through and less likely to need to be changed. It is of course important that money invested in the early stages is well spent and in our experience this is more likely when the Client works closely with the design team.

Design Management

The lack of a properly co-ordinated design results in clashes on site and consequent rework and delay.

The main reasons for this reported in our study are:

- The lead designers and/or design managers lack the skill, fee or desire to properly co-ordinate the design;
- The ambiguity and confusion about who is responsible for design co-ordination in some D&B contracts; and
- The trade specialists responsible for key parts of the design are not involved in the pre-construction phase and so design co-ordination happens very late in the overall process.

To deal with the first two of these, Clients and Contractors need to identify and appoint suitably qualified lead designers and design managers, make their responsibilities clear and pay them enough to do the job properly.

There was a view among some in our study group that there was a shortage of suitably skilled and experienced people to fulfil these roles. It was suggested by some that formal training of design managers was overly focused on management systems without enough attention being paid to developing knowledge of procurement & construction practice or the effective management of multi-disciplinary teams.

Clients and Contractors need to identify and appoint suitably qualified lead designers and design managers.

As such we recommend that programmes of training for lead designers and design managers be reviewed to assess and where necessary address this deficiency.

The trade specialist input problem appears to be intractable given current procurement rules and practices.

Generally members of the study group agreed with the common view that the use of BIM during design development can facilitate spatial co-ordination and information handling and as such contribute to the reduction of error in construction.

The use of BIM should deliver a total rigorous design process from inception to completion and will be the key to good design delivery. Over time, the mandatory adoption of BIM should lead to better co-ordination of design and eliminate ambiguity about who is responsible for co-ordination.

Construction Planning

Our study group identified ineffective planning as the single biggest cause of errors in construction and several of the other causes in the top ten were planning related.

Several organisations identified the shortage of suitably skilled and experienced construction planners as problematic.

Our study group identified ineffective planning as the single biggest cause of errors in construction.

Some identified the mismatch between the stable and predictable environment assumed by many planners and planning systems, and the reality of many fast moving and changing construction projects.

Some advocated “collaborative planning” a technique that comes from the LEAN construction movement. Advocates reported that when properly used it was very effective at improving the quality and certainty of project outcomes.

Some observed that collaborative planning failed to deliver results when, as was often the case, the parties involved in the planning sessions:

- Did not have aligned contractual interests; or
- Were not empowered to make changes to work plans; or
- Did not know enough to be able to assess the impact of changes proposed on other activities.

Others observed that the uptake of LEAN techniques including collaborative planning remains small across the sector and that traditional planning approaches still predominate. These approaches tend to assume relatively small amounts of change during the process and can be cumbersome and inflexible.



A key issue is that although plans are made circumstances will certainly change, rendering the plan obsolete. We should not be surprised by this and indeed we need to plan for it. As an industry we tend to forget the plan and just carry on. We need to develop a standard practice for when things change.

In determining how to improve planning skills in the industry we need to consider the following features:

- **Simplicity:** Simple systems are easily applied and are most likely to be used successfully.
- **Contingency:** A plan should make allowance for alternative scenarios.
- **Adaptability:** A plan should be continuously reworked throughout implementation.
- **Resilience:** Often it is not possible to immediately understand the full consequences of change. Where change is inevitable the system should maximize the team's ability to quickly assess and respond to emerging requirements.

Sharing Best Practice about error reduction

There could be great benefit if we were better able to identify and share best practice. We see the Professional Institutions, trade organisations and major employers leading in this area.

A few examples that came out of our investigation that would fall into the category of best practice include:

- The use of samples or examples of built work showing clearly the quality level required.
- Safety and Quality inductions on projects.
- Regular Board level reviews of performance in relation to quality and error.
- Regular Director level site inspections focused on quality and error as well as safety.
- Proper consideration of quality and error rates in the selection of contractors

STOP → THINK → REPLAN → START AGAIN

Improve construction technology & techniques

We believe that there is a significant opportunity to develop construction technologies and techniques that will reduce error in construction. This section sets out our suggestions.



Off-site manufacture

It is clear that off-site manufacture under controlled conditions can greatly reduce the risk of error in the fabrication and assembly process.

We recommend that in the pursuit of error reduction clients, designers and contractors consider pre-fabrication and off-site manufacture properly throughout the design and construction process.

However, there are a number of challenges to widespread adoption of off-site manufacture across the construction sector. Two of the most significant of these challenges are that using current procurement models off-site manufacture often appears to cost more and be relatively inflexible to change.

We recommend that research into the comparative costs of traditional on-site versus off site approaches properly considers the error costs.

In part a failure to recognise and factor in the full cost of error is one of the reasons why traditional methods appear cheaper than off-site methods when procurement decisions are made.

There may be value in increasing the amount of pre-fabrication in construction projects through regulation. This approach has been used to improve the energy performance of buildings and their accessibility over recent years. However, in the current political environment it is hard to see any interest in regulatory approaches that might result in increased construction costs.

Standardisation

Standardisation of processes or construction elements tends to reduce errors, provided of course that the process or element is itself sound!

It is sometimes argued that there is a conflict between standardisation and “design quality”. Recognising the need for appropriate contextually responsive design it is nonetheless important that we standardise where practical.

As such we encourage clients, designers, contractors and their supply chains to work together to find opportunities for standardisation where appropriate.

Improvement of construction processes

One way of reducing errors is to develop and use processes that minimise the risk of error. This is similar in principle to the philosophy that has been developed and used to in relation to Health & Safety risks. Of course it is important to strike a suitable balance between reducing error and maintaining production output rates.

We recommend that a comprehensive review is undertaken into standard construction activities and processes to identify and develop modified approaches to reduce the risk of error whilst maintaining production rates.

We believe that this sort of practical research might be appropriately undertaken or arranged by the CITB and or the BRE with input from the trade federations.

Error minimising construction components

The more fiddle and faff in a construction task the more likely you are to have errors. This is particularly true for fit-out operations involving connections.

We believe that a concerted effort working with manufacturers to develop standard and practical details would yield real benefit for the sector.

Details should be developed so that they give a clear indication that the connection is made and secure, rather like the clunk click that you get with a car seat belt. There is a need to look outside our industry to learn how others have tackled these issues.

We recommend that a working group is set up to review standard construction technologies and to identify and as appropriate develop modified approaches.

Again we believe that this sort of practical research might be appropriately undertaken or arranged by the CITB or BRE with input from the trade federations and manufacturers.

We should engage with the industry to establish those areas and components which cause the most problems so that the research can be focused on actual needs to maximise the benefits.

Acknowledgments

We would like to thank all of those involved in the project both in providing funding, information and above all insight.

If you want to know more about the Get It Right Initiative, please contact us:

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