Collaborative construction

Achieving common goals

July 2018
Local authorities’ core focus is on meeting the needs of their local communities. Part of that is securing value for money and effective delivery of new infrastructure. For the construction industry, designing, building and maintaining that infrastructure, it is therefore imperative to operate as efficiently as possible. This requires the key players to collaborate relentlessly in order to deliver the best outcome for the commissioning body and end-user.

Collaboration in the construction industry has been a hot topic in recent years, for a number of reasons. The sector is well-known for being fragmented. It is project based, focussed on getting the job done and moving as swiftly as possible to the next. Construction projects bring together a broad set of complex skills. They are characterised by multiple stakeholders, large, widely dispersed supply chains and large delivery teams of architects, designers, engineers and contractors who will often be working together for the first time. It is also an industry which has historically been adversarial in its operation, with a focus on blame allocation in the face of delays or cost overruns, and on risk transfer and claims.

However, not only can a failure to work effectively as one team have serious consequences, putting at risk the efficient delivery of schemes: it can also mean that innovation and best practice take longer to become embedded across the industry. Furthermore, 21%\(^1\) of all construction costs are thought to come from waste – which could be reduced by improving collaboration, resulting in a significant saving which can be passed onto the client.

In our experience, increasing collaboration, on the other hand, can lead to better project outcomes, the more efficient delivery of schemes, improved business performance and greater client satisfaction. It creates a culture that drives innovation and improved solutions to the unexpected challenges that inevitably arise during every scheme. Collaboration, then, can have a significant impact on the success or otherwise of a scheme and has the potential to increase the sector’s historically low productivity\(^2\). There are also other motivating factors for improving collaboration, including lean construction and the importance of sustainability. So if there are so many arguments in favour of collaboration, why have the benefits not yet been fully realised?

There are examples of organisations taking a lead in promoting collaboration within the industry. For example, Network Rail requires that tier one suppliers have systems in place that encourage and value collaboration and are aligned to BS11000 - the British Standard for collaborative working, something Balfour Beatty has worked closely with them on. In spite of these examples of best practice however, and while it has been widely acknowledged since the publication of the Latham Report\(^3\) over two decades ago that there needs to be more and better collaboration across the construction industry, progress towards achieving this has been slower than it should have been.

While some local authorities are using collaborative procurement frameworks and driving collaboration in other ways, maximum use is not, in our experience, being made of collaboration as a tool to deliver value for money.

However, Balfour Beatty believes that attitudes are changing. This paper considers ways to embed collaboration in construction schemes to the benefit of those commissioning infrastructure.

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\(^1\) https://getitright.uk.com/

\(^2\) ONS, Productivity Handbook, April 2016

\(^3\) Constructing the Team, Sir Michael Latham, HMG, 1994
Key points

1. Balfour Beatty believes that further savings could be unlocked and better outcomes delivered for local authorities, if all procurement frameworks focussed on outcomes and broader value for money measures, rather than the delivery of short-term savings and prescriptive specifications.

2. For collaboration to become truly embedded across the sector, there has to be a genuine cultural shift away from the traditional adversarial approach.

3. Increasing collaboration requires clear and consistent leadership from local authorities, large contractors and Government.

4. Allocating collective responsibility, risk and reward to all those involved in the scheme can drive a collaborative culture. Contract type makes the biggest difference here – those with a sensible allocation of risk result in the most collaborative behaviours.

5. Ambiguity undermines collaboration. All roles and responsibilities must be clearly defined, software standardised to aid communication, and clear procedures for tackling problems and resolving conflicts must be in place.

6. New technologies and software offer practical ways to improve collaboration. Capitalising on these opportunities requires leadership and courage from contracting authorities, as new technologies are, by their nature, untested as they come online and public procurement often favours low risk behaviour and tried-and-tested approaches.

Embedding a collaborative approach

Construction is well known for being adversarial and litigious. When behaviours are entrenched, it can require vision and leadership to change the status quo. Balfour Beatty has over 100 years’ experience in the sector. In our view, there are seven basic elements to promoting collaboration on a construction scheme:

1. The contracting authority should set out as early as possible that a collaborative approach will be taken on a scheme, as this impacts the type of procurement process undertaken. It can also then be considered by those bidding, to ensure they are signed up to working collaboratively and can incorporate it into their bid preparations; BS11000 should be the standard for all new contracts.

2. As recommended in the Government Construction Strategy, contracts should be used which promote collaboration rather than older, or more traditional contracts which can encourage a more adversarial relationship between the various parties. Contracts such as NEC 3 and 4 have collaboration at their heart.

3. Clear responsibilities and leads for key areas must be established as early as possible, communicated clearly and adhered to rigidly. Ambiguity undermines collaboration.

4. Procedures should be set up to ensure problems are flagged, discussed and resolved as early as possible and institute a conflict resolution process early on.

5. The establishment of ‘one team’ and shared objectives should be promoted through steps such as locating the parties together; social activities; and team meetings to promote effective working, minimize the blame culture and ensure effective communication and shared principles. Creating an environment that incentivizes all parties to work together to deliver the best result is imperative.

6. Any software being used by the team must be standardised to ensure consistency and minimize errors, and ensure effective communication and information sharing.

7. Collaborative planning must run through every element and every process of the scheme. For it to succeed, there can be no half measures.

8. The identification and allocation of risk must receive appropriate investment to ensure clear ownership and mitigation. Opportunities to value engineer must be identified up front and bought into by all parties.
Collaborative frameworks

Procurement frameworks are not new. The Government began to promote the concept following the publication of a number of Government reviews in the 1990s, all of which found the construction procurement model flawed, highlighting the adversarial nature of the client-supplier relationship, and the inefficiencies and waste stemming from fragmented teams and unequal allocation of risk and incentives. Many frameworks were also established in response to the publication of the Government Construction Strategy⁴, which highlighted the need for a radical change in public sector procurement and a more balanced relationship between public authorities and the construction industry.

Framework arrangements can offer benefits for both sides and, we believe, for the long-term future of the industry. Such frameworks pre-select companies to provide services over a period of time. For clients, they eliminate the need to go through a full tendering process for each scheme. They therefore have the advantage of being quick to access and less bureaucratic and costly. They should be easy to access and use and are often performance benchmarked to drive contractors to deliver at their best. They are also inherently collaborative, providing a transparent, non-adversarial environment where the costs, designs, and risks are all open to scrutiny and best practice is promoted and shared. They result in integrated teams which have clear roles, common incentives and joint objectives.

For the construction industry, procurement frameworks replace lowest price tendering with more sustainable, long-term relationships with the client, encouraging contractors to look beyond the conventional scheme-by-scheme approach to consider how to align themselves with the broader aims of the strategy. They also reduce the costs associated with preparing for bids and generally increase the likelihood of winning work once a company is on a framework.

These long-term collaborative arrangements are becoming increasingly popular due to the better value for money, high performance and continuous improvement they have become associated with. There are now over 7,000 construction-related frameworks being used by local authorities, government departments and other public bodies across the UK. Balfour Beatty currently sits on, or has worked on, several of the leading frameworks, including the Scape Civil Engineering and Infrastructure Framework. However, not all of the many frameworks which exist are as effective as these.

In Balfour Beatty’s experience, the best frameworks combine a number of characteristics beyond the economies of scale, lower procurement costs and greater market leverage which they all aim to deliver. They look beyond simply delivering cost and time savings, as important as those are, and focus on a broader range of outcomes aimed at improving the lives of local communities. They are used to assist local authorities in the delivery of other elements of their local strategies. These priorities are clearly defined and measurable. They could include a range of outcomes, from social value priorities such as jobs and training and use of local suppliers, to sustainability deliverables. The most effective frameworks are also closely managed. Contractors are held to account and benchmarking, to ensure consistency of delivery and continuous improvement, is rigorously undertaken.

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The Balfour Beatty Culture framework

Our Culture Framework provides a simple and clear view of our purpose, vision and values. Collaboration is key to this; one of the values is Collaborate Relentlessly: we’re strongest when we work together to leverage our expertise, scale and supply chain.

On each project, every time a major package team is created (which will include Balfour Beatty people and specialist supply chain partners), we run a full iteration of our collaboration model - from collaborative maturity assessment to transferring learning to the next stage. We establish an environment that promotes collaboration: nurturing relationships and joint innovation.

For each project, we build a collaborative arrangement which will incentivise the right behaviours and practices. Supply chain partners are fully integrated into project teams and invited to join the Collaboration and Transformation Steering Group (CTSG), giving all parties the opportunity to benefit from the collective experience and best practice.

⁴ Government Construction Strategy, HMG, 2011
Early Contractor Involvement (ECI)

ECI has become an established way of working on large infrastructure schemes in around thirty countries. It was a key outcome of Sir John Egan’s 1998 paper *Rethinking Construction*, which considered the scope for improving the quality and efficiency of UK construction, and it was adopted by the Highways Agency for their infrastructure projects in 2001.

ECI has been proven to help commissioning bodies establish the most cost-effective means of delivering schemes on-time and on-spec and is in use on a number of high-profile schemes, from Crossrail to Hinkley Point C and HS2. Each option of course has its own advantages and disadvantages, however, we believe that there are some schemes which could benefit from using ECI, which are not doing so. In some cases this is due to concerns around maintaining competitive tension. In others, there is a lack of detailed of understanding of the ECI concept and its benefits for project success.

The premise is simple: the preparatory work for large infrastructure projects involves a significant amount of time and money. Contractors are often brought into the process only once the scope has been defined, and are asked to make decisions without being aware of all of the information. Under an ECI approach, the contractor is involved in the early phases of design. This enables commissioners to capitalize on the contractor’s advice, experience and specialist knowledge during the early stages of project planning when it is possible to bring to bear the greatest influence on capital costs, advising on things such as constructability, the best use of materials and the phasing of work to ensure the best and most efficient outcomes. Meanwhile, expert involvement during the early phase, and being able to access and understand the site, means that risks and issues can be identified and resolved earlier, resulting in less redesign and fewer claims when problems do occur, while costs can be estimated more accurately.

Contractor involvement from the outset also results in a shorter tendering process, saving money for both the commissioner and the contractor. Overall, ECI has been proven to result in significant savings. Furthermore, the earlier a contractor is appointed in the process, the greater are the potential savings.

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**Crossrail South East Section**

Balfour Beatty delivered the £130m Crossrail South East Section Project, which was completed in October 2017. This included construction of a new station in Abbey Wood, two new dedicated lines from the station to the Plumstead portal, and modifications to several bridges along the route. Balfour Beatty was instrumental in ensuring that this was the first Network Rail project to gain certification for BS11000 Collaborative Business Relationships.

The Crossrail South East Section project was hailed by NR as: “A flagship project for collaborative working.”

ECI is an approach which turns conventional, adversarial contracting behaviours on their head and promotes collaborative working and the building of strong relationships from the outset. Taking this approach can give the contractor a sense of ownership and shared responsibility over the scheme, which results in improved outcomes and fewer cost and time overruns.

There are also, of course, significant benefits for contractors, who gain an earlier and more thorough understanding of what the customer wants. Being appointed so long before construction begins, and with greater schedule certainty, enables better planning in terms of the skills, supply chain and resources that will be needed to deliver the project. The long-term certainty and stronger trust between the parties also enables contractors to invest in areas such as innovation, pushing up productivity and resulting in higher profit margins for the sector.

Of further benefit to the construction industry, ECI often involves not just engaging with the contractor early in the procurement process, but in fact curtailing the procurement process and selecting partners based on generic scheme designs and cost benchmarks rather than any specific project designs. This obviously reduces the bid costs for the unsuccessful bidders, while some ECI schemes also compensate losing bidders if they come up with ideas that are subsequently adopted by the client with the successful bidder.

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6 Rahman & Alhassan, 2012; Song, Mohamed & AbouRizk, 2009
7 Levy, 2012; Quatman and Dhar, 2003
8 Analysing the advantages of early contractor involvement, Robert Eadie and Matthew Graham School of the Built Environment, University of Ulster, September 2014
9 Chan, Chan and Ho, 2003
New technologies and ways of working

New technologies such as virtual and augmented reality offer the opportunity to improve communication and collaboration between the various parties delivering schemes and between the contractor and the client. Digital processes are also having a significant impact, making it easier for the different parties to work effectively together to the same end goal. Teamed with high speed internet and mobile technology, Building Information Modelling (BIM) with its design, modelling and data management capabilities and the information it holds on all project requirements, including specifications, materials, supply logistics and timelines, offers transparency and improves seamless working based around a common dataset. It can ensure that all those involved in the scheme remain abreast of changes and developments in real time, from any location, right through to the end of the construction phase and beyond. In collaboration terms, beyond the availability of data and improved communications, BIM also speeds up decision making and increases the buy-in of all those involved.

However, in spite of the Government’s BIM Level 2 target for public sector projects\(^\text{10}\) which has had a positive impact, BIM is still only being used effectively on the largest schemes, as supply chains are not yet fully abreast of the latest developments. Core to the effective implementation and use of BIM is that all parties are working from a common basis. Smaller companies however, can lack resources to make the initial investment and additional training required to get fully up to speed. Others may be overwhelmed by the multiple software programmes and tools being used in different parts of the industry. Given that small and medium sized companies make up 98% of the industry\(^\text{11}\), addressing this is vital if we are to improve collaboration. Tackling these issues requires leadership from local authorities and other clients, as well as large contractors.

Other developments which have not yet reached maturity could also offer ways to improve collaboration in the industry. These include the use of Blockchain technology, which, if teamed with BIM, has the potential to remove some of the ambiguity in the industry and to cause positive disruption. Although Blockchain, best known as the technology behind Bitcoin, is largely a decentralised database which chronologically and securely records transactions, some of the processes and possibilities associated with it, such as digital payments, smart contracts, and the ability to digitally verify the qualifications and identification of those working on schemes, have real potential to increase trust and collaboration, although their widespread adoption is likely to be some way off.

The other, more tangible opportunity for an increase in collaborative behaviours is the shift to Design for Manufacturing and Assembly (DfMA), off-site prefabrication and modularization. Along with consistent high quality, efficiencies in time and cost, and improved safety due to the reduction in onsite time, these methods demand close collaboration and coordination amongst the different parties, from the client and contractors to consultants and suppliers, from the design phase onwards, as the various parties have to work closely together to ensure that they effectively capitalize on innovative offsite practices.

Embracing new technology and the associated benefits calls for contracting authorities to change the way they think about procuring and building. This will require courage, as new technologies are, by their nature, untested as they come online and public procurement often favours low risk behaviour and tried-and-tested approaches.

\(^{10}\)Government Construction Strategy, HMG, 2011
\(^{11}\)BEIS, November 2017
Collaboration is crucial to deliver value for money and the best outcomes for local authorities and other contracting authorities. As it stands, we are missing opportunities to innovate and deliver improvements, due to the adversarial nature of the sector and rigid specifications. We must break down the barriers that currently exist. Overly detailed specifications and the rejection of innovative ideas proposed during the design and tender process should be challenged. Approaches which encourage collaboration must come to the fore, providing customers with a better outcome and allowing the sector to develop with the times instead of lagging behind.

Balfour Beatty believes that for collaboration to become truly embedded across the sector, there has to be a genuine cultural shift. The whole industry from local authorities and others commissioning infrastructure, to contractors and the supply chain, must fully commit to it, adopting a collaborative mindset and moving to more collaborative behaviours. More than this, it also requires clear and consistent leadership from local authorities, large contractors and Government. The potential prize is a stronger, more efficient and more resilient industry working better together to deliver for the customer.

Conclusion

Balfour Beatty has also committed to reducing onsite activity by 25% by 2025. Supporting the Government’s 2025 strategy for lower cost, lower emissions and faster delivery, we aim to remove the activities we can from our sites to free up our workforce’s time to focus on delivery. We believe that a new wave of innovation, coupled with a more efficient partnership model, will enable us to increase build efficiency and speed while driving down operational costs. Capitalising on these opportunities requires the whole industry to move towards these approaches.

About Balfour Beatty

The UK’s largest construction contractor, Balfour Beatty, was founded in 1909 and is listed on the London Stock Exchange. With 15,000 employees and over 40 offices in the UK, Balfour Beatty finances, develops, builds and maintains the increasingly complex infrastructure that underpins the UK’s daily life.

With a legacy of projects across transportation, power and utility systems, social and commercial buildings: from Crossrail and Heathrow T2b to the M25 and M4/M5; and Sellafield; to the Olympics Aquatic Centre, we are proud to be a British company delivering iconic structures, bold engineering feats, behind-the-scenes innovation and joined-up thinking, financing and partnerships.

Collaboration is an integral part of Balfour Beatty’s approach. Our core values are talk positively; collaborate relentlessly; encourage constantly. As a result of our work on a number of recent partnership projects including with Network Rail on the design phase of the Crossrail South East Section Project, Balfour Beatty has been awarded the British Standard Institute’s certification BS11000 for collaborative working. The internationally recognised standard is awarded to companies who demonstrate a collaborative approach to work by building sustainable relationships with partners and improving company competitiveness and performance by doing so. We are also proud to be the first Tier 1 contractor to carry the ISO44001 accreditation, the industry standard for Collaborative Business Relationships.

Balfour Beatty has made significant progress in its vision to become a truly digitally empowered business. Development of internal expert capabilities such as the training of new Drone Pilots, a digital surveying team with full laser scanning service, a high-end visualisation team and a significant increase in BIM-related skills has shown an increase in quality, a leaner approach and a safer working environment. We have recently undertaken global collaboration in the fields of Virtual Reality and construction robotics, using skills from the UK, USA and Hong Kong. Both technologies are vital to the future of Balfour Beatty and the industry as a whole.

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