

Jacobs

A Better Way

Transforming the delivery of U.K. infrastructure

Introduction

Prior to the COVID-19 development, the U.K. Government announced the most ambitious infrastructure investment plan in its history, with investment planned into road, rail, housing and digital infrastructure over the lifetime of this Parliament. The U.K. Government's Construction sector deal (part of its Industrial Strategy) sets ambitious targets for the industry to enhance social value and improve productivity. It is tasked in the next five years with reducing the cost of construction and whole life assets by a third, halving the time taken from inception to completion of new infrastructure and achieving 50% reductions in both greenhouse gas emissions and the U.K. trade gap in construction products and materials.

These are essential objectives, but create a challenging context for the infrastructure and construction industries, which remain heavily influenced by 20th century needs, standards and solutions. The need to move beyond these has become even more pressing in the light of COVID-19, and its impact on working patterns, commuting routes and demand for regional services. The way society engages with public infrastructure is changing, and both those procuring and delivering major programmes must evolve with it.

This paper outlines six areas where that change can be achieved in a timely, targeted way. There are specific recommendations on issues ranging from the funding, delivery and contracting of major projects, to the establishment of new technical and data standards, and ensuring capacity within the regulatory and legal ecosystem that surrounds infrastructure. These acknowledge and respond to the pressure to get Britain building by expediting 'shovel-ready' schemes, at the same time as identifying areas of change that will be of benefit in the long-term – supporting objectives from the 'levelling-up' of the economy to the achievement of net-zero carbon targets.

Ultimately this paper contends that there has never been a better opportunity, nor a more urgent need, to bring U.K. infrastructure and construction firmly into the 21st century.

1.0

A Better Way: The six areas where change can be achieved.

Funding

Delivery

Contracting

Technical
Standards

Data & Digital

Capacity

Context:

An unprecedented commitment to invest in infrastructure must be matched by unprecedented changes in how that infrastructure is delivered if it is to succeed. We must challenge today's practices and methods to ensure we build infrastructure that will meet the needs of tomorrow.

Accordingly, the specific recommendations in this paper reflect wider needs for U.K. infrastructure: To undo the fragmentation that affects funding, contracting and innovation in infrastructure (Graphic 1); to move beyond the narrow focus on 'value for money' that dominates commercial thinking, inhibiting a holistic understanding and pursuit of value creation; to create non-adversarial structures that encourage industry players to collaborate as well as compete; and to accelerate much-needed new ways of working.

Ultimately, these are changes that will help the industry move beyond a culture of short-termism, arriving at the right solutions rather than those that are most expedient. Where competition over price and speed is currently the primary dynamic, the design of procurement and contracting should instead encourage competing visions for how to deliver the best outcomes – and collaboration where it helps achieve them.

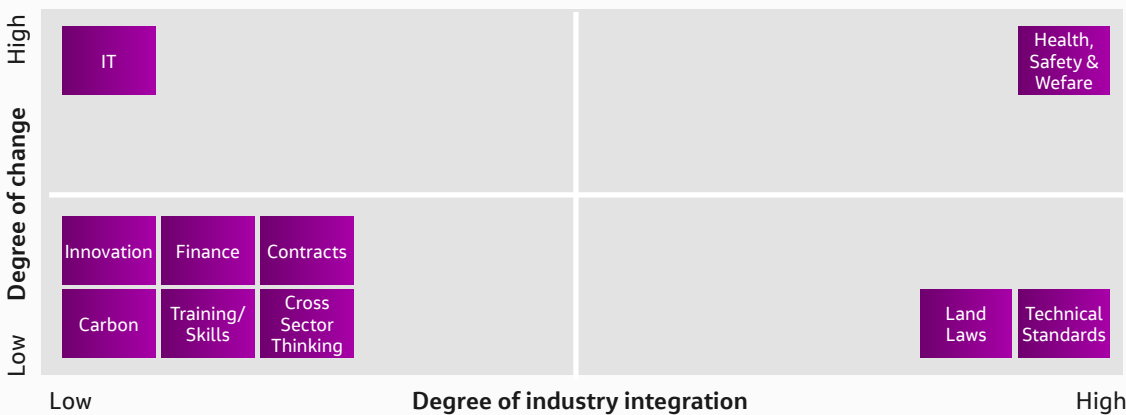
These are co-dependent priorities that need to be understood and progressed accordingly. The proposals in sections 1 and 2 for changing how major projects are financed and delivered rely upon adopting the new industry standards outlined in 3, 4 and 5. In turn, none of that will deliver full benefit unless overall capacity is boosted, the subject of section 6. This is not a menu from which to pick-and-choose, but a prescription that reflects the inter-connected nature of the change needed across many areas of U.K. infrastructure.

The investment mandate of the next five years both necessitates this scale of change, and also provides the opportunity to achieve long-overdue progress. As Graphic 1 highlights, while some aspects of the industry have changed, many essential ones have remained the same for decades and even centuries (including land laws, technical standards, core skills of the industry and financing routes).

The U.K. needs a better way to procure, plan and deliver infrastructure, one that prioritises digital innovation, off-site manufacturing technologies and a focus on whole life asset performance. This will boost the long-term robustness of the industry and enhance its global influence, as well as enabling the U.K. Government to meet its investment priorities in the coming years.

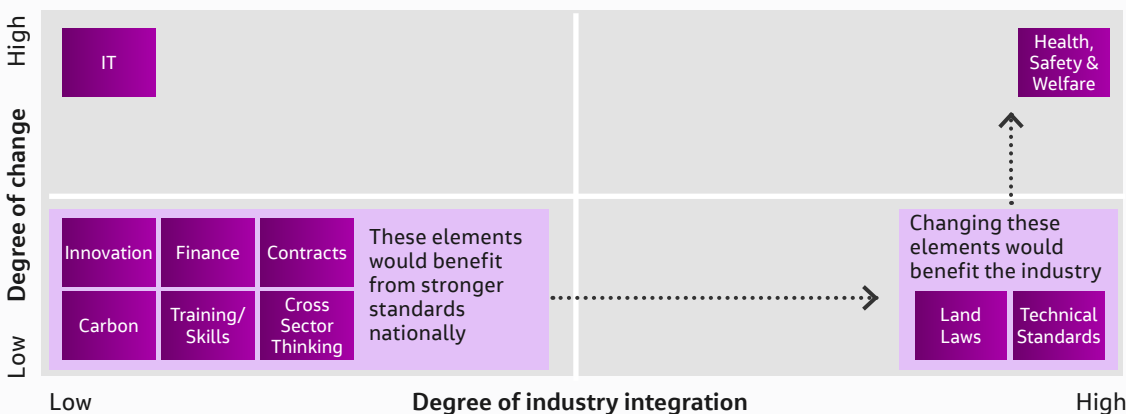
1.0

Introduction



Graphic 1 - What defines the industry - standards, contracts, skills etc

Increasing integration and investing in new standards and approaches will free up industry to collaborate and deliver the goals of the Industrial Strategies' Construction Sector Deal.



Redefining our Industry

Executive Summary

1.1

A better way of procuring, planning and delivering infrastructure is needed to fulfil the Government's forward investment plan for the next five years. This paper makes six recommendations for how the infrastructure industry, and the U.K. Government as its most important client, can change to achieve better outcomes and create long-term value.

Funding

A more flexible approach to the financing of major projects that breaks the sectoral funding model and gives the U.K. Government license to invest dynamically alongside the private sector, helping it to advance priorities such as sustainable development.

Delivery

The creation of a national logistics hub network, to expedite and standardise the move to off-site manufacturing outlined in the Construction Sector Deal. This provides the added benefit of levelling up infrastructure spend regardless of where the infrastructure is located.

Contracting

A new national contracting standard, based on Project 13 principles, that encourages the creation of delivery enterprises that bring together clients, advisors, suppliers and sponsors to support integrated delivery.

Technical Standards

Develop new technical standards for the industry that can accelerate adoption of new ways of working, led by the i3p partnership.

Data & Digital

Task the Centre for Digital Built Britain with developing new industry standards for digital construction and data management, helping the industry speed up innovation, through adoption of common data standards and approaches.

Capacity

Create a dedicated team within the Infrastructure Projects Authority to review the capacity of the legal, regulatory and governmental ecosystem surrounding infrastructure, ensuring it has the resources to expedite the approval of new projects, recognising that all infrastructure interfaces with so many sectors and institutions.



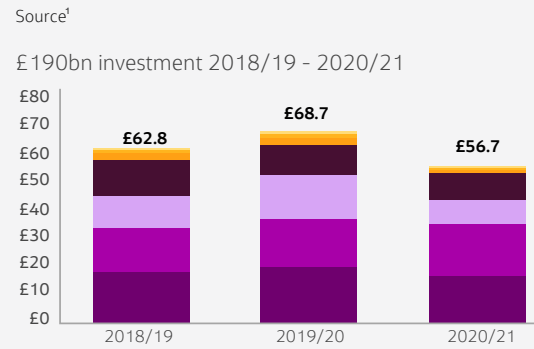
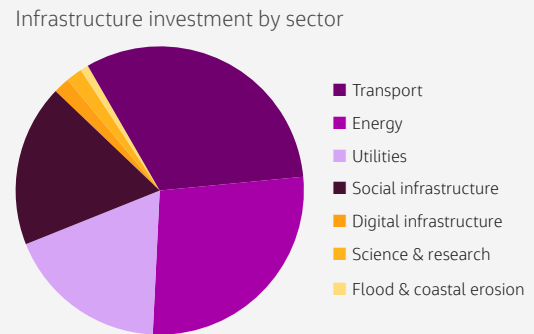
Transpennine
Route Upgrade

1.2

Funding: a connected approach

The challenge:

At present, much of the U.K.'s infrastructure is planned, delivered and funded using a strict market sectoral approach (Graphic 2), despite 50% of the investment coming from private investors and suppliers with no such scope limitations.

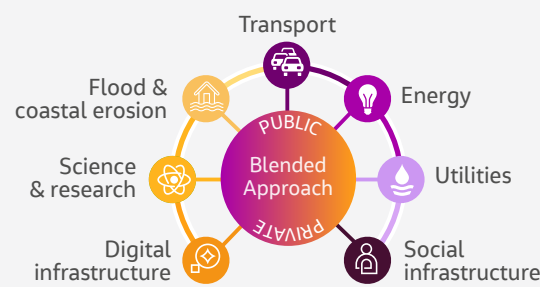


This is an outdated and inflexible approach, resulting in a lack of integrated planning and delivery. Rather than focusing on overall outcomes, organisations are directed by sector-based funding streams that are often uncoordinated and lead to unnecessary competition. This undermines interconnectivity and mutual dependency, making it harder for the industry to work in the systematic, joined-up way needed to deliver projects which can meet the full range of modern objectives.

By contrast, a cross-sector, connected infrastructure approach supports increased resilience, carbon and pollution reduction, and smarter ways of working. A good example is the Oxford to Cambridge corridor, which has benefited from a dedicated All Party Parliamentary Group that draws in expertise from East West Rail Co., Highways England, and England's Economic Heartland. Under the market sectoral approach, stakeholders such as these too often work independently, and inadvertently at cross-purposes.

Connected infrastructure also creates different funding opportunities, breaking the legacy approach of sectoral funding streams. It enables blended finance solutions linked to robust, multi-sector outcomes. With almost 50% of infrastructure investment in the U.K. coming from private sources, there is the opportunity to use public funds in a different way (Graphic 3). For example, by combining this more flexible approach with green finance options that link outcomes to more sustainable methods of delivery, the U.K. could take important steps towards reducing carbon emissions, a significant proportion of which are estimated to be directly influenced by the construction sector. But to realise this opportunity, it needs the flexibility to co-invest quickly with the private sector when the right opportunities arise.

A flexible, blended approach to financing U.K. infrastructure will allow swifter delivery, more effective focus on key outcomes, and more equitable distribution of benefits across the U.K. as it emerges from the COVID-19 pandemic. It will help the industry to do its job better, unlocking private sector investment that can both work more innovatively and increase value for money for the U.K. taxpayer.



Our recommendations:

- The U.K. Government should commit to adopting a blended approach to funding infrastructure, and review how different Departments work together to access funding in more joined-up ways. In turn, the industry must embrace this change and provide the solutions that enable greater integration of planning and delivery.
- Explore the creation of a sovereign wealth fund empowered to promote and invest in infrastructure schemes, giving the U.K. Government greater flexibility to invest dynamically alongside the private sector.

Graphic 2: Summary of U.K. infrastructure investment

Graphic 3: The move from a traditional funding arrangement to a blended funding arrangement

1.3

Delivery: a national logistic hub network

The challenge:

In line with the recommendations of the Industrial Strategy Construction Sector deal, momentum has been building behind the move to off-site manufacturing. Significant infrastructure schemes including London Bridge Station and Queensferry Bridge have begun to demonstrate the opportunities of the approach, while leading infrastructure owners like Heathrow have started to demand off-site manufacturing as standard practice.

But to fulfil the vision of the Industrial Strategy, with off-site manufacturing adopted at a scale that can deliver meaningful benefits, more work is needed. Current adoption still relies on the supply chain proposing off-site solutions on a discretionary basis. There needs to be a more formalised basis for ensuring that an off-site approach becomes the new normal, with infrastructure owners demanding it as standard for all significant investment.

In turn, this will require a new approach to all aspects of infrastructure delivery. For example, rather than the common bespoke design solutions being developed, designs will need to be standardised. New national standards must be developed, alongside changes in liabilities and contract requirements to reflect blurring of traditional design liabilities. Construction sites will need to change, moving to assembly areas in which pre-constructed components are connected. This will result in the need for new skillsets in order to realise the full production potential of this new approach. Production thinking also needs to become part of the infrastructure development process, to help optimise delivery, and ensure efficiency in off-site manufacturing is not undone by inefficiency elsewhere in the scheme development.

By embracing this change of approach, the infrastructure industry will be able to dramatically increase the speed and reduce the cost of construction. This also provides opportunity (due to standardised designs) for greater research into the carbon efficiency of construction and the materials used and supplied through standard approaches. All stakeholders need to give careful thought to how this new approach will impact them and their normal working practices.

Our recommendations:

- U.K. Government clients and regulated industries should work together to create a national network of logistics hubs (off-site manufacturing hubs), primed from the upcoming major projects investment, to establish new approaches to delivery. In the short-term this will allow the construction industry to operate in a secure and safe environment while COVID-19 remains a concern; and in the medium-term it will help realise the benefits inherent in off-site manufacturing, from decarbonisation to the export of advanced manufacturing construction technologies, faster delivery of projects and cost savings. It will also help distribute infrastructure investment nationwide, regardless of the infrastructure location.
- To realise the maximum benefit from these centres, a 'Gateway' organisation should be tasked with establishing a national library of standardised products and designs, to control, manage and maintain quality standards across the new network.



Heathrow Expansion Programme

Contracting: a new national standard

The challenge:

The status quo approach to contracting creates negative commercial tension that undermines many of the broader objectives sought by clients and results in very significant procurement costs.

Instead, we need a new national contracting standard that focuses on combining the best minds in the industry to create holistic value, not simply identifying which provider can promise the lowest cost. Delivery organisations should be connected around common goals and outcomes that are aligned with the needs of society. Only through this approach can the new ways of funding and delivery outlined above realise their potential.

A good basis for this is the Project 13 approach (as developed by the Infrastructure Client Group, via the Institution of Civil Engineers). This promotes the delivery of infrastructure through the creation of an integrated delivery enterprise, formed from client organisations, key suppliers, advisors and sponsors. By moving beyond traditional transactional arrangements, these enterprises have the ability to achieve the best collective outcomes by aggregating skillsets, knowledge and expertise. The Project 13 approach brings significant benefit to all parties, not least the public, who benefit from more efficient delivery of infrastructure solutions focused on outcomes and social value. It also provides a proven delivery model for blended finance, differentiating between clients and investors.

There is also potential for this approach to bring different clients together. Many of the U.K.'s most successful major investment programmes have used Project 13 principles to underpin their commercial model, including Heathrow Terminal 5, the Environment Agency's Thames Estuary Asset Management 2100 Programme and Anglian Water's @One delivery programme.

Our recommendation:

- The U.K. should adopt a new approach for contracting infrastructure projects, using Project 13 principles as the base contract to form delivery enterprises that include clients, consultants, contractors and logistics hubs.
- These enterprises should be established based on 'best for task' capability and mutuality, moving beyond person "marking" to avoid duplicated roles and inappropriate contract conditions. There should be increased reward and fair shared-risk linked directly to delivery of project outcomes, spread across all relevant parties.
- Contracts should be based on a common commercial formula, with nationally consistent profitability, to create a sustainable base commercial model. They should include targets for the delivery enterprise to achieve social value, e.g. whole life carbon reduction, or the creation of local apprenticeships and use of nationwide logistic hubs.



Graphic 4: Project 13 suite of documents <http://www.p13.org.uk/>

Technical Standards: unlocking innovative ways of working

The challenge:

Technical standards are the cornerstone of the entire infrastructure industry - the basis for procurement, project insurance, professional qualification, project delivery quality and much more. Yet existing standards and ways of working are based on legacy approaches, often dating back many decades.

Overhauling these is an essential precondition to realising the benefits of new approaches across financing, delivery and contracting. If the industry is to deliver against modern objectives, and create meaningful value, it must have modern technical standards to underpin it.

The basis for such an overhaul already exists. The i3P (<https://www.i3p.org.uk/>), self-funded by participating companies that include Highways England, HS2, Tideway, The Environment Agency and Jacobs, brings together organisations across the industry to innovate around specific client challenges, pooling ideas and experience.

If appropriately scaled, i3P could take a national lead in innovation and start to develop modern technical standards that will unlock new ways of working. This consolidation of experience

and expertise would allow the U.K. construction industry to maximise the opportunities presented by the digital revolution and significantly increase delivery efficiencies.

It would also enable the U.K. to speak with one voice, creating a platform to promote its infrastructure expertise on a global basis.

If a concerted approach is taken, there is every opportunity for the U.K. not just to overhaul its own approach to major programmes, but to lead the world in construction innovation and the new standards that underpin it.

Our recommendations:

- Use some of the Construction Sector Deal investment to fund the i3P partnership, closely aligned with wholesale industry change. Task an expanded i3P with rethinking technical standards and ways of working that can unlock the potential of blended infrastructure, logistics hubs and Project 13 contracting. These standards would be independently assured by the British Standards Institute.



Graphic 5: i3p brings together organisations across the industry to innovate around specific client challenges, pooling ideas and experience. www.i3p.org.uk

Data and digital: establishing common standards

The challenge:

For an industry that increasingly relies on digital tools and techniques, the industry’s organisation in this area is frustratingly disjointed. Client and industry suppliers each have their own ideas and approaches to digital, resulting in a culture of competition that produces incompatible solutions – slowing the pace of innovation.

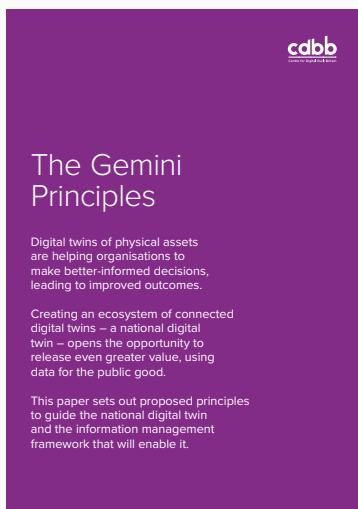
We will not move forward as an industry if multiple clients and suppliers continue working in silos to build their own solutions around, for example, digital twins and data storage. This negates the bigger, bolder moves that would become possible if those competitors were working together as partners.

The approach to managing data is an especially pressing example of where a rethink is required, and common standards needed. If these were adopted, the development of a national digital twin could be accelerated, which would be invaluable in whole life asset management and improving Health and Safety across the industry. Similarly, common data standards would enable big data analysis, use of predictive analytics and, crucially, real data to inform the creation of future risk registers, cost estimates and schedules. These would underpin the change in contracting standards detailed in section 3.

Again, there are strong foundations in place to make this change. The Centre for Digital Built Britain (CDBB), based at the University of Cambridge, has done extensive work in this area and is ideally placed to set a new industry standard. Its Gemini Principles for the creation of a national digital twin (Graphic 6) provide a framework that could be transferred to other digital, data-driven projects.

Our recommendations:

- The Gemini Principles should be adopted as mandatory for all major projects, to create the momentum needed towards the national digital twin.
- The CDBB should be tasked with developing the common standards needed for a digital construction sector in the U.K., facilitating improved construction efficiency and whole life asset management. This must be done quickly, so new standards are ready to use in the creation of all upcoming U.K. major projects.



Graphic 6:
CDBB Gemini Principles
<https://www.cdbb.cam.ac.uk/DFTG/GeminiPrinciples>

Capacity: priming the wider ecosystem

The challenge:

With such an ambitious forward investment plan, the entire infrastructure ecosystem needs to ensure it has the capacity to deliver.

Just as the industry undertakes significant levels of due diligence to ensure that the appropriate delivery organisations are chosen for new projects, every participant in the infrastructure ecosystem must be equally prepared for the scale and pace of implementation needed in the years ahead. That includes regulators, law courts, and other elements of the U.K. Government involved in the oversight and approval of large projects. It will not be enough for the client and delivery bodies to ensure they have the resources required: all stakeholders must do the same.

A lack of capacity can cause delays to project implementation that will quickly lead to a backlog of pending approvals, and overall targets being missed. What is more, given the relative infrequency of major programmes, it should not be assumed that the unique skills needed to procure and deliver them will be available by default.

To avoid this problem, the U.K. can learn from the example of Australia, which took specific measures to accelerate the progress of infrastructure and construction work. According to McKinsey & Co's Reinventing Construction document "...Australia cut the number of procedures for obtaining a construction permit from 25 to 14 and the average permit processing time from 150 to 112 days. It also introduced a national building code and instituted special courts to expedite land-acquisition disputes..."

This is not just about changing the law, but more importantly, increasing the capacity of institutions to ensure that projects can proceed at maximum speed, in full compliance with legal requirements.

Without that increased capacity, it will become challenging to attract and activate the full scale of investment in major programmes currently envisaged.

Our recommendations:

- Establish a dedicated team within the Infrastructure Projects Authority tasked to review the capacity of relevant national institutions, and ensure they have the additional resources needed to facilitate infrastructure delivery with maximum efficiency.
- The IPA and HM Treasury should produce clear guidance and trigger points for the type, scale and complexity of major programmes that require organisations to establish special purpose delivery vehicles with enterprise governance.

Conclusion

2.0

This paper illustrates the importance of different thinking in delivering the expectations of the construction sector deal; no one party in isolation can drive the change needed to the industry by 2025 and beyond. We have proposed six very practical recommendations, which illustrate the steps needed to start the process of change. **In summary, the six recommendations are:**

Connected infrastructure delivery & funding

That we break the current sectoral funding model for U.K. infrastructure, and adopt a blended approach to ensure better interconnectivity of solutions and enable private investment to be used in the most innovative ways.

National Logistics Hubs network

That the U.K. establishes a network of logistics hubs primed from the upcoming major projects investment. To enable this, a 'Gateway' organisation should be tasked with establishing a national library of standardised products and designs to control, manage and maintain quality across the new network.

New Standard contracting approach

The U.K. Government should change its contracting strategy, using the Project 13 principles as the basis to form delivery enterprises that include clients, consultants, contractors and logistics hubs. These enterprises should be established based on 'best for task' capability, and incentivised with targets to deliver social value.

New technical standards

Funding from the Construction Sector Deal should be used to expand the i3P partnership, tasking it to rethink technical standards and ways of working that can unlock the potential of blended infrastructure, logistics hubs and Project 13 contracting. These standards would be independently assured by the British Standards Institute.

Industry Data Standards

The Gemini Principles should be adopted as mandatory for all major projects, to create the momentum needed towards the national digital twin. The CDBB should also be tasked with developing the common standards needed for a digital construction sector in the U.K.

Enhanced capacity of national institutions

That a team be established within the Infrastructure Projects Authority tasked to ensure that wider national institutions have the additional capacity needed to facilitate the efficient delivery of major infrastructure programmes.

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