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31 March 2017

Via email

Re: Joint Select Committee

on Government Procurement - Inquiry into the Commonwealth Procurement Framework

Supplementary submission

Professionals Australia welcomes the opportunity to provide additional comments regarding the current Inquiry into the Commonwealth Procurement Framework, as requested by the Joint Select Committee on Government Procurement.

During our appearance at the Joint Select Committee hearing in Melbourne on Wednesday 19 April 2017, the Committee Chair requested the we provide some additional information regarding some aspects of our submission. This information forms the basis of this supplementary submission

Balancing costs

Professionals Australia is concerned that current procurement framework is overly focussed on cost rather than value. In discussing this topic during the hearing, the Committee Chair requested some additional information regarding the "two buckets of money" analogy, and how this affects the overall efficiency of procurement.

In managing the procurement function, governments and agencies effectively establish their procurement capability through inhouse skills and outsourcing to consultants. In an effort to drive down ongoing costs, over many years, government departments and agencies have seen their inhouse technical skills decline significantly. This has placed governments in a position where they are unable to effectively carry out the procurement function, and unable to purchase goods or services in an informed manner.

These efforts to reduce costs in the bucket of ongoing costs, now results in massive additional expenditure and waste from the second bucket, comprised of project costs. This short-sighted approach is at odds with the very goal of this Inquiry, which is to ensure value for money through procurement.

Many of these functions are inherently ongoing in nature, and yet government lacks the ongoing skills to manage these functions, instead preferring to rely on consultants. We now have consultants managing ongoing procurement in areas such as roads, rail, electricity, water, local government, and other infrastructure, despite an ongoing pipeline of works in all of these areas. As a result, in an effort to save money, governments are wasting billions, and taxpayers are picking up the bill.

At present, governments throughout Australia are pushing further efficiency measures in the public sector, however all this succeeds in achieving is the shift from inhouse skill to more consultants. This way, costs are packaged up into individual projects, without any consideration as to whether the cost of all projects might be reduced through greater inhouse technical skills and slightly larger ongoing costs.

Industry Participation

Professionals Australia supports procurement frameworks, both national and at state level, that maximise the benefit to the Australian people. Outside of direct legislation, procurement is the single greatest means by which governments can shape the future of the nation. Similarly, the sheer size of the procurement function means that poor procurement practices have the potential to waste billions in taxpayers' funds.

In line with the submission made by Mr Ian Nightingale, the Industry Advocate for the South Australia Government, we support policies, at state and federal levels, that promote

- Promote employment for Australians;
- Investment and capital expenditure that builds capacity in the Australian economy, and
- Use of businesses and supply-chains that employ South Australian residents and invest in the State.

In addition, Professionals Australia also supports policies that promote:

- Skill development throughout the local workforce;
- Local content targets;
- Workforce development plans;
- Greater inhouse technical capacity rather than an overreliance on outsourcing.

By supporting skill development, workforce development and local content targets, we can utilise the procurement function to deliver future high-skill jobs, and an ongoing supply of work. Tenders will be encouraged to invest long term, and build a workforce capable on winning future contracts, rather than a workforce based on one project.

We support the premise of the submission by Mr Nightingale, in that the economic benefit and the benefit to the local workforce should be of greatest importance, rather than simply the nationality of the tendering company. However, the support and development of long-term local businesses is an economic benefit to be considered, as these companies may provide employment and other benefits to the nation for many years beyond a specific project or item of procurement. Therefore, where foreign tenders are considered, an effort must be made to balance the long-term benefits associated with the tender against with the benefits derived from ensuring ongoing business to local businesses.

Recommendations

Professionals Australia broadly supports all the recommendations made by the Industry Advocate for South Australia, Mr Ian Nightingale, with the following additions:

1. **Quality and Australian standards**
   In additional to Mr Nightingale's recommendations, appropriate standards should be developed for the Engineering profession through a national registration scheme. This would provide greater assurance to

buyers that they are procuring quality engineering services, and it would provide a base level of assurance that any imported skilled engineers meet required standards.

2. **Assessments of economic benefit**
   In additional to Mr Nightingale's recommendations, workforce development should be assessed as a key item of economic benefit, rather than solely employment. Preferred tenders should demonstrate workforce development initiatives including, targets for apprentices, cadets and graduates, and other training to improve skill development and knowledge diffusion.

   Professionals Australia also supports the introduction of some additional, more specific procurement targets, aiming to encourage specific tenders to support local content. Local content targets would achieve this result, and may broadly encourage all tenders to explore local providers and support local industries.

Sources and reports

During our appearance at the Joint Select Committee hearing in Melbourne on Wednesday 19 April 2017, the Committee Chair requested additional information regarding specific reports referred to in our statements. Below we have included a detailed list of these reports, and relevant quotes in support of improved procurement practices. Additionally, we have attached to this submission a report from the Australian Constructors Association, outlining the successful approach taken in the UK to improving procurement practices, and the massive savings that these initiatives achieved.

Australian Constructors Association, Delivering better infrastructure at lower cost to community, August 2016
"As a result of the implementation of the recommendations of the Infrastructure Cost Review, and a number of other significant operational changes, the UK government and private sector have achieved a greater than 15% saving in major capital works costs. The evidence as to these savings has been documented and analysed and endorsed by the UK Audit Office".

Glenn Stevens, Address to the Economic Society of Australia Luncheon, Brisbane, 10 June 2015
"It would be confidence-enhancing if there was an agreed story about a long-term pipeline of infrastructure projects, surrounded by appropriate governance on project selection".

Deloitte Access Economics, Economic benefits of better procurement practices, 2015
"there are some elements of current government procurement policy and practice that are inefficient, adding unnecessarily to the cost of infrastructure. This includes cases where government clients have unclear project objectives (and) select inappropriate project delivery models".

"This report finds opportunities for improvement in the skills of public sector procurement managers".

"The core objective of procurement policies across the Australian public sector is to achieve value for money… Rather than simply pursuing the lowest cost offering, government agencies must consider a range of factors in order to select the industry offering that best meets end user requirements. Managing this complex decision process efficiently requires a significant level of expertise."

The Productivity Commission, Public Infrastructure, 2014

Governments should "invest more in initial design to reduce the design imposts placed on tenderers" and "solutions rely on government clients becoming more informed about the project they are wishing to purchase".

"Based on recent levels of investment, a 10 per cent reduction in the cost of delivering infrastructure — a conservative estimate of the potential savings from implementing sensible reforms — would amount to an annual saving of around $3.5 billion".

"proper project oversight by the client remains an important role. An informed and competent client has a better capacity for oversighting claims for variations and ensuring compliance with the contract… the inquiry suggested that public sector project management was poor, citing large cost overruns on some key public sector projects."

"Several governments have developed specialist major procurement agencies. These manage infrastructure procurement on behalf of government clients… The Commission sees merit in adopting this approach across all Australian jurisdictions to improve the quality of procurement-related advice and expertise in the public sector."

The Productivity Commission, Productivity Update, 2015

"not all public infrastructure supports productivity and generates economic growth and wellbeing. Poorly selected public infrastructure investment can impede the efficient provision of public infrastructure services, crowd out private investment and reduce productivity, economic growth and wellbeing."

"Most relevant to enhancing the efficiency of the provision of public infrastructure is improving project selection processes."

Infrastructure Australia, Australian Infrastructure Audit, 2015

"Australia would benefit from a strong and consistent pipeline of well-planned infrastructure projects. This would provide greater certainty for infrastructure constructors and investors, and provide the basis for a well-resourced environment for project procurement and informed decision making."

Mark Birrell, Chairman, Infrastructure Australia, 2015

"Governance, planning and decision-making processes across Australia's infrastructure sectors often lack transparency and integration."

"Without a long-term and nation-wide vision for the infrastructure required to support Australia's productivity into the future, as well as effective decision- making processes for how it will be funded and delivered, there will be a lack of public and investor confidence in the capacity of governments to deliver a pipeline of nationally significant projects."

"If these processes are not reformed, increased investments in infrastructure will be inefficient and lead to poor project selection or delivery."

National Infrastructure Coordinator, Submission to the Productivity Commission Inquiry into Public Infrastructure, 2013

"There are deficiencies evident at all parts of the 'infrastructure chain' – planning, problem identification, policy development, option identification, modelling, project identification, approvals and contracting."

"Attracting and retaining staff qualified to manage probity processes and monitor projects will reduce the cost of projects".

Australian National Audit Office, Submission to Senate Committee Inquiry into Commonwealth Procurement Procedures, 2014

"In some cases, procurement processes examined by the ANAO were not adequately supported by a planning process which was appropriate to the scale and risk profile of the procurement. Insufficient planning and scoping for major capital works projects has resulted in unreliable estimates and delivery timeframes".

"One of the keys to successful procurement is the availability of personnel that have procurement management skills and subject matter expertise so that the agency can act as an informed purchaser."

Victorian Public Accounts and Estimates Committee, Inquiry into Effective Decision Making for the Successful Delivery of Significant Infrastructure Projects, 2012

"Skills and competencies are below a level that is desirable to achieve good outcomes on major public infrastructure projects in Victoria. This is caused by a deterioration of commercial and technical expertise in the public and private sectors, evidenced by a shortage of skilled and experienced people in project development and delivery in both the public and private sectors".

Professionals Australia, Securing Defence Capability, 2015

"The responsiveness and capacity of the Australian Defence Force is fundamentally underpinned by the knowledge and expertise of the engineering, science and technical workforce - the people who develop, select, integrate, maintain and operate our modern defence effort. The problem is this intellectual capital has been run down to dangerous levels."

Deloitte Australia, Defence Technical Regulatory Frameworks Workforce Review, Stage 3, November 2012

"Without a competent APS engineering and technical workforce, the probability of material failures or unplanned retirements of capability greatly increases, with large financial consequences (yet) our engineering and technical capacity is diminishing."

Conclusion

Professionals Australia welcomes any effort to improve the procurement process, to deliver better value outcomes and wider economic benefits to the community. Professionals Australia's has long been concerned about the inefficiencies and waste in government procurement, and we view this Inquiry as an opportunity correct the system.

Small changes in the way we manage procurement could save taxpayers billions. We cannot afford to let this waste continue.

If you require any further information on the matters raised in this correspondence, please do not hesitate to contact me via Jenny Broomhall at jbroomhall@professionalsaustralia.org.au.

Yours sincerely

Chris Walton, CEO

AUSTRALIAN CONSTRUCTORS ASSOCIATION

Delivering Better Infrastructure at Lower Cost to the Community

August 2016

Contents

AUSTRALIAN CONSTRUCTORS ASSOCIATION

DELIVERING BETTER INFRASTRUCTURE AT LOWER COST TO THE COMMUNITY – THE WAY FORWARD BY THE AUSTRALIAN CONSTRUCTORS ASSOCIATION

THE ISSUE

The public and private sectors want better infrastructure delivered for lower costs, while the construction industry wants a more reliable pipeline of work that enables it to develop and deliver innovative projects more efficiently.

The issues have been the subject of many inquiries, reports and papers, most of which have identified the key factors that are holding back governments and the private sector from implementing the operational improvements that are available. So, what is stopping the identified improvements being made?

THE PRIZE

The Australian Constructors Association (ACA) sponsored research report ***Changing the game – How Australia can achieve success in the new world of Mega-projects,*** concludes that, based on an estimated public and private sector construction pipeline of around $300bn over the decade to 2025, public and private clients are paying around 20% too much for capital works projects ie there is a likely overrun of up to **$60bn**.

The Mega-Projects Report concludes that the key influencers (public and private sector) at the very top of their organisations need to align themselves in a way which ensures that the economic and social benefits that could flow from a more effective approach to mega-projects are realised.

In 2010 the UK government directed Infrastructure UK to undertake an **Infrastructure Cost Review** to find ways for government and other infrastructure providers to work effectively with the construction supply chain to develop new business models that would improve productivity, achieve better supply chain integration and promote innovation.

Lord Sassoon, then Commercial Secretary to the UK Treasury, said about the report:

What is different about this report is that it has involved a very wide group from across the industry, with the construction firms at the heart of the work; and, critically, that it has identified a clear programme of action which will be driven through by the Government and industry continuing to work together. This will enable taxpayers and utility bill payers to obtain more for less. It will also strengthen the UK"s construction supply chain in a way that will help the industry to be an even fiercer competitor, both for business in the UK but also around the world.

As a result of the implementation of the recommendations of the Infrastructure Cost Review, and a number of other significant operational changes, the UK government and private sector have achieved a greater than **15%** saving in major capital works costs. The evidence as to these savings has been documented and analysed and endorsed by the UK Audit Office.

In 2014 the UK government released an updated Infrastructure Cost Review. So successful had the UK government and private sector been in addressing the barriers to cost savings and project improvements that they are now seeking to achieve, by 2025:

- **A 33% reduction in both the initial cost of construction and the whole life cost of assets.**
- **A 50% reduction in the overall time from inception to completion for new build and refurbished assets.**
- **A 50% reduction in greenhouse gas emissions in the built environment.**

Commenting on the report Lord Deighton, Commercial Secretary to the Treasury, said:

The government's ambition is to equip the UK with world-class infrastructure which ensures the country can compete successfully in the global race. Delivering infrastructure investment efficiently and effectively is vital to ensure that taxpayers and consumers get more for less. This latest Infrastructure Cost Review report shows that we are on track to meet these objectives. In many areas behaviours are changing. As a result we are already delivering savings that average over 15 per cent across infrastructure sectors. The opportunity exists to deliver efficiencies for taxpayers and consumers of over £50 billion over the next decade.

The UK has achieved this improvement because the government and the private sector have joined in a cooperative, holistic, approach to the issues they both face. The outcome has been a staggering turnaround in approach that has been driven by the government, through the UK Treasury and Cabinet Office.

In short, the government has accepted that, notwithstanding contractual and delivery responsibilities placed on, or accepted by, the private sector, major projects are too big to fail and government must be part of the delivery process and work in partnership with the private sector because it will always be ultimately responsible to the community for project overruns or failures.

Australian jurisdictions are well aware of the issues they face and have moved to address them in part through the more recent establishment of specialist infrastructure coordination and delivery agencies. However, unlike the UK, neither Australian jurisdictions, nor the private sector, have joined to establish and operate a consistent approach to projects.

In other words, Australia still operates an adversarial, "arms-length" approach to project development and delivery and is failing to "win" the billions of dollars available from cost reductions and improvements that have been achieved in the UK.

HOW SHOULD AUSTRALIAN JURISDICTIONS APPROACH THE ISSUES

In responding to the issues before it, the UK government and industry have implemented a comprehensive approach on the basis that anything less would be unlikely to achieve the outcomes being sought. Set out below is a summary of their approach that has been configured for implementation in Victoria.

1. Commence and complete the preparation of an Infrastructure Cost Review. The report should be developed by Infrastructure Victoria in conjunction with the proposed Infrastructure Client Group (see below) and be updated annually.

2. Develop, using a traffic light concept, an annual report that provides evidence as to the status of all designated major capital works projects (including projects involving federal funds). The traffic light process will be used to identify projects at risk and enable effective action to be taken to get them back on track.

3. To aid transparency and depoliticise the delivery of projects, individual capital works agencies to report each year in their annual reports the detailed status of every major capital works project for which they are responsible.

4. Establish an Infrastructure Client Group (ICG) chaired by a person with substantial recognised corporate and operational experience and comprised of the chief executives of Infrastructure VIC, Major Projects Victoria, Treasury, Premier and Cabinet together with senior representatives of at least the following organisations:

    - Australian Constructors Association.
    - Australian Industry Group.
    - Australian Logistics Council.
    - Consult Australia.
    - Engineers Australia.
    - Infrastructure Australia.
    - Infrastructure Partnerships Australia.
    - Professionals Australia.
    - Roads Australia.

5. The ICG should be given responsibility to address client organisation and supply chain issues commencing with the development of an Infrastructure Procurement Routemap to guide all projects and including other guides aimed at:

    - improving the commissioning, procurement and delivery of projects incorporating bid processes and bid costs as well as utilising standard form project documents such as NEC3; and
    - more effective collaboration at all levels of the infrastructure supply chain.

6. The ICG should establish sub-groups in the following areas chaired by designated members of the ICG:

- Water Group.
- Industry Standards Group
- Supply Chain Capacity and Skills Group.
- Infrastructure Carbon Group.
- Infrastructure Risk Group.

7. Establish a Construction Leadership Council (CLC) comprised of senior people from across the construction supply chain including representatives from the following areas:

    - Leading construction businesses.
    - Leading engineering companies.
    - Leading suppliers
    - Peak industry organisations with expertise in industry and skills development.

8. The CLC should have the following specific goals:

    - Work between industry and government to identify and deliver actions supporting construction in building greater efficiency, skills and growth.
    - Provide leadership to help transform the construction industry and position it as a driver of productivity across the economy.
    - Produce a Construction 2031 Strategy incorporating an infrastructure plan for skills.

9. The CLC should have the following work streams and identify and deliver priority actions pursuant to those streams:

    - Skills.
    - Supply chain / business models.
    - Innovation.
    - Sustainability.
    - Trade.
    - Communications.

10. Establish a Major Projects Leadership Academy (MPLA) under the auspices of eg RMIT University to be responsible for improving the major project management skills of both public and private sector managers.

11. Implement the following administrative arrangements with respect to the MPLA and related public and private sector operations:

    - Government agencies fund their senior project leader attendances to the MPLA.
    - Government project leaders are not permitted to manage major projects unless they have completed the MPLA program.
    - Project leaders are remunerated on commercial terms in accordance with their skills and the specific project they are responsible for.

- Government project leaders are provided with a letter of appointment that clearly links their activities and expected outcomes to the specific project. These appointments are to be public documents.
- Private sector organisations meet the cost of sending their major project leaders to the MPLA.

CONCLUSION

The approach outlined above that has proved successful in the UK could be developed and adapted for Australian jurisdictions through the collaboration of government and private sector key influencers. It is a very powerful approach to the issues for the following reasons:

- It leads to a change in culture and approach on major projects and results in effective and transparent alliances between stakeholders.
- Government and its agencies are given the opportunity to interact transparently with the private sector in the development of guides and programs designed by experts and directed at achieving a cooperative, win-win outcome.
- The involvement of client, contractor, financier, supply chain and academia ensures that all gaps in existing processes are closed and a consistent long term approach to project development and management is achieved.
- Essential skills development of those responsible for overseeing projects is enhanced and best practice identified and implemented.
- Community expectations and input into projects are addressed and the potential for project destabilisation or delay is significantly reduced.
- Concerns of investment entities as to reliability and deliverability issues are reduced leading to a greater appetite for investment in infrastructure in general terms.
- Employment and economic benefits are realised.

The ACA has had preliminary discussions with a number of Australia's peak industry organisations that represent the major businesses responsible for the development, delivery and management of infrastructure projects and believes that through their support VIC could implement the changes and improvements outlined above.

August 2016

HM TREASURY

Infrastructure UK

Infrastructure Cost Review:

Main Report

December 2010

HM TREASURY

Infrastructure UK

Infrastructure Cost Review:

Main Report

December 2010

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Preface

The June 2010 Budget announced that Infrastructure UK would carry out an investigation into how to reduce the cost of delivery of civil engineering works for major infrastructure projects to report by the end of 2010.

This Main Report sets out the conclusions and recommendations from the investigation. A Technical Report, which contains the detailed analysis and technical annexes, can be downloaded from the HM Treasury website.

The investigation has been led by Infrastructure UK in collaboration with wider government, the Institution of Civil Engineers (ICE) and industry. It was carried out between August and December 2010, over which period an Infrastructure UK team, supported by industry secondees, has gathered evidence on civil engineering infrastructure delivery from over 300 organisations, including over 120 interviews in this country and abroad. The review has been supported by a Steering Group chaired by Terry Hill of Arup. The investigation has also taken advice from an independent Stakeholder Reference Group, hosted by ICE, which included representatives from across the public and private sectors.

A list of members of the Steering Group, the ICE Independent Stakeholder Reference Group and a list of other contributors is at Annex A.

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Foreword

This is not the first study to highlight the excessively high costs of constructing infrastructure in the UK. There should be little surprise that this study confirms that very substantial savings are achievable – at least 15 per cent, or an estimated £2 to 3 billion annually, on the costs of building and maintaining the UK's infrastructure. That is £20 to 30 billion over the next decade.

What is different about this report is that it has involved a very wide group from across the industry, with the construction firms at the heart of the work; and, critically, that it has identified a clear programme of action which will be driven through by the Government and industry continuing to work together.

This will enable taxpayers and utility bill payers to obtain more for less. It will also strengthen the UK's construction supply chain in a way that will help the industry to be an even fiercer competitor, both for business in the UK but also around the world.

Over the next few months, Infrastructure UK, part of HM Treasury, will work with other parts of government and with industry to develop a detailed implementation plan. This work will be integrated with the construction strand of the Government's recently announced Growth Review, which will report at Budget 2011.

I would like to extend my gratitude to Terry Hill of Arup for chairing this investigation and to members of the Steering Group, the Institution of Civil Engineers and industry for contributing to this important study.

Lord Sassoon

Executive summary

The Government's National Infrastructure Plan 2010, published in October, describes planned investment in infrastructure of £200 billion over the next 5 years. Between £15 billion and £20 billion will be spent each year directly on renewals and capacity enhancement projects and programmes – principally civil engineering works.

The ability to deliver infrastructure investment priorities efficiently and effectively is crucial to achieving the UK's growth objectives. The weight of evidence confirms that the UK is more expensive than its European peer group and demonstrates that there are significant opportunities to reduce costs in the delivery of infrastructure.

There is no single overriding factor driving higher costs. However, the investigation has identified that higher costs are mainly generated in the early project formulation and pre-construction phases and provided evidence of a number of contributing factors including:

- stop-start investment programmes and the lack of a visible and continuous pipeline of forward work;
- lack of clarity and direction, particularly in the public sector, over key decisions at inception and during design. Projects are started before the design is sufficiently complete. The roles of client, funder and delivery agent become blurred in many public sector governance structures;
- the management of large infrastructure projects and programmes within a quoted budget, rather than aiming at lowest cost for the required performance. If the budget includes contingencies, the higher total becomes the available budget;
- over-specification and the tendency, more prevalent in some sectors than others, to apply unnecessary standards, and use bespoke solutions when off-the-shelf designs would suffice;
- interpretation and use of competition processes not always being effective in producing lowest outturn costs, with public sector clients in particular being more risk averse to the cost and time implications of potential legal challenges;
- companies in the supply chain typically investing tactically for the next project, rather than strategically for the market as a whole; and
- lack of targeted investment by industry in key skills and capability limiting the drive to improve productivity performance.

Over many years in the UK there has been fragmentation of the construction industry and a significant shift towards the use of subcontracting. Compounded by the problems of infrastructure pipeline uncertainty and overly complex procurement approaches, this has increased transaction costs and deterred industry from a more strategic approach to investment in skills, technology and innovation.

The immediate challenge is to find ways for government and other infrastructure providers to work effectively with the construction supply chain to develop new business models that will improve productivity, achieve better supply chain integration and promote innovation.

Addressing these issues effectively will help reduce the costs of infrastructure and deliver significant benefits in performance and value for money. There is a clear opportunity to realise savings of at least 15 percent, which can deliver sustainable benefits of £2 to 3 billion per annum. This is £20 to £30 billion over the next decade.

While several industry and government reviews have recognised the need for change, few of the targets and recommendations set out in these reports have been fully met or implemented. The Government will develop the actions and proposed programme set out in this Report into a detailed implementation plan by March 2011.

Building on this initial report, the implementation plan will be designed around five key interlinked objectives to:

- create **better visibility and continuity of the infrastructure investment pipeline**, through publication of the future investment programme in the National Infrastructure Plan;
- implement **effective governance of projects and programmes**, particularly in the public sector, by ensuring clear accountability for key project decisions;
- instil **greater discipline in the commissioning of projects and programmes** by ensuring greater objective challenge of the specification of requirements and cost estimates;
- develop **smarter ways to use competition** by improving risk-based assessment of procurement options; and
- create an environment that **encourages industry and the advisory community to invest in efficiency and reduce the direct costs of construction** by developing cost effective delivery solutions.

The Government has identified a range of actions to meet these objectives and will consider how these will be taken forward in the implementation plan. Key actions that have been identified include:

- examining ways to extend planning and funding cycles for non-contentious maintenance and renewals;
- finalising and implementing a new assurance process for all major projects and programmes; and
- reviewing the ways in which contingency is assessed, allowed for and managed.

Infrastructure UK would be please to receive views on issues raised and proposals made in this document via e-mail: InfrastructureCost@hm-treasury.gov.uk

1 The cost of delivering infrastructure

Economic and industry benchmarks

1.1 The UK is an expensive place in which to build infrastructure. The weight of evidence confirms that costs are higher than in other European countries and demonstrates that, irrespective of its comparative position, there are significant opportunities to reduce costs in the delivery of infrastructure.

1.2 Economic indicators and independent industry benchmarks have consistently ranked the UK amongst the most expensive in Western Europe.[1]

1.3 Top-down analysis of benchmarks across sectors where comparative data were available, including high speed rail, roads, onshore wind and tunnelling all indicated higher relative outturn costs in the UK, ranging from a factor of 10 per cent to over 100 per cent difference. These are high level benchmarks and the analysis of specific project comparisons, whilst generally reinforcing the indication of higher costs in the UK, provides a more complex picture. Previous project based benchmarking studies, for example the High Speed 2 cost report and similar studies in roads and metro systems provide further evidence of higher costs in the UK. [2]

Project specific and input cost benchmarks

1.4 Project specific analysis was undertaken in respect of high speed rail, rail stations, roads and tunnelling.

1.5 Examination of seven high speed lines across Europe indicated that the construction costs for the UK examples were significantly higher. When compared to the four most directly comparable projects, the Channel Tunnel Rail Link (CTRL) 1 construction cost was at least 23 per cent higher.

1.6 Comparisons of major station development costs indicate that the UK is 50 per cent more expensive, for example, than Spain. However, UK stations serve a significantly higher peak passenger demand (up to 2.7 times in certain cases).

1.7 Benchmarking of eight roads projects between the UK and the Netherlands indicated that the UK examples were on average 10 per cent higher, based on the unit costs per lane kilometre. A previous study undertaken on behalf of the Highways Agency in 2009 had indicated that the UK was up to 32 per cent higher than the Netherlands per lane kilometre, although this was based on tendered prices rather than actual costs.[3] The UK and the Netherlands are both in the upper quartile of costs for roads in Europe based on other studies. Notwithstanding these benchmarks, the Highways Agency has identified project efficiencies of 20 per cent, where it is able to adopt a programme approach to delivery across schemes.

[1] *International Construction Cost* Survey, Gardiner & Theobald, February 2010; EC Harris, 2007; and *International Construction Cost* Index, Faithful and Gould, 2007

[2] *HS2 Cost and Risk* Model, High Speed Two (HS2) Limited, March 2010; *European Cost Comparison - Cost differences between English and Dutch Highway Construction*, EC Harris and TRL, December 2009; and *Comparison of Capital Costs per Route-Kilometre in Urban Rail*, Bent Flyvbjerg, March 2008

[3] *European Cost Comparison - Cost differences between English and Dutch Highway Construction*, EC Harris and TRL, December 2009. Note that this study makes a series of technical and cultural adjustments to the UK costs which reduces the difference to something more in line with the IUK analysis and if all the adjustments are taken into account the differences in cost are marginal.

1.8 Analysis of tunnelling contract outturn costs indicated that the civil engineering costs for tunnelling are comparable to European costs. However, the total costs for infrastructure projects that involve significant amounts of tunnelling are more expensive than comparators in European countries – suggesting that the higher costs are more likely to be a result of pre-construction and other indirect costs.

1.9 Comparison of labour, plant and material input costs with Northern European countries indicate the UK is generally comparable and that input costs are not a significant driver of higher infrastructure costs.

Whole life and maintenance costs

1.10 As set out in the National Infrastructure Plan 2010, the Government remains committed to ensuring that whole life principles are adopted in making effective and smarter use of existing assets. The analysis undertaken for the Infrastructure UK investigation is focused mainly on infrastructure capital costs and not whole life costs, in part due to the lack of central data available.

1.11 In some sectors higher construction capital costs are, in part, a result of whole life considerations. However, while not analysed in detail, there is some evidence that suggests that infrastructure maintenance costs are higher in the UK. For example, annual analysis of international metro renewal and maintenance benchmarks, undertaken by the Office of the PPP Arbiter, indicate higher costs in relation to track maintenance. The weighted average cost of the non-UK peer metro systems in the 2010 benchmarking exercise was 46 per cent lower than the average for UK metro lines (excluding Tube Lines).

Potential savings

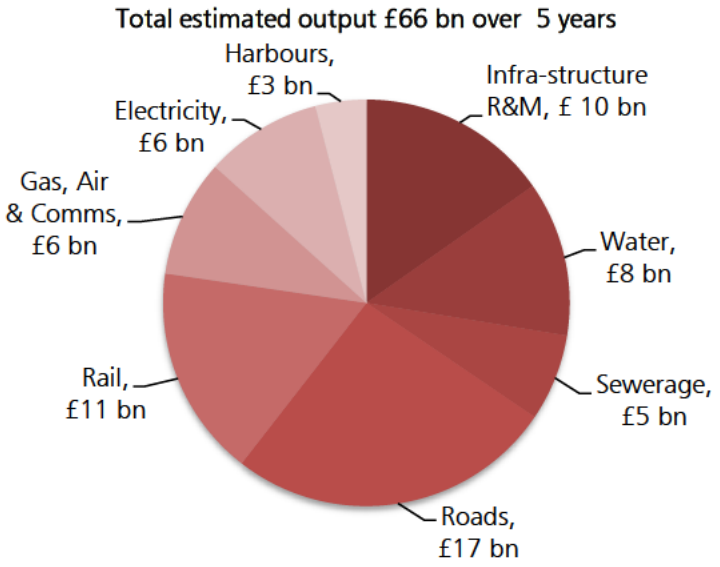
1.12 The National Infrastructure Plan 2010 describes planned investment of £200 billion over the next five years – with investment in the energy sector almost doubling between 2010 and 2015.

1.13 As a component of this, forecasts based on Office for National Statistics (ONS) construction output data (see Chart 1.A) suggest that infrastructure renewals and capacity enhancement over the next five years will be in the order of £66 billion in total, i.e. £13 billion per annum. Other forecasts of infrastructure construction output over the same period (2011-15) indicate a slightly higher figure of £75 billion (£15 billion per annum).[4]

1.14 These estimates are probably conservative when taking into account the possibility of an undervaluation of civil engineering construction output in some regulated sectors (specifically water and energy) within the ONS construction output data. Infrastructure UK's estimates of total investment in water and energy, taken from industry and regulator data, are respectively a factor of three and ten times the ONS construction output figures. For the purposes of this investigation, a conservative estimate for infrastructure renewals and capacity enhancement output of £15 billion per annum has been assumed.

[4] Experian construction demand/capacity model (July 2010 update for ERG)

Chart 1.A: Infrastructure construction output forecasts 2011-15



Source: Based on ONS construction output data and Experian price indices

1.15 The conclusion of the review is that infrastructure costs can be reduced by at least 15 per cent. Based on the estimated infrastructure construction output of £15 billion, this would deliver annual savings or additional investment capacity of £2 billion to £3 billion per annum, or in excess of £20 billion over ten years.

1.16 In the short-term, it is likely that the greatest efficiencies will be delivered by targeting renewals and repetitive programme based infrastructure investment, in particular by removing some of the obstacles that have prevented some infrastructure sectors (notably road, rail and flood management) from replicating the scale of efficiencies delivered in parts of the regulated asset base. Construction output data suggests that infrastructure repair and maintenance costs are roughly a fifth of the total civil engineering construction output. Sector specific evidence in transport suggests a slightly higher ratio of renewals, ranging from 40 to 50 per cent of total public spending on rail and roads infrastructure.

1.17 Evidence from the Scottish Government's long-term road maintenance contracts, lasting up to 10 years, indicates that significant savings can be achieved through giving contractors a pipeline of work that incentivises investment in year-on-year improvement, for example, reducing labour cost through improving productivity by 20 per cent. The *Rijkswaterstaat* in the Netherlands generated similar savings of 20 per cent in roads, by extending contract terms from 1-2 years to 5-7 years and by bundling more maintenance activities together in the same contract.

1.18 There are potential upward pressures on civil engineering infrastructure costs in the short to medium term. These include: forecast year on year construction indexation, which some benchmarks indicate may be as being as high as four to five percent each year on average across the next five years, as the economy moves back into a period of growth; potential costs of carbon reduction measures; and transition costs in adopting new design Eurocodes. It is essential, therefore, that measures are taken that will have an immediate impact in tackling the waste and inefficiency, in order to meet the investment aspirations set out in the National Infrastructure Plan 2010 and mitigate against these upward pressures.

2 Understanding the drivers of higher costs

2.1 As part of this investigation, a survey by Infrastructure UK and the Institution of Civil Engineers targeted over 300 public and private sector organisation from a cross-section of industry clients, consultants, academics and contracting firms; conducted over 120 structured interviews; and collected a wide range of data to understand the reasons for underlying higher costs in the UK.

2.2 The cross-industry survey ranked *client leadership*, *poor design/specification* and *overly complicated procurement practice* as the top three most significant areas for reducing costs. The detailed interviews and project benchmarking also supported the view that higher costs for infrastructure are mainly generated in the early project formulation and pre-construction phases.

2.3 The reasons for higher costs are summarised below under three general headings:

1 policy and systemic issues;

2 funder/client issues; and

3 supply chain delivery issues

2.4 Further detail and evidence of the impact of these issues on the cost of infrastructure is provided in a separate technical report published on the HM Treasury website. The technical report includes a detailed analysis of the cost and non-cost benchmarking data and findings from the 120 interviews completed.

Policy and systemic issues

Urban density and nature of infrastructure assets

2.5 In some instances, higher relative capital costs can be attributed to greater intensity of use in the UK. This is caused by factors such as greater density of population, compounded by higher land costs and the ageing asset base.[1] However, these unavoidable factors do not fully account for the high cost in the UK.

Planning and consultation processes

2.6 Planning lead-times and inconsistencies between different areas of the country have become particularly onerous. Uncertainty and time-lags due to the planning system contribute significantly to delays and have been cited in the evidence gathered as key reasons why major scheme outturn costs are in excess of those seen in other European countries. Early constraints imposed through planning and consultation processes can also lead to lost opportunities to benefit from contractor innovation, for example through design innovation or the use of pre-fabricated components.

2.7 As set out in the National Infrastructure Plan 2010 the Government continues to work towards ensuring the presumption in favour of sustainable development and the incentivisation of local communities to accommodate new infrastructure. The Government is also committed to

[1] Over 70 per cent of infrastructure capacity enhancement in the UK is on 'brownfield' land as opposed to just over 50 per cent in the rest of Europe. 70 per cent of Network Rail bridges are over 100 years old compared to 26 per cent average across Europe.

the development of National Policy Statements for the major infrastructure sectors and to abolishing the Infrastructure Planning Commission and the creation of a new Major Infrastructure Planning Unit.

Regulatory compliance and third party influences on cost

2.8 There is strong consensus amongst clients and industry within the evidence gathered that the UK is incurring significantly greater costs than the rest of Europe as a result of our approach to addressing environmental and ecological concerns, in particular.

2.9 Complex, overlapping and unclear compliance and consents regimes adversely impact on the delivery of public and private sector investments. While these systems are individually designed to protect the environment, heritage, the rights of citizens and ensure high quality, safe infrastructure, the cumulative cost impact is considerable.

2.10 Network Rail estimate that they spend well in excess of £10 million per annum on the preservation of protected species including newts, badgers and bats. In a further example, work on part of a £53 million rail bridge project is to be delayed until the autumn after the discovery of a colony of 11 great-crested newts.

2.11 In other regulated sectors, the statutory obligations on utility providers to replace old iron gas mains have been estimated to cost in the order of £100 to £200 million per life saved.

2.12 Contractors have suggested that for road construction, compliance with environmental regulations and related third party constraints can add as much as 10 to 15 per cent to the cost of the infrastructure. On one specific project example quoted, in the North West of England, a £2.1million variation made to address archaeology issues ended up costing an additional £5 million. The UK also implements regulatory requirements such as aggregate tax and pollution licences that are not currently evident in some other western European countries.

2.13 While the UK should be proud that it has the best construction safety record in Europe, there is a consistent view being put forward by industry that the paperwork involved with the "*demonstration of compliance*" is not cost-effective.

Wider construction market issues

2.14 The UK construction market has become the smallest of the big five European countries. Sustained uncertainty and the cyclical nature of infrastructure investment in the UK has contributed, over several decades, to a significant shift from fixed to variable resources, relative to many European contractors, i.e. there is a greater use of subcontracting and less direct investment in construction, the former driven in part by a move to greater specialisation within the supply chain. Eurostat measures of relative capital intensity also show that the UK construction industry is investing less in its operations than France or Germany. However, this may be a function of the higher levels of sub-contracting in the UK.

2.15 The UK construction industry for infrastructure has tended towards a relatively large number of medium sized construction companies acting as main contractors. This is in marked contrast with Europe where, based on European data, only two UK companies appear in the top 20 (none in the top 10). The largest UK contractor has one third of the turnover of the largest European contractor.

2.16 The difference in the structure of the supply chain and the relative size of the major contracting companies contributes to the fact that UK contractors are less active in Europe than their counterparts in France, Spain and Germany. This is in direct contrast to the UK market, which has a range of European suppliers actively engaged. However, there is also anecdotal evidence that there are still significant barriers to entry to UK contractors in some of these countries.

2.17 Lower capitalisation and the higher levels of subcontracting increase the internal transaction costs in the UK, in particular through the premium cost of risk transfer down the supply chain to second and third tier supply chain providers. In some cases, the evidence suggests that second and third tier suppliers are not always effectively integrated at an early enough stage but are often providing the bulk of the construction capability. There are positive benefits of subcontracting, to industry and clients, for example through specialisation and labour allocation in the supply chain, however, the negative impacts need be addressed through more effective business models that encourage better industry collaboration.

Low carbon agenda

2.18 The report on *Low Carbon Construction* published in Autumn 2010 by The Innovation and Growth Team (within The Department of Business Innovation and Skills) sets out an action plan for improving the sustainability of construction. The report recognises that infrastructure is seen as critical to supporting a more energy efficient society, but that carbon reduction does not seem a priority in the design and construction of those facilities.

2.19 The key themes and recommendations of this report are consistent with the *Low Carbon Construction* objectives. In particular, innovation including standard assets, off-site fabrication and improved logistics would support the objectives of achieving carbon reduction through the design and construction process as well as leading to reduced costs.[2]

Funder and client issues

Stop-start investment

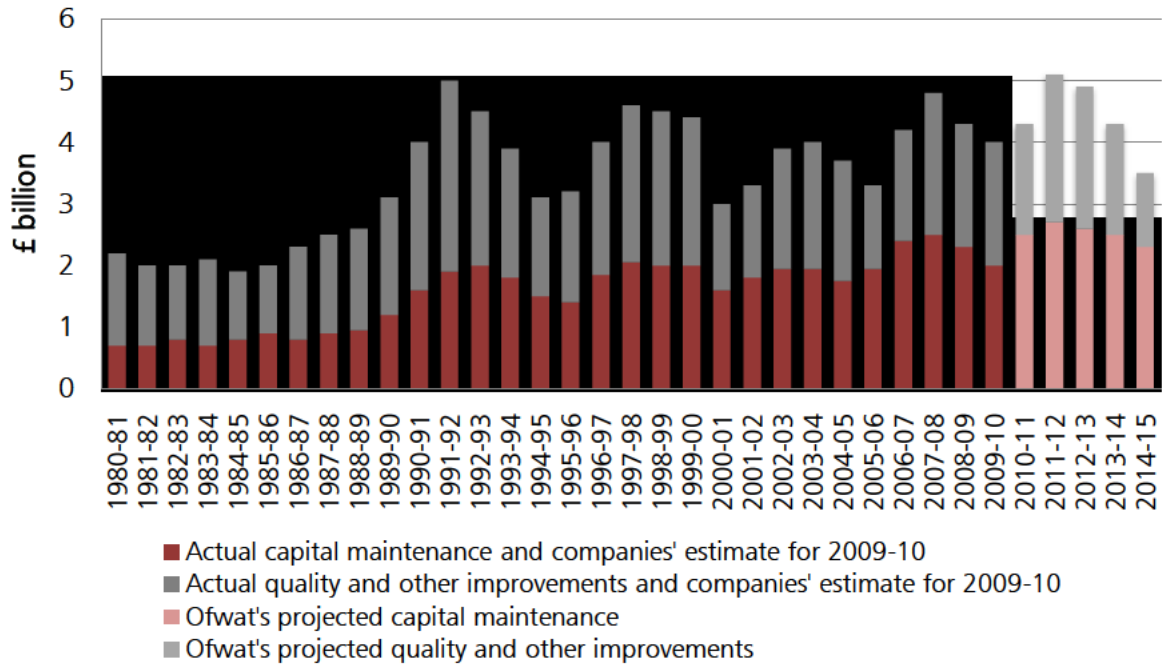
2.20 Infrastructure UK's analysis provides clear evidence that the lack of a visible and continuous pipeline of forward work flow, together with stop-start investment programmes by commissioning clients, leads to higher costs. This is one of the biggest issues to address. It is a driver behind many of the other reasons for higher costs in the UK.

2.21 The lack of a visible and continuous pipeline results in poor incentivisation within industry to invest in people (training, permanent employment and career development), develop innovative processes or purchase plant and equipment. Greater long-term certainty provides more opportunity to clients and the supply chain for innovation across projects, efficient transfer of project knowledge and the ability to plan work more efficiently, for example by sharing plant and equipment assets within the supply chain and across projects or purchasing material and components in advance.

2.22 Particularly in the utilities sector, significant savings have been delivered as a result of the greater continuity in the pipeline for infrastructure renewal and investment. This has been achieved through five yearly cycles of investment planning. However, even in the regulated sectors, the five yearly reviews are creating a line of uncertainty in investment around the review point which means that potential efficiency savings continue to be lost. Chart 2.A shows this effect in the water industry, where this generates inefficiencies across the five year period, estimated by one water company to be in the order of 10 to 15 per cent, as the supply chain gears up and down accordingly.

[2] Innovation and Growth Teams (IGT) are Government initiated and Industry-led projects that seek to look at significant market opportunities to ensure that the UK is positioned to benefit as a result of changing conditions in a given area. Recent IGTs have included: automotive and industrial biotechnology.

Chart 2.A: Stop-start investment in the water industry



Source: Ofwat

2.23 Within the Birmingham Highways Maintenance PFI, the ability to plan long-term provided certainty of requirement for 1million tonnes of asphalt which allowed them to procure this more effectively, reducing supplier and subcontractor costs by at least 10 per cent. In rail, the longer-term planning and partnering strategy adopted for the Great Western track renewals programme helped achieve 22 per cent reduction on unit costs, while increasing quality and reducing health and safety incidents; and helped the contractor by achieving a five-fold increase in business volumes, with sustained profit margins facilitating significant new investment in skill and new plant. There is also evidence that waste occurs when projects or programmes are restructured or cancelled.

2.24 International comparisons indicate that many Western European countries set out and successfully adhere to long-term infrastructure investment plans. For example, Germany, Austria, Denmark and Italy produce 10-15 year federal transport plans to develop coherent long-term investment programmes and in Singapore the implementation of a 10-15 year Land Transport Masterplan, managed by the Land Transport Authority, is facilitating similar delivery efficiencies and reduced construction costs through a rolling-programme.[3]

Poor governance and ineffective incentivisation of cost control

2.25 Evidence indicates that a major driver of higher outturn costs is a lack of clarity and direction, particularly in the public sector, over key decisions at inception and subsequent design change points. The roles of client, funder and delivery agent – which are often clearly and separately defined in private sector projects and programmes – tend to become blurred in many public sector governance structures.

2.26 Outturn costs rise because the processes of budget preparation, approval and management do not provide effective incentives to minimise the outturn costs. In particular, insufficient consideration is given to the assessment, placement and management of contingency and risk budgets.

[3] The Land Transport Authority (LTA) is a statutory board under the Ministry of Transport that spearheads land transport developments in Singapore.

2.27 Many large infrastructure projects and programmes tend to be managed within a quoted budget, rather than aiming at lowest cost for the required performance. Often, projects are managed within an affordability envelope which is based on the cost budget plus contingencies (including optimism bias). The total affordability envelope is then viewed as available project budget. As a result, there is no culture of managing costs down and all the available money within the affordability envelope is spent, including the contingencies.

2.28 Successfully managed projects, such as the Olympics, tend to share common characteristics including:

- the funder's clear commitment to expenditure;
- a clear and fixed timescale;
- accountable, knowledgeable and incentivised leadership;
- single-point responsibility for delivery to budget and a strong culture and incentives to reduce costs; and
- effective placement and control of contingency and risk budgets.

2.29 Within the Olympics programme, there is a very clear delineation of accountability for cost control and the management of contingency budgets. All contingency is clearly identified as either 'project' or 'program' and either 'in-scope' (available to the project) or out of scope (funder's contingency is not viewed, as is often the case, as available budget). A strong governance structure is built around the process for allocating contingency which, combined with effective incentivisation at all levels, has instilled a culture of cost awareness and accountability. The achievement of cost and risk reductions at the delivery level frees contingency for reassignment within the programme, subject to justification and approval by the Government Olympic Executive (GOE). Success has in part been driven by the clarity of decision making and by the commitment to ensuring that the GOE was set up as an effective and properly empowered client organisation.

Poor asset information and cost data

2.30 The National Infrastructure Plan 2010 set out Government's intention to improve the quality of, and access to, infrastructure data to support more informed decision making.

2.31 Poor asset records and condition data can lead to inefficiencies in the transfer of risk for its upkeep and replacement. This is manifest in the high costs of external due diligence required to update and compile asset data prior to putting work out to external competition, and in the risk premium placed by the supply chain on work where asset data is incomplete or unwarranted. This also applies to the provision of utilities asset data, the absence or inaccuracy of which is a frequent cause of variations and cost overruns.

2.32 The variable quality and lack of central visibility of infrastructure outturn cost and project performance data has been a material obstacle to this and many other attempts to undertake benchmarking of infrastructure costs. In some regulated and public sector bodies much is being done to improve the availability and effective use of benchmarking but there is little evidence of coordination of this activity, or the outputs, across sectors.

2.33 The lack of transparency is not unique to the UK and Infrastructure UK will consider, as part of its own programme of work, improving the accessibility and use of international infrastructure benchmark data, both for direct use by projects and in support of central scrutiny and challenge processes.

2.34 Within some parts of the water industry and public sector there are attempts to understand how costs are incurred through the stages of constructing and operating infrastructure assets. Building on experience in the water industry, other public and regulated

bodies are also attempting to use this data more effectively in setting target costs or affordability thresholds. Highways Agency commercial intelligence and data systems have already allowed them to save 14 per cent in negotiating the target cost on one major project, and £70 million over three schemes. The tunnelling benchmark data compiled from the Infrastructure UK work has already been used to reduce cost estimates for High Speed 2 by £400 to £800 million.

2.35 Improving the quality, understanding and transparency of infrastructure cost modelling and benchmark data is an essential prerequisite to effective use of alternative contracting approaches, in particular the use of target cost contracting and partnering models.

Specification, design and standard assets

2.36 There is a strong belief among UK and non-UK organisations consulted that the UK has a tendency, more prevalent in some sectors than others, to over-specify, apply unnecessary standards, and use bespoke solutions when off-the-shelf designs would suffice.

2.37 Where those commissioning the projects and programmes have been able to define the requirement clearly in output terms – leaving the industry to design the most effective way to meet the outputs required – this leads to more cost-effective solutions. However, end-use specifications frequently leave the client with less control over the final product, which can be an issue for aesthetics, durability, maintenance and consequently, approvals.

2.38 Principal reasons given for over-specification are: those responsible for setting and safeguarding standards are not incentivised to concern themselves with cost; written standards tend not to keep up with the times, innovation, new products etc; and designers tend to be more focused on quality than cost. There are, in addition, systemic reasons, for example more stakeholders and approval bodies to satisfy.

2.39 There is a high level of consensus from the interviews that clients in the UK tend to have less in-house technical capability than in other countries and are consequently less able to lead, discuss, challenge or interrogate designs either in technical or aesthetic terms.

2.40 Through effective incentivisation and the creation of a less risk averse culture, Anglian Water, over a period of six years, has successively reduced the cost of one particular water treatment asset from £73,000 to £27,900. Furthermore, by having the units manufactured as standard products, off-site performance has also been enhanced. Conversely, the UK rail lifts standard specification results in additional costs of £59,000 per unit over the cost of a non-rail equivalent asset.

Commercial issues and procurement processes

2.41 The UK's interpretation and use of competition processes, particularly in the public sector, is not always effective in producing lowest outturn costs. The evidence gathered revealed a widely held view that public sector clients are more risk averse to the cost and time implications of potential challenges, and processes are overly complex and too much of a "box-ticking" exercise.

2.42 Outturn costs are higher as a result of the burden of money and time that industry and the authority bears in preparing for and participating in competitions, the competition process itself stifling innovation and because the evaluation criteria for selection are insufficiently defined to select the bidder that will deliver the lowest-cost outcome (not necessarily the lowest price bid).

2.43 There are often timetable pressures that result in some projects starting competition or in some cases awarding construction contracts before the output requirements and design are sufficiently complete. This raises the risk of claims and additional costs arising as a result of variations and rework during construction.

2.44 Early contractor involvement can shorten the time for construction and introduces innovation. Comparisons of Early Contractor Involvement (ECI) on Highways Agency projects demonstrate a lower price and up to 50 per cent shorter time for construction. However, competition law and interpretation of procurement rules can inhibit effective use of early contractor involvement.

2.45 Most continental European countries follow the Civil Law system which codifies the legal framework for contracts in written laws and manuals. This reduces both the length of the contracts and, in many cases, the need for extensive use of legal advisors. As a result, there is less use of bespoke contracts. In Sweden, for example, there are only two standard forms of contracts which are used by 95 per cent of clients for construction.

2.46 In the UK, the NEC3 suite of contracts is being used to deliver many infrastructure projects, although by no means universally.[4] Government, through the Construction Clients' Board, specifies that public sector organisations use the NEC3 contracts when procuring construction. Most contractors reported that significant variations in the approach to risk transfer and amendment of the NEC3 standard forms added to costs for both clients and the supply chain.

2.47 Where smarter competitions have been used – both in the public sector and private utilities sector – there is evidence that increased confidence of potential bidders has led them to respond innovatively and devise solutions that deliver the required outcomes cost effectively. Dwr Cymru (Welsh Water) put together a strategic alliance leadership team that encompassed client, contractors, their respective supply chains and stakeholders including regulators. The alliance delivered the Asset Management Programme ahead of time and for 26 per cent less cost. Collaborative procurement also saved them £0.5 million per annum. Other alliances in the private and regulated sector have achieved similar levels of efficiencies,

2.48 Many clients, consultants and contractors interviewed highlighted the importance of having the right client capability to manage complex contracting models effectively. Achieving a successful outcome using more complex models, such as the NEC target cost and partnering approaches, requires strong leadership, commercial capability and cost awareness (and data) within the client commissioning team.

2.49 The construction industry still exhibits a more contractual approach than other countries (although there are some fundamental differences in the legal structures of different countries that, in part, explain this behaviour), and there is concern that the current economic climate may exacerbate this approach and a return back to a culture of low bid and increased claims.

Insurance

2.50 Most major infrastructure projects are insured via an Owner Controlled Insurance Programme (OCIP), although the contractors typically also carry their own insurances for Public Liability, Employers Liability and Professional Indemnity. OCIP insurances frequently do not cover the designers' Professional Indemnity. The study interviews suggest that the cost of project insurance is typically higher than in other western European countries, principally in response to higher risks of third party claims (both in terms of numbers and magnitude) and a view that UK projects in general put less emphasis on risk management. In France, for example, Employer's Liability insurance is not required as injured workers would be dealt with via their Workers' Compensation scheme, the costs of which would not be included in an analysis of the cost of a project.

[4] NEC is an integrated set of contract documents overseen by a panel of the Institution of Civil Engineers. NEC3 has also been used as the basis for development of the NHS Procure21+ national frameworks.

2.51 There is some evidence that Professional Indemnity (PI) insurance may result in risk-aversion on the part of designers. If this is the case, it is likely to be driven, at least in part, by the relative large amounts of PI cover demanded in the UK compared with other European countries which tends to make designers a large target for potential claims in projects where problems occur.

Supply chain delivery issues

Poor supply chain integration

2.52 The need for integration of the whole supply chain was a common theme among those interviewed. Previous reports on the construction industry have highlighted the importance of new industry partnering models to drive change and release expertise and efficiency from the supply chain.[5] Much of the specific expertise in delivery efficiency, associated with product development and component implementation, lies in the second and third tiers of the supply chain. However, incentivisation for cost savings under target cost contracts is not always passed down the supply chain, representing lost opportunities for innovation.

2.53 Evidence and examples from the investigation indicate that when objectives can be aligned between clients and through all levels of the supply chain, innovation can be harnessed, reducing out-turn costs to clients and safeguarding profits for industry, for example, the British Airports Authority's partnering model for Heathrow Terminal 5.

2.54 Combined supply chain capability can only be leveraged if there is a business model that forces this expertise into the project at an early stage. Developing a common procurement approach that forces supply chain integration (in appropriate circumstances), would enable focused development of capability and skills across the public sector and provide a consistent approach for industry to engage with.

Investment in innovation

2.55 Compared to Europe, the UK tier 1 supply chain has typically invested tactically for the next project, rather than responding to the market as a whole. The use of greater modularisation and off site manufacture, which can be evidenced to reduce unit costs, requires investment. The current levels of fragmentation of the industry, compounded by infrastructure pipeline uncertainty and overly complex procurement approaches, militate against a more strategic investment or integrated approach to innovation.

Skills and training

2.56 A key development area for the supply chain is the investment in skills, particularly at site supervision level. There is evidence of individual programmes developing and implementing in house programmes to plug the gap, such as the tunnelling academy established for Crossrail, or the National Skills Academy for Railway Engineering but these are not usually designed to be transferable between sectors, and are not initiated by the supply chain.

2.57 Attraction, retention and training of key talent in engineering and management is hampered by the stop-start nature of the pipeline, as is the ability to keep high-performing teams together. Sectors with stable pipelines progressively up-skill over time.

2.58 There was some evidence to suggest that European engineers are trained to take a multidisciplinary engineering leadership approach, leading to smaller, cheaper project teams that need not rely on over-conservative design codes.

[5] *Rethinking Construction*, Department of Trade and Industry, July 1998 and *Never Waste a Good Crisis*, Constructing Excellence, November 2009

Low productivity

2.59 The data available on relative construction industry productivity is inconclusive. There was a small but relatively strongly held view from some UK and non UK organisations that construction labour productivity in some sectors was comparatively poor, but no specific project based evidence has been provided to support this. The UK may suffer from lower productivity of professional staff and labour as a result of the relative geographic inflexibility of people, poorer career progression and poorer perception of engineering as a career.

2.60 In certain sectors, there is an emphasis on maintaining service delivery during construction that has a negative impact on the productivity of civil engineering works. For example, rail maintenance and renewal is usually undertaken overnight and through weekend closures rather than more intensive but longer closures that cause a greater interruption to services.

2.61 Numbers of professional staff in project teams have risen in recent years, exacerbated by delivery teams man-marking across the client and supply chain boundaries, leading to a higher internal transaction cost.

Logistics

2.62 Improving the management of logistics on complex programmes is seen by a number of industry respondents as a driver for improved productivity, and this provides a mechanism for driving greater supply chain integration. Experience from complex projects, such as Heathrow Terminal 5, points to a common logistics process as a fundamental aspect of reducing project risk. The London 2012 Olympics programme has successfully implemented logistics centres, with dedicated expertise to manage materials to and from a constrained site with multiple contracts. For programmes that require a significant use of plant and equipment, cost can be saved by finding creative ways of sharing it, such as through a central pool.

3 Actions to reduce cost

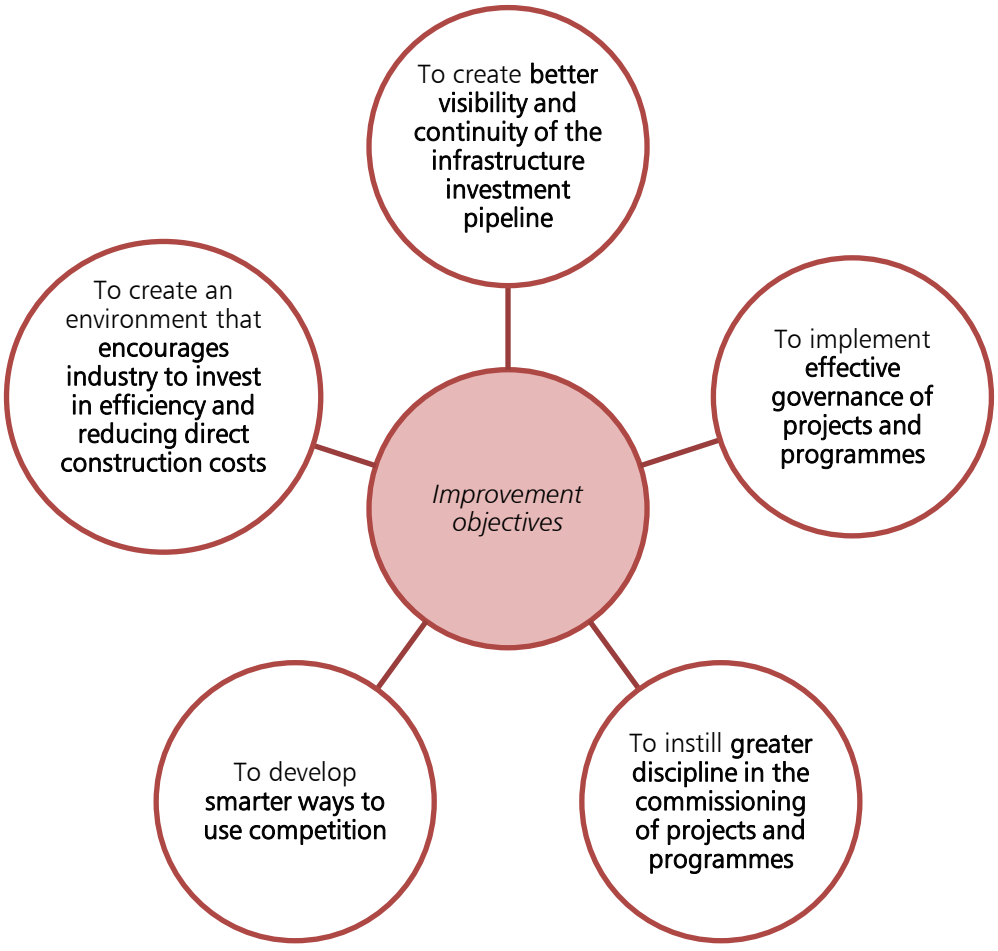
3.1 There is no single reason for the higher costs of infrastructure. Achieving the potential benefits of £2-3 billion per annum requires a sustained and multi-faceted approach, with a programme of activity supported by improved data and a central capability within Government that can oversee its delivery.

3.2 Evidence from the consultations with industry and their clients suggests a high degree of consensus that efficiency improvements can be achieved and that the infrastructure construction industry will respond positively to client side improvements in planning, commissioning and procurement of projects and programmes.

3.3 Clients will respond in turn to improvements in industry by becoming more efficient and transparent. In the public sector, Departments have already been set tough efficiency targets in capital spend, which the actions in this report will help them to deliver.

3.4 The proposed actions from the investigation are aimed at meeting five interrelated objectives as described in Figure 3.A.

Figure 3.A: Improvement objectives



3.5 Set out below are the main areas where actions are needed to deliver these objectives and realise the cost savings identified. Many of the issues are already well recognised and understood but will require concerted action between the Government, regulated companies, regulators and industry to deliver. There is also a need to take account of the findings from the recently published Innovation and Growth Team report on low carbon construction and Sir Roy McNulty's rail VFM interim findings study and to consider ways in which meeting these objectives will contribute to the Government's plans for economic growth.

3.6 Infrastructure UK will work with these stakeholders and with the Efficiency and Reform Group in the Cabinet Office to finalise a prioritised programme for implementation of the actions considered in this report, to be announced in March 2011.

To create better visibility and continuity of the infrastructure investment pipeline

3.7 To allow industry greater confidence to plan investment, innovate and develop stronger supply chains, the Government is considering the following areas for action:

- working with the regulated infrastructure sectors, as part of the Infrastructure UK wider regulatory review and ongoing reviews within the energy, water and rail sectors, to examine opportunities to create greater long-term investment certainty by extending the planning and funding cycles or varying the frequency of settlement periods for non-contentious renewals and maintenance investments;
- encourage consideration of mechanisms within Government departments to extend planning and funding cycles for non-contentious renewals and maintenance of publicly funded infrastructure and address disincentives to their use, in conjunction with clear cost reduction targets. In highways this will be undertaken in conjunction with the review of the operation and structure of the Highways Agency;
- introducing a new mechanism to incentivise better work planning and use of end year flexibility;
- produce supplementary Green Book guidance on creating the business case for bulk buying of engineering asset components; and
- in the National Infrastructure Plan 2011 (and subsequently), provide improved transparency to the markets of the forward pipeline of infrastructure investment, including key milestones for approval and funding decisions.

3.8 The delivery of these actions requires considered changes to a range of regulatory planning cycles and controls.

To implement effective governance of projects and programmes, particularly in the public sector

3.9 Where major public projects have created a clear governance structure, with role separation between client, funder and delivery agent functions comparable to that seen in the private sector, this has helped to develop positive tension between decisions on design specification and cost, which can reduce outturn cost.

3.10 The Government intends to extend this approach into wider public sector projects and programmes to encourage greater cost discipline in decision making across sectors. To help achieve this the Government is considering the following areas for action:

- finalising and implementing a new integrated assurance process, currently being developed by the Efficiency Reform Group in the Cabinet Office, and ensuring in particular that all major projects and programmes are established with clear lines of accountability and

decisions vest through individuals or bodies capable of discharging their function as a 'single controlling mind' with appropriate delegated authority and suitably incentivised to optimise cost and programme outcomes;

- developing a standard form delivery framework agreement for use between public sector stakeholders on major infrastructure projects and programmes;
- reviewing the ways in which contingency is assessed, allowed for and managed in the process of budgeting for and delivering infrastructure projects and programmes. Any review will include investigation of the benefits of separate management of elements of contingency allowances independent of the delivery body, consider the potential to manage individual project risks centrally and publish revised guidance on the principles for the structuring and management of contingency allowances to incentivise efficient management between stakeholders; and
- working through the Cabinet Office Civil Service Accountability and Transparency Programme, help develop clearer accountability and responsibilities for civil servants in making effective decisions and embed a cost conscious approach.

3.11 This objective also requires a review of some existing common project processes and governance arrangements, including considering the benefits of revising the ways in which optimism bias is currently applied in the budgeting process. These new approaches will be trialled on selected pilot projects.

To instil greater discipline in the commissioning of projects and programmes

3.12 To ensure that infrastructure projects and programmes meet the required output at the minimum sustainable cost, the Government will consider the following areas for action:

- introducing measures to ensure that assurance regimes for projects and programmes provide for objective challenge, at an early stage, of the key decisions that will impact on outturn costs;
- improving the managed coordination of infrastructure cost data and the extended use of benchmarking and enhanced cost-modelling capability across infrastructure sectors that will support more effective use of target costs and alliancing contracting models and support objective challenge;
- reviewing the completeness and accuracy of information on the condition of UK infrastructure assets – including those held by the public sector and regulated markets – and developing processes to improve the quality and transparency of this data to ensure that future maintenance and renewal risks are effectively priced and managed;
- reviewing the way in which codes and standards are managed and applied to infrastructure projects. The review will include consideration of the reconciliation or removal of standards that duplicate Eurocodes, establish a transparent basis for cost: benefit assessment of standards and consider ways in which regulatory bodies and public authorities can be made more accountable for the cost consequences of their requirements; and
- developing a means to ensure the capture of post project cost information and improve access to international data.

3.13 This will require change to the processes used to evaluate and determine the scope and specification of projects and programmes, to encourage outcome based specifications, removal of unnecessary prescription and to ensure that value for money is always considered.

To develop smarter ways to use competition

3.14 As part of its objectives to improve procurement and fairness the Government has already issued guidance on the use of competitive dialogue, mandated use of fair payment regimes for sub contractors and developed the use of standard pre-qualification processes.

3.15 To help achieve the maximum benefit from competition in the delivery of infrastructure, realise cost savings through the whole supply chain and minimise wastage in the procurement process, the Government will consider the following actions:

- developing a framework and guidance to encourage a more risk-based approach to the selection of procurement options and use of competition;
- publishing guidance on the selection of an effective contract type for different categories of infrastructure projects and programmes that properly takes account of clients' risk appetite and commercial capability through the use of competency frameworks;
- developing mechanisms to encourage greater alignment of interest between the supply chain and clients/commissioners in reducing costs and managing risks, including:
    - review the use of NEC3 form and other standard contracts used for infrastructure and make recommendations for further areas where standardisation may be effective; and
    - the potential to develop a standard form public sector partnering agreement that will improve supply chain integration; and
- reviewing the ways in which certain construction risks, for example cost inflation risks, are currently analysed and allocated in contracts and consider the value for money benefits of adopting alternative approaches.

3.16 Infrastructure UK is already working with the Efficiency and Reform Group in the Cabinet Office to develop the implementation of these recommendations.

To create an environment that encourages industry to invest in efficiency and reducing the direct costs of construction

3.17 The earlier objectives have focussed on the client side issues of commitment and improved pre-contract activity. These things are all capable of being undertaken or, in the case of private sector utilities, influenced by Government. However, the full benefit of available cost savings can only be achieved if industry responds in turn.

3.18 There has been strong industry engagement in undertaking this cost investigation, which has given visibility of the issues to be addressed and added to the credibility of the public sector in seeking to address them. To help maintain and develop the relationships with industry, the Government will consider the following actions:

- publish, in collaboration with industry and the principal infrastructure and engineering bodies, a charter which in particular will set out a basis for improved communication channels between Government and the construction industry and encourage better engagement of the UK construction industry with the European Commission and standards bodies; and
- encouraging collaboration and joint venturing business models as a means to driving change through all levels of the supply chain, specifically:
    - as part of a wider review of infrastructure delivery models consider how the benefits of supply chain integration can be incorporated into procurement approaches and contracting models; and

- issuing guidance on the procurement process for infrastructure that encourages early contractor involvement and other means by which industry can put forward innovative variant proposals for standardisation, the use of off-site fabrication and other means of improving efficiency.

3.19 While Government can take steps to create the right environment and encourage such behaviour, it relies on industry to respond positively and to co-operate with infrastructure clients in achieving lower cost outcomes by increasing productivity and reducing the direct costs of construction.

3.20 Industry will be challenged to invest resources in the development of new skills and innovation, and to respond to the new technologies required to deliver cost effective solutions in the delivery of infrastructure across all sectors – energy, water, transport, waste and telecommunications. Government will look to industry leaders to establish clear and effective communications links, identify market leaders to work with the Government in developing the initiatives set out in this report and implement business models that will enable greater integration of the supply chain and the required investment in new skills.

Implementation and next steps

3.21 The actions set out in this report represent a considerable challenge. While some of the activities are already in hand, involving Infrastructure UK, the Efficiency Reform Group and wider stakeholders across Government and industry, other elements will take longer to implement.

3.22 To support the realisation of the significant savings available through the reduction in costs of delivery, Infrastructure UK will take the lead in bringing together the key stakeholders across Government, regulators and industry to finalise and prioritise the detailed programme and implementation plan. The final plan will be published by the end of March 2011

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Press release

Government launches new guide to infrastructure delivery

From:
HM Treasury and Lord Deighton
First published:
28 January 2013

This news article was published under the2010 to 2015 Conservative and Liberal Democrat coalition government

On 28 January 2013 the Government published for consultation a set of guidelines and tools to support public and private sector infrastructure providers' capability to improve the delivery of large scale projects and programmes.

Developed by Infrastructure UK in collaboration with industry and academics from the University of Leeds, the 'Infrastructure Procurement Routemap: a guide to improving delivery capability' provides a valuable guide for infrastructure clients. It provides for the first time a coherent approach to assessing and building an effective delivery environment, combining best practice tools and case study examples such as Crossrail.

The launch of the toolkit forms part of the Government's Cost Review programme, led by Infrastructure UK, which aims to improve delivery and make efficiency savings of at least 15 per cent by 2015.

The ‘Procurement Routemap’ recognises that while there is no “one size fits all” solution to the delivery of our infrastructure there are common characteristics for effective delivery that must be applied more consistently. The toolkit has already been successfully piloted and shown to improve efficiency by providing a structured framework for project sponsors and clients to take a look at their capability and areas for improvement.

Lord Deighton, Commercial Secretary to the Treasury said:

I welcome the publication of the ‘Infrastructure Procurement Routemap’. This important work provides the private and public sector with the tools to assess capability at delivering complex infrastructure projects. Our goal is to ensure that programmes are delivered efficiently and represent the best value for money. This will also be reflected in my upcoming infrastructure delivery reviews.

Don Ward, Chief Executive, Constructing Excellence said:

We are particularly pleased to be working with the Government and other industry partners to establish a legacy for some of the outputs of the Infrastructure Cost Review programme. Supporting the Routemap would be a natural extension of Constructing Excellence’s current role.

Andy Mitchell, Programme Director, Crossrail said:

The Routemap enables sponsors and clients to understand the delivery environment they have, then create the one they need.

Simon Kirby, Chair of the Client Working Group, said:

I welcome the involvement of clients and industry in the development of the Infrastructure Procurement Routemap. Focussing on matching capability with complexity and the enablers of successful delivery will significantly improve project outcomes. The Client Working Group looks forward to supporting the implementation of the Routemap and will continue to provide a forum for clients to share experiences and best practise to support successful infrastructure delivery in the UK

The closing date for consultation on the draft toolkit is 22 April 2013 after which responses will be reviewed in preparation for the release of an update of the toolkit in late spring 2013. The consultation will involve continued development with industry and the opportunity to participate in a series of regionally based roadshows. Further details

will be advertised through trade press and industry representative bodies.

Notes for Editors

1. Further details and the additional Infrastructure Procurement Routemap tools and best practice resources can be accessed on the Infrastructure UK Cost Review page.
2. The Government has already taken steps to boost the capability of senior project leaders through the establishment of the Major Projects Authority Leadership Academy and has streamlined procurement processes through the LEAN procurement initiative. In addition to implementing the Infrastructure Cost Review programme, the Government also set out a package of measures under the Government Construction Strategy and, more recently, announced measures to streamline the PFI procurement process.
3. This routemap was developed in conjunction with the Industry Client Working Group, chaired by Simon Kirby and the University of Leeds - Engineering Project Academy.
4. The University of Leeds, the Infrastructure Alliance Group and Constructing Excellence will work in partnership with the Government in developing the updated Routemap and supporting resources. The Infrastructure Alliance Group is a collaboration between Government and industry that brings together a number of industry bodies to support the Cost Review programme, including the Institution of Civil Engineers, Civil Engineering Contractors Association, Construction Products Association and the Association for Consulting and Engineering.
5. The Government is committed to extending the application of the Routemap to improve delivery, in particular across the Top 40 priority infrastructure projects.
6. The Government's priority infrastructure projects and programmes were first identified in the National Infrastructure Plan 2010 and updated in 2011. A progress update was set out at Autumn Statement 2012.
7. The key components and application of the Routemap are based on:
   - a suite of assessment tools developed as part of the Routemap to enable sponsors, clients and the supply chain to align behaviours and identify capability gaps

- the use of ‘complexity’ assessment tools for establishing the nature of the delivery environment
- enabling the adoption of the common characteristics and behaviours associated with successful infrastructure project and programme delivery, including:
  - early visibility and commitment to the pipeline of programme opportunities or the specific project
  - clearly articulated sponsor requirements adopting whole life principles linked to service outcomes that define the project or programme requirement
  - effective governance, accountability and timely decision making
  - early supplier engagement that engages all tiers of the supply chain
  - effective use and structuring of standard contracts such as the NEC suite to align risk, reward and behaviours in an integrated supply chain
  - appropriate incentivisation approaches that stimulate further integration of the supply chain
  - an environment that encourages innovation and departures from standards that embed cost and add no value to the outcome or safety.
- Pragmatic approaches to compliance with EU procurement legislation;
- An ongoing role for industry leaders and experts in the infrastructure sector to identify, develop and disseminate best practice.

8. Views on the report and associated toolkit should be sent by close on Monday 22 April 2013 to infrastructurecost@hmtreasury.gsi.gov.uk

https://www.gov.uk/government/news/government-launches-new-guide-to-infrastructure-delivery

Press release

Improving major project delivery: Project Initiation Routemap

From:
Infrastructure and Projects Authority, Cabinet Office and HM Treasury
First published:
15 June 2016

The Infrastructure and Projects Authority (IPA) launches new content for the Project Initiation Routemap for improving the delivery of major projects.

The Project Initiation Routemap is a strategic tool that allows sponsors and clients to address the problems that commonly emerge at the beginning of major projects, setting themselves up to succeed.

It forms part of the government's National Infrastructure Delivery Plan, which sets out how the government will deliver key projects and programmes over the next 5 years. Over 20 major projects, and programmes including Crossrail and Anglian Water's Alliance Strategy, have undergone routemap assessments, helping to drive their successful delivery.

The launch includes two new modules on risk management and asset management, to complement the 5 existing modules. The risk management module will help project leaders identify and mitigate the factors that can prevent a project from meetings its objectives. The asset management module will help projects secure the best value for taxpayers and investors by ensuring they focus on managing assets across their whole lives.

Following the launch, the IPA will begin to broaden the scope of the routemap from economic infrastructure to include construction and transformation projects in the government's Major Projects Portfolio.

At a launch event at the Institution of Civil Engineers, Tony Meggs, Chief Executive of the Infrastructure and Projects Authority, said:

I'm delighted to launch this new content for the IPA's Project Initiation Routemap. Studies have demonstrated that many problems encountered in the delivery of projects can be traced back to issues in the early stages of development. The routemap is a vital tool for setting up major projects to succeed and I look forward to applying it to the full range of projects in the government's Major Projects Portfolio.

Nick Baveystock, Institution of Civil Engineers (ICE) Director General, said:

Today's Project Initiation Routemap update will further strengthen UK clients' capability to deliver infrastructure and construction projects to time, budget and specification. ICE is delighted to have supported the work of the Infrastructure Client Group. This is industry working together to solve our own issues. In bringing together a broad collection of industry leaders from major UK clients and subject matter experts to develop these new modules on risk and asset management of major projects, decision makers will be able to ask better questions about their from the outset. I would encourage all major clients to use the framework and also to give us feedback so we can continue to improve it.

https://www.gov.uk/government/news/improving-major-project-delivery-project-initiation-routemap

Improving Infrastructure Delivery: Project Initiation Routemap

Handbook

Version 2 June 2016

Any enquiries regarding this publication should be sent to us at public.enquiries@hmtreasury.gov.uk

You can download this publication from:
www.gov.uk/government/organisations/infrastructure-and-projects-authority

ISBN 139781910337080

Infrastructure and Projects Authority

Improving Infrastructure Delivery: Project Initiation Routemap

Handbook

June 2016

Infrastructure and Projects Authority

Infrastructure and Projects Authority and Infrastructure Client Group

Infrastructure shapes the way we live and is the foundation on which a successful economy is built. Transport links get us where we need to be, energy systems power our homes and businesses, and digital networks allow us to communicate. It is vital to improving our quality of life and integral to the creation of a vibrant economy.

The government is committed to delivering the high-quality infrastructure that the UK needs to build and sustain a more productive economy. To achieve this the government has committed to spend £100 billion on infrastructure this Parliament. This investment will create jobs and raise productivity.

To help realise the benefits from this investment the government created the **Infrastructure and Projects Authority** (IPA) as the government's centre of expertise for project development and delivery. The IPA's Cost Review and the NAO report on delivering major government projects identified the early stages of projects as a common source of failure on infrastructure projects. The original Project Initiation Routemap (Routemap) helped address these challenges and this update, which expands to include all construction projects and adds new modules, will enhance that work, helping provide the UK with the infrastructure it needs to thrive.

The **Infrastructure Client Group** demonstrates the value of effective collaboration between government and industry to support the development and exchange of best practice to improve delivery. Initially brought together by government to support the work of the Infrastructure Cost Review, the membership of this group is representative of the major infrastructure clients. It has been instrumental in setting a common agenda for change and supports a programme of activities and applied knowledge transfer across the public and private sectors. The success of this initiative has been made possible by the continued and valuable support from industry and academic partners.

Tony Meggs
Chief Executive of the Infrastructure & Projects Authority

Andy Mitchell
Chair of the Infrastructure Client Group

Preface

Since the launch of the Routemap over 20 major projects across the transport, water, flood defence and energy sectors have undergone a Routemap assessment, helping to drive their successful delivery. Yet there is still work to do as projects continue to face challenges.

The recent NAO report on ***Delivering Major Projects in Government*** (2016) and the Infrastructure UK Cost Review (2010) both noted that projects continued to encounter problems in their early stages - and, particularly, that projects often publically announced timelines and costs before plans have been properly tested. The report also identified a lack of project capability especially at portfolio level. The Routemap will help address these challenges by offering support on strategic decision making during project initiation based on the latest thinking and knowledge acquired from delivery of Major Projects applied in a series of structured exercises. It enables sponsors and those responsible for project delivery to properly align complexity with the necessary capabilities and other enhancements to ensure a more successful outcome.

The Project Initiation Routemap is a product of government working collaboratively with industry and the University of Leeds, through the Infrastructure Client Group.

Building on its success with economic infrastructure, the Routemap is being expanded to cover all construction projects and longer-term transformation projects as well. As part of this expansion two new modules are being added, for Risk Management and Asset Management alongside the existing topics on Requirements, Governance, Procurement, Execution Strategy and Organisational Design & Development. The new Risk Management Module covers the best practice in how to develop the project's approach to risk management during the initiation phase. The Asset Management Module provides advice on how to structure and manage the interaction between the project team and the corporate asset management function to successfully deliver project outcomes.

> *Understand the delivery environment you HAVE, then CREATE the one you need."*
>
> **Andy Mitchell,**
> Chair of the Infrastructure Client Group

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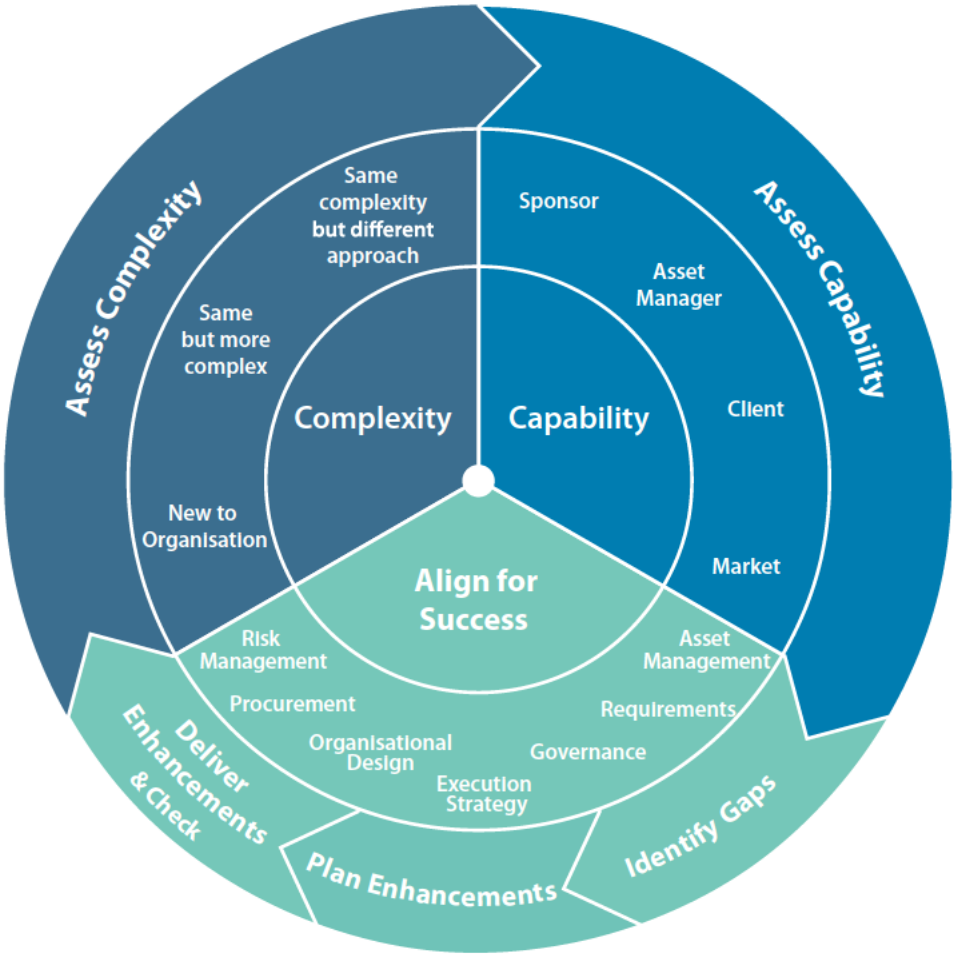


Section 1

Introducing the Project Initiation Routemap

"I welcome the involvement of clients and industry in the development of the Project Initiation Routemap. Focusing on matching capability with complexity and the enablers of successful delivery will significantly improve project outcomes. The Infrastructure Client Group looks forward to supporting the implementation of the Routemap and will continue to provide a forum for clients to share experiences and best practise to support successful infrastructure delivery in the UK."

Simon Kirby, High Speed 2

Why is the Project Initiation Routemap (Routemap) needed?

Projects† that enhance and expand the UK's infrastructure are critical to the nation's success, therefore it is important to ensure that these projects do not fall short of expectations. Various studies into the causes of failure on such projects have clearly shown that more focus on creating the appropriate delivery environment could have prevented poor performance.

The Cabinet Office Review Guidance: *Common causes of programme/project failure* (2012)* included the following:

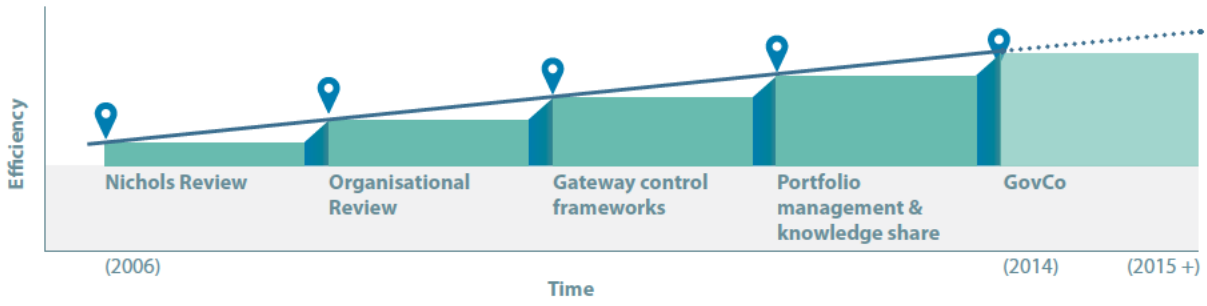
- Lack of clear link between the project and the organisation's key strategic priorities, including agreed measures of success;
- Lack of clear senior management and ministerial ownership and leadership;
- Lack of effective engagement with stakeholders;
- Lack of skills and proven approach to project management and risk management;
- Too little attention to breaking development and implementation into manageable steps;
- Evaluation of proposals driven by initial price rather than long-term value for money (especially securing delivery of business benefits);
- Lack of understanding of and contact with the supply industry at senior levels in the organisation;
- Lack of effective project team integration between clients, the supplier team and the supply chain.

The Edinburgh Tram project provides an example of a project that may have fallen short of expectations and failed to create the right delivery environment, generating uncomfortable headlines such as this:

> *"...in the decade since the first money was allocated to the project, the price has doubled, the network has halved and it has taken twice as long to build as was first thought."*
>
> **BBC Scotland News Website**
> (30 May 2014) Going off the rails: The Edinburgh trams saga.

The sponsors and clients of infrastructure projects have a key role to play in establishing the appropriate delivery environment, in order to avoid these causes of failure and create the foundations for project success.

The marked improvement in project performance achieved by the Highways Agency since 2006 provides a clear example of what can be achieved.



In the Nichols report *Review of the Highways Agency's Major Road Programme* (2007), the root causes of poor project performance were identified as primarily being in the establishment of an appropriate delivery environment, rather than the subsequent execution of the projects.

The Highways Agency response was to focus on a review and staged improvements of their governance and programme structure supported by improved data and strengthening capability. This has resulted in notable performance improvements across their projects and means the Highways Agency is now well placed to move to a GovCo as part of the Roads Reform.

† Throughout this guide the term project is used to mean both project or programme.
* Cabinet Office Review Guidance download available at:
www.gov.uk/government/uploads/system/uploads/attachment_data/file/62076/PPM-Common-Causes-of-Failure.doc

Pilot applications of the Routemap have demonstrated its value as a framework that allows sponsors and clients to establish what they need to do to create the appropriate delivery environment for a specific project. It achieves this by framing an assessment of a project's complexity together with the organisations capability to undertake the project, and so identifies complexity-capability gaps that need enhancement for the project to be successful.

> *Using the Routemap is like holding a mirror up to yourself. We used it retrospectively at Crossrail and demonstrated that the components of the Routemap correspond to the challenges that Crossrail faced and how they were actually dealt with (many intuitively).*
>
> *The key lessons we took from its use were: Understand the environment you have and create the one you need; when planning for a major transition consider - what differing skills, structures and processes are required at different phases; reflect on the optimal programme interfaces to avoid ending up with them by accident, expending unnecessary resource; and protect and keep the crucial programme elements moving, even in the face of organisational change."*
>
> **Andy Mitchell,** Programme director, Crossrail

What is it?

The Routemap is an aid to strategic decision-making. It supports the alignment of the sponsor and client organisations' capability to meet the degree of challenge during initiation and delivery of a project. It provides an objective and systemic approach to project initiation founded on a set of assessment tools that help determine:

- Complexity and context of the delivery environment;
- Capability of current and required sponsor, client, asset manager and market;
- Key considerations to enhance capability where complexity-capability gaps are identified.

The Routemap helps organisations to understand their current delivery environment then create the one they need. For instance, it provides assistance on addressing the most common capability gaps that sponsors and clients need to enhance, such as blurred governance structures, or lack of alignment between benefits and requirements. These are explored in more depth in supporting Align for Success modules, which are outlined in section 4.

The intention is to address issues as early as possible in the project life cycle. However, as projects progress, the assessment and gap analysis results can be reviewed and the Align for Success modules revisited, in order to fine-tune the enhancement activities.

What it is not?

The Routemap is **not** a:

- prescriptive process. It is meant to enable reflection on the project environment;
- route to a single solution. It ensures that the "right" questions are asked at critical points in the project lifecycle;
- replacement for existing assurance and review procedures, though its outcomes can support these;
- maturity model for organisational capability building. However, applying the Routemap on specific projects may identify organisational issues that need enhancing.

Who is it for?

The Routemap is aimed primarily at public or private sector sponsor and client organisations that deliver infrastructure projects. It provides particular value where a proposed project is either new in its nature to the participating organisations, is being delivered in a different way, or is on a significantly bigger scale than those previously undertaken.

What does it contain?

The tools within the Routemap assess the capability of the sponsor, client, asset manager organisations and the market, together with the complexity of the project environment. Through this analysis, areas of alignment and misalignment can be identified.

It contains detailed checklists to use during the initial assessment steps, advice on how to do the gap analysis, and advice about what to include in plans for an enhanced project environment.

The components of the Routemap are:

Complexity Assessment

The Delivery Environment Complexity Analytic (DECA)* - a set of 12 factors that determine complexity.

Capability Assessment

- **Sponsor** - strengthens understanding of the requirements for the sponsor's capability during the investment and delivery planning process;
- **Asset manager** - highlights key operational constraints and requirements to be considered;
- **Client** - considers the ability of the client organisation to engage effectively with an appropriately selected supply chain, and to manage the delivery outcomes;
- **Market** – reviews the market's ability and appetite to respond to the requirements.

The complexity and capability assessments identify the areas that require enhancement in order to achieve project success. To support enhancement, a series of supplementary modules have been developed that deal with these common topics that need to be addressed.

Align for Success modules

There are currently five Align for Success modules that provide organisations (sponsors and clients) with advice on enhancing capability in the following areas:

- Requirements;
- Governance;
- Execution Strategy;
- Organisational Design & Development;
- Procurement;
- Risk Management;
- Asset Management.

This list is not exhaustive and other areas of capability may need to be examined as part of the process of improving delivery. Additional modules may be developed when other areas are identified.

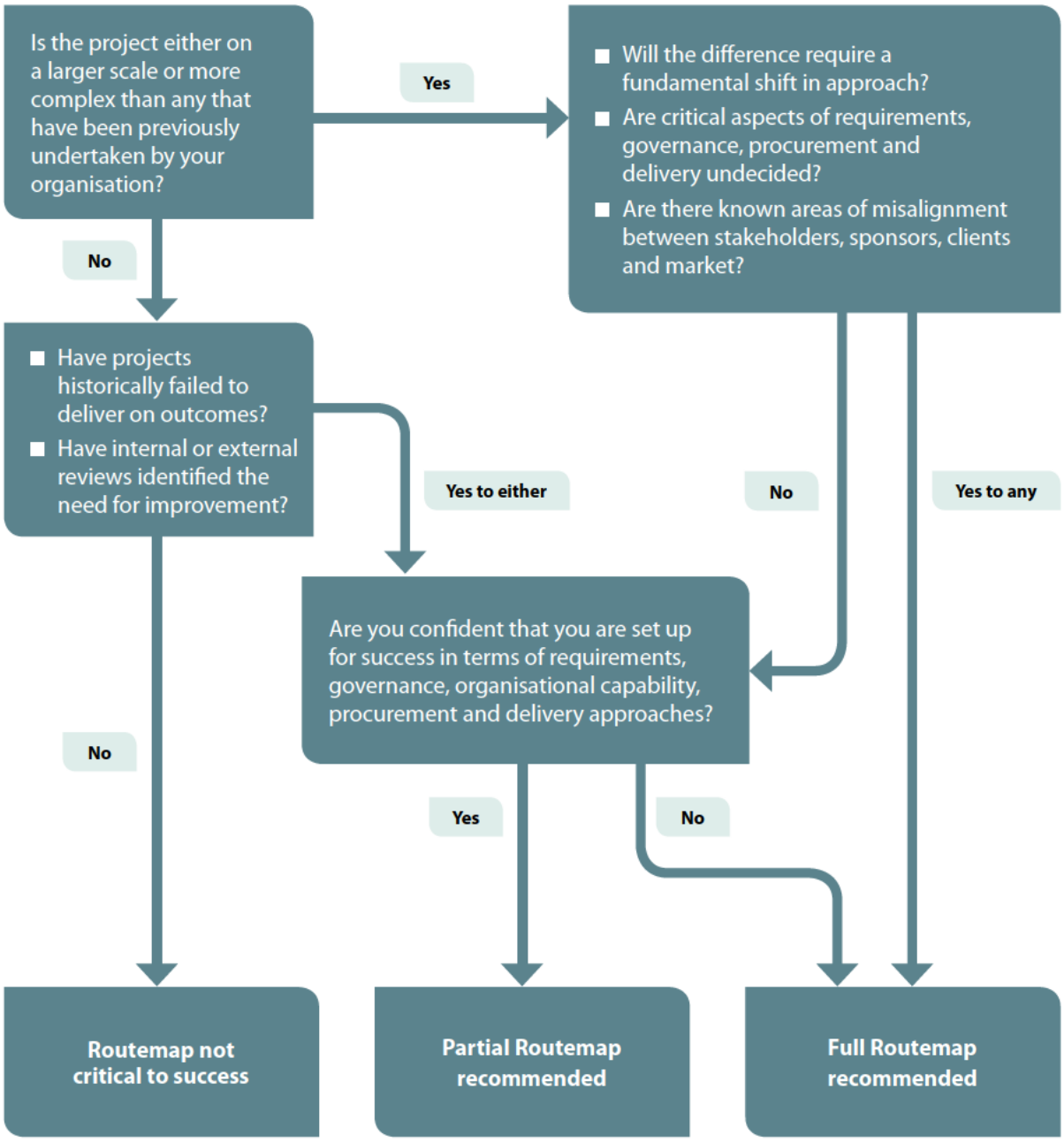
> *Not only did the process work in helping to identify the approach to procurement through constructive challenge in a series of workshops, it also gave confidence during subsequent assurance that the right solution was being pursued."*
>
> **Peter Quarmby,** Thames Estuary Flood Risk Programme Director, Environment Agency

> *Too often projects are started on an unrealistic basis, so it is no surprise there are problems in delivery. MPA has been delighted to support the development and evolution of the Routemap as a way of providing a more structured approach to understanding the challenges facing infrastructure projects and their deliverability."*
>
> **Tim Banfield,** Director, Strategy, Major Projects Authority

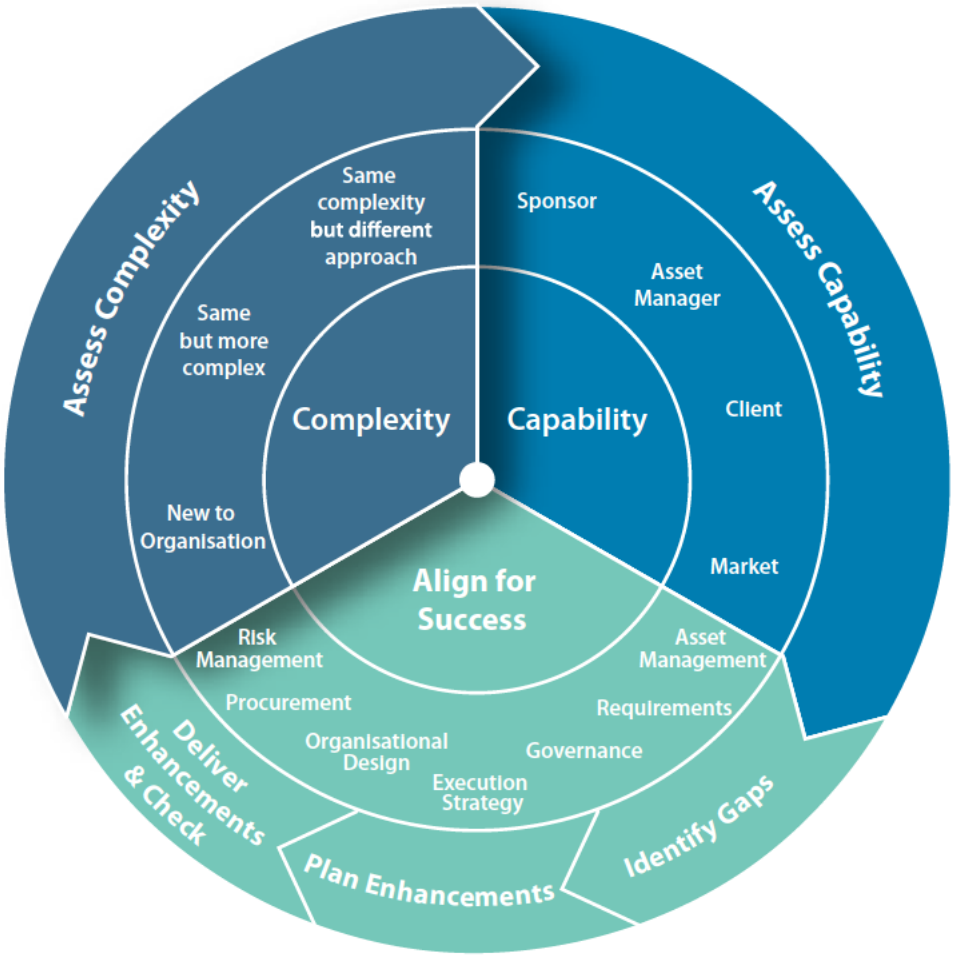
*The DECA (October 2013) has been developed by the National Audit Office and is incorporated within the Routemap with their permission.

Deciding whether to use the Routemap

Not every project will benefit from using the Routemap, or need to apply it fully. Working through the questions in the diagram below should help decide the best way forward. The Qualifying Checklist in Appendix A helps identify the minimum set of Routemap components that the project would benefit from using.



> *The Routemap has provided a fulcrum for us to change."*
>
> **Miles Ashley,**
> Programme Director,
> London Underground



Section 2

Assess Complexity

> *We found striking patterns in the reasons for projects failing, which all related to the importance of understanding the delivery environment and complexity of the project when making a decision whether to proceed. Organisations which really understood the inherent challenges of their project were able to create an environment for success at the earliest stages of its design, while those which did not set themselves up for failure at a later stage."*

Source: **National Audit Office**

Using the Delivery Environment Complexity Assessment (DECA) tool

Why understanding complexity is important

Lack of understanding of the context in which a project is being created and delivered is a significant contributory factor to project failure. Understanding the wider project environment is especially important where the proposed project may in itself be more complex or on a larger scale than normal, or is being delivered in a novel way.

Purpose

The DECA (see following page) is a tool for considering the challenges, complexity and risks to delivery of a project, policy or area of work.

It provides a focus for discussion and consolidation of existing knowledge through consideration of the likely impact of 12 factors which are key influencers of success or failure. These factors can be used to develop a broad, high-level understanding of an organisation for assessing the challenges surrounding the implementation of major projects.

How to assess delivery environment complexity

Users decide whether the potential impact from each factor is high, medium or low to build an overall picture of the delivery environment and its complexity.

When applying the DECA various approaches have been applied to decide on the complexity rating, for example:

- a team meeting or workshop to share existing knowledge and complete the DECA together;
- team members each complete a DECA separately and then compare their thoughts;
- a single team member completes the DECA, with other team members adding their own thoughts and comments afterwards.

Further advice can be found in the National Audit Office publication

'The DECA: Understanding challenges in delivering project objectives'. (2013)

Using the DECA results

There is necessarily a judgement to be made as to whether overall complexity is low, medium or high because different factors will carry more weight in some projects than others.

For instance, 5 highs, 3 mediums and 4 lows may look like a fairly even spread across the factors but averaging these out to give an overall medium complexity would give too little weight to the high factors when analysing the complexity-capability gap later on in the Routemap process.

As well as feeding into the Complexity-Capability Gap Analysis, completion of the DECA generates a profile that can be used by the sponsor and client to sanity-check risk and readiness at various points in the project lifecycle. It also helps improve team understanding of what they will need to deal with in the project. The results of this assessment combined with the Capability Assessments then feed in to the development of a robust delivery plan tailored for the project.

Delivery Environment Complexity Assessment (DECA)

Factor	*Low (Level 1 Complexity)*	*1 Low*	*2 Med*	*3 High*	*High (Level 3 Complexity)*
Strategic importance	Low priority operational level project. Expected benefits are necessary but low in value relative to organisation's/government's overall ambitions. Externally there is little political, media or public interest and failure would not have significant impact outside the organisation.	☐	☐	☐	Critical to delivery of policy, key strategic objectives or legal obligations, with very high expectation of benefits. High level political or public interest with strong media attention. Failure would have major impacts and consequences outside the organisation.
Stakeholders / Influencers	Low number of stakeholders or level of influence. Stakeholders are aligned with the business objectives, supporting the project and agreeing on the expected outcomes. Key stakeholders and influencers are unlikely to change.	☐	☐	☐	Significant number of stakeholders with high levels of influence and differing or misaligned objectives/expectations. Stakeholders/influencers may change.
Requirements and Benefit Articulation	Requirements and expected benefits are clear and linked to business policy. Key performance measurements link to goals, vision and values.	☐	☐	☐	Ambiguity around requirements and how the expected benefits contribute to the realisation of the goals, vision and values. High uncertainty on project impact.
Stability of overall context	Requirements, governance and delivery modes are clear and unlikely to change. No significant risk of change in scope, structure, external requirements or economic/political landscapes. High degree of confidence in planning, estimates and/or governance. Necessary approvals/ investment already received or guaranteed.	☐	☐	☐	High risk of scope, structure, external requirements or economic/political landscapes changing. Low level of certainty within key estimates, planning and/or governance. Uncertainty over whether necessary authorisations will be received.
Financial impact and value for money	Investment is not significant relative to sponsoring body's capital expenditure, or comparable investments. Project is not material to key suppliers. Anticipated revenues, efficiencies or returns on investment are not fundamental to the business. High level of assurance over key estimates.	☐	☐	☐	Investment is significant for the sponsoring body. Investment expected to deliver significant value for money, efficiencies or returns. Highly involved type/source of investment anticipated. Low level of assurance over key estimates.
Execution Complexity (including Technology)	No new or untested business practices or technologies form part of the scope. There is front end loading for phased implementation and piloting if required. Organisation or its partners has past experience of all practices, key technologies and methods used.	☐	☐	☐	New/untested business practices or technology is required. Wide scope and challenging objectives with limited scope for risk management such as phased implementation or piloting due to immovable deadlines and demanding targets.
Interfaces / Relationships	Project spans few boundaries (organisational, political, regional) and success is not dependent on relationships. Governance is not complex and supports decision-making and reporting. Success is not dependent on factors outside control of the organisation.	☐	☐	☐	Project spans many boundaries with internal and external partners. Success is dependent on factors mainly outside control of the organisation and is dependent relationship management. Governance is complex.
Range of disciplines and skills	Delivery involves few specialist disciplines or skill requirements. Acquiring the skills for implementation is straightforward and readily available in the market.	☐	☐	☐	Large number of disciplines and skills and/or potential for strain on the supply chain capacity and capability.
Dependencies	Project is not critical to the delivery of other projects.	☐	☐	☐	Project is critical to the delivery of other projects.
Extent of change	Business as usual.	☐	☐	☐	Large amount of organisational change required to deliver desired outcomes and benefits. Delivery represents a fundamental change to the organisation.
Organisational capability: performance to date	Demonstrated capability to deliver project through delivery of similar successful projects. Culture promotes 'intelligent client' attributes.	☐	☐	☐	Has not demonstrated key capabilities in delivering major projects and/or has not delivered under similar arrangements in the past.
Interconnectedness	Consideration of the required alignment and relationships between policy, culture, practices, technology, people, processes and procedures. Interrelationships inform decision-making and risk management.	☐	☐	☐	Consideration of the relationships between policy, culture, practices, technology, people, processes and procedure has not been investigated, captured or communicated.

Examples:

The two examples below show the contrast in profiles between the outputs of the complexity assessments carried out on the Transport for London (TfL) Vauxhall Station Upgrade Project and Network Rail's European Train Control System (ETCS) Programme.

The Vauxhall Station Upgrade Project included: installation of a new lift shaft, renovation of the ticket hall and provision of additional ticket gates and wide-aisle gates. There was good alignment around the complexity profile of the delivery environment with the majority of factors not posing a management challenge. However, due to the familiarity of the work type it was considered helpful to validate that the 'business as usual' approach was effective at dealing with stakeholders and interface management.

TfL – Vauxhall Station Upgrade Project

Factor	*Rating L/M/H*
Strategic importance	M
Stakeholders/Influencers	M
Requirements and benefit articulation	L
Stability of overall context	L
Financial impact and value for money	L/M
Execution complexity (including technology)	L
Interfaces/Relationships	L/M
Range of disciplines and skills	L/M
Dependencies	L
Extent of change	L
Organisational capability: performance to date	L
Interconnectedness	L

"Are the stakeholders being managed by those best placed to do so?"

"Whilst project is not viewed as high capex there is still a need to ensure value for money."

"Active management of the interface with operations is critical to project acceptance and handover."

The ETCS programme is the planned upgrade from the existing rail trackside signalling system to in-cab signalling. The overall complexity attributed to the delivery environment was agreed as high and the risks arising from each of the DECA factors were compared with the programme risk register to help identify actions to reduce complexity if possible, for example reduction of dependencies or improving stability through political/ funding commitment.

Network Rail – ETCS Programme

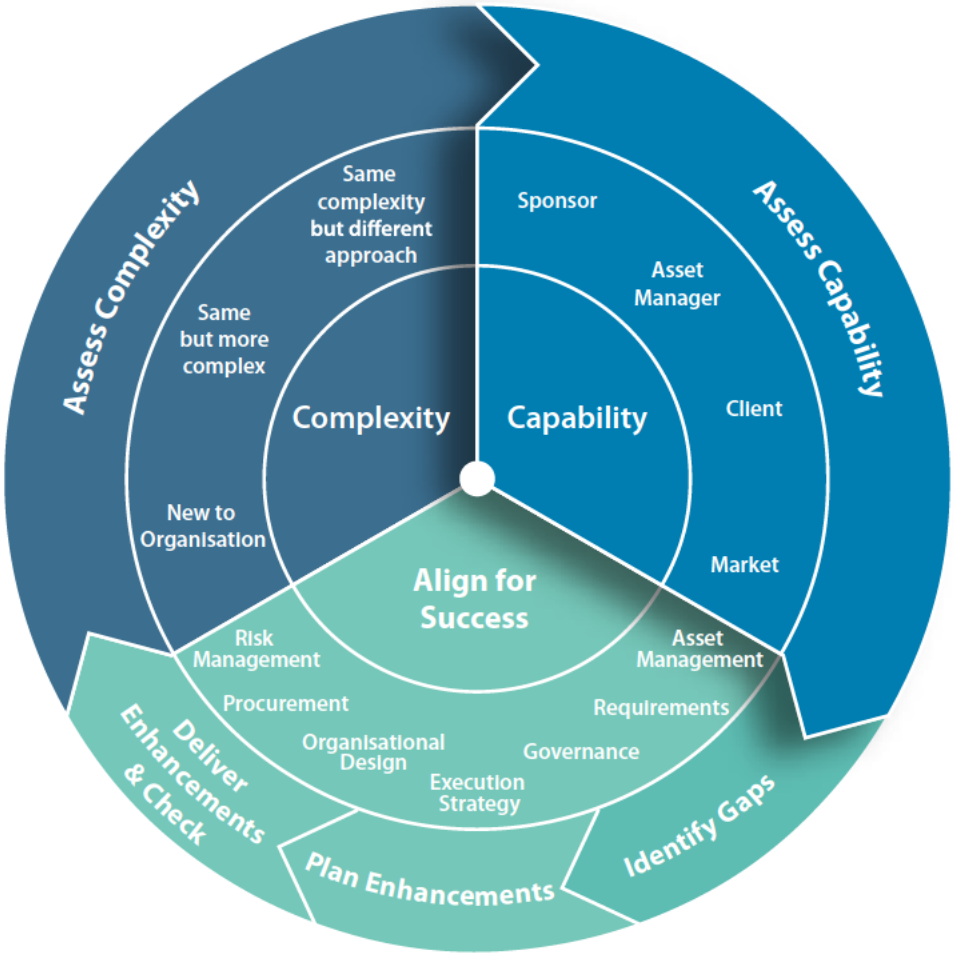
Factor	*Rating L/M/H*
Strategic Importance	H
Stakeholders/Influencers	H
Requirements and benefit articulation	M/H
Stability of overall context	H
Financial impact and value for money	H
Execution complexity (including technology)	H
Interfaces/Relationships	H
Range of disciplines and skills	H
Dependencies	M/H
Extent of change	H
Organisational capability: performance to date	M/H
Interconnectedness	H

"The whole industry is involved, every member of the industry in some way, shape or form as a stakeholder for this because it is fundamentally going to change the way the railway operates."

"The control period/regulatory framework is a constraint that stakeholders are struggling to see beyond."

"The priorities for deployment and execution strategy are not clear – including national vs route considerations."

"The nature of the 'organisation' needed to deliver a programme of this magnitude has not been fully considered."



Section 3

Assess Capability

> *In planning for the AMP6 programme and the next evolution of its @one Alliance, Anglian Water assessed client capability as being appropriate to the challenge, but that greater alignment and integration across the Anglian Water / Alliance interface would enable further progress. Any enhancement to that interface would improve the translation of Anglian Water outcomes and requirements through the supply chain."*

Dale Evans, Director, @One Alliance, Anglian Water

Capability Assessments

What is meant by capability?

The Routemap uses capability to describe the ability of the sponsor, client, asset manager and market to organise for effective and efficient delivery of a project. It refers to a part of the business involved with the project and not the individual, as most barriers to effective practice are rooted in systemic issues and not individual action.

Why assess capability?

In addition to understanding the complexity of the delivery environment it is important to understand the capability of the various parties involved, in order to check alignment (or misalignment) with the capabilities needed to deliver a project of the level of complexity being proposed. This includes taking a broader view of the market capability that might be needed to address identified capability gaps and the degree to which the respective views of capability are consistent and aligned across the various parties.

What are the capability assessments?

Each of the assessments provides a set of observable characteristics that represents the organisational capability as it applies to the project. These characteristics can be used to reflect on the 'current' and 'needed' capabilities for successful delivery. The characteristics are grouped into three sets:

- **Red** are indicative of a failing system. Any individual red characteristic will hold an organisation back regardless of other good practice, and either needs to be addressed or allowances made for the consequences;
- **Green** are seen in systems that are performing acceptably. The system may be appropriately governed but not be fully optimised;
- **Blue** are indicative of an effective and efficient system that has been optimised. Not all projects will require systems that have blue characteristics to succeed.

Note: These three sets of characteristics should **not** be seen as a progressive scale. An organisation can demonstrate a mix of all three at any one time.

The assessment characteristics have been shaped by recognised good practice and are drawn from practical experience of the assessment of project failure.

The capability assessment results represent snapshots of systemic capability.

Getting value out of the assessments

To maximise the value of the assessments, you need to have an appreciation of the scope and complexity of the project and its strategic importance to the business. The scope of the project as contained in the business case, and the results of the complexity assessment (DECA), need to be communicated to the people taking part in the capability assessments.

When assessing, consider both the characteristics that are currently observable and those that are needed. This should be based on current understanding of what will be required for successful project initiation and delivery. The differences between current and needed characteristics inform thinking about how to narrow the gaps in capability.

The alignment of the sponsor, client, asset manager and market capability should also be considered. Capability misalignment between organisations can be a barrier to effective working and certain capability combinations may not promote efficient practice.

The combined assessment results feed into the Complexity-Capability Gap Analysis as outlined in Section 4.

Assess Sponsor Capability

What is meant by sponsor?

The sponsor owns the business case and is responsible for specifying the requirements to the client. In most cases the sponsor also secures the funding.

As owner of the business case, the sponsor is responsible for ensuring strategic alignment of the project and achieving the optimum whole life value. They should be the owner of the investment and overall business change.

In some contexts the sponsor and client could be from the same organisation.

Purpose

To show whether the level of sponsor capability is equal to the challenge of ensuring that the project remains viable and it is aligned to the strategic objectives of the whole organisation.

How to assess sponsor capability

Review the characteristics in the table opposite and tick those that you consider are currently present in sponsor capability and those that should be in place.

The groups of characteristics in the table opposite are seen in sponsor organisations that demonstrate the following behaviours.

- **Red:** Provides insufficient direction and strategic guidance. Ownership of benefits are fragmented and subject to conflicting sponsor/client priorities. Immature processes and systems;
- **Green:** Provides direction and policy guidance. Demonstrates active stakeholder management. Informs and works with the client to manage strategic risks;
- **Blue:** Invests in strategic planning. Assured governance structures and processes. Undertakes structured evaluation of requirements and sets demanding but realistic efficiency targets. Actively seeks out best practice and incorporates into policy/strategy.

How to use the results

The assessment results contribute to the Complexity-Capability Gap Analysis.

Additionally, the sponsor results will help in considering how the capability of the sponsor and the balance of responsibility within potential delivery options will determine the desired capability of the client, as illustrated in the Crossrail project example below.

Example: Crossrail Sponsor capability

Throughout the development phase of Crossrail, the lack of clear accountability for key decisions was an anchoring characteristic of the sponsor capability. This resulted in slow decision making and a lack of the delegated authority needed to deliver.

The formation of a joint sponsor board between the Department for Transport and Transport for London provided a clear hierarchy for decision-making and was subsequently underpinned by a Project Development Agreement giving Crossrail staged authority to confidently manage the project.

Sponsor Capability Assessment

Level	*Current*	*Needed*	*What sponsor characteristics do you recognise?*
Red	☐		Lack of future thinking
	☐		Stop/start investment and inflexible funding cycles
	☐		Political imperatives compromise good practice
	☐		Reactive approach
	☐		Insufficient planning
	☐		Alternative solutions are not sufficiently considered
	☐		Assessing project in isolation without reference to overall business strategy
	☐	N/A	The stated business need does not articulate realistic and justified objectives
	☐		Projects handled as discrete entities
	☐		Focused on processes to the detriment of outcomes
	☐		Inappropriate transfer of risks
	☐		Lack of clear accountability for key decisions
	☐		Suspicious culture
	☐		Technology viewed as a panacea
	☐		Work practices compromise delivery
	☐		Poor strategic awareness of market capacity and capability
	☐		Poor development and retention of sponsor capability
Green	☐	☐	An accurate and frequently validated baseline of benefit measures is maintained
	☐	☐	Requirements and issues are identified
	☐	☐	Scenario planning
	☐	☐	Recognition of the need for investment in initiation/front end loading
	☐	☐	Robust business case
	☐	☐	The investment case is reviewed before progressing to implementation
	☐	☐	Clarity of accountability and authority
	☐	☐	The 'right' programme of projects is identified
	☐	☐	Smart management of the sponsor/client interface
	☐	☐	Active stakeholder engagement
	☐	☐	Lessons learned are fed back into the decision-making process
	☐	☐	Key project risks identified and mitigation plans put in place
Blue	☐	☐	Visible and consistent support and ownership of the vision
	☐	☐	Continuity of investment
	☐	☐	Achievability of business objectives is validated
	☐	☐	Clear requirement definition with measurable benefits
	☐	☐	Effective and clear decision-making processes that challenge assumptions
	☐	☐	Active risk management focused on benefits delivery
	☐	☐	Adaptive culture established
	☐	☐	Investment aligned with business needs
	☐	☐	Leverages/optimises value-adding interdependencies
	☐	☐	Managed stakeholder support
	☐	☐	Sufficient autonomy and capability to enable delivery and manage resources
	☐	☐	Lessons learned and performance data are systemically captured and built into decision-making
	☐	☐	Clear operational plan for measurement and delivery of asset performance

Assess Asset Manager Capability

What is meant by asset manager?

The asset manager is responsible for day-to-day operations and maintenance of the asset. The asset manager may be a part of the sponsor or client organisations or a separate entity. Similarly the operator and maintainer of the assets might be separate entities.

Effective asset management takes a systemic, organisational view of assets as enablers of the strategic goals of the organisation.

Purpose

To highlight key operational constraints and/or requirements that will need to be addressed in the project.

How to assess asset management capability

Review the characteristics in the table opposite and identify those that you consider are currently present in asset management and those that are considered necessary for the project to succeed.

Consideration of the project's impact on existing assets and maintenance routines is as relevant as considering how new assets will be adopted and owned.

The groups of characteristics in the table opposite are seen in asset managing organisations that demonstrate the following behaviours;

- **Red:** Ownership of assets is fragmented and subject to conflicting sponsor/client priorities. Immature processes and systems. No link to strategic goals;
- **Green:** Clear line of sight to strategic goals and policy. Clear responsibility for assets. Management of strategic risks;
- **Blue:** Invests in strategic planning. Assured governance structures and processes. Undertakes structured evaluation of asset performance and sets demanding but realistic efficiency targets. Actively seeks out best practice and incorporates into policy/strategy.

How to use the results

The assessment results contribute to the Complexity-Capability Gap Analysis by providing insights to the wider operational and maintenance context, into which the project will ultimately deliver its outputs. This is illustrated in the example below.

Example: Surrey County Council asset management

Surrey County Council Strategic Highways identified that there was potential to unlock efficiency and innovation savings through a new approach to asset management and the provision of an extended funding horizon. They used the Asset Manager Capability Assessment to assess their current capability and were able to build the case for change by highlighting barriers to effective practice, such as the investment asset strategy not being aligned to the organisations strategic objectives.

Asset Manager Capability Assessment

Level	*Current*	*Needed*	*What asset management characteristics do you recognise?*
Red	☐		Inadequate whole life asset management approach
	☐		The investment asset strategy is not aligned to the organisations strategic objectives
	☐		Poor decision making, governance structures and processes undermine asset strategy
	☐		Reactive management and/or ill-defined roles and responsibilities
	☐		Lack of resilience
	☐		Unnecessary use of bespoke solutions
	☐		Not based on a whole life value for money proposition
	☐	N/A	No strategic engagement with the operators and/or supply chain
	☐		Inappropriate, changing or no data
	☐		No investment in capability development
	☐		Inappropriate transfer of risks
	☐		Lack of clear accountability for key decisions
	☐		Suspicious culture
	☐		Technology viewed as a panacea
	☐		Work practices compromise delivery
	☐		Poor strategic awareness of market capacity and capability
	☐		Poor development and retention of asset management capability
Green	☐	☐	Whole life asset strategy
	☐	☐	Optimised asset grouping
	☐	☐	Asset performance measurement
	☐	☐	Planned asset resilience
	☐	☐	Formalised whole life asset management processes, functions and roles
	☐	☐	Plan for operational readiness
	☐	☐	Active stakeholder engagement
	☐	☐	Competency assessment and development framework is utilised
	☐	☐	Data usage and information management
Blue	☐	☐	Intelligent use of assets aligned to organisational goals
	☐	☐	Continuity of performance through asset life
	☐	☐	Effective governance, leadership and change management
	☐	☐	Investment efficiency and performance measurement
	☐	☐	Systemic organisational view of assets
	☐	☐	Effective operational readiness strategy in place
	☐	☐	Assured capability
	☐	☐	Intelligent data usage and knowledge management
	☐	☐	Contract incentives aligned to sponsors whole life requirements and client model
	☐	☐	Clear operational plan for measurement and delivery of asset performance
	☐	☐	Senior Managers challenge the risks to the project and understand the organisations risk appetite

Assess Client Capability

What is meant by client?

The client is responsible for fulfilling the requirements and delivering the benefits. The client translates the requirements from the sponsor and manages the delivery outcomes. The client selects the most appropriate supplier/s to meet project objectives. Fundamental to this is the ability to manage relationships with suppliers in order to maximise the delivered value.

The Routemap is consistent with the principles of the Institution of Civil Engineer's characteristics of an 'Intelligent Client' as follows: An intelligent client should understand and define the needs of the project; define its requirements fully; select the contractor competitively and fairly and reward through incentivised contracts; support the contractor and enforce the contract fairly; bring projects together to make the whole programme and commission the projects and measure their effectiveness.

Purpose

To investigate whether or not the client is capable of navigating the range of potential Delivery Models and delivering the complexity of the project.

How to assess client capability

Review the characteristics in the table opposite and tick those that you consider are currently present in client capability and those that should be in place.

The groups of characteristics in the table opposite are seen in client organisations that demonstrate the following behaviours.

- **Red:** The delivery environment is not stable. It has an unrealistic or no formal plan. Immature processes and systems. No evaluation of impact or performance;
- **Green:** Organised and coherent. Provides direction and policy guidance. Repeatable control methodology and evaluation but focused on objectives rather than outcomes. Processes are evaluated but not improved;
- **Blue:** Capable of specifying the requirements to external participants and managing the delivery outcomes. Obtains maximum value from the supply chain through relationship management. Adaptive and sustained system focused on learning and continuous improvement.

How to use the results

The assessment results contribute to the Complexity-Capability Gap Analysis. They help identify organisational development needs, as was found by Transport for London in the example below.

Additionally, the client results will help in considering how the capability of the client and the balance of responsibility within potential delivery options will determine the desired capability of the support required from the market.

Example: TfL Client capability

Transport for London's (TfL) Station Stabilisation Programme aimed to develop a delivery environment capable of realising greater efficiencies by bringing specific delivery capabilities in house. For business as usual, TfL demonstrated 'green' capability, but needed 'blue' capability to support this new way of working and achieve the expected benefits. It was identified that this would require more planning for the transition to enhanced capability, thus impacting the overall programme of delivery. However, not allowing sufficient time to acquire or develop the required capability usually results in poor value from later stages.

Client Capability Assessment

Level	*Current*	*Needed*	*What client characteristics do you recognise?*
Red	☐		Lack of clarity and direction causing incomplete or unclear requirements
	☐		Blurred governance structures
	☐		Poor risk and contingency management
	☐		Application of unnecessary standards
	☐	N/A	Unnecessarily bespoke solutions
	☐		Competitive processes do not result in desired outcomes
	☐		Highly risk averse approach regardless of market capability
	☐		Does not adapt or change behaviour to the circumstances
	☐		Does not incentivise investment within the supply chain
	☐		No investment in the development of client organisation capability
	☐		The project initiation and delivery focuses on the capital delivery to the detriment of outcomes and associated asset management goals
Green	☐	☐	Knows what is needed and prioritises accordingly
	☐	☐	Establishes project purpose, principles, roles and tasks before the detail
	☐	☐	Translates sponsor requirements into clear functional/technical requirements
	☐	☐	Constructively challenges changes from sponsor
	☐	☐	Challenges 'specialist' requirements
	☐	☐	Establishes appropriate measurements, metrics and targets for success
	☐	☐	Benchmarks cost and performance and applies industry comparators as appropriate
	☐	☐	Implements appropriate business processes and understands their benefits
	☐	☐	Invests in information management
	☐	☐	Balances risk and reward appropriately with the supply chain
	☐	☐	Consistent behaviours towards others
	☐	☐	Makes timely decisions
	☐	☐	Governance arrangements provide clear accountability to sponsoring organisation
Blue	☐	☐	Considers long term efficiency before short term commercial gain
	☐	☐	Objectively challenges the requirements and cost estimates
	☐	☐	Understands and applies whole life cost and carbon reduction principles
	☐	☐	Effectively bridges interfaces between organisations
	☐	☐	Ensures project needs supersede individual stakeholder demands
	☐	☐	Risk and reward deliver optimum outcome
	☐	☐	Makes informed use of competition
	☐	☐	Advocates on behalf of the team – a no blame culture
	☐	☐	Adopts lean principles and concepts
	☐	☐	Continuous capability and capacity enhancement
	☐	☐	Strategic awareness of market appetite, capacity and capability

Assess Market Capability

What is meant by market?

A market is a group of organisations that integrates and competes to provide goods or services to one or more clients. The construction and infrastructure market is often characterised by a large number of suppliers and SMEs. This fragmentation of the market means this sector is often less responsive to change and innovation.

Market capability assessment looks at the broader industry/sector capacity or capability requirements over the life of the asset. Early engagement with the market is always encouraged.

Purpose

To understand, plan and confirm what the market capability and appetite is for the project. If either capability and/or appetite are insufficient, identify what development might be required. This includes support from consultants, delivery partners, contractors and suppliers. Alignment of market capability to the demands of the project and to complement the capability of the client is fundamental for a successful working relationship and project success.

It is the responsibility of the sponsor and client to work strategically with the market to understand and verify what can realistically be achieved. If a sponsor and/or client requires or wishes to engender different outcomes then they must plan for and verify how the market will be enhanced. For example, by building the capability in the market (recognising that this may take time), or looking to another market to fulfil the needs or changing the project approach.

How to assess market capability

Review the characteristics in the table and tick those that you consider are currently present in the market's capability and those that should be in place.

The groups of characteristics in the table opposite are seen in markets that demonstrate the following behaviours.

- **Red:** The market has insufficient capacity or capability to meet the project's needs or has instabilities that are likely to be detrimental to the project's success;
- **Green:** The market has sufficient capacity and capability to support the project's needs, or has viable plans to enhance any shortfall;
- **Blue:** The market is mature yet innovative and is likely to deliver efficiencies in addition to meeting the project's needs.

Where there is an established supply chain the Align for Success Procurement module provides a similar approach to assessing supplier capability.

How to use the results

The assessment results contribute to the Complexity-Capability Gap Analysis. Where there are market capability gaps the Align for Success module on Procurement can help with:

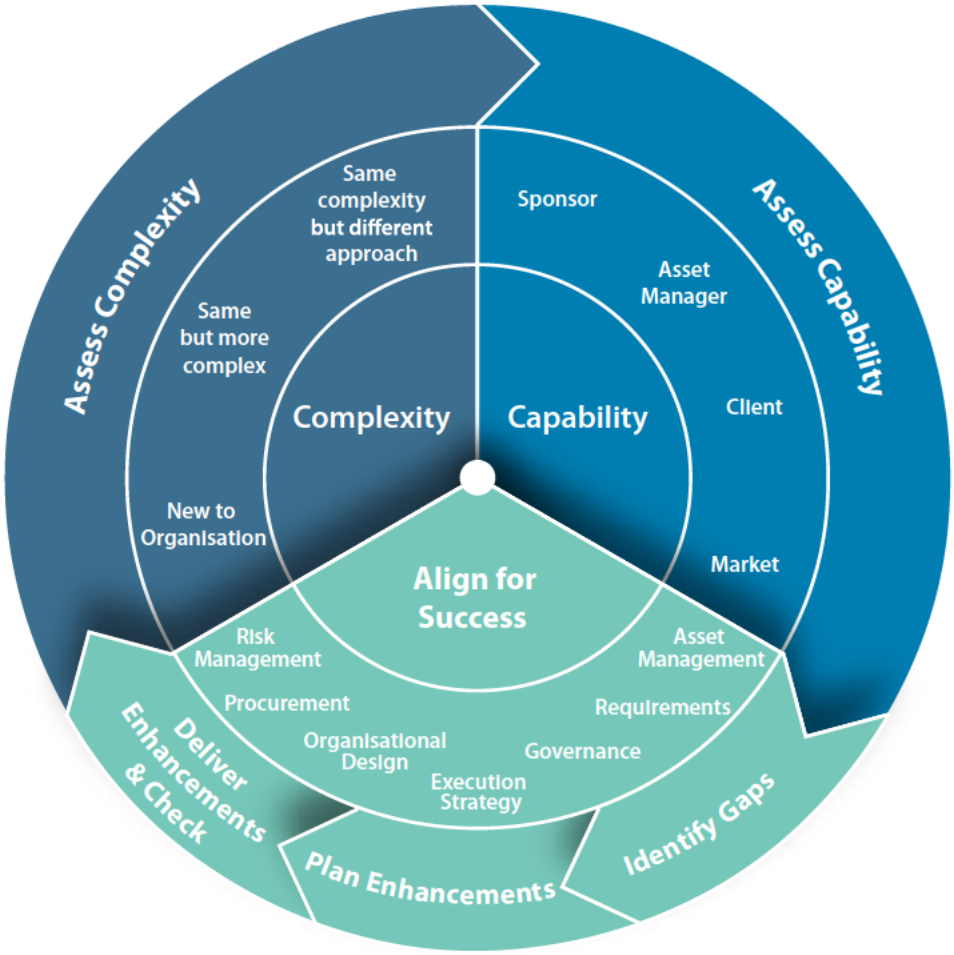
- any issues identified – e.g. where the project requires more from the market than it is currently capable of providing;
- any misalignment issues between client capability and market capability. Note: there might be circumstances that require a sponsor or client to engage with the market while still in a "vulnerable" state regarding their own capability;
- capability assessments of specific supplier organisations.

Example: Network Rail market building

Network Rail opened a new dialogue with their supply chain in 2011 about a collaborative approach to driving industry change. Time and effort was required to reach the current level of maturity and the key was focusing on bringing tangible change across the whole supply chain; from faster payment, removal of retentions, adoption of BS11000 & the creation of alliances. With each step Network Rail and their supply chain collectively proved that they could make a difference and bring a new commercial dynamic to the Rail sector.

Market Capability Assessment

Level	*Current*	*Needed*	*What market characteristics do you recognise?*
Red	☐		The market comprises many small individual organisations working for multiple clients
	☐		One party tends to dictate the relationship (e.g. client or supplier dominates)
	☐		Work is normally awarded based on lowest price
	☐		Little interaction between suppliers prior to contract awards
	☐	N/A	No collective understanding of market's capacity to deliver
	☐		Suppliers do not understand the client business and therefore cannot offer business oriented solutions
	☐		Roles and responsibilities across the supply chain are hierarchical with each sub-let being dictated by the letting supplier's tender
	☐		Design tends to be a discrete activity completed before implementation suppliers are invited to tender
	☐		Inconsistent performance resulting in unfulfilled outcomes
	☐		Contract incentives appear misaligned to sponsor's requirements or Client Model, which may mean the supply chain performs contrary to expectations
Green	☐	☐	The market works closely together up and down the tiers of the supply chain
	☐	☐	Clients manage suppliers strategically but encourage interaction and contribution
	☐	☐	Agreements between suppliers and/or customers enable long-term investment in performance improvement
	☐	☐	The main players involved in projects focus on delivering project goals
	☐	☐	Suppliers understand the client business and offer business oriented solutions to mutual benefit enabling more effective incentivisation
	☐	☐	Client team work on an integrated basis with some key suppliers
	☐	☐	Design is iterative and involves parties concerning installation, operations and maintenance (whole life approaches)
	☐	☐	The market collaborates to find ways of getting more benefit for the same cost, thus adding value
	☐	☐	Suppliers form multi-skilled joint ventures and consortia for specific projects
	☐	☐	Generally time, cost and quality requirements are met
	☐	☐	Performance across the supply chain is measured, understood, communicated and acted upon
Blue	☐	☐	The whole industry is interconnected and those interconnections are understood and maximised
	☐	☐	Suppliers bring forward supply chain partners they feel will add the most value to successful delivery
	☐	☐	Organisations regularly participate in repeat activity where many partners at all levels move from project to project and/or customer to customer
	☐	☐	Organisations understand the importance of ensuring that all parts of the chain understand the goals of the project and the philosophy being adopted
	☐	☐	Structure and organisation on projects is agreed by the collaborative integrated project team
	☐	☐	There is a market focus on removing unnecessary duplication and wastage, thus adding value
	☐	☐	There is long term investment to building market capability (e.g. research, development, facilities)
	☐	☐	Established and long-term joint ventures and new companies formed to offer integrated solutions



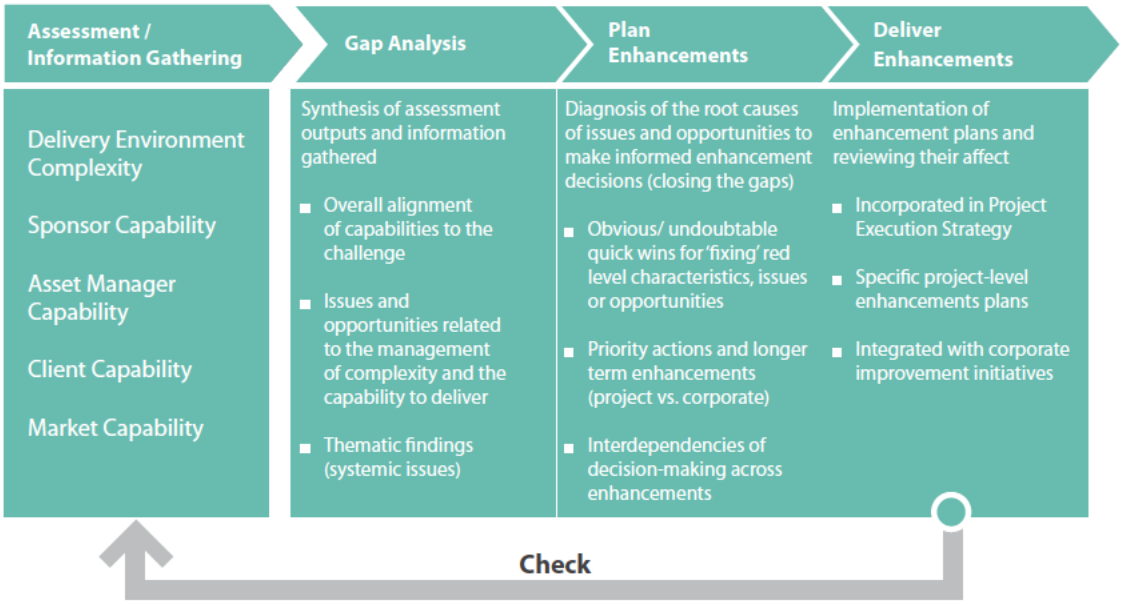
Section 4

Align for Success

> *The issues that lead to poor execution of major projects are not usually rooted in individual shortcomings, they are systemic failures that should have been addressed during initiation. This means that aligning for success has to start as early as possible and be planned holistically."*

Prof. Denise Bower, Exec Director, Major Projects Association

Having completed the complexity and capability assessments the next step is to identify any gaps so that enhancement plans can be developed, implemented and checked - as shown in the diagram below.



Synthesis of the interview outputs typically involves the same people who conducted the assessments. Document reviews, workshops and other information gathered contributes to an understanding of any issues/ opportunities and areas of misalignment. Issues to consider:

- Is there consistency?
- Are there differences between individuals or organisations?
- Does this alignment/misalignment create specific concerns or challenges?
- Do people recognise the complexity or capability misalignment and have a plan to deal with it?

Outputs from the gap analysis may show various findings: good/bad; already being addressed/not; clustered on a theme/isolated; relating to project organisation/relating to corporate organisation. The critical thing is to identify issues/opportunities relating to successful delivery that require enhancements to be implemented.

Some enhancements will be quick wins that have little impact on other aspects of the planned project approach. However, other enhancements may be more far reaching and require further diagnosis. Typically these will relate to either reducing the complexity, enhancing capability or taking a different approach, as was found by Anglian Water in the example below.

Example: Anglian Water AMP6

Routemapping of the Anglian Water @One Alliance highlighted the critical dependency between a Client Model that sought benefits from greater integration of the supply chain and from initiatives that required different ways of working, such as industrialised construction.

Enhancement planning included an exercise to map the entire supply chain for AMP6 (and beyond), from strategic sub-contractor to equipment suppliers. This mapping highlighted the different capabilities needed to deliver the new ways of working and included capabilities outside the traditional water industry supply chain.

This subsequently led to a procurement programme that included a greater degree of market making; assessing cross sector capability and introducing new supply chain partners that could support the changes required in AMP6. The procurement strategy also identified the appropriate commercial model for each part of the alliance supply chain, with a general shift towards greater collaboration and incentivised contracts.

The Routemap provides further diagnostics through a suite of Align for Success modules. The modules relate to a number of common themes that emerged through the Routemap pilots. They can be used to evaluate further considerations before formulating enhancement plans for findings relating to these common themes.

The Align for Success modules have been developed collaboratively by industry, IUK and the University of Leeds based on real world experiences. They are designed to support enhancement planning decisions: they are not intended to replace existing best practice to be found elsewhere. Each module is set out in the following sections:

- Why it matters - a description of each theme and its importance;
- Considerations – key areas to take into account when planning enhancements;
- Supporting material and tools – for the planned enhancements;
- Final check – assurance checklists to assist with monitoring enhancements;
- Further guidance – where to look for wider and/or more detailed help and advice.

Applying the suggestions in the Align for Success modules will result in the creation of strategies and plans to help address the assessment findings. Enhancement plans fall into three categories:

- Enhancing corporate capability – addressing opportunities/weaknesses external to the project;
- Enhancing project capability – addressing opportunities/weaknesses within the project;
- Shaping the project execution strategy – decisions/actions to go in the execution strategy.

The Complexity-Capability Assessments and the Align for Success modules can also be used during delivery to check the project is still on track. It is recommended that the Routemap is considered at key transitions in the project lifecycle or when there has been significant change in the participating organisations. Each of the Align for Success modules includes a 'Final Check' which can be used as a means of deciding whether the module should be revisited.

> *"The Routemap has provided a fulcrum for us to change our approach and helped us to build confidence in changes to our Client Model. It has helped us to move from an introspective client – we now engage more fully with fellow clients and value their peer review – the Routemap has been at the heart of this dialogue."*
>
> **Miles Ashley,** Programme Director, London Underground

Linking key findings to Align for Success modules

The table below highlights the example findings from the pilot Complexity-Capability Assessments. It can be used to help identify which of the Align for Success modules will help where further diagnostics or consideration is needed.

The use of this table should not be a substitute for doing the complexity and capability assessments, as the examples shown are not exhaustive, but are included to give an indication of which modules help with what type of finding. If you have identified a number of systemic issues it may be worthwhile working through all the modules to better understand the related impact of your decision-making.

Example key findings	Requirements	Governance	Execution Strategy	Organisation	Procurement	Risk Management	Asset Management
The requirements are poorly articulated, resulting in ambiguity as to the purpose of the project or what it needs to deliver.	●						◐
The key stakeholders within the sponsor organisation have differing opinions on what the project needs to deliver; or it is not clear that all stakeholders have been consulted.	●						
There is low confidence in the benefits being realised because there are assumptions underpinning the benefits that have not been tested in this context.	●						
It will be difficult to prove success because the benefits are not defined in tangible or measurable terms.	●		◐				
It is not clear how the deliverables align with or contribute to expected benefits, therefore it is unclear whether the totality of the benefits will be realised by the project.	●		◐			◐	◐
There is likely to be conflict or tension between the participating organisations as the project is not fully aligned with all their relevant individual objectives.	●	◐				◐	
A Delivery Model (e.g Public-Private Partnership) is being proposed that the sponsor/client organisations do not have previous experience of applying successfully, therefore may need capabilities they currently do not have.		●	◐	◐			
Corporate governance arrangements are insufficient to host a project of this scale/complexity.		●					
Slow decision-making is likely to absorb management time and if left unresolved will lead to project delays.		●	◐	◐			
There are too many layers, or unclear decision-routes may result in unnecessary effort and duration to gain approvals.		●	◐	◐			
Lack of clarity regarding who has authority for what type of project decisions means previously agreed decisions are re-opened by each decision-making body, resulting in decisions being remade or overturned.		●					
Lack of accountability, as people (or organisations) are able to make decisions for which they are not fully accountable.		●	◐	◐		◐	
Lack of transparency in decision-making means confidence and trust in the project diminishes as stakeholders are unable to understand how, when and by whom project decisions are made.		●					

● Primary module ◐ Related module

Example key findings

	Requirements	Governance	Execution Strategy	Organisation	Procurement	Risk Management	Asset Management
The accountability for risk does not match the organisation's capability or appetite to manage the risk.		◐	◐	◐	◐	●	
This project is encumbered by political or other interests external to the project.		●					
There is a disjointed relationship between sponsor, client, asset manager and supply chain.		●	◐	◐	◐	◐	
Project team forecasts for time, cost and benefits are not supported by realistic plans and controls, resulting in low confidence of them being met.			●				
The delivery team is over-focusing on a single element of execution (e.g. just on implementation and not enough on operational support).			●				
Through the life of the project there is little provision for or anticipation of potential scope changes caused by changes to external factors.	◐	◐	●	◐	◐	●	
The delivery team has not established any continuous improvement capabilities therefore there are likely to be missed opportunities to apply efficiencies or lessons learned.			●				
There is a lack of understanding of the extent of new capability required by the client to deliver the project.			◐	●			
The approach for implementing the capability enhancement is inappropriate, or the scale of change is underestimated.			◐	●			
Changes to capability requirements at transition points are not identified, anticipated or prepared for. e.g. transitioning from design phase to build phase).			◐	●			
A Client Model (e.g. alliancing) is being proposed that the client/supply chain organisations do not have previous experience of applying successfully, therefore may need capabilities they currently do not have.			◐	●	◐	◐	
Contract incentives appear to be misaligned to sponsor's requirements or Client Model, which may mean the supply chain performs contrary to expectations.	◐	◐	◐	◐	●	◐	
A procurement model is being proposed that the client/supply chain organisations do not have previous experience of applying successfully, therefore may need capabilities they currently do not have.			◐	◐	●		
The client over-prescribes how work should be done thus may miss out on innovation and value-add from the supply chain.			◐		●		
The market appetite to support the project is unproven.			◐	◐	●		
There is a lack of understanding of the extent of capability development required by the market to deliver the project.			◐		●		
The current supply chain structure for the market is convoluted resulting in inefficiencies and failure to integrate.			◐		●		

● Primary module ◐ Related module

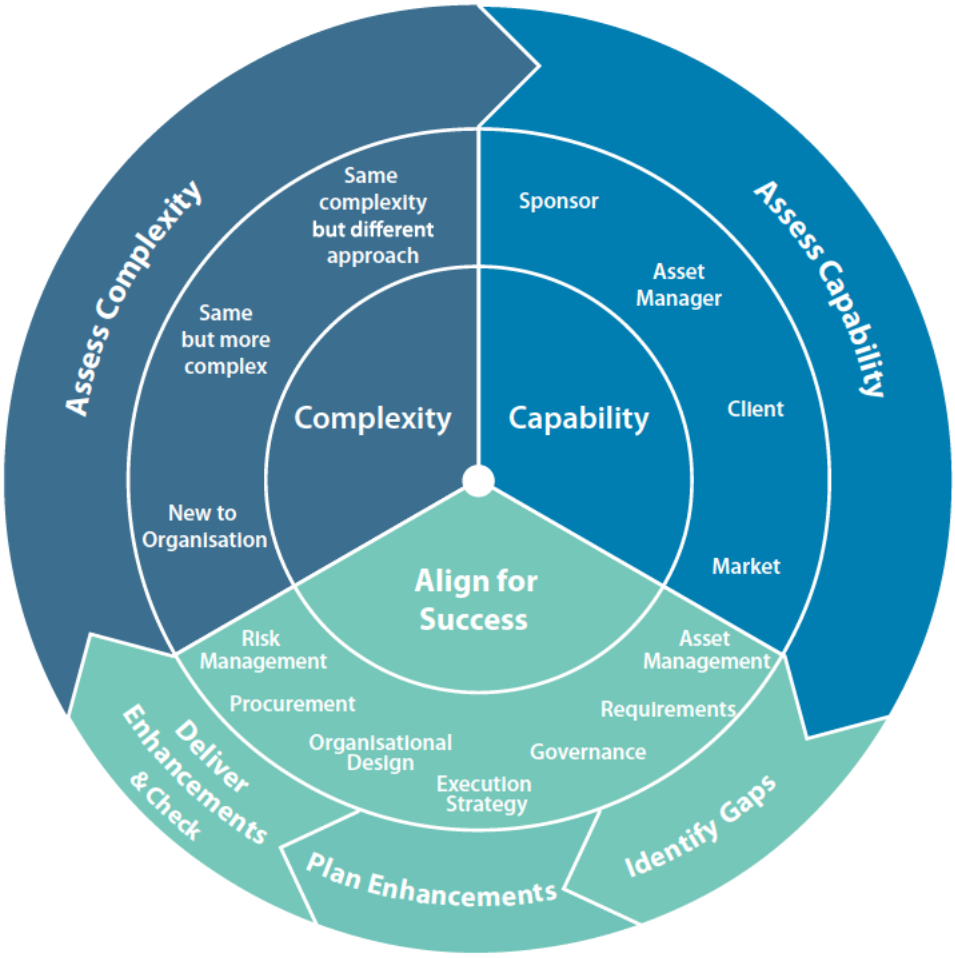
Example key findings

	Requirements	Governance	Execution Strategy	Organisation	Procurement	Risk Management	Asset Management
There is no clear lifecycle asset management strategy in the asset manager organisation articulated to sponsor or client	◐						●
There are no or inadequate lifecycle parameters – such as asset reliability, availability, cost of maintenance, or operability – defined in the requirements	◐	◐		◐	◐	◐	●
The project initiation and delivery focuses on processes to the detriment of outcomes and associated asset management goals	◐	◐	◐	◐			●
There is no current requirement specified or plan and budget in place to develop lifecycle asset strategies, particularly for maintenance, asset information, and risk management, in the project before handover to operations and maintenance	◐	◐				◐	●
There is no clear role/dedicated resource on the project specifically tasked with providing the whole life asset knowledge and articulating the asset vision so as to optimise achievement of the organisational goals	◐	◐		◐	◐		●
There is no strategic engagement with the operators and/or supply chain to ensure that the project solution is defined, developed, constructed and handed over appropriately	◐	◐	◐	◐	◐		●
There is limited use of Asset Information in developing project requirements and BIM is not built into project development activity.	◐				◐		●
The project requirements, business case and design indicate a lack of future thinking and/or inadequate links to a corporate asset management strategy.	●	◐					◐
The project has been assessed in isolation without reference to the business and asset management strategy	◐	●					◐
Poor decision-making, governance structures and processes undermine the integrated asset strategy	◐	●	◐	◐	◐		◐
Poor development and retention of Asset Management capability leads to inadequate asset management and, in turn, to less than optimum whole life value	◐	◐	◐	●			◐

● Primary module ◐ Related module

What each module provides

Align for Success module	*What it diagnoses*
Requirements	How to align the project with the organisation's objectives, the benefits it is expected to deliver, and how the benefits can be managed to significantly increase the certainty of project success. An example of the importance of aligned objectives is illustrated in the lessons learned from auction of the 3G licenses to subsequent 4G auction, as described in the NAO report. The auction for 3G licences erred on the side of maximising the auction proceeds, which resulted in the successful bidders being unable to build the infrastructure in line with the market demand. Whereas the auction for 4G licences set the objective of maximising the government's income from a sustainable market whilst optimising the auction proceeds.
Governance	How all the parties involved in the project allocate the right levels of authority and accountability so that key decisions can be made with confidence throughout the life of the project. It helps highlight areas where existing governance structures may be weak or inappropriate for either the scale or the complexity of the project. An example of where further consideration on governance has helped is at Crossrail, where its multi-ownership resulted in multiple tiers of management and introducing inefficiencies in decision-making. A streamlined governance structure was established that removed some of these layers and made decision-making more efficient.
Execution Strategy	How the project is set up to fulfill the requirements, adhere to governance needs, manage its risk and set its delivery strategy, within which organisation structure and procurement strategies can be formulated. An example of the importance of a clear execution strategy can be found in the NAO report on the BBC's Digital Media Initiative programme, which was cancelled after 4 years. One of the reasons cited for the failure of the programme was an over-focus on just one element of the programme's execution, namely the technology aspects, and insufficient focus on delivering the process and structural changes to the BBC.
Organisational Design & Development	How to determine and enhance the structure of the project organisation, including determining the optimum boundaries for in-house and external resource provision. It also provides a diagnostic for identifying transition points in the project lifecycle and the change management approach to developing organisational capability to close identified gaps. An example of where further consideration on organisational design and development has helped is at TfL, where their Stations Stabilisation Programme (SSP) involved a different supply chain model than previously used. The diagnostics identified that the programme needed a different type of organisation as it was engaging with the supply in a different way. An initiative was established to help transition the organisation.
Risk Management	How to to identify, evaluate and manage any potential factors which could reduce or increase the likelihood of meeting the objectives of the programme. Risk management can save time, improve quality and reduce the cost of achieving an agreed outcome. An example of where risk management has supported improved project outcomes is provided with Crossrail who established clear accountability for the management of risk within the tiers of the projects governance structure. Financial authorities and contingency budgets proportionate to the risk exposure managed at each level were then set.
Asset Management	How to ensure the project is focused on delivering the required long-term as well as immediate benefits, the total cost of ownership as well as the benefits over the practical life of the assets and to realise the capital and operational delivery benefits of the project back into the client's asset system. An example of where asset management considerations have helped is with Scottish Power who have a funding model which supports whole life asset management and enables them to align their project delivery to this. As a recognised industry leader in optimal management of physical assets they follow a stringent process of assessment which benchmarks best practice in asset management.
Procurement	How to engage with the market, determine optimum allocation of risk between the client organisation and the supply chain, package up the work to be procured and identify the most appropriate procurement route and form of contract. Examples of a more considered approach to procurement are the move to establishing alliance contracts for long term infrastructure pipelines (utilities), or pooling of procurement activities across multiple organisations (police, local government).



Section 5

Applying the Project Initiation Routemap

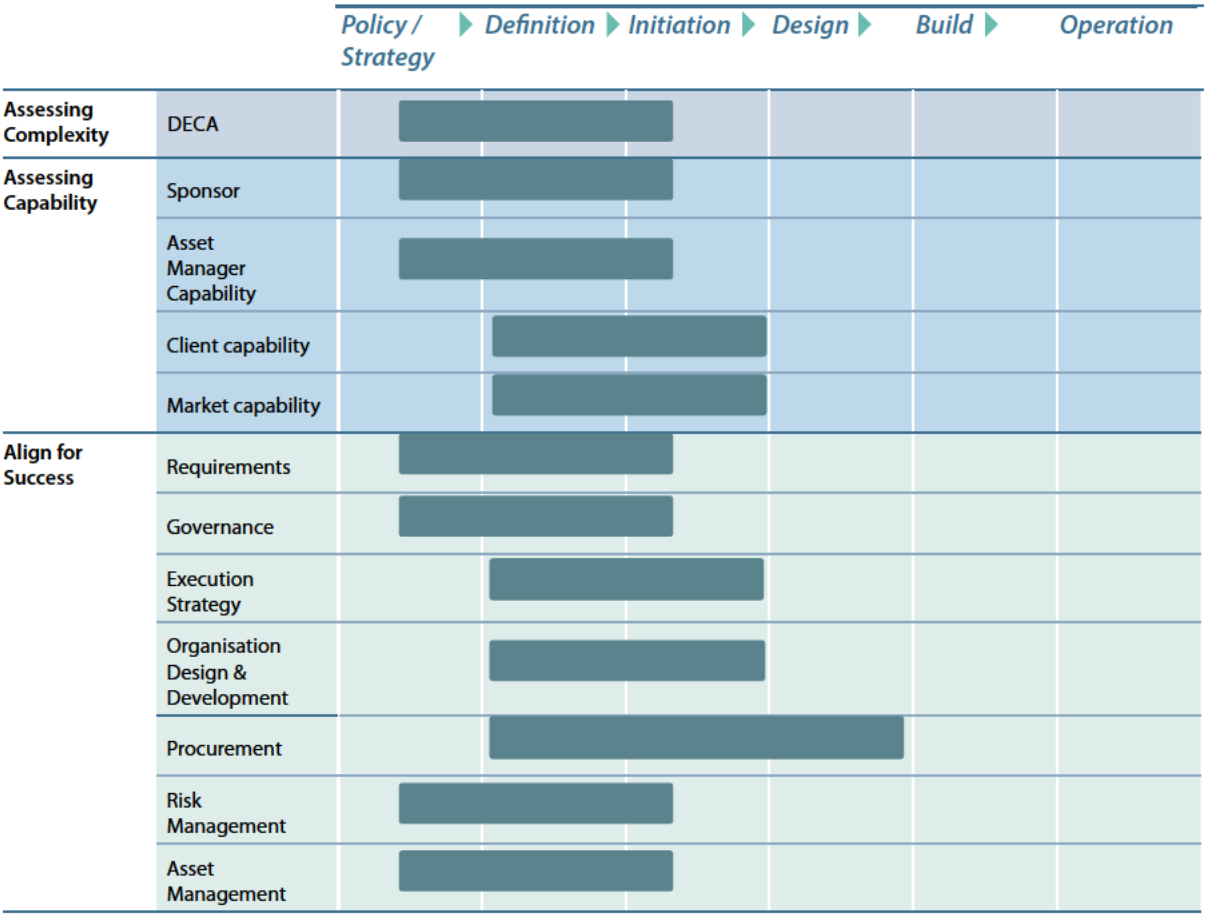
> *Overall a very useful and insightful experience, the application of the Routemap approach was something that I hadn't previously been aware of. I found the process followed from the pre-workshop research and interviews with key stakeholders and members of the programme team very engaging and thought provoking. Having someone come in and take a look at what was going on and apply some really methodical approach to examine how things could be improved was really beneficial."*

Simon Whitehorn, Head of National Operating Strategy, Network Rail

Introduction

This section provides some advice and prompts about how and when to use the Routemap. It is aimed at people who will take an active role in conducting the assessments, gap analysis and subsequent enhancement planing.

When to use the Routemap



The project lifecycle above is a generic one typical of infrastructure projects. Lifecycles such as RIBA, GRIP* and Pathway† may have slightly different number of stages and names for their stages, but the basic flow from strategy through to operation is essentially the same.

The generic project lifecycle shows the optimum stages for using the various components of the Routemap. As found by the Environment Agency, the activities should be front-loaded in the stages as they will determine decisions and actions to be taken. They are not to be used as a surrogate for assurance reviews or approval points in the lifecycle. The on-going validity of the outputs from the assessments and the Align for Success modules can and should be checked at appropriate points in the design and build stages of the project.

Example: Environment Agency TEP1

The Environment Agency considered a different delivery approach for its TEP1 investment programme. The TEP1 Routemap trial has emphasised the benefit of applying the process at the development stage in a project's lifecycle as a means of building evidence for the outline business case, substantiating the proposed commercial strategy. The Agency developed its commercial and procurement strategy for the programme using the Routemap to validate the Agency's approach prior to seeking business case approval. The outcome of the Routemap was a more detailed action plan regarding further development of the Client Model, including enhancement plans for the Agency's capabilities to apply the new Client Model.

*RIBA – Royal Institute of British Architects. GRIP - Governance for Railway Investment Projects
† Pathway as used by TfL

Context of the assessment

Having decided that application of the Routemap to a project would be beneficial, using the Qualifying Checklist in Appendix A, it is important to clarify the specific areas of concerns in order to set the context of the review.

Setting the context for the review by reference to, for example: the business case; specific areas of concerns and/or existing enhancement workstreams, helps provide a focus for the review and an initial structure for the gap analysis and consolidation of findings.

For example, the assessment at HS2 was designed to inform the content of the development agreement between HS2 ltd and the DfT, specifically in respect of governance considerations. Whereas, the assessment for TfL's Stations Stabilisation Programme was designed to inform considerations in respect of organisational development and supply chain integration.

Who should lead the assessment?

There is real value to be gained from having a level of independent challenge throughout. The question of who should lead the assessment should be based around best value, considering what would work in your context given the scale and type of the undertaking.

Clearly, **self-assessment** is the most easily managed approach. Where resources are tight, running the assessment as a desk exercise would be the most achievable way of getting a result. Even without such constraints, the client organisation could opt for managing and leading its own staff through the assessment. This could reduce the time spent in interviews and document capture. However, it is unlikely that any project assessing itself would fully recognise its own shortcomings. Hence it is recommended that assessments are carried out by someone with some level of independence, such as a Centre of Excellence or Corporate PMO.

Peer assessment can be achieved through the Sponsor assessing the Client capability and vice-versa. This approach will provide the requisite challenge to in-built assumptions. Even with peer assessments, to gain maximum benefit from them, it is recommended that workshops be led by an independent facilitator who understands the assessment processes. The IUK Infrastructure Client Group and the Routemap Steering Group members are available for reference on adoption best practise and are able to offer support with peer review to share respective experiences.

Independent assessment may involve external costs, but has the advantage of being independent from start to finish. People may be more open in interviews about their organisation's shortcomings with someone who is not a party to the proposed project and promises anonymity.

How long to allow?

Using the Routemap need not be an onerous activity. Anglian Water and Network Rail demonstrate that the application methodology can vary to suit the nature of the challenge and specific requirements of the project. It is possible to undertake the complexity and capability assessments in a few half-day workshops and targeted interviews over the course of a week or two, with outputs and enhancements plans developed in the workshops or by Client leads post the workshops.

Example: Anglian Water and Network Rail Routemap approaches

In the case of Anglian Water and their adoption of the Routemap to support their AMP 6 preparations, the assessments were conducted over a 2-day workshop with key members of the Client team, who then took the workshop outputs and integrated them into their transition and procurement planning for AMP6. By contrast, the application on ETCS for Network Rail involving multiple industry stakeholders resulted in interviews being scheduled over 3 weeks at different venues, followed by 2 weeks of analysis and preparation for a cross industry workshop to share findings and develop enhancements.

Tools supporting complexity and capability analysis

The DECA provides an excellent checklist of things to consider when determining the complexity of the project environment. The NAO report provides advice on what to think about. There is significant value in including risk and opportunity analysis when working towards a sound understanding of the project's context. Various techniques can be used to support this process. The following have all been found to be useful techniques:

- SWOT analysis when linked with PESTEL analysis (Strengths, Weaknesses, Opportunities and Threats linked with Political, Economic, Social, Technological, Environmental and Legal);
- Value Networks consider the social and technical resources within and between organisations. The DECA uses the Socio-Technical Hexagon from the University of Leeds (see Appendix B) but other Value Networks such as "Michael Porter's 5 Forces" or Nalebuff's Game Theory derived Value-Net could also be used.

If an organisation is already undertaking complexity assessments using other tools then it may be appropriate to use the outputs from those tools and simply cross check the DECA for complexity factors not covered. For example, TfL uses the Helmsman Institute's complexity model which covers all 12 factors from DECA.

Likewise, an organisation may already use maturity models to assess capability, such as the Portfolio, Programme, Project Management Maturity Model (P3M3). Such models differ from the capability assessments within the Routemap in that they look at an organisation's capability to deliver all their projects whereas the Routemap assesses capability specific to the project context. Nevertheless, it can be useful to review the outputs from previous maturity assessments as part of the information gathering activity and also to relate enhancement plans relating to corporate capability with any pre-existing improvement initiatives relating to maturity reviews.

> *At TfL we have been working hard to understand our own capability and that available in the supply chain, and to develop that capability to enable us to deliver our challenging investment programme. We have actively supported the development of the Routemap and hosted a number of pilot applications.*
>
> *We know from pursuing P3M3 maturity more generally that great efficiency gains are available through consistency. Application of the Routemap presents another important step in our maturity and has great potential for us and the industry.*
>
> **Doug Norman,** Head of Centre of Excellence, Transport for London

Techniques to use during assessments

Briefing note

Capturing the project context and specific areas of concern in a briefing document and sharing this with participants either before or during interviews will help determine whether there is a shared understanding and alignment of project objectives.

Workshops

Workshops are an excellent technique for achieving a balanced view of how an organisation operates. They are very effective in gaining consensus, so the assessment as a whole will be shorter and the (possibly unwelcome) findings more readily received by the senior stakeholders. One or two day workshops can be used throughout the assessment process to:

- Undertake assessments collectively;
- Consolidate and/or validate the results achieved from other techniques (see below);
- Plan a way forward to address the complexity-capability gap (quick wins, Align for Success modules, etc.);
- Consider the detailed decisions required by the Align for Success modules.

Document review

Document reviews provide evidence of the true state of a project, rather than what the organisation expects its state to be. For instance, even if a project has a well-articulated risk management strategy, it is worth checking that the risks contained in the risk register can be reconciled to outputs from the assessment and they are relevant to the current stage of the project.

Interviews

For workshops to maximise the use of people's time, interviews should be conducted beforehand. These will develop a basis from which the workshop participants can have productive discussions and make well-founded decisions. For example, interviews can be used to gain views of:

- What the target capability should be for the project to be a success;
- First-pass complexity profiles to be refined at the workshop;
- Initial sponsor and asset management characterisations;
- Initial client characterisation;
- Possible Delivery Model and procurement approaches including functional arrangements over the life of the project;
- Identification of the measures required for successful procurement and delivery and to address capability gaps.

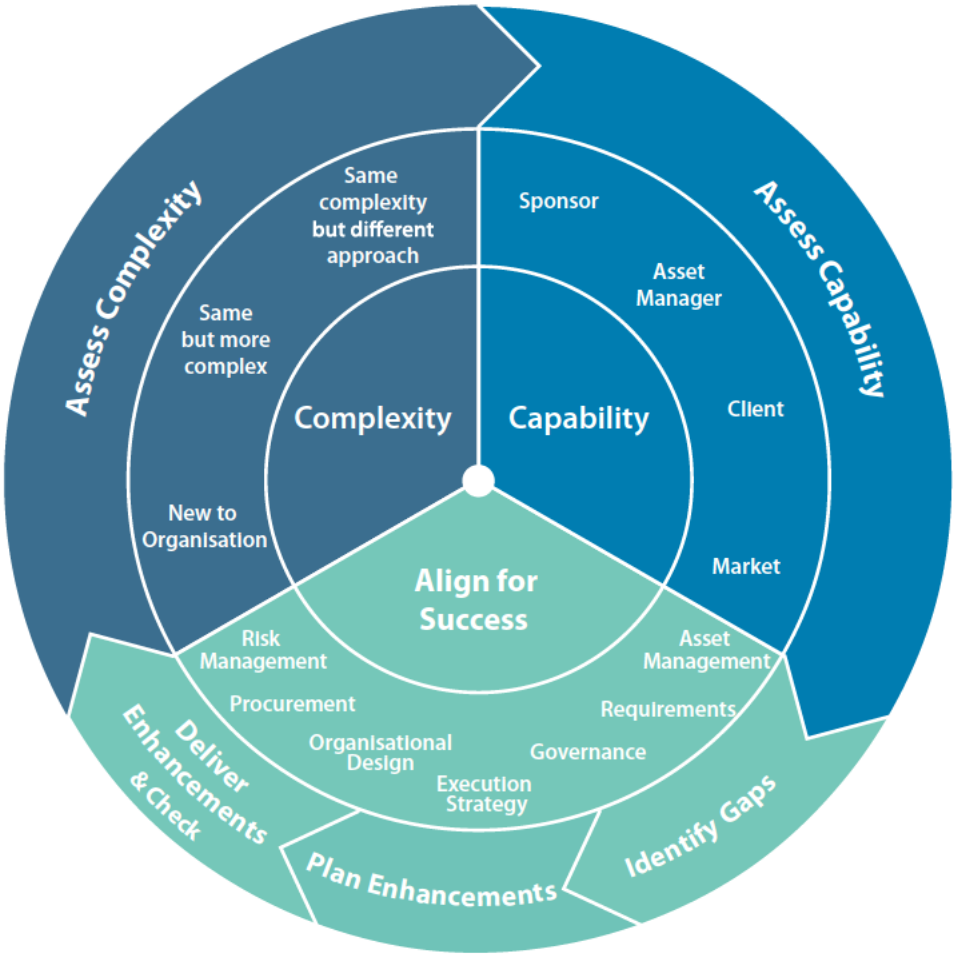
If workshops are not used, then interviews will need to be the basis for assessment.

Surveys

While surveys would need more preparation, they can provide the easiest way to access different views within an organisation. As long as it is recognised that survey results often have a tendency to be over optimistic they can provide a good starting point for areas to investigate in detail.

Who will benefit?

It has been found that even the most experienced project-oriented organisations can gain significant benefits through using the Routemap at key points in their projects, particularly during initiation. To give an idea of the type of project where assessments could be useful, the table in Appendix E provides a summary of examples from projects that underwent pilot assessments.

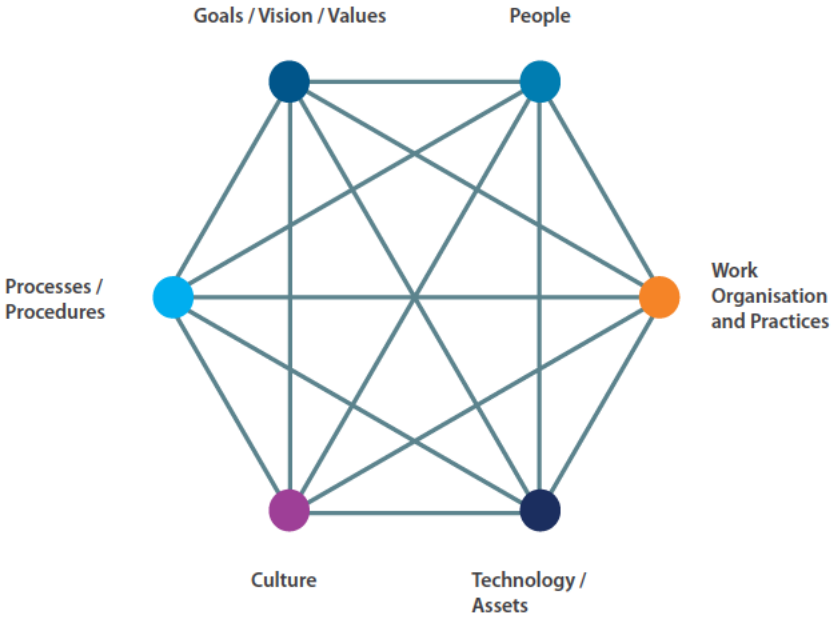


Appendices

Appendix A: Qualifying Checklist

Use the table below to help in deciding which parts of the Routemap could be most useful in a partial assessment.

If any of the questions below give you cause for concern, then consider using the Routemap components in the next column.	*Minimum components recommended*
☐ Has the customer and/or user been identified and adequately consulted?	Complexity Assessment Sponsor Capability Assessment Requirements module
☐ Is there clear line of sight between the sponsor requirements, the output specification and the benefits to be realised?	
☐ Have the forecast benefits been tested and consideration given as to how the benefits will be measured?	
☐ Can the risk be managed within participating organisations' policy and authority?	Complexity Assessment Governance module
☐ Has the Delivery Model been decided and has there been sufficient consideration of its implications?	
☐ Is it clear who is leading the project and who is accountable for its success?	
☐ Is there funding certainty for the whole project?	
☐ Is there a process to incorporate best practice and lessons from other projects?	Complexity Assessment Client Capability Assessment Execution Strategy
☐ Are arrangements in place to manage and measure benefits realisation?	
☐ Have the conditions for achieving efficiency been established?	
☐ Has the extent of possible change been identified and plans developed for building in the required flexibility?	
☐ Has there been sufficient planning around the shape and nature of the client organisation or delivery entity including structure, capability and capacity?	Complexity Assessment Client Capability Assessment Organisational Design & Development module
☐ Has the Client Model (e.g. thin client) been assessed and chosen?	
☐ Are the organisational transition points identified and the changes in capability understood?	
☐ Has the proposed procurement been used in your organisation previously?	Complexity Assessment Procurement module
☐ Has consideration been given to risk allocation, mitigation and management?	
☐ Has market analysis been conducted that supports the supply chain's ability to make any required changes to deliver the expected outcomes and benefits?	
☐ Do the commercial and contractual arrangements (existing or proposed) promote the required behaviours and level of innovation?	



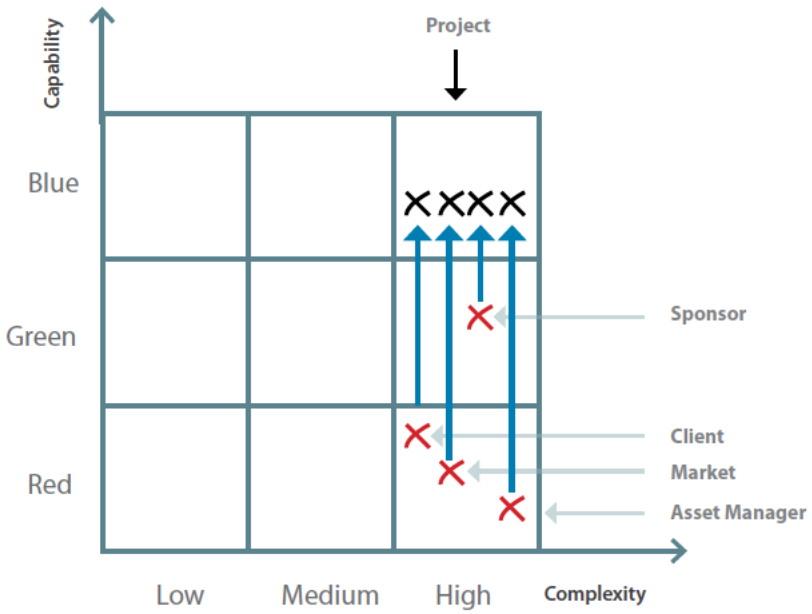
The socio-technical hexagon developed by the University of Leeds and shown above can be used when considering the interconnectedness of an organisation (the 12th row of the DECA).

Any organisation's goals, people, work practices, assets, culture, processes and procedures are all part of an interdependent and interacting system and therefore, need to be understood, designed and improved as such.

The socio-technical hexagon is a graphical representation of the relationships within a socio-technical system. Consideration of the client (or sponsor) organisation as a system leads to a better understanding of how well the organisation is functioning and the identification of opportunities for enhancement.

The nodes of the hexagon are used to map risk and opportunity and ultimately sanity check that there is joined up thinking around the:

- Goals, Vision and Values – the reason the organisation exists and continues to exist;
- People – the capability and capacity to deliver the objectives;
- Work Organisation and Practices – the structure and function;
- Technology/Assets – the enablers of the organisation;
- Culture – ways of working;
- Processes and Procedures – effective and efficient information management.



Gap analysis can be used to identify potential gaps between the capability required by the delivery environment and an organisation's current capability. This is analysed using the overall results of the sponsor, client, asset manager and market assessments.

The graph above shows a project with High complexity (the third column): this requires all participating organisations to enhance their current capabilities (marked with red crosses) so that they can be assessed as Blue. In this example, if the project complexity can be reduced to a medium level, Green capability assessments will be sufficient. So the sponsor's capability is already aligned, the client capability is almost there, but there is work to be done in Asset Manager. If, however, the complexity cannot be reduced then all three areas need a significant increase in capability.

How to plot your results

- Mark on the horizontal axis (complexity), the result from the DECA;
- Plot on the vertical axis (capability), the results of each completed capability assessment for sponsor, asset management and client. Take the lowest value as the one to plot. For instance, if the characteristics are mostly Green with a few Blue and only one Red, the capability will be Red, unless a "quick win" can be identified that will immediately lift the capability up to the Green zone of the graph;
- To plot the capability that is needed for success, match the vertical score to the horizontal one (Low matches Red, Medium matches Green, and High matches Blue). However, to avoid having a failing system, the minimum needed capability has to be Green, since Red signifies a failing system.

Appendix D: Client and Market Capability Gap Analysis

Gap Analysis can be used to demonstrate the level of alignment between client and market capabilities. To use this technique, you select the cell in the table above that is at the intersection between client and market scores.

The table shows where there is good alignment (OK cells), and potentially dangerous misalignment (Avoid cells).

Caution 1 could be safe if the DECA score is low but there will no skills transfer from the supplier to the client and the client should avoid using sophisticated incentives.

Caution 2 means the client may need to enhance their procurement and contract management capability in order to get full value from the market sophistication.

Appendix E: Referenced Examples

Organisation / Project	*How the Routemap helped*
Anglian Water AMP6	Anglian Water established the @one Alliance to bring together an integrated supply chain to deliver many of the projects in its AMP4/AMP5 spending periods. In planning for the AMP6 programme of work and the next evolution of its @one Alliance, Anglian Water assessed client capability as being appropriate to the challenge, but that greater alignment and integration across the Anglian Water/Alliance interface would enable further progress. The goal was to improve the translation through the supply chain of Anglian Water outcomes and requirements.
Crossrail	The Routemap principles were mapped retrospectively against Crossrail's journey as the programme progressed from development to preparing for operational readiness. In doing so, the benefit of the Routemap's objective and systematic approach led to identification of a number of areas where its application would have realised further gains. It was found that the components of the Routemap corresponded to the challenges that Crossrail faced and how they were actually dealt with (many intuitively). As a form of rapid appraisal, the Routemap identified critical aspects requiring in-depth review and provided guidance on how to systematically take steps to increase both effectiveness and efficiency. The significant benefits achieved at Crossrail, reflective of the application of Routemap principles, illustrate the potential of the Routemap for application on other major projects and programmes. Having led to savings against the original budget of approximately 7% (£1.1billion from a mature sponsor-client relationship and tens of millions from client capability transitioning and OCI), it is reasonable to assert that the adoption of an objectively systematic approach, as outlined by the Routemap, would enable other major investments to achieve the projected savings.
Environment Agency TEP1	The Environment Agency considered a different delivery approach for its TEP1 investment programme. The Agency developed its commercial and procurement strategy for the programme used the Routemap to validate the Agency's approach prior to seeking business case approval. The outcome of the Routemap was a more detailed action plan regarding further development of the Client Model, including enhancement plans for the Agency's capabilities to apply the new Client Model. The TEP1 Routemap trial has emphasised the benefit of applying the process at the development stage in a project's lifecycle as a means of building evidence for the outline business case, substantiating the proposed commercial strategy.
Highways Agency South East '5' Highways strategy	The review assisted the collaborating authorities to develop a vision for success and qualify the complexity attributed to delivering shared services. The alignment of the authorities behind this vision is key but the degree of the challenge and the capability of the 'organisation' needed is dependent on the extent of collaboration. Understanding where value comes from with respect to standardisation, shaping the market, sharing best practice, investment and innovation, economies of scale, strengthening capabilities and improving planning and prioritisation represents a significant amount of front-end effort to achieve alignment around a purposeful relationship.
HS2	DfT, HS2 Ltd and other key stakeholders including Network Rail needed to prepare for the next stage of the HS2 programme from hybrid bill submission through to procurement and construction of Phase 1and design development of Phase 2. The review focused on consideration of the Governance arrangements needed to reflect this new phase of the project and the development high performing sponsor, client, and delivery organisations, together with clear roles and responsibilities, delegations of authority. The output of the review will feed into the development of the proposed "Development Agreement" between HS2 Ltd and DfT.

Appendix E: Referenced Examples

Organisation / Project	*How the Routemap helped*
Network Rail ETCS Programme	The ETCS programme requires investment and engagement from a large number of stakeholder organisations, who have different business drivers and who will experience different costs and benefits with different timescales. Consequently, in order to successfully deliver this fundamental change in railway operation, over multiple settlement periods, it is essential that industry stakeholders and sponsors recognise the need to govern the programme at a network level in order to maximise the benefits. The review focused on the development of a cross industry vision for the programme along with the establishment of an appropriate leadership team, governance structure, and an understanding of how the programme will be prioritised and resourced.
Surrey County Council Strategic Highways	A capability assessment of Surrey's Highways Maintenance and Improvement Programme identified the need to establish a dedicated project team to contribute to and support the development of a new approach to asset management. It was tasked with addressing the asset knowledge gap and articulating the asset vision and outcomes in the form of a robust business case with a clear plan for how the expected benefits would be managed and measured.
Transport for London (TfL) Stations Stabilisation	TfL's Stations Stabilisation Programme (SSP) is based on a 'Fair For 10 years' asset management strategy. SSP will be undertaken via a rolling three year funded programme, which offers the opportunity to provide substantial efficiencies in terms of improving productivity, reducing defects, and avoiding multiple overheads. 12% savings have already been taken into budget considerations. However to deliver the savings a new Client Model is required regarding construction management, including a different relationship to be developed between TfL and its supply chain. A step change it needed. The Routemap exercise was conducted alongside a change initiative that was already underway within SSP. The Routemap provided confidence that the new Client Model was sound, but identified some enhancements needed to how the programme was governed, the number and type of resources required for the new model and how the supply chain engaged and aligned with the 'Fair For 10' concept.

Glossary

Asset Manager

The asset manager is the organisation (or parts of) that is responsible for day-to-day operations and maintenance of the asset. The asset manager may be a part of the sponsor or client organisations or a separate entity. Similarly the operator and maintainer of the assets might be separate entities.

Asset management is the coordinated activity of organisations to realise value from their assets.

Capability

The Routemap uses capability to describe the ability of the sponsor, client, asset manager and market to organise for effective and efficient delivery. It refers to a part of the business and not the individual as most barriers to effective practice are rooted in systemic issues and not individual action.

Client

The client is the organisation that is responsible for fulfilling the requirements and delivering the benefits. The client translates the requirements from the sponsor and manages the delivery outcomes. The client selects the most appropriate supplier/s to meet project objectives.

Complexity

Project complexity is a measure of the inherent difficulty of delivering a project based on factors such as stakeholder alignment; interconnectedness of projects; systems & organisations and the level of innovation required etc. The Routemap uses the Delivery Environment Complexity Assessment (DECA) published by the NAO for complexity assessment.

Client Model

The Client Model refers to how the client organisation will structure and resource the responsibilities for project execution between the client, advisors/partners and supply chain (e.g. thin/fat client). This is a key consideration in determining organisational design and procurement strategy.

Delivery Model

The Delivery Model refers to the organisational entity that will be appointed to deliver the project (e.g. establishment of a special purpose vehicle). This is a key consideration in determining governance arrangements.

Infrastructure

Infrastructure includes the networks and systems that supply and support reliable and effective domestic and international transport, digital communications, energy, flood protection, water and waste management.

Market

A market is a group of organisations that integrates and competes to provide goods or services to one or more clients. The construction and infrastructure market is often characterised by a large number of suppliers and SMEs.

Procurement Model

The approach taken and the contracting model used to procure the supply chain.

Project

Throughout this guide the term project is used to mean both project or programme.

Sponsor

The sponsor organisation secures the funding, owns the business case and is responsible for specifying the requirements to the client. The Sponsor ensures that the project remains strategically aligned and viable, and that benefits are on track to be realised. In some contexts the Sponsor and Client could be from the same organisation.

Target Operating Model

The end state of how the asset will be: used; funded; owned; operated and maintained.

Appendix G: List of Contributors

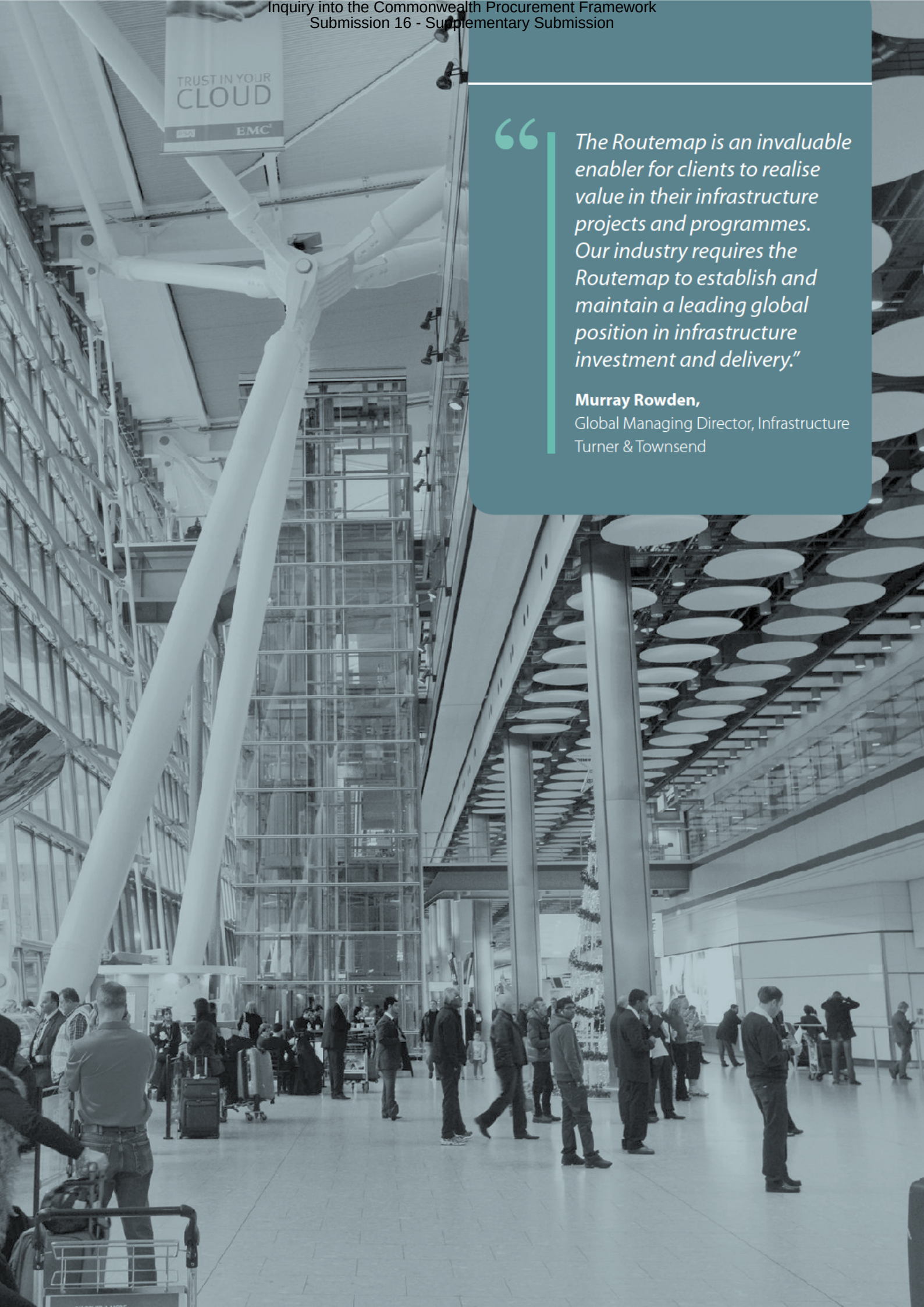
IUK would like to thank the following organisations that contributed time and expertise to the development of the Project Initiation Routemap.

Steering Group & Contributors

AMCL
Anglian Water
Cabinet Office
Constructing Excellence
Crossrail
Crossrail 2
Environment Agency
High Speed 2
Infrastructure UK, HM Treasury
Institution of Civil Engineers
Major Projects Association
Outperform UK
Pinsent Masons
Scottish Power
Southern Water
Surrey County Council
Transport for London
Turner & Townsend
University of Leeds

Infrastructure Client Group

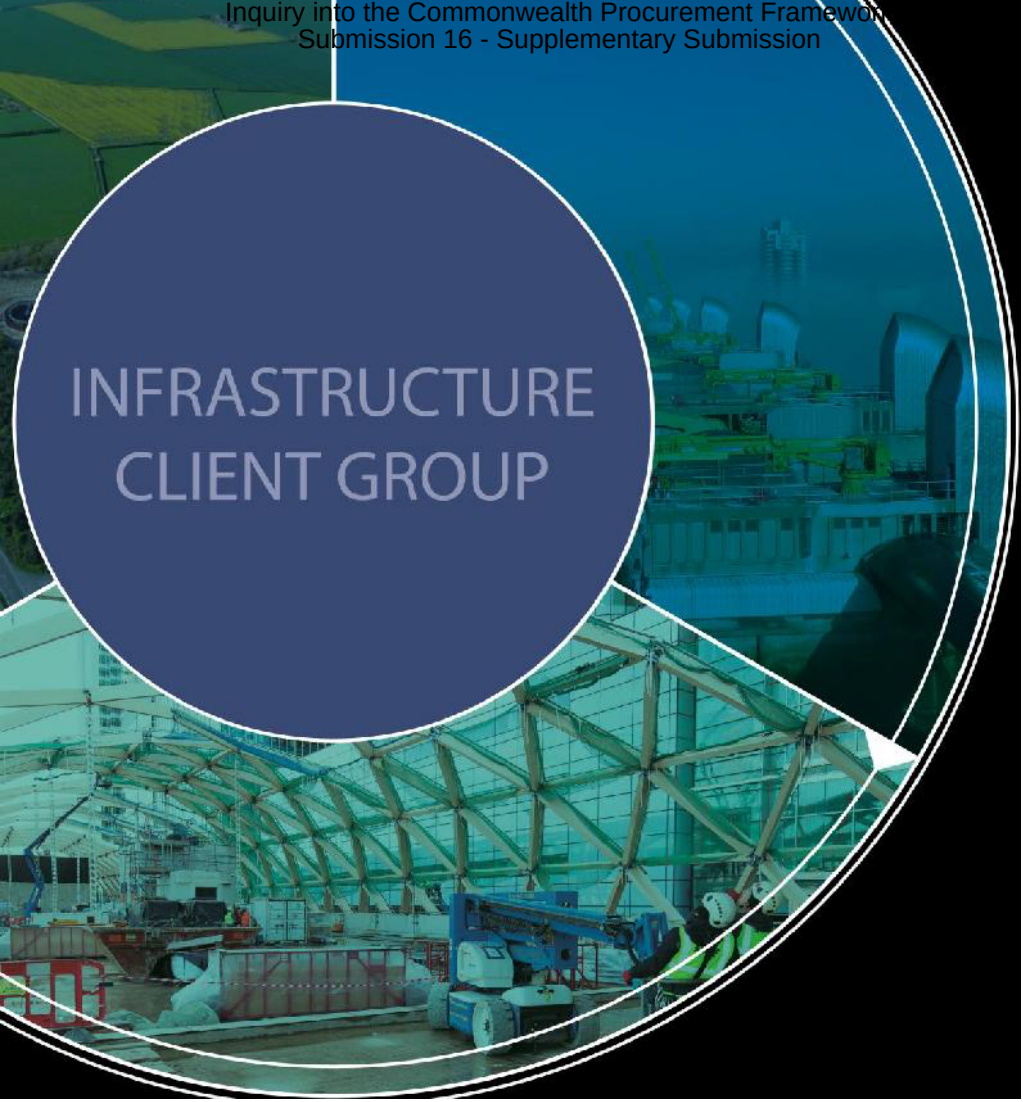
Andy Mitchell (Chair)	Thames Tideway
Adam Green	Carillion
Nick Baveystock	ICE
Beth West	HS2
Denise Bower	University of Leeds and Major Projects Association
Dale Evans	Anglian Water
David Rooke	Environment Agency
Mark Worsfold	South West Water
Martin Buck	Crossrail
Miles Ashley	Transport for London
Nirmal Kotecha	UK Power Networks
Peter Adams	Highways England
Phil Wilbraham	Heathrow Airport Holdings
Simon Murray	Consultant
Alan Couzens	Infrastructure & Projects Authority
David Hancock	Cabinet Office
Martin Arter	Network Rail
Kenna Kintrea	NDA
Alasdair Reisner	CECA
Ian Cartwright	National Grid
Jonathan Cole	Scottish Power



> *"The Routemap is an invaluable enabler for clients to realise value in their infrastructure projects and programmes. Our industry requires the Routemap to establish and maintain a leading global position in infrastructure investment and delivery."*

Murray Rowden,
Global Managing Director, Infrastructure
Turner & Townsend

Notes:



Infrastructure Client Group

Improving infrastructure delivery

October 2014

ICG

Infrastructure Client Group (ICG) support

The ICG core group includes the following organisations

HM Treasury
ice Institution of Civil Engineers
University of Leeds
Transport for London
Major Projects Association
NetworkRail
Crossrail
Heathrow Making every journey better
Environment Agency
hs2 engine for growth
BG Group
Cabinet Office
anglianwater
Thames Tideway Tunnel Creating a cleaner, healthier River Thames
Highways Agency
TESCO
OFWAT

> *"For the first time the Infrastructure Client Group has brought together key infrastructure organisations to deliver a set of common objectives and improvements to the way we deliver the UK's infrastructure needs"*
>
> **Simon Kirby**, Chief Executive, HS2

ICG

Infrastructure UK and the Infrastructure Client Group

Infrastructure is the backbone for the UK economy. It provides the networks and systems that supply and support reliable and cost effective transport, flood protection, energy, communications, water and waste management. These are vital to ensuring that the UK remains a competitive force in the global race.

The government is committed to establishing a long-term sustainable plan for infrastructure investment. **Infrastructure UK (IUK)'s** Cost Review Report 2010 identified the opportunity to improve infrastructure delivery. It set a target to remove wastage and make efficiency savings of at least 15 per cent by 2015 across public and private sector infrastructure delivery. The government's Construction 2025 Strategy goes further, setting a target of lowering costs by 30 per cent and reducing time by 50 per cent.

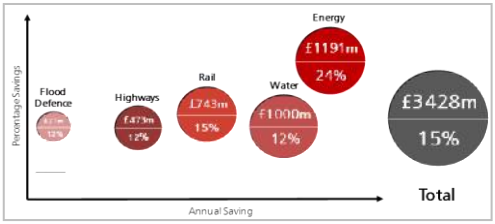
The government, through IUK, continues to work with industry to drive improved productivity and remove wastage in the delivery of infrastructure investment. These measures are providing better value for money for taxpayers and consumers. Across public and private sectors, these combined efforts are starting to yield success. However, there is no room for complacency. There is still much to be done to match the levels of efficiency and productivity seen in some other sectors.

The **Infrastructure Client Group** is demonstrating the value of effective collaboration between government and industry to support the development and exchange of best practice and delivery improvement. Initially brought together by IUK to support the Infrastructure Cost Review work, the membership of this group is representative of the major infrastructure clients. It has been instrumental in setting a common agenda for change and supports a programme of activities and applied knowledge transfer across the public and private sectors. The success of this initiative has been made possible by the continued and valuable support from industry and academic partners.

Lord Deighton
Commercial Secretary to the Treasury

Simon Kirby
Chair of the Infrastructure Client Group

IUK Cost Review and ICG outputs



The 2014 Cost Review report, 'Measuring and Improving Delivery', set out evidence of improvements in collaborative behaviours and reduced costs of delivery. Over £3.4 billion per annum of cost savings have been measured improving the cost effectiveness of infrastructure by over 15 per cent.

IUK and the ICG have published a number of key reports to help drive changed behaviours and support improved outcomes.

Managing Cost Risk and Uncertainty

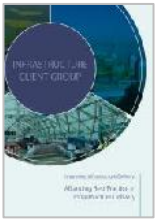
This guidance looked at the management of cost risk and uncertainty throughout the project lifecycle and the approach to using optimism bias.

Specifying Successful Standards

This report sets out recommendations as to how clients can simplify their approach to the maintenance and specification of technical standards.

Project Initiation Routemap

Built on lessons learned by both public and private sector, the Routemap provides a framework to help identify and address common and recurring problems, particularly during the early stages of projects.



Alliancing Best Practice

This Best Practice in Alliancing document highlights the areas in which alliancing can potentially add value and the key elements that drive a successful alliance.

Water cyclicality

The objective of this study has been to identify best practice and to make recommendations to enable key stakeholders to help smooth out investment cycles. This will in turn result in reduced costs to consumers and promote growth and sustainability in a vital sector of infrastructure delivery.

Infrastructure Carbon Review

This report set out recommendations which could save the UK economy £1.46 billion per year and reduce carbon emissions.

Measures of success

There has already been strong progress on implementing the recommendations from these reports, including:

- **£440m of transition investment** in the water sector has been identified to bring forward work from AMP6 helping to reduce costs to consumers and mitigate cyclical impacts on the supply chain;
- **11 Routemap assessments** have been undertaken on major infrastructure projects for 9 different clients in 5 sectors worth over £60 billion helping to support successful project initiation.
- **27 signatories to Carbon Commitments** from both client and supply chain organisations who have committed to implement the recommendations of the Infrastructure Carbon Review.

Future Priorities

The government will work with the ICG to strengthen its remit and ability to help drive delivery improvements and report on progress. The ICG published Work Programme for 2014/15 builds on the successes to date. The work will be taken forward as a series of projects under four main themes. The ICG and IUK will report on progress annually each autumn, starting 2015.

Improved pipeline visibility and certainty

We will continue to improve the visibility and certainty of the infrastructure investment pipeline, publishing biannual updates and working with stakeholders to drive these principles further into sector or individual organisations' approaches.

Improving project initiation and procurement

We will continue to extend the implementation of the Project Initiation Routemap across priority infrastructure projects and programmes. We will seek to improve collaborative behaviours on projects and promote a common set of principles to support faster, smarter procurement and more effective risk allocation.

Whole life planning and cost control

Alongside commitments to longer-term funding we will seek to maximise the opportunities to incentivise whole life planning and delivery outcomes. Building on the published report we will undertake further work to embed greater transparency and management of risk and contingency. We will promote the principles of the Infrastructure Carbon Review. We will consider the impact of technical standards and codes as obstacles to innovation.

Supply chain skills and construction delivery

We are improving our modelling and understanding of critical skills and supply chain gaps to inform actions for government and industry. We will improve our understanding of how our supply chains are performing across projects.

ICG members

Simon Kirby, HS2 Ltd

Andy Mitchell, Thames Tideway Tunnel

Peter Adams, Highways Agency

Miles Ashley, Transport for London

Roger Bailey, Thames Tideway Tunnel

Jim Barlow, Environment Agency

Nick Baveystock, ICE

Denise Bower, Major Projects Association and University of Leeds

Martin Buck, Crossrail

Alan Couzens, Infrastructure UK (HM Treasury)

Dale Evans, Anglian Water @one Alliance

Adam Green, Carillion

Mark Hagger, Environment Agency

David Hancock, Major Projects Authority (Cabinet Office)

Steve Hudson, Infrastructure UK (HM Treasury)

Nirmal Kotecha, UK Power Networks

Simon Murray, Independent

John Oliver, BG Group

Nick Roden, Tesco

Keith Waller, Infrastructure UK (HM Treasury)

Beth West, HS2 Ltd

Phil Wilbraham, Heathrow

Andrew Wolstenholme, Crossrail and Construction Leadership Council

Mark Worsfold, Ofwat

ICG related groups

Richard Coackley, URS – Chair, Water Cyclicality Group

Terry Hill, Arup – Chair, Industry Standards Group

Dr Diana Montgomery, CPA – Chair, Supply Chain Capacity and Skills Group

Chris Newsome, Anglian Water – Chair, Infrastructure Carbon Group

Beth West, HS2 – Chair, Infrastructure Risk Group

Where to find out more?

HM Treasury

www.gov.uk/government/collections/infrastructure-cost-review

ice Institution of Civil Engineers

www.ice.org.uk/topics/Industry-initiatives/About

hs2 engine for growth

EARLY CONTRACTOR INVOLVEMENT

Early contractor involvement (ECI) is an approach to contracting that supports improved team working, innovation and planning to deliver value for money. It involves an integrated contractor and designer team, appointed under an incentivised, two-stage contract.

Key stages

Stage 1 involves design development and construction planning, which is aimed at meeting our objectives and which leads to the agreement of a target price. Stage 2 covers the period of detailed design and construction.

Why will HS2 use ECI?

ECI is well suited to large and complex contracts because it allows an integrated team to gain a good understanding of the requirements, develop innovative solutions, plan and mobilise resources, and manage risks to accelerate delivery and reduce costs.

The proposal to use ECI received overwhelming support from the market during our engagement process. In line with recognised best practice, we will use ECI for our civil engineering contracts, and will also look for feasible and appropriate opportunities to use it for other contracts.

How does ECI improve value for money?

- It integrates design development and construction planning at an early stage. This allows the contractor, designer and key supply chain to develop innovative solutions.
- It provides more time for planning and the preparation of the construction programme. For example, Stage 1 allows time to understand and plan for critical events, such as rail possessions and utilities diversions. It also ensures that an agreed NEC3 contractual programme is in place for the start of the construction stage.
- It enables companies to plan for the recruitment, training and retention of personnel needed during the construction stage; appoint key supply chain partners; and source long-lead items.
- It provides greater opportunities for the integrated team to support stakeholder management, and to improve the management of risk and health and safety planning during the planning stage.

"ECI is a straightforward approach – it integrates design development and construction planning"

How does it work?

Before the ECI contract award

Prior to issuing invitations to tender, we will prepare the specification and develop the design sufficiently to clearly set out the contract requirements and establish the contract budget. Some elements of design may need to be reasonably mature in order to gain consents and confidence in the pre-tender budget estimates.

Tenderers will be required to submit their delivery proposals, but the tender process will not require any design development. The competition stage will focus on technical and commercial criteria – the main aim is to award the contract to the best team with the necessary skills and appropriate collaborative culture to deliver value for money. As part of this, we want to see innovation, including innovation in collaboration with the supply chain. The commercial submission should establish the Stage 1 price and the fees and pricing mechanism for Stage 2.

After the ECI contract award

Stage 1: design development and construction planning

The ECI contractor team's role in Stage 1 is to:

- provide the expertise to take ownership of, develop and optimise the design, aligned with our objectives (including buildability);
- commence construction planning, including identifying opportunities for off-site manufacturing and supply chain engagement (as appropriate); and
- develop the target price.

Stage 1 will normally last 8 to 12 months – enough time to develop innovative solutions and efficiency ideas. Progression to ECI Stage 2 will depend on satisfactory performance during Stage 1, including the development of a cost-effective solution, the agreement of a construction programme and an affordable target price for construction. We will develop a mechanism whereby, if a contractor is not performing in Stage 1, we will be able to re-procure quickly and effectively.

Stage 2: detailed design and construction

The ECI contractor's role in Stage 2 is to take responsibility for and complete the detailed design; and construct the works.

Incentivising the ECI contractor

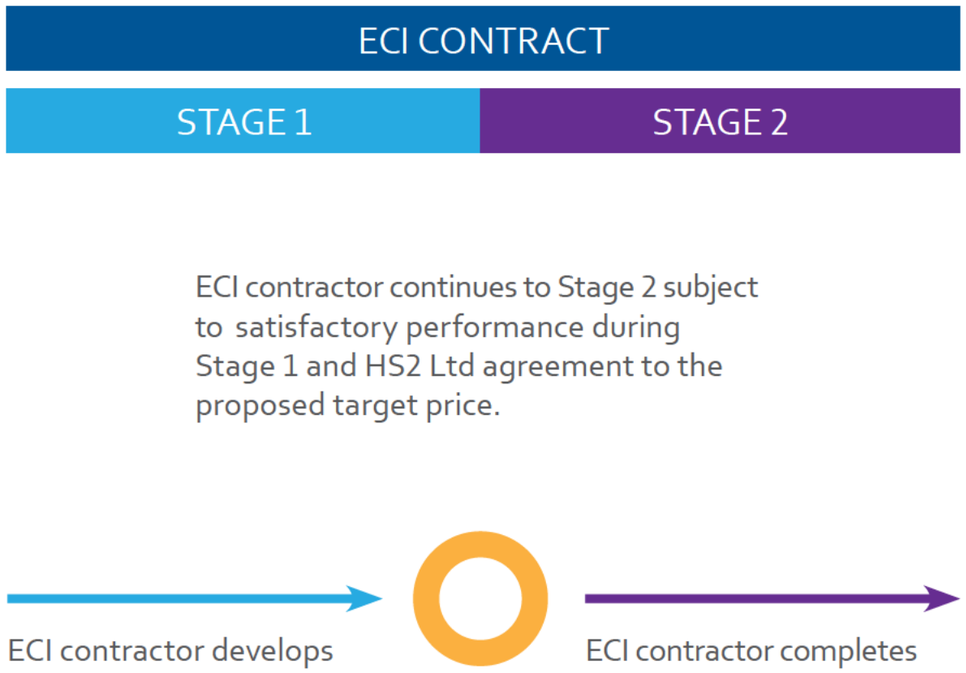
During Stage 1, we will pay for the design and construction methodologyto be developed by the ECI contractor's team. During Stage 2, the ECI contractor will be paid actual costs for the construction works, plus a fee, and will be incentivised against the agreed target price. We are developing further contract incentives that will:

- link to our works package budget and other objectives;
- maximise rewards where design and construction innovation and risk mitigation are developed in Stage 1, then delivered as planned in Stage 2;
- reward clusters of suppliers for working together to minimise overall cost – for example, in managing interface risks; and
- reward wider collaboration across the entire Phase One project.

"ECI improves value for money, enabling contractors to plan for recruitment, training and retention of personnel"

CS213_K

ECI – KEY STAGES



HS2 Ltd prepares the design to define the employer's requirements and determine the contract budget.

ECI contractor develops the design, plans the works and prepares the construction programme and target price for agreement.

ECI contractor completes the detailed design and constructs the works.

Infrastructure and Projects Authority

March 2016

Major capital programmes: a discussion document based on insights from recent experience

Reporting to HM Treasury and Cabinet Office

Contents

Introduction

The UK has delivered, or is in the process of delivering, a number of high-profile major capital programmes. Lessons learned from their delivery have been applied to the design of subsequent programmes. For example, the lessons from the Olympics and Crossrail are being used in the design of the delivery arrangements for HS2. An execution strategy with a number of common elements has emerged that attempts to address the significant challenges inherent in these programmes.

This discussion document has been written by the Infrastructure and Projects Authority, supported by Deloitte, with the intention of drawing together some aspects of this experience in order to inform the design and delivery of future major capital programmes. It is based on a review of case study experience, and discussions with leaders from the programmes.

Some words of caution are necessary about what this discussion document is, and what it is not. This document considers various aspects of the key challenges that have been faced by major capital programmes, and the actions taken to deal with them. It provides examples of how the risks in a number of major programmes have been identified and mitigated, why a particular delivery, governance or commercial model has been chosen, the impact of financial arrangements, and the required capability to support these actions.

This discussion document is not intended to be the following:

- First, it is not intended to provide prescriptive guidance. Instead, it sets out the execution strategy that has been developed by a number of major capital programmes and, equally importantly, some of the reasons why this execution strategy has been adopted. The differing market, regulatory and technical contexts for major capital programmes mean that no simple guidance can be offered for all cases. However, the intention here is that useful insights for the design of future capital programmes can be obtained by understanding the reasons why recent programmes have been executed in a particular way.
- Second, this document is not a comprehensive review of all aspects of major capital programme delivery. It is a selective analysis, drawing out some key current trends and issues. There are a number of important aspects of capital programme delivery that are not considered here; for example, the importance of defining the purpose and outcomes of major capital projects first, and ensuring that there is a strong sponsor to delivery these outcomes in detailed project design. Equally, this document does not discuss many of the requirements for successful management of all programmes, such as effective leadership and strong governance.

The HM Treasury Infrastructure Routemap tool provides a good source of insight and guidance into many of the issues associated with the delivery of major capital programmes.[1]

https //www gov uk/government/publications/improving infrastructure delivery project initiation routemap

Acknowledgements

The IPA is grateful to the programme leaders who have given their time generously in the development of this review. In particular, we would like to thank: Andrew Wolstenholme and Martin Buck, Crossrail Ltd; David Higgins, HS2; Jeremy Rolstone and Allison Phillips, Rail Executive; Nathan Phillips, Shareholder Executive; and John Clarke, NDA. We would also like to thank colleagues from Infrastructure UK, the NDA, Crossrail, TfL, DfT and the MoD for their comments on drafts of this document. The views expressed in this document nevertheless represent the opinions of the authors, not the programme leaders or departments.

Authors

Tom Le Quesne, IPA

Tim Parr, Deloitte

Case studies

The review considered the following major programmes, most of which are referred to in this document.

- Crossrail
- Terminal 5
- High Speed 2
- London 2012
- London Underground
- Thames Tideway Tunnel
- Network Rail
- MOD Astute Submarines
- Nuclear Decommissioning Authority

Summary

Whilst the context – including the market, regulatory and statutory environment – has differed in each case, a number of broad trends have emerged in the delivery strategies adopted for recent major capital programmes in the UK. Although the examples reviewed here constitute the very largest public sector capital programmes, many of the key issues and insights apply to other government projects and commercial relationships.

The very largest public sector capital programmes face a number of particular challenges: they are 'too big to fail'; they are very expensive, even in the context of public finances; and they have high levels of inherent uncertainty and risk. The examples reviewed here demonstrate the evolution of a programme delivery strategy that has responded to these challenges.

- First, **there has proved to be a need for significant public sector involvement in managing a programme or enterprise, in order to create the conditions under which the private sector will deliver effectively, as has been done successfully with Crossrail**. It has rarely proved possible to transfer effectively the contractual responsibility for the delivery of major capital programmes to a single private sector entity working in a 'prime' role. The private sector has often ultimately been unwilling or unable to take on this level of risk. Even where such arrangements are entered into, government may still hold the risk implicitly and be required to bear the costs in the event that risks materialise, for example in the cases of some NDA projects and the Astute programme. Attempting to contract with a single entity has also created significant challenges around effective incentivisation, particularly in the context of complex outcomes and in cases where suppliers hold the monopoly and/or incumbent power. However, for smaller scope 'packets', or once major risks have crystallised, it has in some cases been possible to contract successfully for the holistic delivery and management of risks.
- Second, **these major capital programmes have been managed through a different approach in the centre of government**. In some cases, it has been judged beneficial to move away from the government's standard financial and approvals processes, as these do not always align with the need for long-term management of risk and contingency finance, or with the fact that HM Treasury is – implicitly or explicitly – acting as a funder of last resort for these programmes. This has therefore led to the development of bespoke financial and approvals processes, characterised by higher levels of cross-government collaboration, as in the case of HS2.
- Third, **the delivery of these programmes has taken place in the context of a robust project control environment, overseen by the public sector**, within which the private sector can deliver. This has allowed for control of a disaggregated contracting environment and the structured management of risk. This has been supported by an effective management information regime, integrated from suppliers through to senior sponsors in the top of government, as in the case of Crossrail and the Olympics.

- Fourth, **enabling a more sophisticated commercial and operating environment has typically required significantly enhanced public sector capability**, in particular – but not only – in the client function. In the programmes reviewed, this has been undertaken through a combination of in-house capability development, often secured with the use of pay freedoms, consultant support, and delivery partners. In many cases, enabling this has also required the development of a new public sector client organisation. Bespoke entities need to be understood in these cases as a means for public sector client organisations to develop the capabilities to succeed, rather than being an end in themselves. In some cases, adjustments have been made within existing organisations, for example the establishment of the Rail Executive within the Department for Transport. Experience has demonstrated the importance of client arrangements that evolve through time.

In the most effective cases, the different elements of the execution strategy were designed and understood as a coherent whole.

1. The shifting boundary between the public and private sectors

In recent years effective delivery strategies for major capital programmes have been built around a more nuanced boundary between the private and public sectors, with a renewed recognition of a greater necessary role for the public sector in creating the conditions under which the private sector will deliver successfully.

In recent major capital programmes, the role of the public sector has been substantial, as sponsor, client and sometimes partner in the delivery organisation; and the public sector has been required to take on some of the roles that, under previous arrangements, it had attempted to transfer to the supply chain. Primarily this is because the public sector has recognised that there needs to be a relationship in which the private sector can be incentivised to deliver effectively, and held to account when they do not, especially with the largest and riskiest programmes.

1.1 Learning from experience: the challenges of transferring overall delivery responsibility to the private sector

Previously, in major capital programmes, there was an attempt to package up a significant portion of the client role and contract with a single 'prime' supplier. This was driven by a view that the public sector could be reduced in size, thereby cutting direct costs, and that the expertise to act as a client was more readily available in the private sector. However, recent experience has demonstrated that this did not always work.

Effective risk management

The re-growth of the public sector role in recent major capital programmes has reflected the challenge of transferring in a meaningful way bulk risk in major capital programmes to private sector suppliers, which is a prerequisite to incentivise and hold private sector providers to account. A number of recent experiences, including the early phases of the Astute programme and more recent experiences with Sellafield, have illustrated the issues around attempts at transferring bulk risk. There are two main challenges that need to be considered.

First, the scale and complexity of these programmes means that the private sector is often not the natural 'owner' of the risk of unsuccessful outcomes and is therefore unwilling or unable to take responsibility for the required levels of risk associated with overall delivery. Shareholders in private sector companies are unlikely to tolerate taking on risk except where it sits within a narrow definition of the company's control and competence, for example construction companies taking on civil engineering risk, or oil companies taking on oil price risk. By definition, major capital programmes have a broad set of risks that no single private sector company is likely to be able to manage or offset. In other cases, it may be that no organisation has a balance sheet sufficiently strong to take on overall programme risk: this was one of the considerations that led to the management of Crossrail by a public sector-controlled entity. As a corollary to this, companies are likely to charge a high premium where they are asked to take on risk for major capital programmes with high levels of uncertainty which they cannot control.

Second, these programmes are often of national importance. Government often cannot tolerate delivery failure; and if delivery failure is imminent, the government is typically required to step in regardless of the contractual position. An example was the use of the Armed Forces to provide security at the Olympic Games. Government 'step-in' is most likely when programme delivery is highly time-sensitive, such as defence equipment and the Olympic Games.

The client may therefore 'pay' for risk twice – once to pay the supply chain for holding or managing the risk, and then to bear the actual costs of the risk when its transfer ultimately proves impossible.

Monopoly and incumbent power

In the context of major capital programmes, the public sector also needs to counteract supplier side power. This may be either because of monopolistic characteristics in the industry, or because incumbent private sector suppliers are the only organisations capable of continuing to deliver the programme regardless of their performance.

Understanding market conditions will enable the client to take an informed view of the most appropriate commercial approach. In some cases this may include market building in order to introduce an element of competition. Alternatively, structuring the aggregation of packages of work within the programme can encourage different behaviours from the market.

Terminal 5: The client holds all the risk, all of the time

The Terminal 5 programme risk strategy was that 'BAA held all the risk, all the time'. Contracts were let to Tier 1 suppliers on a cost-plus basis, with profit margins held in project-by-project incentive pots, calculated by BAA, through pricing of risks and opportunities with the supply chain. The incentive pot remaining at the end of the programme would then be split on a 50:50 basis between the Tier 1 suppliers and BAA;

The only Tier 1 contractor 'liability' was a reduction in the proportion of the incentive pot that they might receive. This aligned BAA and Tier 1 contractor objectives around effective risk management, contributed to a culture of collaboration for mutual benefit, and prevented costly and disruptive litigation.

NDA, Sellafield: The challenge of incentivising private sector delivery in the context of high risk

A multitude of first-of-a-kind risks and ultra-long-term programmes are inherent in nuclear decommissioning. Indeed, realisation of escalating waste management liabilities led to the wind-down of British Nuclear Fuels Ltd (BNFL), resulting in the establishment of the Nuclear Decommissioning Authority (NDA) in 2005. The NDA implemented an arms-length approach to delivering nuclear decommissioning, based on US and military models, contracting operations for managing the Site Licence Companies (SLCs) to private sector Parent Body Organisations (PBOs). The intention was to 'encourage innovation…improve contractor performance and deliver best value to taxpayers'.[2]

For many of its operations, particularly where meaningful short-to-medium-term closure milestones were present, this strategy worked well. At Sellafield, however, the level of complexity and uncertainty, multi-decade timelines and the scale of the liabilities proved unacceptably large to the private sector. As a result, the contract signed in 2008 was fully cost-reimbursable, with no risk attributed to the PBO management organisation except where deficiencies could be proved to be the fault of the PBO. Whilst performance targets were set (in the context of strategic long-term objectives) they could only ever represent short-term assumptions.

As the implications of previously unknown risks became apparent and delivery performance did not meet cost and schedule targets, the NDA commercial team was inundated with requests for changes to the baseline, driven in part by a desire to protect the fee position for the PBO. The ultimate liability associated with inherent uncertainty remained with the government under the PBO model, and the NDA had only limited incentive mechanisms in place to drive for improved delivery performance. Additionally, within the PBO model underlying drivers did not align themselves naturally: PBO interests are inevitably relatively short-term and underpinned by a low risk appetite, whereas the programme required a longer-term focus and a greater appetite for risk.

The NDA therefore made the decision in 2014 to assume management of the Sellafield SLC as a subsidiary company, fully integrating the enterprise into its remit, and accepting that it is the only institution able to discharge its responsibilities effectively at such a level of risk. Importantly, this model seeks to prioritise more agile and extensive use of the supply chain beneath the enterprise level, starting with one or more strategic partners, and seeking to tailor contracting models on key projects to improve the calibration of incentives and risk transfer. The model is premised on appointing a world class Board and management team.

[2] NDA Strategy (2006) p 10

Complexity and uncertainty

The scale and complexity of the challenges faced by major capital programmes create an environment where it is difficult to develop a meaningful single contract for the entirety of the programme. It is a challenging task to specify time, cost and quality outcomes in major capital programmes without creating perverse incentives. The experience of the London Underground Public Private Partnership (PPP) contracts illustrates this point: recognising the need to exercise control over very large private sector consortia, the response was to create lengthy and detailed contracts, which attempted to anticipate and provide for the whole range of programme management and operational circumstances that might occur.

This was supported by a fully-staffed arbitrator. Not only was the contracting process itself very long and costly – the contracts took up to four years to reach financial close, with two years of negotiations from best and final offers – but the management of the contracts required significant investment from the 'thin' client to oversee the performance of the contractors. In effect, this meant paying twice for programme management, once to the supplier to manage, and then again for London Underground as client to monitor.

Astute: Prime model in the context of a monopoly provider

The *Astute* programme marked the first time the MoD had transferred the management of the majority of risk for construction of a class of submarines to a prime contractor. There was a prevailing sentiment that although the production of the Vanguard class submarines had been a success, VSEL (the owners of the Barrow shipyard where the majority of the submarines were produced) had made excessive profits. The MoD sought to mitigate VSEL's supplier monopoly through open competition for the *Astute* contracts. Moreover, the contractor was to assume total design responsibility in its prime contractor role, allowing MoD to reduce significantly much of its internal capability. This move to a 'hands off, eyes on' approach was symptomatic of the general trend at that time towards cost reduction in the public sector and a reliance on private sector innovation.

The prime contractor relationship proved unable to deliver the cost efficiency and innovation expected. The MoD reduced its direct oversight of the programme, and lacked the visibility to understand problems as they arose. This was compounded by the low level of design maturity when construction started. There was a breakdown of relations between prime contractor, shipyard and Tier 2 suppliers. Costs eventually soared by 53% over the original contract price[3], and the delivery of the first boat was 57 months late. As a result, the contract was unsuccessful in its original form and had to be renegotiated. As part of the necessary re-balancing, the MoD assumed design responsibility and ultimate cost risk for overspend above a reduced prime contractor liability threshold. In addition, the overall fee increased by over £1bn.

[3] Learning from Experience Vol Lessons from the United Kingdom s Astute Submarine Program (2011) p 38

2. New ways of working across government

The major capital programmes considered in this document have been delivered through more innovative, collaborative and flexible ways of working at the centre of government (the sponsor level) and between government and public sector client bodies.

The traditional government structures and ways of working, with HM Treasury setting annual spending limits, Departments defining policy and delivering, and HM Treasury holding Departments to account, were judged in some cases to be inappropriate for managing government interests in major capital programmes. In some cases, notably London 2012, Crossrail and HS2, a much more collaborative approach to managing government's role as sponsor has been developed. This is particularly apparent in the more involved approach taken by HM Treasury, Cabinet Office and the relevant Department to the design and operation of the major programme operating environment. It has often meant the creation of joint sponsor Boards (London 2012, HS2) enabling the interests of all the relevant Whitehall departments to be represented. In the case of Crossrail, a Crossrail Sponsor Board was established with both DfT and TfL represented.

2.1 The development of more bespoke approval and financial frameworks

In some of the cases reviewed here, flexibilities have been developed in three main areas when compared to the 'normal' public sector operating environment, all of which are the result of a more considered approach to managing greater uncertainty and financial risks. In many cases, HM Treasury has taken a much more active interest in creating the conditions that enable the public sector to manage financial risk, aligning the capability to manage risk with programme accountability in a more transparent way.

In high-risk major programmes that are 'too big to fail', HM Treasury has chosen to hold ultimate financial liability in a role, implicitly or explicitly, akin to that of an insurer. HM Treasury has therefore needed to understand the underlying cost model and risks to a much greater degree than in the 'normal' course of its public spending control activity. To do that effectively, it has to be engaged early in the programme, working closely with the sponsor Department as an active partner in the programme's development. London 2012, Crossrail and HS2 all demonstrate how this has worked.

The variation of the traditional Main Gate 'big bang' approach to programme approvals

The traditional approach to securing funding for large programmes has been to develop a 'Main Gate' final business case, through its various stages for final financial and political (including Parliamentary) approval before the programme can commence in earnest.

This approach has been supplemented in programmes such as Crossrail and HS2 with a stage gate 'Review Point' process, whereby financial and procurement authorities are delegated only once departments and HM Treasury have confidence in budgetary certainty and the plan for delivery. This has been because it is questionable whether, for programmes with such uncertain and risky characteristics, sufficient certainty can be created so as to 'cost out' the entire programme, which may last for decades, for a one-off approval. In addition, decisions on execution strategy are needed well in advance of decisions on major funding commitments; and both these decisions could potentially be required at a different time from when it makes most sense to obtain political and parliamentary approval. Review points can also provide an opportunity for decisions to stop or re-scope programmes.

At Sellafield, regular review points drive efficiency, allowing project teams to relay cost information to the NDA as the programme's scope becomes clearer and risks mature.

The development of formal, structured contingency arrangements

In cases where the programme is subject to high levels of uncertainty, for example where there are high levels of technological innovation, a formal structured set of contingency arrangements that can be drawn down over time has proved helpful. These are underpinned by the development of a thorough understanding of risks at the outset of the programme, with the potential to allocate elements of the contingency to particular risks. Maintaining this clarity builds confidence in delivery and supports collaboration through openness between stakeholders.

In the case of London 2012, £2.7bn of formal contingency was included within the overall £9.2bn Public Sector Funding Package. There were clear procedures in place for applying for the use of the contingency, and £238m was set aside within the contingency specifically to cover higher security costs in the event of an increase in the threat level. As risks did not materialise over the course of delivery, funding in the contingency was re-directed to operational requirements.

The creation of multi-year and flexible budgets

Annualised budgets for multi-year programmes are a key financial control mechanism intended to mitigate against potentially wasteful underspends, which is of particular importance in times of public spending constraint. However, successful management of very large, long-term capital programmes has benefitted from the ability to move resource between years, as risks materialise and the programme matures. The development of structured, multi-year contingency funding cannot be easily accommodated within conventional annualised budgets. Other financial flexibilities that have proved useful for programme budgets have included the ability to move resource between revenue and capital expenditure as required.

Network Rail and Highways England have been working to a five-year funding cycle, based on a financial profile linked to forecast spend; and, consideration is now being given to longer-term funding cycles for major Network Rail projects). Such flexibilities are contingent on a degree of isolation of the budget from other pressures, i.e. ring-fencing. Trust in the underlying estimates around cost and the development of an appropriate approval process are important prerequisites to the granting of financial freedoms and flexibilities.

3. The changing operating environment

Enabling and incentivising successful private sector delivery has required the public sector to create and manage a sophisticated commercial and project control environment, and to oversee the long-term development and maintenance of scarce skills.

The development of a more sophisticated operating environment has manifested itself in a range of features. These include the development of more collaborative approaches to commercial arrangements, the design of more sophisticated programme control architectures, and the involvement of the public sector in ensuring private sector capability is in place.

3.1 Greater innovation in the development of disaggregated and collaborative commercial arrangements

The 'traditional' approach to contracting and commercial strategies involved clear delineation between the client and the supply chain, perhaps facilitated by delivery partners, with an objective of transferring as much risk as possible out of the client organisation. This encouraged some inefficient practices within the supply chain and client, with the fear of litigation resulting in closed books and opaque cost-tracking.

The programmes reviewed here highlight two key approaches. First, the move away from a 'prime' relationship with a contractor to whom risk is passed means that the public sector has contracted with a more disaggregated supply chain. This can include both contracts with multiple parties and multiple contracts through time with key ('Tier 1') suppliers. This has encouraged private sector involvement at more attractive prices, motivated by targeted incentives around manageable packets of work, focusing on collaborative risk mitigation.

Programmes have attempted to strike a balance between awarding numerous small contracts and a small number of large contracts. Where there are a large number of small contracts, the consequence is that integration risk – tying together the work packages to deliver the required outputs – remains with the public sector client. It is tempting therefore to consolidate packages of work into large commercial arrangements, reducing the size of the contract management function, encouraging economies of scale and reducing the number of interfaces with the supply chain. This does, however, limit the number of commercial levers available to the client. Similarly, clients must consider the length of the contract. Continuity is an attractive attribute of long-term arrangements, but without continued incentives there is a risk that innovation and performance are stifled. Framework Agreements, as at Terminal 5, have been used effectively to create long-term commercial arrangements within which shorter-term incentive packages can be developed.

Second, more collaborative commercial arrangements have been developed: both clients and contractors are seeking many of the same certainties, specifically in terms of cost, delivery timescales and quality standards. Contrary to previous practice, it has been shown that collaborative working facilitates this and is particularly successful when risk is held at the right level, not necessarily transferred to the supply chain.

Contracting methods have changed over the past 20 years, with a trend towards collaborative and new standardised commercial arrangements between the public and private sector. Contracting structures have moved away from procurement of a 'product' and towards incentivising joint delivery of a common endeavour.

Such approaches have become standardised over time with the express intention of moving away from confrontational negotiation around minutiae and towards a stronger focus on more substantive matters that are bespoke to the programme in question, often termed outcome-based contracting or cardinal point specifications. Disaggregating the supply chain to reduce supplier power creates the risk of complexity, but standardised contracts such as the New Engineering Contract (NEC) help mitigate this risk.

Crossrail: Management of a disaggregated supply chain

Once funding agreements were secured in 2009, Crossrail Ltd was established as a subsidiary of TfL working under a Project Delivery Agreement between DfT and TfL as joint sponsors. It was recognised that it would not be appropriate for Crossrail Ltd to contract for delivery with a single delivery partner. Crossrail Ltd therefore entered into contractual relations with a number of different suppliers, including a handful of large contractor joint ventures, who themselves contracted with a large number of sub-contractors. As a result, Crossrail Ltd is supported by the provision of commercial and programme management by a number of delivery partners.

The more recent trend towards 'alliancing' continues on the collaborative theme, as an explicit attempt to secure the benefits of disaggregating supply while mitigating the integration risk that comes with moving away from a prime contractor model. It also represents a shift away from bilateral arrangements between a supplier and the client, to multilateral relationships between numerous suppliers and the client, with the aim of strengthening collaboration.

Experience suggests that within an alliance, all parties need to have 'skin in the game' and be incentivised to work as a partnership. Incentives need to be sufficiently large enough to motivate collaborative behaviour. Given major programmes are long term, stretching over many years (and sometimes decades), alliances need to be sufficiently flexible to accommodate varying levels of supplier primacy at different phases of the programme. The required 'share' in the upside may need to fluctuate between phases. It may also be necessary for the parties to the contract to change over time.

Terminal 5: Delivery through a commercial alliance structure

In contracting for the T5 programme, BAA opted for an Alliance arrangement with its supply chain. All Tier 1 contractors signed up to the 'T5 Agreement', a document which doubled as a ways of working handbook as well as a legally binding contract. The partnership approach that BAA adopted required all contractors to work collaboratively in fully-integrated transparent teams. This allowed the supply chain to focus on risk management rather than litigation avoidance which, combined with a gainshare mechanism, encouraged best-in-class performance. Without liability in the supply chain, BAA was able to demand contractually that its contractors delivered to this best-in-class level.

Importantly, this departure from traditional contracting methods required a step-change in culture for many of the supply chain organisations. In some cases, BAA leaders were forced to intervene when contractors began to depart from the Alliance ethos, for example when construction of the terminal roof deviated from plan and organisations began to brief their legal teams.

The evolution of the London Underground contracting strategy

London Underground has adopted the New Engineering Contract (NEC) for its standard form of contracts. NEC is based on a requirement for mutual trust and co-operation, and promotes timely decision making. Variations to the contract are agreed as the programme progresses rather than at the end. There is an incentive for parties to work closely together and to maintain an effective working relationship. LU varies the contract type depending on the project in question, for example fixed price or target price. Whilst there were various reasons why LU decided to adopt NEC as its main form of contract, the main reason was that it promotes sound project management practice and collaboration with the supply chain. The highly specialised and exceptionally complex types of contract that were seen under the London Underground PPP arrangements are no longer used.

3.2 Effective programme controls

A robust framework that enables the client to exercise the required control over programmes has proved to be an important component of recent successful execution strategies. In a highly complex operating environment with significantly enhanced client responsibility, multilateral contracts and high levels of uncertainty, the public sector client has needed to satisfy itself that the programme is proceeding as planned, and that it can intervene if required. A well-designed programme control framework, underpinned by data architecture that gives the client real-time, independent overview of programme progress, has become a key aspect of successful major capital programmes in the UK, enabling timely and evidence-based decisions to be made.

Crossrail: Programme controls and data architecture at the heart of major capital programme management

The programme controls function was set up as a priority by Crossrail, and used to drive delivery throughout the programme. Crossrail procured strategic and delivery partners to support it in its role, creating an integrated and streamlined set of business processes and procedures, backed by a robust data model and systems architecture, that enabled leaders and stakeholders to gain one version of the truth. Initially, Crossrail had relied on disparate systems across various functions. The lack of consistently-mapped centralised data created inefficiencies, and so three years into the programme a re-mapping exercise and implementation of a centralised data warehouse were undertaken. The result was a reduction in the headcount required for reporting and higher-quality, consistent information for management.

3.3 Public sector investment in the private sector skills base

Skills shortages in specific industries and regions in the UK have proved significant challenges for major programmes. Under certain circumstances, the market has proved incapable of providing these skills in the timeframes required, in particular niche skills without broader market demand where long-term training is required. Examples include engineering skills in nuclear decommissioning and railway signalling.

Investing in nuclear decommissioning skills

Historically the NDA's Site Licence Companies had responsibility for skills development, with the NDA providing oversight of the approaches taken.

A review of this approach concluded that the NDA needed to be more proactive in ensuring that SLC Resource and Skills Strategies are aligned to the delivery of the NDA's long-term mission, and a new Skills and Capability Strategy was launched in 2008.

In this regard NDA has developed the case for a National Skills Academy for Nuclear (NSAN), part-funded a new £20m centre of excellence for skills and training in West Cumbria, supported the creation of around 400 apprenticeships, and launched the national nuclear graduates scheme.

Leaders of such programmes have been required to focus on longer-term skills planning rather than relying on the supply chain. Addressing skills shortages in the supply chain (many of which are long-lead specialisms) requires long-term planning and an upfront assessment of what skills will be required when compared against the current market, and how the required capabilities will change over time.

Developing specialist rail skills

The UK lacks people with the right skill sets to deliver high-speed rail programmes. Consequently, HS2 have committed to establishing a college to train the next generation of engineers, and will provide the specialist training and qualifications required for high-speed rail. It will focus on training British workers to have the technical capability to deliver HS2 and also other major infrastructure programmes in the future.

In a similar fashion, Crossrail established a Tunnelling and Underground Construction Academy with the objective of ensuring it had the skills it needed for construction. The Academy will be retained following the completion of Crossrail as a specialist training centre for other tunnelling projects.

4. A more capable public sector

To enable a more sophisticated operating environment in the major capital programmes reviewed here, the capability and the capacity of the public sector to deliver the enhanced client role have grown. This has required the development of approaches to building stronger pubic sector clients, including the establishment in some cases of bespoke delivery organisations.

4.1 Make or buy?

The programmes reviewed in this document have used different combinations of in-house development, external support and the tactical or strategic use of delivery partners, in order to develop the required capability. To build capability organically it has been necessary to invest directly in skills. It has been acknowledged that for particularly scarce skills, it may be necessary to provide substantially more generous remuneration packages than are typically available in the public sector.

For example, the new delivery strategy being implemented at Sellafield has been premised on pay freedoms in order to secure a world-class board and management team. Relaxation of pay constraints has been considered on a case-by-case basis, requiring the explicit approval of HM Treasury. The standard of evidence required has been high, particularly for evidencing skills scarcity.

Pay freedoms in London 2012 delivery

London 2012 had to be 'ready on time and right first time'. With global scrutiny, there was no scope for poor delivery and so the ODA, LOCOG and GOE took the decision that pay should not be allowed to prevent the attraction of talent. Instead, remuneration packages were designed to attract high-calibre individuals from the private sector and leaders who could 'speak the same language as … delivery bodies.'.

Additional capability has also been bought in. Partners can be tactical (to meet specific skills gaps not readily available in the current client organisations and that would take too long to fill through in house growth) or strategic partnership (to work together with the client organisation over the lifetime of the programme as a more equal partner in the delivery of shared outcomes). More than one delivery partner may be appointed at the same time. However, the recent experience of major capital programmes suggests that the appointment of strategic delivery partners has not always proved the optimal way of developing capability, in particular for longer-term programmes and enterprises. HS2 has decided from the outset to build its capability internally, without reliance on external partners, with particular regard to the fact that it will require this client capability over a long timeframe.

Crossrail: Evolving use of delivery partners

Crossrail Ltd was intended to be a 'pop up' client, preferring to contract for capability rather than develop it in-house. Cross London Rail Links Ltd (CLRL), the development organisation charged with demonstrating the feasibility of the Crossrail project, recognised that there was a gap in the leadership and project management of this major capital programme. A world-class leadership team was recruited, alongside the appointment of delivery partners with subject matter expertise in project management. Crossrail Ltd appointed two partners, one at the strategic level – the Programme Partner (PP) – and one at a project delivery level – the Project Delivery Partner (PDP). However over time, the size and cost of the delivery partners started to increase. Crossrail Ltd has therefore moved to a strategy based on building up its internal understanding of project management processes, leading to less reliance on its partner organisations.

4.2 Evolving client capability

The delivery arrangements and organisation structures required to deliver these major capital programme have not been static; instead they have evolved as the programmes have moved through feasibility, design, construction and handover phases before the asset is moved into operation.

It has proved appropriate that different levels of authority should be delegated to the client from the sponsor, and from the client to the suppliers, at different phases of the programme life cycle. A common feature of these programmes has been progressive delegation of authority as confidence in the competence of the client and the supply chain has increased and the nature of the decisions has changed from being mostly strategic to mostly tactical. In some cases, rather than being planned at the outset, the evolution of client structures and capability has been in response to a change in delivery strategy during operation, for example recent changes at Sellafield, and the evolution of approaches to client capability in Crossrail.

The delivery structure of major programmes has required upfront planning to meet changing resource requirements, including a need to scale up (and down) parts of the project organisation rapidly. The recent trend is for programme leadership to dedicate more time looking forward, to determine necessary changes to their delivery model.

London 2012 and HS2: Evolving management capability and arrangements

London 2012 transitioned from a bid team of 20 to a team of about 250,000 at the peak of the Games, reverting back to very few in seven years. The London 2012 team identified seven stages in the lifecycle of the Games and the capabilities required to execute each stage, confirming specific requirements for delivery partners and external recruitment. The organisation also amended governance structures during the life of the programme. For example, in the final year leading up to the Games a more agile approach to decision-making was required, and this led to the Senior Responsible Owners Group being disbanded in favour of a more responsive committee with representation from a wider range of stakeholders, better suited to the needs of the programme.

HS2 have adopted an approach of planning the delivery structure of the programme early. They have appointed an Organisational Development Director to the executive team, to plan the organisational transitions.

4.3 The development of bespoke organisations

In many recent examples such as London 2012 and Crossrail, the response of the public sector has been to set up bespoke entities that are able to create the conditions for success. It is important to recognise that bespoke entities have been a means for the public sector client organisations to develop the capabilities to succeed, rather than being an end in themselves.

Such entities have typically been created so that they can operate outside the normal boundaries of the public sector. By establishing bespoke organisations it has been possible to develop fit-for-purpose arrangements and organisational cultures that enable programme delivery, without constraint from existing governance, processes and ways of working. Governance arrangements have been tailored to suit the needs of stakeholders, and specific freedoms around headcount and salaries have been secured to ensure that these programmes have sufficient capacity and capability to deliver value for money. Often these freedoms and flexibilities have to be earned by the organisation and increase over the life time of the programme. As discussed previously, trust is a crucial requirement.

The timing of establishing a new entity (if required) has proved important. Crossrail Ltd, as we now know it, only became a separate entity immediately prior to the commencement of construction and after the major financial and commercial risks had been identified and quantified. At this point, Cross London Rail Links (a distinct body charged with the development of Crossrail) was liquidated and replaced with Crossrail Ltd, the delivery body. In contrast, HS2 was set up as a development organisation with the expectation that it would evolve into a delivery organisation.

This does not mean that the setting up of a new organisation is a prerequisite for success. In some cases, amendments have been made within existing organisations to create some of the required enabling conditions, for example the establishment of the Rail Executive within the Department for Transport.

HS2: A bespoke delivery organisation

High Speed 2 will be the biggest infrastructure programme in Europe, and will be a unique programme in the UK. A decision was made to set up HS2 Ltd as a non-departmental public body, still answerable to the public but with bespoke freedoms and flexibilities to deliver this major infrastructure programme. The sponsor and programme organisations are supported by structures, such as governance and financial arrangements, which are appropriate for the HS2 programme. The financial freedoms afforded to HS2 Ltd have allowed the programme to offer competitive remuneration packages to attract talent. The governance structures detail how the unique relationship between HS2 Ltd, the DfT and Network Rail will operate and change over time.

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