National Audit Office

Lessons learned from Major Programmes

Cross-government

REPORT

by the Comptroller and Auditor General

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Cross-government

Lessons learned from Major Programmes

Report by the Comptroller and Auditor General

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Gareth Davies
Comptroller and Auditor General
National Audit Office

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This report examines lessons from our work on major programmes, including a significant number of transport, defence and energy programmes. Our work has directly supported Parliamentary scrutiny of government programmes and provides an independent evidence base to inform the public about how government programmes are performing.

Our lessons learned reports bring together what we know on important recurring issues to make it easier for others to understand and apply the lessons from our work.

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Findings

Lessons learned from major programmes

1 The government's major projects and programmes (programmes) range from transport infrastructure, military capability and nuclear projects, information technology (IT) and digital programmes through to ones to improve school or government buildings. The Government Major Projects Portfolio (GMPP), which includes government's largest, most innovative and most risky programmes currently includes 125 major programmes at a combined whole-life cost of £448 billion. Many current programmes combine bespoke features and new technology, and aim to be transformational, whether that is transforming services, communities, or departmental systems. For example:

- High Speed Two will introduce a new, high speed railway across the country using technology not yet used in the UK.
- Carrier Strike involves building new aircraft carriers, a radar system and supply and support ships, buying new aircraft and then making them work together to undertake a range of military tasks.
- The programme to carry out significant work to restore the Palace of Westminster will involve bespoke work on a historic building.
- The Emergency Services Mobile Communications Programme will replace the mobile communications service used by three emergency services.

2 The government chooses which programmes to invest in; how they are set-up, their scope, objectives, budget and timescale. The scale of major programmes chosen and designed by government, the condition of the supply chain, and the needs of the different communities they affect – for example, because of where the programme is located – can create complexities in how programmes need to be delivered. Some complexity in government programmes is also created by necessity – for example, in programmes to introduce advanced new military capability or to overhaul outdated government IT systems.

3 In order to secure best value from the significant amounts of public money the government has committed, it is crucial that government can successfully navigate the challenges of delivering its major programmes. However, government programmes often encounter difficulties, taking longer and costing more than planned, and not delivering the intended aims, with significant and high-profile consequences.

The National Audit Office's role

4 We have examined major programmes across different parts of government and at different stages over many years, including a significant number of transport, defence and energy programmes. Our work has directly supported Parliamentary scrutiny of government programmes and provides an independent evidence base to inform the public about how government programmes are performing.

5 We have previously brought together what we have learned in different ways and for different audiences. For example, we have produced:

- outputs on over-optimism, assurance, lessons from major rail infrastructure programmes;
- a briefing for the Committee of Public Accounts on the government's attempts to improve programme management;
- a framework to review major programmes, currently being updated;
- a tool to understand the challenges in delivering programme objectives;
- a guide to initiating successful projects; and
- a survival guide for senior decision-makers on how to challenge project costs.

6 This report draws together insights from our recent reports on major programmes, including on Crossrail, Carrier Strike and Universal Credit. While there is a wealth of literature and courses on major programmes, we repeatedly see similar problems. We think that many of these problems have their roots in four key areas: scope, planning, managing interdependencies and oversight.

7 This report examines the root causes of the issues we see most often and why we think they occur, in order to identify learning points that we think government should focus on in order to improve its performance on major programmes. It is not an exhaustive account of the difficulties that programmes face. In some places we include specific examples from our published work. These are illustrative examples and are not indicative of the overall performance of a specific department. Nor do all of the programmes featured, or in government, suffer all of the issues we identify. The report focuses mainly on infrastructure rather than purely transformation or digital programmes, but these lessons are also applicable to all types of projects and programmes.

8 **Figure 1** on pages 6 and 7 summarises our key learning points.

Figure 1

Learning for Government – Lessons from Major Programmes

This is a summary of our learning points for government

Scope

NAO insights	Learning points
Ensure that a programme's scope clearly aligns with its strategic objectives	1. Bodies should establish a clear alignment between a programme's objectives and its scope. Where there are multiple objectives, these should be coherent, and any tensions clearly recognised. 2. Establishing a clear alignment between objective and scope should provide bodies with a firm foundation to assess and prioritise any potential changes to scope or objectives.

Cost and Schedule

NAO insights	Learning points
Understand the limits of cost and schedule estimates	1. Senior decision-makers should ensure they understand the underlying bases of estimates, and where areas of risk and uncertainty lie. 2. An estimate produced from early high-level information is unlikely to be suitable for setting a programme budget and schedule, and should be used only in an indicative fashion to guide long-term planning until a detailed design supported by industry pricing is available. 3. Ranges are now being used to better reflect the boundaries of possible cost and schedule outcomes. Decision-makers must work to understand what these ranges represent and how much confidence they can put in them.
Critically examine and be realistic about the schedule	1. Senior decision-makers should be alert to behaviours that suggest a schedule is becoming increasingly challenging. 2. Organisations should consider early in a programme's lifecycle what needs to be in place to meet their schedule targets, and periodically assess the likelihood of these requirements being in place.
Develop detailed plans to achieve anticipated savings	1. Once bodies have identified potential sources of savings, they should develop detailed plans which identify the steps needed to achieve them.

Source: National Audit Office

Interdependencies

NAO insights | **Learning points**

Ensure inter-dependencies are identified and managed

1. Bodies should assure themselves that a programme's critical path identifies all the contributing activities needed to bring a programme to completion, including where issues and delays with one element might threaten the delivery of the whole programme.
2. Bodies should clearly define who is responsible for integration, and ensure that they have the appropriate authority and levers to co-ordinate other elements of the programme.
3. Where government intends a programme to have wider benefits, it should put in place a plan setting out how these wider benefits will be achieved and who is responsible for doing this, particularly where these might depend on other departments not delivering the core programme.

Consider operational planning from the start

1. Bodies should define how a programme is intended to be used in practice from the outset, and continually develop their understanding of how it will be used in operation as the programme develops.
2. Where possible, entry into use should be carried out in stages to test and refine delivery and reduce the implementation risks of a larger improvement. However, bodies should develop arrangements for each stage in advance and in detail.

Governance and Oversight

NAO insights | **Learning points**

Ensure that programme management changes as the programme develops

1. Bodies should consider the different types of activity required by the programme, and the different risks that may emerge at different stages of the programme. This understanding can help guide planning for how programme management arrangements may need to change as it progresses.
2. Regardless of what governing agreements are in place, government fundamentally remains accountable for the programme. As a result, departments should remain alive to when their current governance approach may not be working, and be prepared to amend arrangements to enable them to carry out their responsibilities.

The importance of transparency and honesty in major programmes

1. Bodies must ensure that information within their organisation is accurate, consistent, and timely. Decision makers should consider whether the indicators they are presented are the right ones, and how they would alert them to issues emerging.
2. Organisations should examine their, and their contractors' culture and behaviours to ensure they allow an effective line of sight from the working level up to decision makers, as well as the wider public. They should also ensure that commercial arrangements incentivise transparency and honesty within the supply chain.

Background on major projects and programmes

9 Different government departments have different approaches to who delivers major programmes. For some, the department is the 'sponsor body', responsible for setting requirements, budget and benefits. The programme itself is delivered by a 'delivery body' that has the technical expertise to develop the cost, schedule and designs, and to oversee the programme through its lifetime. The delivery body often contracts private sector suppliers to develop more detailed plans, and then to deliver the programme. Alternatively, some departments choose to take on both the sponsor and delivery body roles in-house, contracting with suppliers directly. **Figure 2** shows the top 10 largest government programmes by value.

Figure 2

Top 10 major projects and programmes in the Government Major Projects Portfolio (GMPP) by value, as at July 2020

The government has invested in a variety of major programmes across many departments

Programme name	Department	Whole life cost on Government Major Projects Portfolio as at 9 July 2020 (£m)
High Speed Two Rail programme	Department for Transport	55,700
Heathrow Expansion Programme	Department for Transport	32,608
Dreadnought	Ministry of Defence	30,100
Complex Weapons	Ministry of Defence	28,717
Nuclear Warhead Capability Sustainment Programme	Ministry of Defence	20,901
Smart Metering Implementation Programme	Department for Business, Energy & Industrial Strategy	20,137
Crossrail programme	Department for Transport	17,631
Geological Disposal Facility Programme	Department for Business, Energy & Industrial Strategy	12,743
Universal Credit Programme	Department for Work & Pensions	12,717
Land Environment Tactical Communication and Information Systems	Ministry of Defence	11,400

Notes

1 The whole life cost is from the Infrastructure and Projects Authority's 2020 Annual Report data and may not reflect other government announcements, for example on High Speed Two.

2 Costs are whole life costs, and include non-government funding. This means that some programmes, such as the Heathrow Expansion programme, are included even though the government expects the costs to be met by the private sector.

Source: National Audit Office analysis of *Infrastructure and Projects Authority 2020 Annual Report*, published July 2020

10 HM Treasury sets the government's approval process for programmes that are above departmental delegated spending limits or which are novel, contentious or significantly repercussive for future public finance.[1] **Figure 3** on pages 10 and 11 sets out the government's framework for approving and managing major programmes, including the activities that commonly take place at each stage.

11 The Infrastructure and Projects Authority (IPA) is the government's centre of expertise for infrastructure and major projects. The IPA provides expert project delivery advice, support and assurance to government departments, and works with industry to ensure that projects are delivered efficiently and effectively, and to improve performance over time. It leads the project delivery and project finance profession across government, and the embedding of lessons learned, such as those in their *Lessons from Transport for the Sponsorship of Major Projects* (produced jointly with the Department for Transport).[2] It also oversees the GMPP which aims to improve the delivery of the government's biggest and riskiest projects by increasing transparency and providing independent assurance.

NAO insights

Ensure that a programme's scope clearly aligns with its strategic objectives

12 HM Treasury guidance requires departments to establish a strategic case for a programme at each key decision point. The strategic case should justify the investment in a programme, setting out its strategic rationale, objectives – and how the programme will meet them. However, despite setting out a strategic case, we often see bodies struggle from the start to maintain a clear focus on a programme's objectives and how a programme's scope aligns with them. Government major programmes are likely to have multiple objectives, sometimes involving more than one department, and we see cases where objectives are neither necessarily coherent when taken together, nor clearly prioritised when tensions emerge between them.

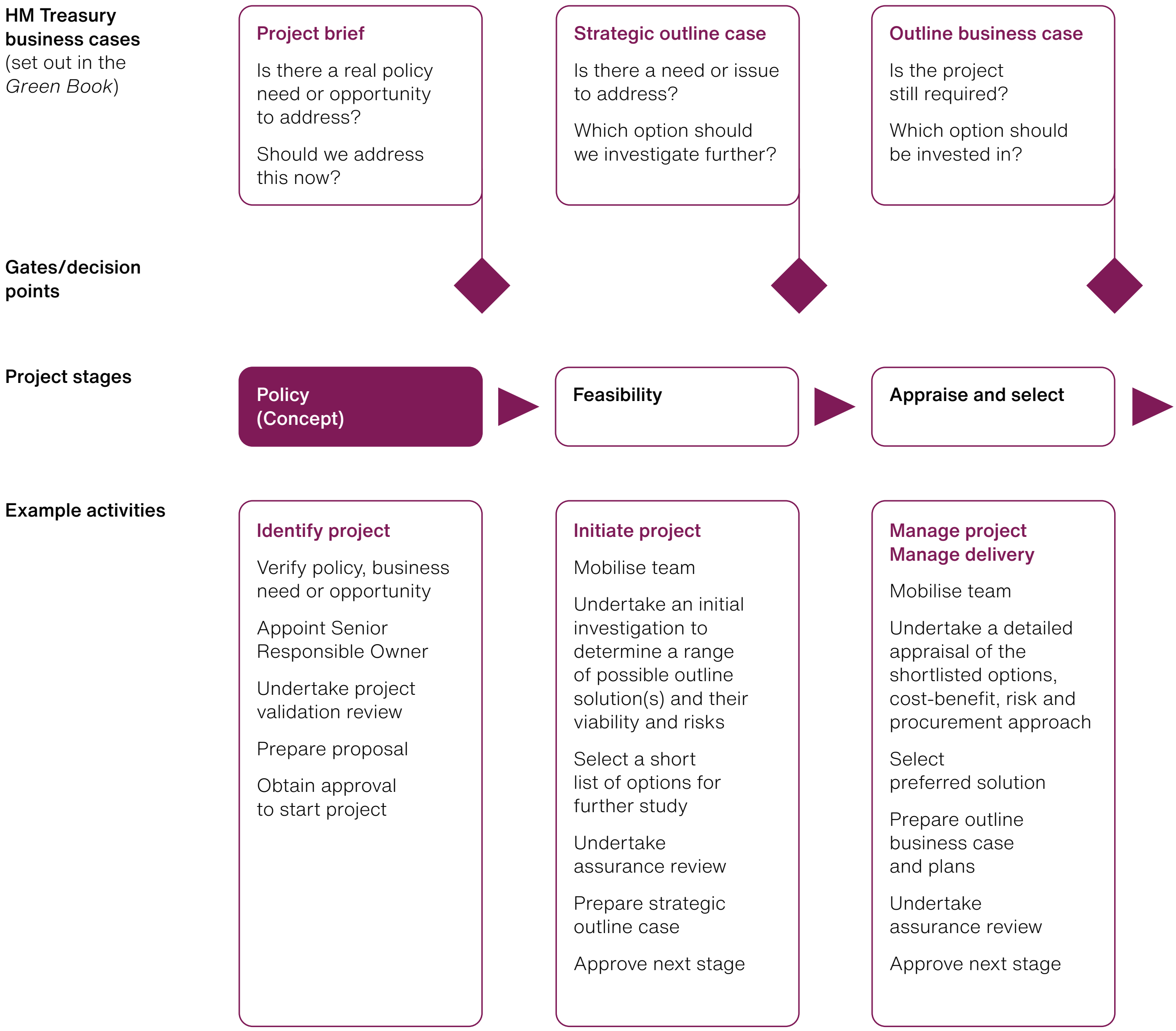
13 Having a clear scope that aligns with objectives is critical for the future success of a programme. In the early stages, it enables the government to make good decisions about what is the right programme to deliver the intended impact, and then how to focus its resources and plan it.

1 HM Treasury, Treasury approvals process for programmes and projects; available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/567908/Treasury_approvals_process_guidance_final.pdf, November 2016

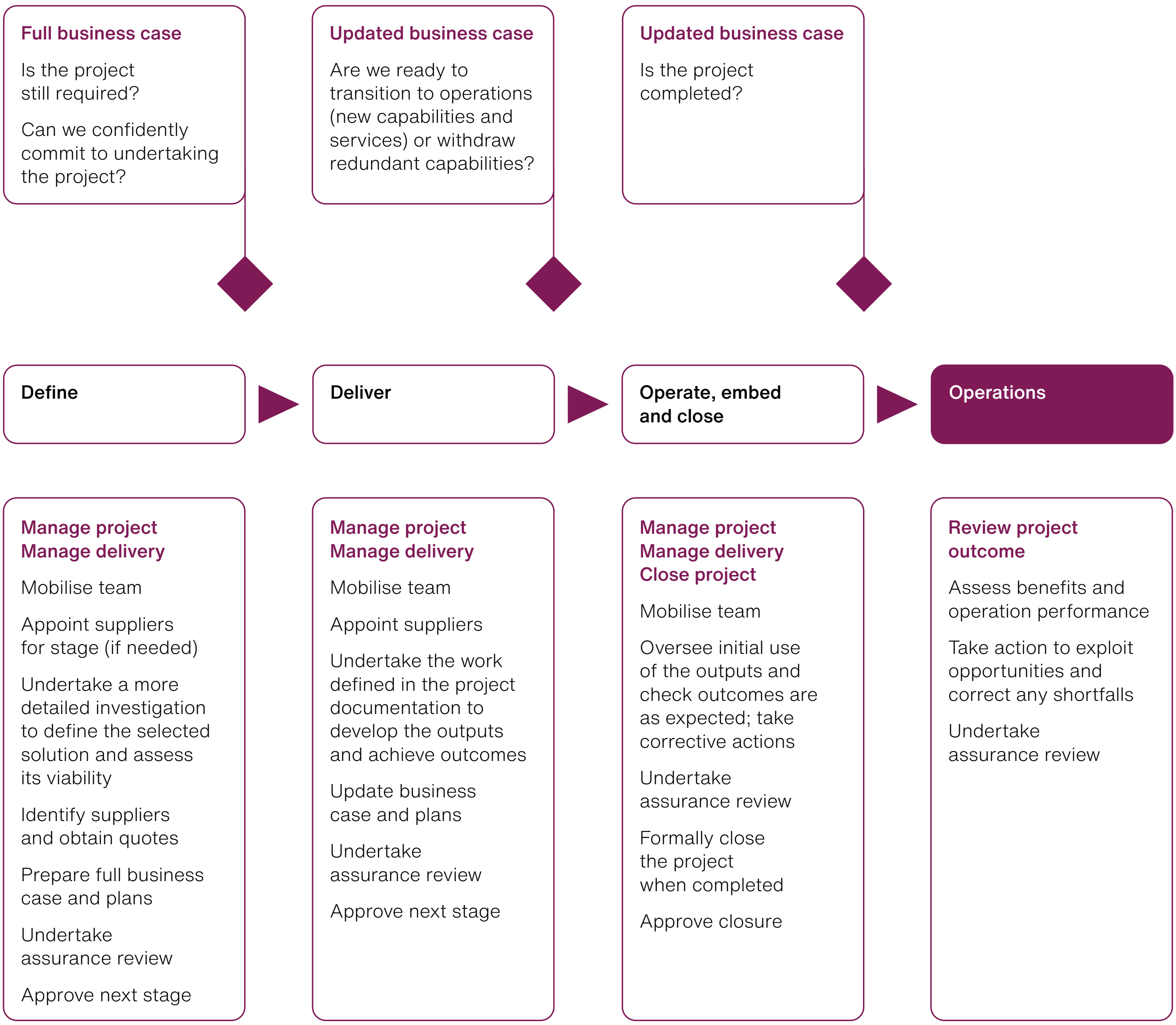
2 Available at: www.gov.uk/government/publications/lessons-from-transport-for-the-sponsorship-of-major-projects

Figure 3

Infrastructure and Projects Authority representation of the lifecycle of major projects and programmes, from concept to operation



Source: Infrastructure and Projects Authority


Full business case
Is the project still required?
Can we confidently commit to undertaking the project?
Updated business case
Are we ready to transition to operations (new capabilities and services) or withdraw redundant capabilities?
Updated business case
Is the project completed?
Define
Deliver
Operate, embed and close
Operations
Manage project
Manage delivery
Mobilise team
Appoint suppliers for stage (if needed)
Undertake a more detailed investigation to define the selected solution and assess its viability
Identify suppliers and obtain quotes
Prepare full business case and plans
Undertake assurance review
Approve next stage
Manage project
Manage delivery
Mobilise team
Appoint suppliers
Undertake the work defined in the project documentation to develop the outputs and achieve outcomes
Update business case and plans
Undertake assurance review
Approve next stage
Manage project
Manage delivery
Close project
Mobilise team
Oversee initial use of the outputs and check outcomes are as expected; take corrective actions
Undertake assurance review
Formally close the project when completed
Approve closure
Review project outcome
Assess benefits and operation performance
Take action to exploit opportunities and correct any shortfalls
Undertake assurance review

14 Being clear about how a programme's scope meets its objectives is also vital for decision-making throughout a programme. The long-term nature of government programmes, and additional requirements emerging as a programme develops – as a result of the external environment or emerging technologies – mean that changes to a programme's scope are highly likely. We see cases where there are shifts in a programme's objectives or scope, but bodies do not take a planned approach to assessing how such changes affect value for money or the original aim of the programme. It is therefore difficult for bodies to prioritise potential trade-offs. For example, the Government is currently considering which objectives to prioritise for the roll-out of gigabit-capable broadband. In our recent report, Improving broadband we found that prioritising the speed of programme delivery over other objectives posed a risk to value for money.[3]

Learning points

- Bodies should establish a clear alignment between a programme's objectives and its scope. When there are multiple objectives, these should be coherent, and any tensions clearly recognised. Bodies should also recognise that given the long-term, transformational nature of major programmes, the objectives or scope may need to be revised during the programme's lifecycle.
- Establishing a clear alignment between objectives and scope should provide bodies with a firm foundation to assess and prioritise any potential changes to scope or objectives. Bodies should take a controlled approach to making any changes, ensure that they understand how these may affect the programme's scope, objectives and overall value for money, and prioritise accordingly.

Understand the limits of cost and schedule estimates

15 Government uses estimates as the basis for setting both cost and schedule targets, as well as measuring performance in meeting them. It wants to announce the likely cost and schedule of a programme early on to demonstrate action, as well as to be transparent in the use of public funds and show that a programme is affordable. However, the precision and accuracy of estimates are highly dependent on the stage that a programme is at.

3 Comptroller and Auditor General, *Improving broadband*, National Audit Office, HC 863, Session 2019–2021, October 2020.

16 Estimates made at the concept stage will necessarily be based on high-level information, which becomes more detailed as the scope of the programme is developed. The relative lack of information at a programme's early stages means that any estimate will be highly uncertain and contain many areas of potential risk. For example, assumptions will need to be made about elements such as ground conditions, which cannot be known until detailed surveying takes place, and knowing how something will be built might require a certain level of detailed design to understand. Early costs will also likely lack input from suppliers. In many programmes we have reviewed, governments have not sufficiently recognised the inherent uncertainties and risks in early estimates, and has used them to set budgets and a completion date. We then see situations where forecast cost and schedules exceed early estimates as these uncertainties and risks crystallise.

17 In addition, the use of early estimates as delivery targets can incentivise delivery bodies and suppliers to attempt to meet unrealistic expectations, which then drive behaviours that are detrimental to the successful delivery of the programme. These behaviours include overambitious attempts to find savings and meet risky schedule targets (see our section on schedule, paragraphs 21 to 25, and our section on savings, paragraphs 26 to 29). A better understanding of the nature of estimates would allow for a more informed and transparent discussion of financial and schedule risks, which would better guide programme management.

18 Even when plans are more detailed and contracts in place, a programme's cost and schedule estimates will still contain risks and uncertainties. It is not always possible to see that bodies have arrangements in place that allow them to distinguish between cost and schedule increases resulting from better estimates being produced, and those caused by poor performance in delivery.

19 Recently, some bodies have begun to use ranges to publicly communicate the likely cost and delivery date of a programme, rather than using a single cost or date target. For example, the current estimated cost of Phase One of High Speed Two is £35 billion to £45 billion, with services between Old Oak Common and Birmingham starting between 2029 and 2033.[4] Ranges are typically wide in the earlier stages where the greatest uncertainties exist and should narrow as information about the programme becomes more certain.

20 While using ranges publicly is an encouraging development, they have been used internally within programmes in the past. The top end of a range would inform the single cost/date targets used previously. Because programmes have often exceeded these targets, there remains a need to interrogate what a range is based on, and what risks and uncertainties could cause a programme to exceed the range.

4 *Full Business Case, High Speed Two, Phase One,* The Department for Transport, April 2020. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879445/full-business-case-hs2-phase-one.pdf

Learning points

- Senior decision-makers should ensure that they understand the underlying bases of estimates, and where areas of risk and uncertainty lie.
- An estimate produced from early high-level information is unlikely to be suitable for setting a programme budget and schedule. Any early estimate of programme cost and schedule should be seen as provisional, should clearly recognise limitations and uncertainties, and be used only in an indicative fashion to guide long-term planning until a detailed design supported by industry pricing is available.
- Previous practice in government has been to publish cost and schedule estimates as single point figures, and it is now moving to the use of ranges to better reflect risks and uncertainties. While we welcome this development, decision-makers must understand what these ranges represent and how much confidence they can put in them. Bodies should work to understand what risks and scenarios might cause the programme to exceed these ranges, and revisit this analysis as the programme progresses.

Please also refer to our *Survival Guide to challenging costs in major projects*[5] which explores cost estimating further.

Critically examine and be realistic about the schedule

21 A programme's schedule is a tool to manage its delivery, as well as a means of communicating when it will be completed and its benefits delivered. Contractors' incentives might also be tied to achieving schedule dates, to encourage productivity. These political and commercial uses can drive a reluctance to reconsider schedule targets, to avoid unnecessarily disappointing constituents or releasing the pressure on contractors to deliver efficiently. While it is understandable that a government wants to be ambitious in meeting its goals, this too often overrides a frank assessment of the mounting risks and potential negative consequences of overreaching for a deadline, such as service failure and unnecessary costs.

5 Available at: www.nao.org.uk/report/survival-guide-to-challenging-costs-in-major-projects-2/

22 We have seen certain behaviours indicating that a programme's schedule and deadline are becoming increasingly unrealistic. These include:

- persistent re-planning of the schedule to meet the same deadline, often accompanied by ever more ambitious assumptions and proposals to reach it;
- organisations removing scope and/or benefits from the programme;
- shortening the time allotted for operations and systems testing at the end of the programme schedule;
- attempts at the last minute to bring the programme into use in stages. Whilst using stages, rather than everything happening at once, can be a useful way of reducing risk (see paragraphs 40 and 41 below), it can be complex to introduce if not planned carefully;
- organisations focusing on resolving individual project risks, rather than stepping back to understand and assess the totality of risks facing the programme.

23 Being too focused on meeting a deadline means that bodies miss opportunities to properly plan and execute other contingency options. It can also lead to sponsor and delivery organisations taking potentially damaging actions in the hope that unrealistic targets can be met.

24 In our report, *Completing Crossrail*, we found that decision-making in the latter stages of the project was dominated by achieving a fixed completion date, and some of these decisions drove unnecessary cost into the programme.[6] These included an attempt to meet the schedule by carrying out construction and systems testing in parallel when few meaningful test results could be acquired, taking time and space from construction workers on site. Crossrail Ltd reduced the number of people in its risk management team in anticipation of completing the programme and then had to re-hire personnel when it became clear that significant work remained. It also persistently re-planned the programme schedule based on what contractors needed to achieve to meet the deadline, rather than on historical performance.

25 It is important for sponsor and delivery bodies to consider early in a programme's lifecycle all the elements required to be in place to complete the programme by the deadline. Examples could include staff training, regulatory approvals or other related projects. We see cases where there is no clear understanding about what is required, meaning that it becomes difficult for bodies to assess whether a deadline remains feasible once pressures emerge or to consider whether the benefits of proceeding outweigh any potential risks.

6 Comptroller and Auditor General, *Completing Crossrail*, National Audit Office, HC 2106, Session 2017–2019, May 2019.

Learning points

- Senior decision-makers should be alert to behaviours that suggest a schedule is becoming increasingly challenging. Persistent schedule replanning, the removal of scope and /or benefits, previously unplanned staging of a programme and excessive focus on individual project risks are signs that they need to examine closely the feasibility of the schedule.
- Organisations should consider early in a programme's lifecycle what needs to be in place to meet their schedule targets, and periodically assess the likelihood of these requirements being in place. The assessment should include historical performance and productivity and should feed into an assessment of whether the benefits of meeting a deadline under pressure outweigh the risks.

Develop detailed plans to achieve anticipated savings

26 Organisations can face pressures from the outset to try and find programme savings, sometimes known as 'efficiencies', particularly when the government wants to make a programme more affordable alongside other spending commitments. It is good practice to identify potential savings and aim to work as efficiently as possible throughout a programme's delivery. However, we often see examples of poor practice, including savings targets set with no solid basis and no detailed plan for how they will be achieved. As a result, it is rare for bodies to realise savings as planned.

27 When the potential for savings does exist, bodies do not put enough effort into developing the actions necessary to realise them. We see bodies assuming that savings will arise from adopting a particular approach to delivering a programme, a high-risk solution such as a technological change, or assuming that industry will develop initial ideas further without an explicit instruction to do so. They may also include savings in cost forecasts even when the true likelihood of realising them is low, resulting in cost increases later on when the savings do not materialise.

28 On High Speed Two, HS2 Ltd included £4.9 billion of savings within its April 2017 estimate, such as efficiencies, changes to the design and scope of the programme and price estimate reductions. These savings included those based on the benchmarking approach it used to cost the programme, such as the assumption that it could reduce administrative costs by encouraging UK industry to work closer together, as is common in European countries. When we reported on the programme in 2016, HS2 Ltd had identified where these savings might be found but did not develop them further into a programme of activity to achieve them.[7] As a result, these savings were not delivered, and elements that had the most assumed savings saw significant cost increases within HS2 Ltd's 2020 cost estimate.[8]

7 Comptroller and Auditor General, *Progress with preparations for High Speed Two*, National Audit Office, HC 235, Session 2016-17, June 2016.
8 Comptroller and Auditor General, *High Speed Two: A progress update*, National Audit Office, HC 40, Session 2019-20, January 2020.

29 Without sponsor and delivery bodies developing concrete plans for how savings will be realised in practice, the likelihood of their being achieved will continue to be low. Identifying the source of a particular opportunity is only the first step, and on its own does not set out who will be responsible for delivering them, how progress will be reported and when mitigating actions might be needed where savings become at risk.

Learning points

- Once bodies have identified potential sources of savings, they should develop a detailed plan which identifies the steps needed to achieve them. The bodies should track performance against this plan, identifying who is delivering these savings and what mitigating actions might be needed if savings became at risk.

Ensure interdependencies are identified and managed

30 Major programmes are composed of multiple, smaller inter-related projects, which can themselves be significant undertakings. They may also be dependent on the progress of other programmes. Therefore, successful programme delivery often depends on integrating programmes and projects. While arrangements to deliver individual elements may be clear, we have often seen bodies fail to establish how an entire programme will be delivered, what wider Government activity might be needed for its success, and who is responsible for carrying this out. This leads to additional resources being needed to reintegrate the programme, or instances where one element of the programme being late prevents the entire programme from achieving its objectives.

31 For example in *Carrier Strike – preparing for deployment*, we found that the Ministry of Defence had made considerable progress in having built two new carriers, receiving jets to schedule, and completing berthing infrastructure and most of the facilities for the jets. In doing so, the programme team had tracked progress, monitored risks and identified interdependencies, engaging continually with the various commands. However, the new Crowsnest radar system will be 18 months late, which will affect Carrier Strike's capabilities in its first two years.[9] This was because the Department did not oversee its contract with Lockheed Martin effectively and, despite earlier problems on the project, neither was aware of the sub-contractor's lack of progress until it was too late to meet the target delivery date.

9 Comptroller and Auditor General, *Carrier Strike – preparing for deployment,* National Audit Office, HC 374, Session 2019–2021, June 2020.

32 We also often see cases where it is unclear who is accountable for integrating the various elements of a programme. Delivery bodies often expect that integration will emerge from collaboration between delivery partners (be they from other parts of government or industry) but, in practice, collaboration is weakly incentivised. Even when a body identifies a programme partner as being responsible for integrating elements of the programme, their role might not carry the authority needed to execute this. Encouraging collaboration is not enough: someone with sufficient authority needs to specify its end goal. Otherwise delivery partners will feel unable to take the necessary actions for integration, particularly when conflicts or trade-offs emerge. When integration fails to occur, the costs of this ultimately fall back on the government.

33 For example, in the new generation electronic monitoring programme, we found that the Ministry of Justice (the Ministry) had added responsibility for integrating the different elements of the programme into its contract with the supplier Capita. The Ministry saw Capita's role as taking on some of the risk that would traditionally fall to a prime contractor and managing the other three suppliers proactively. However, Capita was contractually not responsible for the work and performance of the other suppliers, and considered it lacked leverage to perform the integrator role. This difference in opinion grew into a dispute and, as delays worsened, the Ministry became concerned about Capita's incentives as the integrator. The Ministry and Capita mutually agreed to resolve their contractual differences in June 2016. As part of this agreement, the Ministry decided to bring the integrator role in-house, although it acknowledged that it needed to build capability to manage this.[10]

34 Government also often expects major programmes to deliver wider social and economic benefits such as job creation and access to housing, which may depend on the actions of bodies outside the control of those delivering the programme. However, it is often the case that government does not make any organisation responsible for delivering these wider benefits, assuming that completing the programme will act as an impetus for them in and of itself.

Learning points

- Sponsor bodies should assure themselves that a programme's critical path identifies all the contributing activities needed to bring a programme to completion, including when issues and delays with one element might threaten the delivery of the whole programme. This should include elements that may be beyond the immediate control of programme managers, so that sponsor bodies can work with others to identify mitigating activities should these elements fail to materialise on time.
- Bodies should clearly define who is responsible for integration, and ensure that they have the appropriate authority and levers to co-ordinate other elements of the programme.

10 Comptroller and Auditor General, *The new generation electronic monitoring programme*, National Audit Office, HC 242, Session 2017–2019, July 2017.

- When a government intends a programme to have wider benefits, it should put in place a plan setting out how these wider benefits will be achieved and who is responsible for doing this, particularly when the benefits might depend on other departments not delivering the core programme. When bodies outside government are needed to deliver benefits, there should be a strategy for influencing them to do so. The government may also need to consider whether extra funding may be needed to achieve these benefits.

Consider operational planning from the start

35 Moving from programme delivery into day-to-day operations is a complex task and bodies must take particular care to manage dependencies at this stage. Some major programmes carry a high risk of disrupting existing services, especially when they are expected to lead to transformational change.

36 Nonetheless, bodies often underestimate the complexity of bringing a programme into use and may not begin planning for operations until the programme is nearing completion. For example, the Thameslink programme aimed to increase capacity and relieve crowding on rail services in London and the South East. It represented a substantial change in how the railway functions in this region, involving new technology, new ways of managing passengers at stations and new maintenance arrangements. However, the collective rail industry, including the Department for Transport as programme sponsor and Network Rail as network operator, did not start planning sufficiently early enough to manage the transition to bring the enhanced services into use. In May 2018, there was severe disruption to the rail network in that region, due to deficiencies in planning the introduction of the Thameslink services.[11,12]

37 A flawed understanding of how a programme will be used in practice can lead to gaps in its scope, requiring costly changes later on, and also to bodies making programme decisions with potentially far-reaching unintended consequences. If bodies do not plan effectively and early enough, the limits of what can be in place on day one may suddenly become apparent, and then need to be addressed rapidly to meet the programme schedule.

38 The risks around moving into day to day operations are made worse by the temptation to squeeze the time allotted for operational and systems testing to make up for delays that have occurred earlier in the programme, as we explored earlier on being realistic about the schedule (paragraphs 21 to 25). Furthermore, a new or enhanced service may require significant changes to ways of working and/or depend on additional capability in existing services to support it.

11 Comptroller and Auditor General, *Update on the Thameslink Programme*, National Audit Office, HC 413, Session 2017–2019, November 2017.
12 Office of Rail and Road, *Independent inquiry into the timetable disruption May 2018*, December 2018. Available at: www.orr.gov.uk/sites/default/files/om/inquiry-into-may-2018-timetable-disruption-december-2018-report-grayscale.pdf

39 For example, as we reported in *Carrier Strike – Preparing for Deployment*, Carrier Strike relies on the sustained availability of munitions and stores, such as ammunition and food. However, the Ministry of Defence has been slow to develop the support ships needed to supply the carriers and currently has only one suitable ship. It has long been aware that this will restrict the operational freedom of Carrier Strike but has not yet developed a solution. In November 2019, the Department stopped the competition to build three new support ships because of concerns about value for money. It now believes that this will delay the introduction of new ships by between 18 and 36 months, making it uncertain that the first new support ship will be operational before the existing one leaves service in 2028.[13]

40 There is often an ambition to introduce a new service in a 'Big Bang' improvement, rather than in smaller stages that can be tested, refined, and embedded more carefully. For a staged approach to work, however, bodies must plan each stage in advance, considering what they hope to learn from each stage and what risks they are seeking to mitigate. They should not assume that the use of stages alone will solve any problems that a programme may encounter. For example, in introducing the Personal Independence Payment, the Department for Work & Pensions (DWP) did not identify the most significant risks to test, and did not allow enough time between stages to assess performance across the full benefit process before it increased volumes. Backlogs developed early and the Department did not have sufficient time to resolve problems before the next stage of implementation.[14] We have also seen cases where introducing stages at the last minute has caused problems because bodies have not fully thought through the consequences of rapidly changing planned arrangements.

41 While timely planning can avert potential problems, bodies should also expect that unknown issues will emerge, and should allow time for these to be discovered and managed. For this reason, bodies must continue to have contingency arrangements in place in case of service failure, regardless of the approach taken.

Learning points

- Bodies should define at the outset how a programme is intended to be used in practice, and then continually develop their understanding of how it will operate as the programme develops. This should include considering what existing services and capabilities might be needed to support a new or enhanced service, and whether assumptions about the level of service to be introduced remain realistic. It should also include active engagement with whichever body will run the programme once in use.

13 Comptroller and Auditor General, *Carrier Strike – preparing for deployment*, National Audit Office, HC 374, Session 2019–2021, June 2020.

14 Comptroller and Auditor General, *Welfare Reform – Lessons Learned*, National Audit Office, HC 77, Session 2015-16, May 2015.

- Wherever possible, entry into use should be carried out in stages to test and refine delivery and reduce the implementation risks of a larger improvement. However, bodies should develop arrangements for each stage in advance and in detail, including an understanding of what risks are being mitigated, and what is intended to be learned from each stage. Contingency arrangements for failure must also be in place regardless of whether or not a staged approach is adopted.

Ensure that programme management changes as the programme develops

42 In recent years, the government has chosen to manage many programmes by retaining the role of programme sponsor and creating a bespoke organisation to deliver the programme. It chooses this model for various reasons, including separating delivery from potential political interference from within the government of the day, and to recruit and retain specialist skills in key industries. This separation becomes more apparent as a programme moves away from its early development as a policy and into day-to-day delivery. Ultimately, regardless of delivery arrangements, responsibility for spending taxpayers' money, and delivering the programme as intended, remains with the sponsoring department.

43 The relationship between the sponsor and delivery bodies is often set out in an agreement that delineates the roles and responsibilities of both parties, describes arrangements for reporting information and outlines when the sponsor can intervene if the programme begins to falter.

44 However, once a programme is underway, we have found that these governance arrangements tend to remain similar throughout the remainder of the programme. This is despite the fact that the different stages – for example civil engineering, systems testing and preparing for use – all have different risk profiles, require different skills to oversee, and might require engagement with different stakeholders. While we occasionally see efforts to refresh the skills available at a senior decision-making level, a more thorough examination of what structures and skills are needed to oversee a programme often occurs too late. We have also found that mechanisms in agreements between sponsor and delivery bodies, which might be useful at an early stage of the programme, become less so as the programme develops, reducing a sponsor body's options for overseeing or intervening.

Learning points

- Sponsor bodies should consider the different types of activity required by a programme, and the different risks that may emerge at the different stages of it. This understanding can help guide planning for how management arrangements may need to change as the programme progresses, including the types of skills and capabilities an organisation may need, and in what way a sponsor body might need to intervene if the programme goes off-track.
- Regardless of what governing agreements are in place, government fundamentally remains accountable for the programme. As a result, sponsors should remain alert to when their current governance approach may not be working, and be prepared to amend arrangements to enable them to carry out their responsibilities as appropriate.

The importance of transparency and honesty in major programmes

45 Underpinning all our themes is the need for transparency and honesty both within government and throughout the supply chain. Accurate, timely and relevant information is crucial to guide and monitor the delivery of programmes. Transparency and honesty are also the basis for constructive challenge of delivery bodies by sponsors, as well as from Parliament and wider society. Despite its importance, we have found issues with both the technical quality of programme information, as well as organisational cultures preventing the right information from emerging. Without these, the quality of decision-making may suffer from over-optimistic assessments of programme progress and problems that could have been identified earlier may suddenly emerge.

46 Underlying data on the costs and benefits of programmes are often poor or non-existent. Within departments and delivery bodies we have seen multiple estimates and numbers in use that are not easily reconciled with one another, making it difficult for sponsor and delivery bodies to track and report progress. Reporting has also been supported by evidence that is insufficient or out of date, demonstrating a lack of connection between the working level and that presented to decision-makers. For example in *The Equipment Plan 2017 to 2027*, our review of a sample of projects in the Plan found insufficient evidence from some teams to conclude that the assumptions made in their costings were robust, and cases where the initial evidence provided by project teams was inconsistent with the information on which the Plan was based. We also identified two cases where forecast costs did not reflect the most accurate data available at the time the Plan was compiled. Our subsequent report found some improvements: budgets for the first year of the Plan were based fully on forecast costs and financial risks, although this did not apply to subsequent years.[15]

15 Comptroller and Auditor General, *The Equipment Plan 2017 to 2027,* National Audit Office, HC 717, Session 2017–2019, January 2018; *The Equipment Plan 2018 to 2028,* National Audit Office, HC 1621, Session 2017–2019, November 2018.

47 We have also observed weaknesses in the form of information; for example, bodies have not always considered what information could act as a leading indicator of issues that are emerging. For example, on Crossrail, we found that the emphasis on progress reports presented to the board and sponsors was on what had been achieved, rather than on the level of risk to successful delivery that remained in the programme.[16] During the early stages of the Universal Credit programme, we reported that the DWP lacked a detailed plan or management information, which meant that it could not measure its progress effectively against what it was trying to achieve. The Department has since improved its use of performance measures. For example, it has introduced lead indicators of payment timeliness which it uses to investigate and challenge variations in its offices' performance, thereby helping to increase the number of claimants paid on time from 55% in 2017 to 90% in February 2020.[17]

48 Different types of information may be important at different stages of a programme, particularly information that indicates whether a programme is ready to transfer to the next stage, such as from design to construction or construction to operation. For the right information to flow through the programme, bodies must work to embed a culture of transparency and honesty throughout an organisation and into the supply chain. The pressures that sponsor or delivery bodies are under can make them defensive about the programme or allow a 'good news' culture to develop which can undermine processes intended to transmit accurate information. This means that opportunities to identify and mitigate serious issues may be missed, and instead emerge suddenly and unexpectedly. This can also damage the trust in an organisation's delivery of a programme at a time when it most needs the support of its external stakeholders.

Learning points

- Bodies must ensure that information within their organisation is accurate, consistent, and timely. Decision-makers should consider whether the indicators they are given are the right ones, and how these would alert them to emerging issues. They should also actively consider whether the types of management information may need refreshing to keep fulfilling this purpose, and if so, when.

- Organisations should examine their own, and their contractors' culture and behaviours to ensure that they allow an effective line of sight from the working level up to the decision-makers, as well as to the wider public. They should also ensure that commercial arrangements incentivise transparency and honesty within the supply chain.

16 Comptroller and Auditor General, *Completing Crossrail,* National Audit Office, HC 2106, Session 2017–2019, May 2019.
17 Comptroller and Auditor General, *Universal Credit: early progress,* National Audit Office, HC 621, Session 2013-14, September 2013; *Universal Credit: getting to first payment,* HC 376, Session 2019–2021, July 2020.

Appendix One

Our scope and evidence base

Scope

1 This report has been prepared to provide insights from our previous work auditing major programmes, examining common issues that we see and providing learning points that we think government should focus on to help improve its performance on major programmes. It is not an exhaustive account of the difficulties that programmes face.

2 The report focuses mainly on infrastructure rather than purely transformation or digital programmes, but these lessons are also applicable to all types of projects and programmes. In some places we include specific examples from our published work, which are illustrative examples and are not indicative of the overall performance of a specific department. Nor do all of the programmes featured, or in government, suffer all of the issues we identify.

Evidence Base

3 This report draws on our experience of auditing major programmes across different parts of government and at different stages over many years. Our work has directly supported Parliamentary scrutiny of government programmes and provides an independent evidence base to inform the public about how government programmes are performing.

4 Our previous reports on major programmes can be found on our website (https://www.nao.org.uk/search/pi_area/managing-major-projects/). Examples of reports we reviewed for this output include:

- Improving Broadband (October 2020).
- Carrier Strike: Preparing for deployment (June 2020).
- Palace of Westminster Restoration and Renewal Programme (April 2020).
- The Equipment Plan 2019 to 2029 (February 2020), and its predecessor reports.
- High Speed Two: A progress update (January 2020).
- Managing infrastructure projects on nuclear regulated sites (January 2020).

- Transforming Courts and Tribunals – a progress update (September 2019).
- Progress delivering the Emergency Services Network (May 2019).
- Completing Crossrail (May 2019).
- Rolling out smart meters (November 2018).
- Update on the Thameslink Programme (November 2017).
- The new generation electronic monitoring programme (July 2017).
- Universal Credit: progress update (November 2014).
- Managing risk reduction at Sellafield (November 2012).

5 It also draws on our wider experience and understanding of major government programmes, and on publications where we have previously brought together what we have learned in different ways and for different audiences. For example, we have produced:

- Over-optimism in government projects (December 2013).
- Assurance for major projects (May 2012).
- Lessons from major rail infrastructure programmes (October 2014).
- Delivering Major Projects in Government: a briefing for the Committee of Public Accounts.
- Framework to review major programmes (April 2019).
- The DECA: Understanding challenges in delivering project objectives (October 2013).
- Welfare reform – Lessons Learned (May 2015).
- Lessons for major service transformation (May 2015).
- NAO Guide: Initiating successful projects (December 2011).
- Survival guide to challenging costs in major projects (June 2018).

6 We also use:

- information published by government, for example, guidance on how to initiate and manage major programmes;
- evidence provided to Parliament, for example written ministerial statements or oral or written evidence provided to select committees; and
- public reports of Parliamentary select committees, particularly those of the Committee of Public Accounts from sessions based on our reports.

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