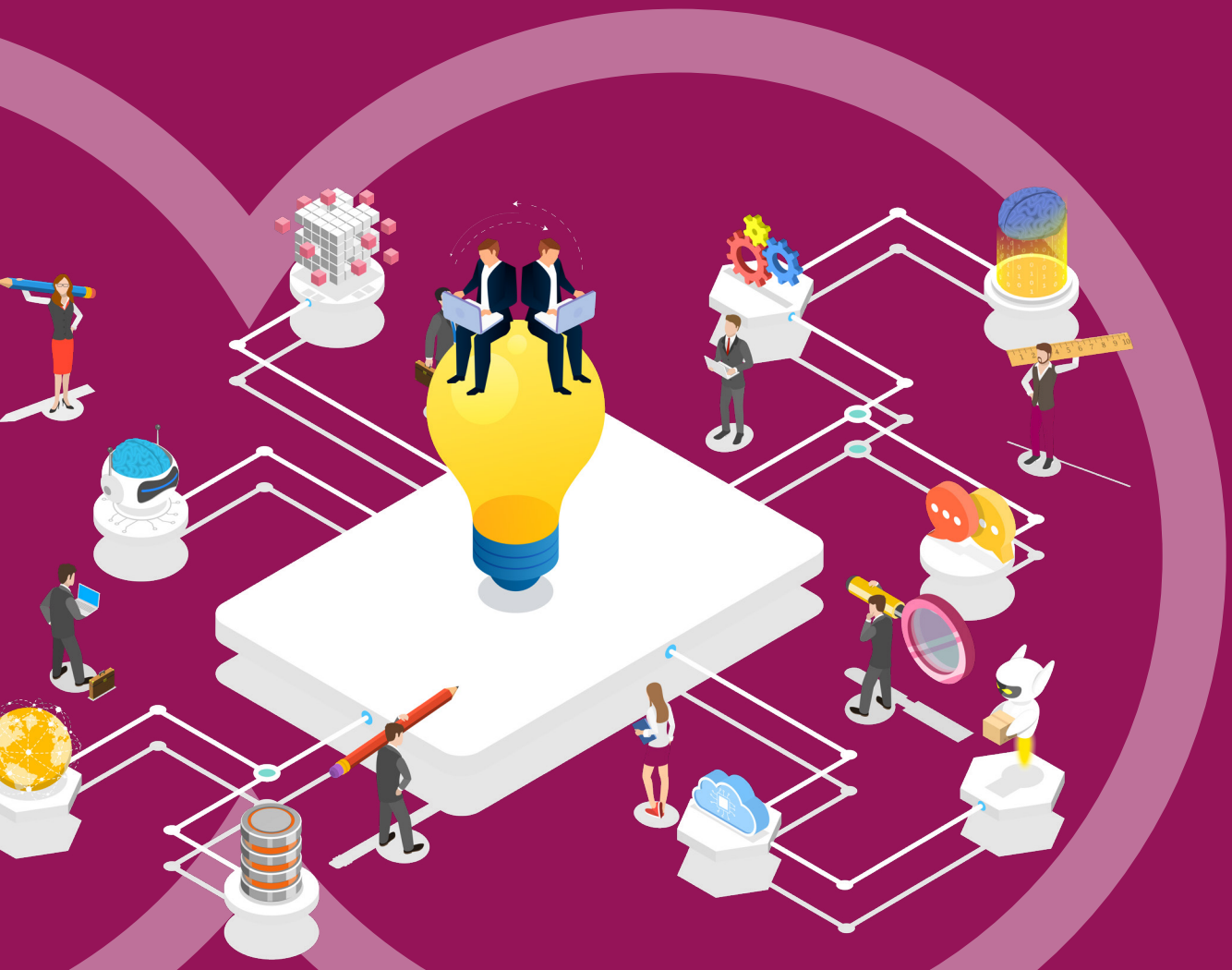
Good practice guide

National Audit Office

INSIGHT

Digital transformation in government:

A guide for senior leaders and audit and risk committees



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Introduction

1 We have produced this guide to help audit and risk committees ask questions of their organisation's management when undertaking large-scale digital change programmes. These are typically complex, multi-year undertakings involving a collection of internal and external teams across several business functions, information technology (IT) operations and service delivery units. Consequently, audit and risk concerns would start at an early stage in these projects to ensure that organisations do not set off on the wrong footing with unrealistic scopes or inappropriate budgets and timescales that are not grounded in a realistic assessment of what is deliverable within the available resources and constraints.

2 Additionally, it should be recognised that the vast majority of change programmes now being undertaken will involve significant digital technology components. Hence, senior non-specialist leaders and steering groups in departments who deal with major change programmes will also find benefit in noting the points and suggested questions contained in this guide.

Why this area requires attention

3 Digital technology is widely deployed across many aspects of government. However, its adoption and use has often required significant investment. Our work over the last decade has shown that government's attempts at digital transformation have had mixed success. Former flagship major transformation programmes have failed to deliver results as expected. Larger projects have a greater margin of error, and complexity generally increases exponentially with scale. This means there are differing rates of success between smaller and larger engagements. The same themes have been repeated in government's transformation strategies over the last 25 years, which shows that digital transformation is a difficult and complex undertaking (Appendix One).

4 Making government services available digitally has been underway for many years. As a consequence, there is a rich legacy of technologies and services in use that have been developed across several generations of technology using skills from many internal and external specialists. This has resulted in a diverse set of solutions. To broaden access, more recent changes to government's services have mainly focused on improvements to the citizen's online experience. These have benefited the user, but often without tackling the greater task of modernising the complex legacy environments that underpin the service.

5 This approach addresses a limited set of transformation needs and may create frustration because, although access to the service may have improved, the way the service is implemented may be unchanged. Overall, the changes will have limited impact on the efficiency or effectiveness of service delivery. Furthermore, departments then need to take on substantial additional people and other costs to update services to operate in today's environment. Without a deeper understanding of digital transformation, senior leaders often focus on tactical solutions and quick fixes and avoid addressing the underlying inefficiencies that contribute to driving future costs.

6 In our 2021 report, *The challenges in implementing digital change*, we reported that specialist digital leaders in government have a good understanding of the challenges that government faces and bring much needed expertise to the public sector.[1] However, they often struggle to get the attention, understanding and support needed from senior decision-makers. The technology community in government is often expected to drive transformation. However, most digital change decisions are made by the senior business leaders.[2] They make decisions on digital matters such as funding and investment, the scope of programmes and how procurement should be undertaken. The success of these decisions requires that business leaders in government demonstrate the digital fluency necessary to make the best choices and fully understand the consequences of their decisions for digital transformation.

Aim of this guide

7 Our aim is to support audit committees and senior leaders who are tasked with overseeing large-scale digital change by helping them understand in more detail the core issues to be addressed and pitfalls to avoid. As a result of misplaced confidence due to inexperience, we have seen programmes derailed from the outset and trying to deliver to impossible budgets and timescales, as illustrated in our report, *The challenges in implementing digital change*. A key factor was found to be poor assessment of the complexities of the baseline starting point for these programmes.

Where it applies

8 This guide is aimed primarily at transformation of core operational citizen- and business-facing services that already exist. It is also relevant to organisations when determining their future strategies and considering funding requirements.

1 Comptroller and Auditor General, *The challenges in implementing digital change*, Session 2021-22, HC 515, National Audit Office, July 2021.
2 Such as permanent secretaries, chief executives, chief operating officers and directors general.

The challenge areas

9 Based on our recent work, we have identified seven areas where the more persistent obstacles stand in the way of successful digital transformation in government and have grouped them into three themes as set out below:

a constraints of the existing environment;

- existing landscape;
- funding models;

b under-estimating the scope of early work;

- ambition and risk;
- commercial approaches;
- delivery approach; and

c lack of skills and leadership;

- leadership skills;
- specialist resources.

Constraints of the existing environment

Existing landscape

10 Government still has a large operational estate of ageing or inflexible services that present a major constraint on its ability to deliver business change and exploit opportunities for innovation. Moreover, many legacy systems in government have been insufficiently maintained over many years. The result is that addressing the gap between the present state of business operations and the desired future state for modernisation cannot be attempted in a single bound. Making the transition from legacy systems to modern replacements is complex and difficult. This is especially the case if the legacy systems have many other systems to which they are connected and which rely on them.

11 Business transformation in government cannot be properly achieved without understanding the barriers presented by established systems which are also increasingly costly to maintain or difficult to update. We have stated how this is complex and challenging for departments to address but the effort is constantly underestimated.

12 Data is the lifeblood of services. Government holds large volumes of data, but it is a misconception to equate this with being in a good position to create better, interconnected systems using that data. Government suffers from data which is incomplete, inconsistent, inaccessible, difficult to process, of poor quality and not easily shareable. Manual workarounds still occur, and these add cost through extended timescales and extra money for additional resources needed to compensate for these limitations. It is not just about the data itself; it includes everything surrounding the data such as how it was gathered, where it is stored, what governance is in place, who has access, who holds the risks and liabilities, when it is declared unfit for purpose, and so on. The issues are covered in more detail in our insights guide *Improving government data: A guide for senior leaders*.[3]

13 The Central Digital and Data Office (CDDO) has provided leadership and guidance to tackle these underlying issues. We welcome the publication of the *Legacy IT Risk Assessment Framework* and *Data Maturity Assessment for Government* as an attempt to adopt a more systematic and structured approach.[4,5] It is important that departments maintain the commitments they have made as part of the *Roadmap for digital and data 2022-2025*.[6]

Illustrative examples from recent National Audit Office (NAO) reports:[7]

- **Digital Services at the Border, 2020 –** the Home Office has been trying to upgrade its legacy systems and improve information at the border through digital transformation programmes since 2003 but had not succeeded in translating intent into realistic implementation plans.
- **Modernising Defra's ageing digital services, 2022 –** the Department for Environment Food & Rural Affairs has found it hard to develop and maintain long-term plans for tackling legacy because IT budgets are often cut to meet other departmental priorities.
- **Making Tax Digital, 2023 –** the HM Revenue & Customs original plan to introduce Making Tax Digital had not fully appreciated the complexities of delivering the desired level of change while replacing the existing legacy systems.

3 National Audit Office, *Improving government data: A guide for senior leaders*, July 2022.
4 Central Digital and Data Office, *Guidance on the Legacy IT Risk Assessment Framework*, September 2023. Available at www.gov.uk/government/publications/guidance-on-the-legacy-it-risk-assessment-framework (link accessed 20 February 2024).
5 Central Digital and Data Office, *Data Maturity Assessment for Government*, March 2023. Available at www.gov.uk/government/publications/data-maturity-assessment-for-government-framework (link accessed 20 February 2024).
6 Central Digital and Data Office, *Transforming for a digital future: 2022 to 2025 roadmap for digital and data*, June 2022. Available at www.gov.uk/government/publications/roadmap-for-digital-and-data-2022-to-2025 (link accessed 20 February 2024).
7 Examples drawn from past reports in this guide reflect the situation when these reports were published. We have not included follow-up action that departments may have taken post-publication.

Funding models

14 Standard mechanisms for approval, procurement, funding and assurance do not align very well with the needs of digital programmes, which can be hard to define within the degree of certainty expected in business cases. Often, digital programmes aspire to introduce new ways of working rather than simply replacing one digital technology for another or digitising current non-digital practices. In such circumstances, the level of risk, uncertainty and innovation in these programmes requires management and governance to be aligned. Furthermore, programmes need business cases early to secure funding, and digital leaders perceive there is an incentive to show a high return on investment and so forecast too far ahead, giving a false impression of certainty and reducing the accuracy of the estimates.

15 This is exacerbated because most government changes involve complex legacy challenges. Government is not a 'green field' site. Additional complexity arises from the need to invest significantly to transform or in any way change existing legacy services. Especially in the short term, benefits from digital programmes may take some time to realise and may not result in direct cost savings. Consequently digital leaders can find it hard to make the financial and economic case for significant investment into remediating legacy IT.

16 Government's largely annual funding model hinders departments from strategic improvements over time and makes it difficult to maintain them when they enter live service. Departments have told us it is easier to bid for capital funding (CDEL) over resource expenditure (RDEL), which can lead to a situation where organisations struggle to maintain services once they have been built. One common approach is to purchase more infrastructure capacity to make existing systems run faster, rather than make the effort of redesigning and rebuilding them. This may bring short-term operational improvements. However, it also contributes to the situation government now finds itself in when dealing with the risks posed by legacy systems. Budgeting needs to acknowledge the ongoing need for funding to maintain services.

17 This is especially the case as migration to cloud-hosted models shifts the financing from CDEL and its up-front costs to RDEL 'pay-as-you-go' expenditure through the life of the service. Furthermore, cloud-based strategies often introduce a new financial model where organisations do not own the underlying assets. Transferring applications to cloud-based hosting may involve different levels of redesign of the systems being migrated.

Illustrative examples from recent NAO reports:

- **The challenges in implementing digital change, 2021 –** we highlighted the comparative ease of getting capital funding to invest in assets, compared to revenue funding needed to maintain those assets and operate services. This can lead to delivering digital services without adequate funding to maintain them.
- **Digital transformation in government: addressing the barriers to efficiency, 2023 –** departments told us there is no additional funding for inflationary pressures (relating to digital investment). Departments must use existing budgets and funding for the systemic improvements, and government's Roadmap will have to compete against other priorities.

Under-estimating the scope of early work

Ambition and risk

18 Programmes go astray when ambitions are unrealistic and not grounded from the start in an informed view of the realities and complexities involved. In digital transformation programmes the starting point is an informed understanding of the type of legacy environment that underpins the services being delivered. Ambition and stretch targets are not in themselves problematic. However, unsubstantiated claims to be "world beating" or "cutting edge" may be excessively ambitious given government's starting point. Furthermore, such comments may falsely raise expectations beyond current capabilities. The intangible nature of digital change and use of new technology can lead non-specialists to believe that digital change is simpler and more straightforward than found in practice.[8] Owing to the variety of usage scenarios and rapid pace at which technology evolves, digital change introduces many uncertainties that need to be acknowledged and explored up-front. This contrasts with non-digital programmes (for example, IT infrastructure upgrades) where the physical environment and constraints can be more stable and readily visualised.

19 Transformation implies substantial change to operating procedures, decision-making processes and daily practices. In addition to setting out a vision for the future and establishing a high-level business case for the programme, it requires a detailed action plan and a meaningful approach to measure progress against defined objectives. External research and international best practice suggest that the transformation journey requires a strong focus on risk management. Detailed planning therefore exposes uncertainties by describing activity in detail, laying bare all the complexities, compromises and challenges. Otherwise progress is typically slow and shallow as problems are not unearthed until the later stages when delivery is underway. In particular, incremental changes are enhanced when associated with a robust architecture. Otherwise this can create an artificial impression of progress, with limited impact and potentially an increase in maintenance costs.

8 A joint report from The Royal Academy of Engineering and The British Computer Society in April 2004, *The Challenges of Complex IT Projects*, observed that technology projects are not subject to the laws of physics and the associated constraints in the same way as, say, civil engineering projects. This can produce a perception that anything and everything is possible with technology, but this is not the case – the constraints are more abstract in nature and therefore more difficult to understand.

Illustrative examples from recent NAO reports:

- **The new generation electronic monitoring programme, 2017 –** the desire for a 'world-leading' solution for electronic ankle tagging of offenders proved too difficult to implement because the requirements specified to the suppliers went beyond the capabilities of the technology.[9]
- **GOV.UK Verify, 2019 –** the programme to provide identity assurance services for the whole of government was subject to repeated optimism bias and ultimately failed to fully understand how the solution would work with existing government services.
- **The Emergency Services Network, 2019 –** the programme to replace the dedicated radio network used by the police, fire and ambulance services with a novel solution based on an existing public 4G mobile network sought to be at the cutting edge of technology, but encountered too many issues and the Home Office could not implement it within planned timescales.

Commercial approaches

20 As with all government programmes, complex projects frequently depend on a blend of internal and external resources to deliver results. Leaders of digital programmes often fail to engage sufficiently or early enough with commercial partners. As a result, organisations too often commit to contracts very early in the project lifecycle despite having an insufficient understanding of what is involved in the transformation. Initial agreements are often found to be inadequate when the detail and the related complexities emerge over the following months when research, design and development take place.

21 In situations involving advanced and emerging digital technology, additional consideration is required to recognise the volatility inherent in these projects and to clarify lines of authority, responsibilities and risks. A common response to uncertainty in government is to assume risk can be passed on to suppliers. Programme leaders press ahead without clearly setting out what needs to be delivered and how control of the project can be maintained as it evolves. This can deter some bidders, reducing the range of commercial options for procurement. Contracts should support the flexibility to allow for the change and uncertainty typically found in the digital world. Without these considerations, there may be perverse incentives for suppliers to exit contracts early, thereby diminishing the likelihood of a project's success.

9 This relates to the New Generation Electronic Monitoring programme that closed in March 2022. There is now a new Electronic Monitoring Expansion programme.

22 It is difficult to define the scope and costs of large digital programmes until teams perform detailed exploratory work and build their understanding. However, programmes need business cases early to secure funding. Digital leaders told us that the current business case process does not work well for digital programmes because it locks in assumptions too early and gives a false impression of certainty.

23 Extending the period for early engagement can improve collaboration, facilitate innovation, pool knowledge between the respective parties and improve quality requirements.

Illustrative examples from recent NAO reports:

- **NHS England's management of the primary care support services contract, 2018 –** problems can arise from failure to understand what is being contracted for and not reflecting the requirements appropriately.
- **Army recruitment, 2018 –** inflexible contracts can result in poor outcomes for both departments and suppliers.

Delivery approach

24 While flexibility has advantages, it can also cause problems if there is not enough focus on fully understanding the changes that are needed to the existing systems and data. This is needed before plans and business cases are created.

25 Applying flexible and iterative methods to large-scale transformation can work for mature digital organisations but has created problems in government due to its general lack of digital maturity. These methods can exacerbate problems when the complexity of a programme is not sufficiently understood, the scale of the changes is mishandled, and organisations fail to define the right architectural foundations. These include an assessment and analysis up-front to determine the maturity of existing data and approaches to data integration across existing systems. In practice, fitting into the existing environment is one of the hardest challenges to be faced in transformation.

26 The enthusiasm in government for use of agile approaches to system delivery can mean that rigorous up-front thinking about the overall design and implementation is de-emphasised. In large, complex digital transformation programmes, many things need to be thought about in parallel – business operations, data and the existing infrastructure – which all need to be designed to align effectively. When iterative approaches are over-simplified they struggle to provide practical solutions where the foundations are complex, missing or insufficiently developed. We discuss these matters in more detail in our insights guide *Use of Agile in large-scale digital change programmes*.[10]

10 National Audit Office, *Use of Agile in large-scale digital change programmes*, October 2022.

Illustrative examples from recent NAO reports:

- **Universal Credit, 2011-20 –** agile approaches were initially unsuccessful because the Department for Work and Pensions focused on the technology components without fully understanding the policy and business needs. The use of agile improved over time once the foundations had been developed.

Lack of skills and leadership

Leadership skills

27 While there are some excellent and very experienced senior digital leaders in government, there is limited digital capability across the wider civil service. Senior digital leaders in departments struggle to communicate their messages effectively because their wider leadership teams lack sufficient experience and understanding of digital issues to make informed decisions. In the majority of departments, the chief digital and information officer or equivalent is not a member of the organisation's most senior decision-making board. Only a small proportion of senior decision-makers in government have first-hand experience of digital business. Furthermore, those whose career development has had a heavy policy focus may also lack knowledge on running operations and effective business processes.

28 Tackling an ambitious digital change agenda while keeping existing services running requires a level of capacity and capability that is hard to find. This is exacerbated by the scarcity of digital skills in the market and the high costs of acquiring them.

29 New technologies such as artificial intelligence (AI) provide excellent opportunities for innovation. But these are at risk of being misdirected if business leaders fail to understand how best to harness them for use within the existing environment. Expectations for AI are high. Widely publicised announcements that AI will be broadly deployed at pace and provide major savings or productivity gains across the public sector belie the difficulties of practical implementation. Technology-driven change is often slow and challenging without the necessary business skills to properly exploit it. AI pilots and experiments are important, but there is a big gap between vision and ambition on the one hand and the ability to roll out solutions for wider practical use on the other. This initiative requires more attention aimed at aligning funding, training, and change management processes to integrate these with existing legacy systems and practices. Successful deployments of technology will depend on relatively well-defined objectives, a clear business purpose, good-quality data and a clear understanding of how they will be used. They will also require major changes to business processes and the workforce as well as adoption of the technology itself.

Illustrative examples from recent NAO reports:

- **The challenges in implementing digital change, 2021 –** overall we found there has been a consistent pattern of underperformance in delivering digital business change, often resulting from decisions on technology being taken too early, before the business problem is properly understood. We said government must learn from past experience and better equip senior leaders if it is to improve its track record of delivering digital change.
- **Digital transformation in government: addressing the barriers to efficiency, 2023 –** we said that many in the target group of non-specialist executives for digital awareness training do not have the digital leadership skills to make informed decisions on digital issues.

Specialist resources

30 Many elements of digital change require people with background and experience in various aspects of large-scale software and systems delivery. However, skills in many aspects of the digital economy (including systems architecture, solution design, data analysis, software development, change management, cyber security, and IT operations), while highly sought after, are in short supply right across the UK economy. This skills shortage is replicated globally, and government will not match private sector pay levels. While recent initiatives have gone some way to try to narrow the gap, pay is market-driven and government struggles to recruit given the differentials with the commercial sector.

31 Reductions in resource budgets represent a false economy if skills shortages arise as a result. Programmes that are initiated without adequate resources in place, or press ahead despite shortfalls, are at high risk of delay, de-scoping or outright failure. Care should be taken in projects to ensure staffing levels are appropriate, and that they can be maintained throughout the lifetime of the project. Organisations should critically assess their available digital transformation resources and design their implementation plans to take account of their available skills and capabilities.

Illustrative examples from recent NAO reports:

- **The digital strategy for defence, 2022 –** the Ministry of Defence does not have enough people with the right digital skills and, although it is trying various approaches to overcome this, progress has not been fast enough to match the problem and a different approach is required.

Our guidance: questions to ask

Areas for audit and risk assurance committees to question

32 The questions below are intended to help audit and risk committees probe their organisations to assess how well their organisations are managing risks and seizing transformation opportunities.

33 Audit and risk committees should also consider the strength of the supporting evidence given in answers to these questions.

Constraints of the existing environment

Question 1

34 Are the constraints of the existing environment properly understood?

- Has the organisation reviewed the scope and impact of the digital transformation, including the legacy systems and data on which it is based?
- Has the organisation assessed which legacy systems and data have suffered from neglect in maintenance, and estimated realistic costs and timescales of remediation?
- Is there an understanding of the age, consistency, quality and accessibility of data contained in legacy systems so that the need for any additional work is planned?

Question 2

35 Do funding allocations provide for legacy as well as transformation?

- Is there ongoing funding for resource expenditure (RDEL) to maintain assets or consume cloud-based services?
- Does the organisation have sufficient budget allocated to protect system maintenance and avoid deferral of upgrades or technology refreshes?
- Does the organisation's IT strategy explicitly address legacy with clear plans and defined activities to address remediation?
- Where applications are transferred to cloud-based hosting without being changed (popularly called 'lift and shift' or 'moving without improving'), do non-specialists mistakenly believe this represents digital transformation?

Under-estimating the scope of early work

Question 3

36 Do senior leaders understand the scale and depth of what is proposed?

- Is there evidence to demonstrate that the programme's ambition can be realistically delivered?
- Does the top level documentation provide sufficient information beyond broad agile intentions and high-level statements, or does this remain under-developed in the belief that digital delivery teams can just 'get on with it'?
- Are the main sources of programme uncertainty and risk understood and accompanied by details of how and when these uncertainties will be better addressed?
- Are there adequate business and technical design authorities and expert independent technical assurance mechanisms in place throughout the programme delivery?

Question 4

37 Are the baseline facts analysed and presented in full for the environment, organisation and service to be changed?

- Are the costs of the existing services presented in detail (as expected under the CDDO Roadmap) and the benefits assessed against these costs?
- Has the organisation determined which services should be prioritised for transformation, such as those that have the highest people support or IT maintenance costs?
- Have senior leaders established how efficiencies will be delivered, such as reducing headcount, and the overall effects on transforming internal operations on service performance?

Question 5

38 Has the organisation taken the necessary key business decisions ahead of beginning the design and development of technology solutions?

- Is there evidence of in-depth exploratory work to understand the business need, the existing systems being affected and the opportunities for transformation (not just tactical changes)?
- Is such exploratory work being led by experienced people with an in-depth background, knowledge and understanding of the issues and the ability to challenge?
- Have alternative solution scenarios been evaluated, such as the distinction between improving what currently exists but leaving existing systems in place with their associated inefficient and high cost base, as opposed to more extensive transformation that has the potential to lead to much greater benefit by replacing existing costly and inefficient services?
- Is the business fully involved in making key decisions about the future operating model?
- Have the data quality, data strategy, data model and data architecture requirements been defined in the design of the new service?

Question 6

39 Have the various requirements (such as system, operational, contractual) been properly analysed and determined before committing to commercial contracts?

- Is there evidence of work (on business analysis, new data needs, legacy dependencies) having been undertaken, so that complexities are not exposed until after contracts have been signed and delivery begins?
- Have exploratory discussions with commercial partners taken place before settling on a solution, in order to help the organisation to de-risk the programme and determine what is possible?
- Are assumptions and uncertainties incorrectly treated as risks that can be managed or passed off as the supplier's responsibility?
- Has the organisation appropriately set expectation with suppliers on pricing solution proposals with respect to handling project uncertainties?
- Is the timetable realistic and not unduly driven by near-term contract expiry dates?

Lack of skills and leadership

Question 7

40 Do senior leaders have the required level of expertise and experience?

- Is there a senior permanent business leader with experience of delivering business outcomes enabled by technology and the time to be available when key solution decisions need to be made?
- Does the organisation have business leaders with sufficient digital fluency on its most senior decision-making bodies?
- Is there senior digital and data representation capable of influencing business change at board level?
- Does the input of digital and data leaders provided to business change programmes address all aspects of the change, not just the technology?

Question 8

41 Has the organisation set out clearly the minimum capability required for digital change programmes?

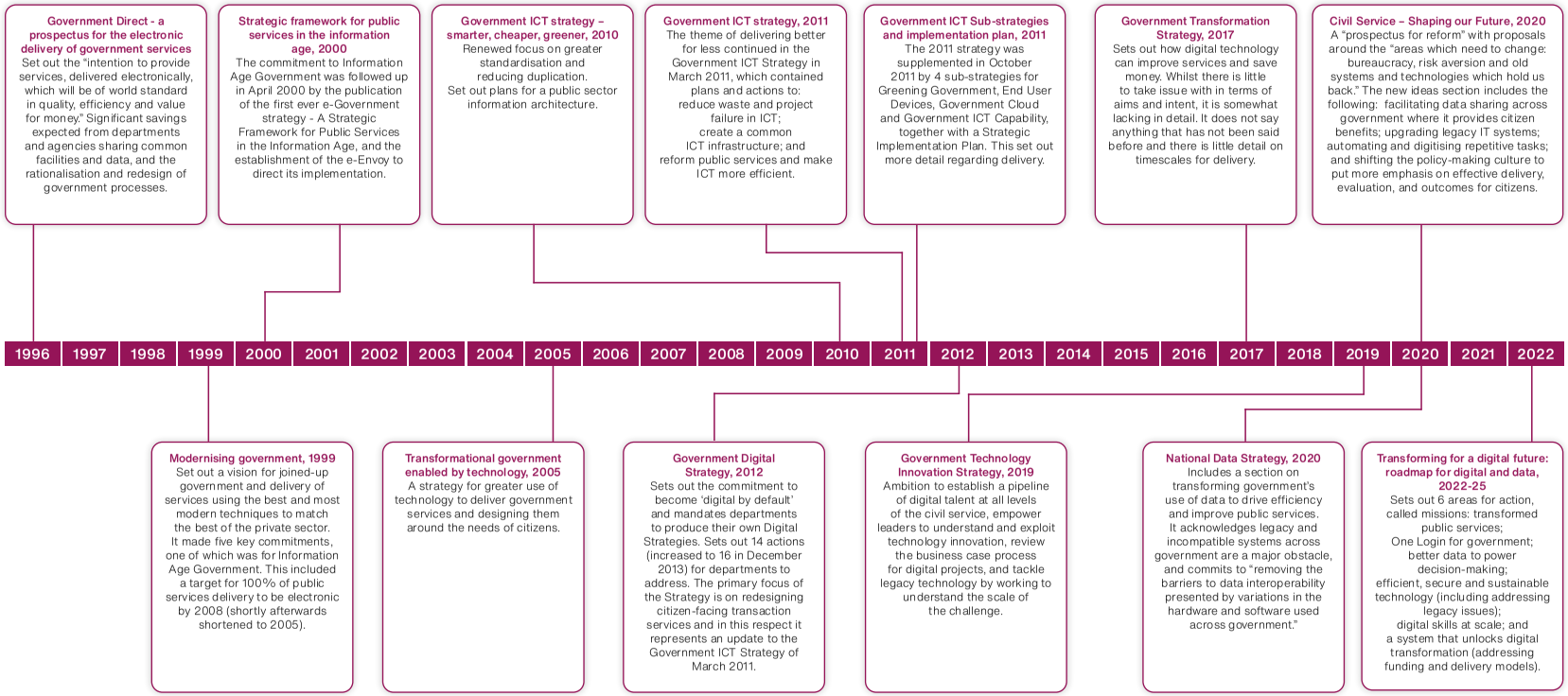
- Have those with responsibility for digital transformation programmes participated in structured training that includes education on understanding legacy systems, the importance of data, and the opportunities and risks when delivering using advanced technology?
- Do business leaders have the skills, commitment and time to engage in programme governance and decision-making as well as doing the 'day job'?
- Do non-technical leaders have an understanding of the role of technical leaders in guiding transformation?
- Does the organisation have the required skills and know-how for changes of the scale required over and above those it is likely to have for lesser changes?
- Where an inability to offer market rates of pay is affecting the ability to attract and retain suitable staff, is the organisation realistically assessing its talent and skills management profile to consider options such as rescheduling, replanning or deferring activities or projects in order to reflect staffing and capability shortfalls?
- Is there access to in-house expertise to assure the services being delivered by external providers?

Appendix One

Figure 1

Government strategies and initiatives on digital transformation from 1996 to the present

The repetition over many years of the themes of modernising legacy systems and joining up data shows the difficulty of practical implementation



Source: National Audit Office analysis of government digital transformation strategies

Appendix Two

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