The challenges in implementing digital change

Cross-government

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Lessons learned reports

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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Summary

1   Our way of life is now increasingly digital, and technology is almost always a feature of large-scale government business change programmes. Current and future public services are dominated by digital change. This is clear in much of government's thinking about how to build back public services following the COVID-19 pandemic, as well as in longer-term policies and strategies. In addition, the public increasingly expects the government to make effective use of technology, so public bodies have little choice but to deliver high-quality digital services.

2   When large digital business change programmes run into difficulty, the technology solution is often cast as the primary reason for failure. There is rarely a single, isolated reason which causes critical programmes to fail. Many of these programmes face intrinsic business challenges as well as technical challenges. Our findings point to a range of problems, including: shifting business requirements; over-optimism; supplier performance; and lack of capability at the senior and operational level. Only a small proportion of permanent secretaries and other senior officials have first-hand experience of digital business change and as a result many lack sufficient understanding of the business, technical and delivery risks for which they are responsible. This means that many of the problems stem from the inability of senior decision-makers to engage effectively with the difficult decisions required to implement technology-enabled business change.

3　Pressures on public finances mean there is an urgent imperative for those designing and delivering digital business change programmes to learn from the mistakes and experiences of their predecessors. If they do not do so, these programmes will continue to fail. This report sets out the lessons for the centre of government and departments to learn from the experience of implementing digital change. It will be particularly useful for senior decision-makers who may not have direct technical experience or who have not yet grasped the scale of the challenge. We have focused on operational business change programmes with a significant technical component, by which we mean programmes which deliver a service that users interact with electronically. In pulling together these lessons, we have reviewed our published reports and interviewed senior digital leaders across government and the private sector. We have assessed good practice and consulted with experts from industry, academia and think tanks to highlight the nature of the challenges and understand why government has found it hard to apply the lessons of experience. Our scope and evidence base are set out in Appendix One.

Findings: lessons for government

4　Having consulted widely across government and its commercial suppliers, we found a high level of agreement among digital leaders regarding the challenges they face in delivering digital business change programmes. These programmes share characteristics and challenges with all major programmes, but added complexities make the difficulties even more acute and have often been poorly understood. We hope that our report will add further impetus to the work being carried out in government and support practical improvements in digital change programmes.

5　We have identified lessons for government digital programmes in six categories, which are essential to get right at the outset. These are critical in any major project or programme, but in digital change the initial and pre-deployment stages are even more pivotal than usual because of the increased uncertainties which typically characterise them, including 'unknown unknown' risks. If the delivery implications are poorly understood the level of ambition can be unrealistic from the outset. Successful delivery of digital business change programmes requires organisations to equip non-technical leaders with the right skills, and design suitable approval and governance frameworks.

Lessons for government digital business change programmes: things to get right at the outset

Understanding aims, ambition and risk

Avoid unrealistic ambition with unknown levels of risk.

Ensure the business problem is fully understood before implementing a solution.

Plan realistic timescales for delivery, which are appropriate to the scope and risk of the programme.

Engaging commercial partners

Spend enough time and money exploring requirements with commercial partners at an early stage.

Adopt a more flexible contracting process that recognises scope and requirements may change.

Work towards a partnership model based on collaboration with commercial suppliers.

Approach to legacy systems and data

Plan better for replacing legacy systems and ensure these plans are appropriately funded.

Recognise the move to the cloud will not solve all the challenges of legacy.

Address data issues in a planned and incremental way, to reduce the need for costly manual exercises.

Using the right mix of capability

Be clear about what skills government wants to develop and retain, and what skills are more efficient to contract out.

Better align political announcements, policy design and programme teams' ability to deliver through closer working between policy, operational and technical colleagues.

Choice of delivery method

Recognise that agile methods are not appropriate for all programmes and teams.

When using agile methods ensure strong governance, effective coordination of activities and robust progress reporting are in place.

Effective funding mechanisms

Ensure that requirements for both capital and resource funding are understood and can be provided for.

See technology as part of a service that involves people, processes and systems in order to better consider the economic case for investment.

Concluding remarks

6   Initiating digital change involves taking a difficult set of decisions about risk and opportunity, but these decisions often do not reflect the reality of the legacy environment and do not fit comfortably into government's standard mechanisms for approval, procurement, funding and assurance. We found that digital leaders understand these issues well and bring much needed expertise to the public sector, but they often struggle to get the attention, understanding and support they need from senior decision-makers.

7   Despite 25 years of government strategies and countless attempts to deliver digital business change successfully, our reports show a consistent pattern of underperformance. This underperformance can often be the result of programmes not being sufficiently thought through before key decisions on technology solutions are made. This means that there is a gap between what government intends to achieve and what it delivers to citizens and service users, which wastes taxpayers' money and delays improvements in public services. If government is to improve its track record in delivering digital business change, it must learn the hard-won lessons of experience and equip its leaders to act effectively.

Recommendations: Actions for government

8   We do not underestimate the challenge involved in digital change, particularly given government's vast legacy IT estate and the need for government to deliver services where there is no counterpart model in the private sector from which government can draw. But there is widespread support from stakeholders for the centre of government to learn from the lessons we have identified in this report and make the required changes. The new Central Digital and Data Office, along with the Government Digital Service and the Cabinet Office, should work to provide clear leadership for this agenda, in particular:

a   **revise existing training programmes to better equip and train all decision-makers with responsibility for digital transformation programmes**. This should include education on legacy systems, the importance of data and the risks of 'build before buy' and of opting for unproven technology;

b   **work with HM Treasury to review existing business case funding and approval processes for digital programmes to:** remove the incentives to state with full confidence those things which are still unknown; ensure that uncertainties associated with assumptions are made clear, together with when these uncertainties will be better understood; understand what the final product should look like, and the path to get there; be clear on what risks represent 'unknown unknowns'; and ensure professional independent technical assurance mechanisms are in place, to support those responsible for approving programmes; and

c   **disseminate and apply lessons learned** from the successes and failures of the past and seek to understand why digital strategies have made poor progress.

9   Individual departments and public bodies should:

d   **carry out proper evaluation and assurance in the early stages of a digital programme** to understand its complexity and scope, assess how realistic the chance of success is and reflect this in the programme approach;

e   **ensure senior digital, data and technology colleagues have wider influence** on all change programmes with digital components, by providing strategic direction and oversight at key decision points in the process;

f   **strengthen their intelligent client function for digital change** including identifying and developing key requirements before tenders and bid processes commence and taking the lead on supplier engagement;

g   **maximise the chances of effective digital delivery by ensuring that business leaders have sufficient skills, commitment and time** to engage in all aspects of governance and decision-making;

h   **produce departmental strategies and plans for how to manage the legacy IT estate** so that maintenance, support and decommissioning are systematically addressed and required funding is ringfenced; and

i   **ensure that agile principles and approaches are appropriately applied** within the context of significant business programme change, for example by developing interim and target operating models, and having appropriate business and technical architecture in place.

Part One

Introduction

1.1   This part introduces the rationale for this 'lessons learned' report. In it we describe the challenge of delivering digital change and government's response to that challenge.

	Part One **Introduction**	The challenge of delivering digital change	The nature of the problem	The government's response
	Part Two **Initiating for success**	Understanding aims, ambition and risk	Engaging commercial partners	Approach to legacy systems and data
	Part Three **Setting up for effective delivery**	Using the right mix of capability	Choice of delivery method	Effective funding mechanisms

The challenge of delivering digital change

1.2   Digital transformation is one of the most influential drivers of organisational change today, challenging public sector organisations to come up with new ways of serving their customers and the public. Our way of life is increasingly digital, and technology is now widespread in large-scale government change programmes. This is clear in much of government's thinking about how to 'build back better' following the COVID-19 pandemic and the planned use of technology in policy documents such as *Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy* and *Build Back Better: our plan for growth*.[1] These plans suggest that the need to deliver successful digital change will be even more crucial in future.

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1   Cabinet Office, *Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy*, CP 403, March 2021 and HM Treasury, *Build Back Better: our plan for growth*, CP 401, March 2021.

1.3   As a result, those working to develop public services need to understand how to manage digital change, by which we mean how government brings together data, processes, technology and people to deliver high-quality and effective services to, for and with citizens. This requirement creates a challenge for the skills and capabilities of everyone involved, including senior decision-makers, senior responsible owners, delivery teams, digital leaders, those providing assurance and suppliers and delivery partners.

1.4   However, government is not a 'green field' site and added complexity arises from the need to transform or change existing services. The difficulties lie in understanding and determining how to make changes to these, often ageing, systems, known as the 'legacy environment', and what it means to build new systems on top of them. This type of change requires a level of analysis before making decisions that does not fit comfortably into government's standard mechanisms for approval, procurement, funding and assurance.

The nature of the problem

1.5   Government has many major projects and programmes which include some form of digital transformation. The government's Major Projects Portfolio has 125 projects worth £448 billion, many of which have digital elements. We regularly report on major programmes, and this has included some digital change programmes that did not achieve all their intended benefits. Some digital change programmes deliver successfully but they may not have the typical characteristics of the programmes we are considering, for example because they do not have to deal with the legacy environment. **Figure 1** shows some of the digital projects which have not met their planned timetables. **Figure 2** (on page 12) sets out some of the financial costs and lost benefits arising as a result of poor performance.

Figure 1

Analysis of a sample of National Audit Office reports to show timetable changes in digital change programmes

Our previous reports have demonstrated that original timetables have proven to be unrealistic. These programmes have contained similar features, including managing interdependencies and implementing untested or novel technology in a legacy environment

Major programme including digital elements	Features of the programme			Original target date	Actual/ expected completion date
	Integration with legacy and other systems	Managing interdependencies	Novel technologies		
E-borders	●	●		2011	Cancelled
GOV.UK Verify	●	●		2012	2016
New generation electronic monitoring		●	●	2013	2019
Common Agricultural Policy Delivery	●	●		2015	2016
Emergency Services Network		●	●	2017	2024
Universal Credit		●		2017	2024
Crossrail (Central section)[1]	●	●	●	2018	2022
Digital Services at the Border	●	●		2019	2022
Smart meter national programme	●	●	●	2019	2025
Her Majesty's Courts & Tribunals Service courts and tribunals reform programme	●	●		2022[2]	2023

Notes

1 The central section of Crossrail refers to the section between Paddington and Abbey Wood.

2 Her Majesty's Courts & Tribunals Service extended the timetable from four to six years following scrutiny before the programme formally began in 2016.

Source: Analysis of published National Audit Office reports and public announcements on programmes

Figure 2

The costs of failing to deliver digital change successfully, 2015 to 2020

Digital change programmes often experience significant increases in cost and decreases in expected benefits

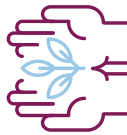|	Impact on expected cost	Impact on expected benefits
Emergency Services Network Latest National Audit Office (NAO) report published May 2019	The total forecast cost of implementing the Emergency Services Network **increased by £3.1 billion** between the 2015 business case (£6.2 billion) and our report in 2019 (£9.3 billion) and is believed to have increased further since.	The forecast benefits **decreased by £2.1 billion** between our 2016 study (£3.6 billion) and our update on progress in 2019 (£1.5 billion).
Smart meter national programme Latest NAO report published November 2018	In 2018 we estimated that the expected cost of the programme had **increased by at least £0.5 billion** from the previous estimate made in 2016 of £11 billion.	Expected benefits **decreased by £1 billion** between the Department for Business, Energy & Industrial Strategy's 2013 forecast (£17.7 billion) and the 2016 forecast (£16.7 billion).
Digital Services at the Border Latest NAO report published November 2020	In July 2019 the Home Office decided to reset the programme. This significantly reduced its scope, extended its delivery timescale by three years, and **increased net costs by £173 million.**	The new scope **reduced programme quantified benefits by £51 million**, from £62 million in the 2014 business case down to £11 million. These benefits are now expected over nine years rather than the originally planned three years.
Her Majesty's Courts & Tribunals Service courts and tribunals reform programme Latest NAO report published September 2019	The decision to rescope the portfolio and extend the timeframe had an impact on long-term implementation costs, **which increased by £64 million.**[1]	The expected overall lifetime savings **decreased by £172 million** between 2017 (£2.3 billion) and 2019 (£2.1 billion).
Common Agricultural Policy Delivery Latest NAO report published December 2015	Costs **increased by £60 million** between its start in 2012 (£155 million) and the 2015 business case (£215 million).	The programme was originally expected to bring benefits of £274 million. Our report found that immediate issues had **diverted attention away** from these and that greater clarity was needed over their delivery.

Notes

1   Her Majesty's Courts & Tribunals Service funded this cost pressure by drawing on planned contingency, meaning it kept within its allocated budget.

2   Costs and benefits presented come from the latest available National Audit Office reports and may not reflect the most recent business case position. For a full list of the reports analysed please see Appendix One.

Source: National Audit Office analysis of the published reports

The government's response

1.6 Over the past 25 years, the government has published a series of strategies to improve its digital performance (**Figure 3** on pages 14 and 15). But these strategies have failed to change the pattern of performance for individual projects and programmes.

1.7 Responsibility for improving government's overall performance rests with both the centre of government (**Figure 4** on page 16) – setting strategic direction and supporting capability development – and departments, who have day-to-day responsibility for delivery.

1.8 We found that digital leaders understand the challenges set out above well and bring much needed expertise to the public sector, but they often struggle to get the attention, understanding and support they need from senior decision-makers. The digital leaders we spoke to revealed their frustration with the status quo and with their inability to influence change programmes with digital components. Only a small proportion of permanent secretaries and other senior officials have first-hand experience of digital change and as a result many lack sufficient understanding of the technical and delivery risks for which they are responsible. Outside government, there is an increasing focus on equipping senior executives with the understanding they need to provide effective leadership to programmes with a strong technical element.

1.9 The centre of government remains committed to improving performance in various ways. The Central Digital and Data Office within the Cabinet Office, created in 2021, together with the Government Digital Service, is responsible for addressing many of the issues we have identified. In the remainder of the report we discuss the areas that can be improved by the centre and departments. In some places we include specific examples from our published work, which reflect our findings at the time of the original report and not the current status of each programme.

Figure 3

Twenty-five years of similar government IT strategies, 1996 to 2021

The repetition of themes in government strategies reflects the lack of progress

1996 – Government Direct	
Usability	User email facility to comment on the service provided
Efficiency	"World standard quality, efficiency and value for money"
Shared infrastructure	Common facilities and data
Legacy systems	Exploits world class private sector telecoms infrastructure

2005 – Transformational Government	
Usability	"Services based on IT designed around citizen or business"
Efficiency	"Efficiency of corporate services and infrastructure"
Shared infrastructure	"Joined-up shared government"
Legacy systems	"Remove old, custom-built, obsolete and costly to maintain technologies"

1996	1999	2005	2009	2010

1999 – Modernising Government	
Usability	"Matching services to people's lives"
Efficiency	"More efficient and effective service"
Shared infrastructure	"Joined-up government"
Legacy systems	"Not trail behind technological development"

2009 – Putting the frontline first: smarter government	
Usability	"The needs of users at the heart of the way services are designed"
Efficiency	"Public services delivered more efficiently"
Shared infrastructure	"Joined up and sharing data with a common infrastructure"
Legacy systems	"Ending historic underinvestment and manage assets more effectively"

2010 – Government ICT Strategy	
Usability	"Faster, better services"
Efficiency	"Smarter, cheaper, greener"
Shared infrastructure	Common infrastructure to enable local delivery, local needs
Legacy systems	"Interoperable – supporting the transition from legacy systems"

Note

1   We reviewed government IT strategies released over the past 25 years and extracted relevant content against four themes we identified. The four themes we identified are: usability of government IT for users; using IT to make efficiency gains; moving toward a shared IT infrastructure across government; and transitioning off legacy systems.

Source: National Audit Office analysis of government IT strategies

2012 – Government Digital Strategy

Usability	Access to information and services in ways convenient to the users, not providers
Efficiency	Services more efficient and cost-effective to develop and run
Shared infrastructure	Develop and provide shared technology platforms
Legacy systems	Services layered on top of legacy IT systems, some of which are more than 30 years old

2017 – Government Transformation Strategy

Usability	"User centred services"
Efficiency	Improved, and money saved
Shared infrastructure	Cross-government flexible digital infrastructure
Legacy systems	"Overhauling legacy technology"

Timeline: 2011 — 2012 — 2017 — 2019 — 2020

2011 – Government ICT Strategy

Usability	API tools to enable users to access information on a range of national and local services
Efficiency	"Reduce waste and ICT project failure"
Shared infrastructure	"Create a common ICT infrastructure"
Legacy systems	Legacy ICT systems have acted as barriers

2019 – Government Technology Innovation Strategy

Usability	"Transform and design their services around the needs of users"
Efficiency	"To make services better and more efficient"
Shared infrastructure	Sharing learnings openly and across sectors allowing solutions to be shared
Legacy systems	"Tackle legacy technology – less fit for purpose"

2011 – Government ICT Strategy: Strategic Implementation Plan

Usability	"End-user focus"
Efficiency	"Reduced waste and efficiencies"
Shared infrastructure	"Common infrastructure"
Legacy systems	"Migration from legacy"

2020 – National Data Strategy

Usability	Deliver better services and operations for their users
Efficiency	"Use of data to drive efficiency and improve public services"
Shared infrastructure	"Removing the barriers to data interoperability"
Legacy systems	Recognises the obstacle of legacy systems

Figure 4

Responsibilities for digital strategies and capability across government

The centre of government is responsible for setting strategic direction and supporting capability development

Organisation	Responsibilities
Cabinet Office	Corporate headquarters for government, in partnership with HM Treasury. Responsibilities include: • helping to ensure the effective development, coordination and implementation of policy; • promoting efficiency and reform across government through innovation, better procurement and project management, and by transforming the delivery of services; and • improving the capability and effectiveness of the civil service.
Central Digital and Data Office (part of Cabinet Office)	Created in January 2021 with main aims that include to: • provide professional leadership and support to the digital, data and technology (DDaT) leads of government departments and the wider DDaT community; • offer expert advice to ministers and senior civil servants on the development and execution of digital, data and technology policies and strategies; • work with HM Treasury to optimise government's approach to funding DDaT initiatives; • support the Government Commercial Function and Crown Commercial Service to reform technology procurement processes; and • support the Government Digital Service in the development and enforcement of technical standards and strategies to ensure efficient delivery and interoperability of systems.
Government Digital Service (part of Cabinet Office)	Centre for the government's digital transformation of products, platforms and services. The emerging strategy, alongside a clear mandate to address the challenges the government faces, is to deliver the next stage of modernisation by developing digital products and infrastructure.
Government Commercial Function	Cross-government network of civil servants involved in government procurement, and commercial experts who support departments.
Crown Commercial Service	Helps buyers in central government and across the public and third sectors to use their collective purchasing power to get the best commercial deals in the interests of taxpayers.
Infrastructure and Projects Authority	Centre of expertise for infrastructure and major projects, supporting the delivery of major projects including IT and transformation programmes.
HM Treasury	The government's economic and finance ministry, maintaining control over departmental spending and capital investment.

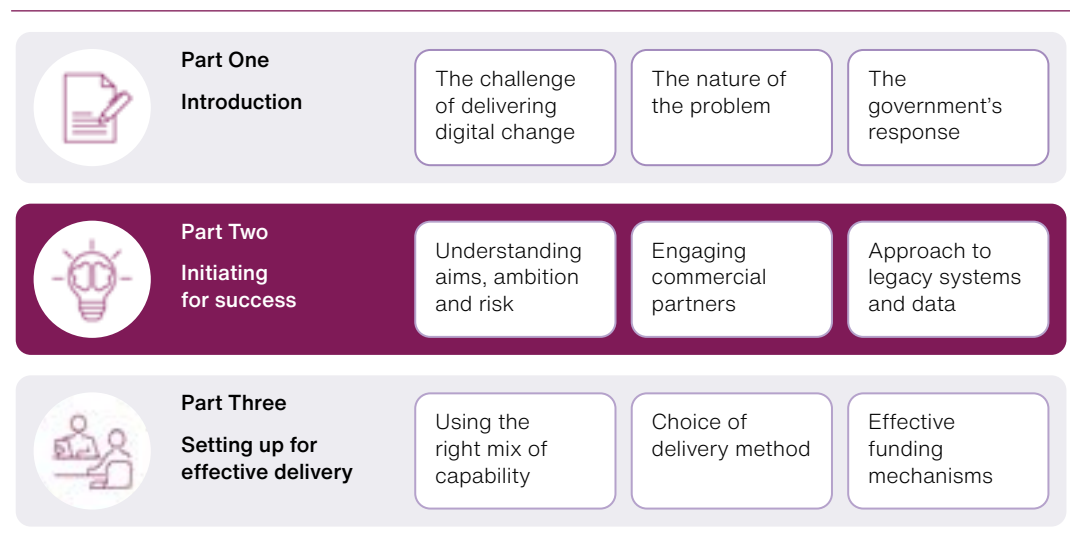Source: GOV.UK (accessed 15 July 2021)

Part Two

Initiating for success

2.1   Digital programmes and projects can deliver beneficial change but require a great deal of up-front thinking and planning to succeed. There needs to be a thorough understanding of the business problem to be solved and an overall plan and design for how the business can move from its current state to its changed state. Delivery planning should include a realistic timetable, engagement with end users, an aligned supply chain and a shared goal, recognised by all stakeholders.[2]

2.2   This part discusses some of the key challenges that the government faces when first setting up large digital programmes. Our evidence highlights three lessons that departments have found particularly challenging. These are:

- understanding aims, ambition and risk;

- engaging commercial partners; and

- approach to legacy systems and data.

Part One Introduction	The challenge of delivering digital change	The nature of the problem	The government's response
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2   Prepared for the Association for Project Management (APM) by BMG Research, *Factors in project success*, November 2014.

Understanding aims, ambition and risk

2.3 The government has significant ambitions for digital business change, and this has led to rapid, large-scale business transformation attempts, often using untested technology. This is a complex and risky approach and the government needs to assess from the outset if these programmes are realistic. Digital leaders highlighted to us the need for the government to take a longer-term view of transformation, delivering more manageable levels of change in incremental steps and managing the risk of 'scope creep' – when a programme or project's scope extends beyond what was originally agreed.

2.4 Government has begun to use more pragmatic and good-practice approaches to digital innovation, by looking for opportunities to test out ideas on a small scale. This is the approach taken by the £20 million GovTech Catalyst fund, created in 2018 by the Government Digital Service, which tries to solve public sector problems using innovative digital technology via a two-stage approach. During the first stage, the public sector proposes complex 'challenges' and will fund up to five suppliers to work on the challenge for three months. At the end of the first stage a panel of government experts evaluate progress. If the results look promising, the government grants additional funding to one or two of the suppliers to work on their solutions for a further 12 months, with the aim of developing a working product that addresses the challenge.

2.5 Although parts of government experiment with smaller-scale innovation, our evidence shows that some digital programmes have tried to implement untested technologies immediately on a larger scale. The Ministry of Justice's programme to develop ankle-tags for monitoring offenders (**Figure 5**) showed how difficult this is to achieve. Instead, the government can benefit from being a fast follower of innovation in the private sector by making better use, where possible, of proven, off-the-shelf solutions.

2.6 If departments do not think sufficiently up-front about the complexities of a digital programme, they risk failing to meet the business need or needing to de-scope or abandon programmes as understanding grows. Digital leaders told us programme teams often rush to a solution because of pressure to deliver quickly, and do not spend enough time understanding the business need, the existing system or what business improvement the programme team wants to deliver. **Figure 6** on page 20 shows how in developing the Verify programme, the team did not fully understand the end-to-end needs of users or the changes needed to the business environment.

Figure 5
Case example: The new generation electronic monitoring programme, 2017

The Ministry of Justice's requirements for 'world-leading' ankle tags for monitoring offenders proved too difficult to implement

Main department: Ministry of Justice (the Ministry)

Objective: The Ministry launched a programme to develop a new 'world-leading' ankle tag for offenders, combining both radio frequency and GPS functionality. The tags aimed to store and send more location data than existing tags in the market, meet higher data security standards, and be reliable and robust. They also aimed to be compact enough to wear comfortably and not require continual recharging.

What happened: The Ministry signed the contract to develop the tags in August 2012 and expected to deploy them from November 2013. The bespoke requirements proved too ambitious to implement, resulting in serious delays and parting company with two successive suppliers.

Outcome: The Ministry decided to procure existing GPS tags that were already available in the market and began to deploy these in 2018, five years later than planned.

What lessons departments can learn:
Departments should avoid unrealistically ambitious plans to use untested technology at scale.

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

2.7 Delivering digital change is challenging and departments have often taken longer to deliver programmes than originally scheduled, due to insufficient or unrealistic scoping and planning (Figure 1). Our report on the Emergency Services Network (**Figure 7** on page 21) found that despite the high inherent risks, the Home Office set an over-ambitious timeline for delivery, with no contingency, and fell significantly behind schedule. We found this problem is widespread, as international public sector digital programmes also often overrun and exceed their budget.

2.8 A range of digital leaders told us that senior decision-makers and operational and policy teams lack an understanding of digital change. This lack of understanding is one potential reason why digital programmes appear to under-deliver against their business cases. Senior leaders need to be able to make credible and informed decisions about the scope and timescales of digital change and provide large digital change programmes with active leadership. The Infrastructure and Projects Authority (IPA) runs a ministerial training course on how to sponsor major projects effectively but has not been commissioned to provide specific training for digital projects. In May the Government Digital Service created a new Digital Leaders course for senior civil servants. Digital, data and technology leaders, who do understand these issues, need to be able to influence programme decisions to give implementing teams the best chance of success.

Figure 6

Case example: GOV.UK Verify, 2019

GOV.UK Verify (Verify) was a technical scheme that was subject to repeated optimism bias, but ultimately failed to fully understand the needs of all intended users

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Main department: Government Digital Service (GDS), which is part of Cabinet Office

Objective: GDS intended Verify to be a flagship digital programme to provide identity assurance services for the whole of government. Verify required citizens to register with a commercial identity provider who would validate and confirm the citizens' identity when they logged in to a service. GDS chose this approach to avoid creating a single database of users and to stimulate a market for identity assurance services.

What happened: Government announced an identity assurance scheme in May 2011 with the expectation GDS would implement it from August 2012. Verify entered live service in May 2016 but take-up by both users and government services fell short of expectations, and by 2019 only two of the original seven identity providers remained in the scheme. At the time of our report in 2019, the verification success rate was 48% against a 2015 projection of 90%. After login, departments must still use their own assurance processes to check benefit and tax entitlements and Verify cannot deal with businesses or people acting on behalf of others (such as tax agents). HM Revenue & Customs therefore continued to use and develop the Government Gateway, which Verify was intended to replace.

Outcome: The Cabinet Office announced that the government would stop funding Verify in March 2020. At the start of the COVID-19 pandemic, HM Treasury approved an extension on condition that no new services would use Verify and existing services should no longer depend on it by September 2021. A ministerial written statement in April 2021 granted a further extension to allow existing users to sign in until April 2023.

What lessons departments can learn:
Departments should avoid repeated optimism bias and should ensure they fully understand the needs of all intended users.

Source: Comptroller and Auditor General, *Digital transformation in government*, Session 2016-17, HC 1059, National Audit Office, March 2017; and Comptroller and Auditor General, *Investigation into Verify*, Session 2017–2019, HC 1926, National Audit Office, March 2019

Assuring changes to programme scope

2.9 It is difficult to define the scope and costs of large digital programmes until programme teams perform detailed exploratory work and build their understanding. Programmes need business cases early to secure funding, and digital leaders perceive there is an incentive to show a high return on investment and give a false impression of certainty. *The Green Book: Central government guidance on appraisal and evaluation* produced by HM Treasury requires departments to make adjustments to deal with the challenge of uncertainty.[3] Despite this guidance, digital leaders told us the current business case process does not work well for digital programmes in practice because it locks in assumptions too early, which can lead to scope creep.

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3   HM Treasury, *The Green Book: Central government guidance on appraisal and evaluation*, December 2020.

Figure 7

Case example: The Emergency Services Network, 2019

The programme sought to be at the cutting edge of technology despite the high inherent risks and was unable to manage the delivery effectively

Main department: Home Office

Objective: The Cabinet Office instructed the Home Office to decommission the dedicated radio network used by the police, fire and ambulance services and replace it with a novel solution based on an existing public 4G mobile network.

What happened: The public 4G mobile network approach involved significant technical challenges, including:

- working with the network provider to increase the coverage and resilience of its 4G network;
- developing new handheld and vehicle-mounted devices as no current devices were compatible with the Emergency Services Network;
- successfully integrating all the components; and
- meeting the needs of the emergency services in situations such as in the air or underground.

As the programme progressed, the Home Office faced significant technical difficulties in scenarios including aircraft transmission and the availability of devices able to communicate directly with each other without a network signal.

Outcome: The Home Office reset the programme in spring 2018 and extended the existing dedicated radio service to December 2022. In January 2019 the Infrastructure and Projects Authority reviewed the programme and found that successful delivery of the programme was in doubt, with major risks or issues apparent in a number of key areas.

What lessons departments can learn:
Many unknown risks emerged from imposing a technical solution from the start which was also untried and untested. Departments should avoid setting a tight timeline with no contingency, and when programmes fall behind schedule, responding by squeezing the time available further is unlikely to recover the situation.

Source: Comptroller and Auditor General, *Upgrading emergency service communications: the Emergency Services Network*, Session 2016-17, HC 627, National Audit Office, September 2016; and Comptroller and Auditor General, *Progress delivering the Emergency Services Network*, Session 2017–2019, HC 2140, National Audit Office, May 2019

2.10 The difficulty of getting detailed specifications right early means that the full extent of a programme's requirements can emerge over time. This can cause scope creep, and programme teams need to be able to respond. It is important to consider if deviations from the initial business case are a necessary response to new information, rather than a failure of execution. However, our published reports show programme teams can be slow to effectively acknowledge and address underlying scope challenges.

Engaging commercial partners

2.11 Commercial partners are an important source of expertise and bring valuable experience of working with complexity and scale.[4] It is hard to define and write detailed specifications for complex digital programmes, yet our evidence shows departments have not spent enough time exploring requirements with commercial partners at an early-enough stage. Early discussions with a range of suppliers before settling on a solution can help departments to de-risk programmes and explore what is possible. Lengthening that early engagement can improve collaboration, facilitate innovation and improve quality requirements. Our experience has shown, however, that departments ask suppliers to commit to contracts without a reasonable understanding of what to deliver. NHS England's management of the primary care support services contract (**Figure 8**) is an example of the problems that can arise from failure to understand what is being contracted.

2.12 Programmes and requirements change over time, but we found that departments do not incorporate sufficient flexibility into their contracts to allow for change and uncertainty. Suppliers told us that it is difficult to introduce assumptions or flexibility into initial contracts, and our evidence suggests departments do not typically revisit, renegotiate and update contracts, except in the event of failure. Government may not get the best possible outcome if the requirements delivered by suppliers are not the right ones. This can also result in financial losses for suppliers if the government holds them accountable for unrealistic contractual obligations.

2.13 Our investigation into the British Army's Recruiting Partnering Project (**Figure 9** on page 24) highlighted that inflexible contracts can result in poor outcomes for both the department and the supplier. The government is unlikely to get the quality of service it needs if suppliers need to minimise their losses. A more mutually beneficial arrangement for departments and suppliers would involve commercial negotiation that recognises that scope and requirements may change. This would avoid government's tendency to over-specify and then fail to adapt to other emerging key dependencies.

4   By commercial partners we mean external suppliers of digital technology who have an ongoing relationship with government through extensive contractual involvement.

Figure 8

Case example: 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

Main department: NHS England

Objective: NHS England aimed to create better-quality primary care support services that were more efficient and easier to use, as well as reducing costs by 35%. It did not believe it had the necessary skills in-house for transforming services through better use of IT. In August 2015, NHS England entered into a contract with a supplier to deliver primary care support services.

What happened: NHS England did not know enough about the services it inherited to set achievable service specifications and performance standards from the start of the contract. As a result, it made assumptions about the services in order to set service specifications and performance standards. The supplier underestimated the scale and nature of the task.

Outcome: NHS England largely secured the financial savings it expected but did not achieve the transformation it wanted. Failure to deliver key aspects of the end-to-end service had a detrimental impact on primary care services and primary care providers, and potentially put patient safety at risk.

What lessons departments can learn:
Government should set realistic but challenging expectations by developing an understanding of what is wanted and at what cost, before the procurement.

Source: Comptroller and Auditor General, *NHS England's management of the primary care support services contract with Capita,* Session 2017–2019, HC 632, National Audit Office, May 2018

Figure 9

Case example: Army recruitment, 2018

Inflexible contracts can result in poor outcomes for both departments and suppliers

Main department: Ministry of Defence

Objective: In 2012 the Army contracted with a supplier for their expertise in recruitment and marketing and set up a partnering agreement to manage the recruitment process. This included plans for a centralised, automated approach to engaging with candidates, using a new online recruitment system.

What happened: The supplier underestimated the complexity of the Army's requirements and the amount of customisation required for the new online system. As a result, it could not use an 'off-the-shelf' commercial solution and took longer than expected to develop a bespoke application. The Army included 10,000 specifications in the supplier contract and did not take the opportunity to simplify the recruitment process before introducing the new online system. Between 2013 and 2018, it also responded slowly to the supplier's proposals to streamline or change the process.

Outcome: The Army was concerned that continuing to apply the maximum service credit deductions for failing to meet monthly recruitment targets would not give the supplier an incentive to improve its performance. Delays in developing the Army's own part of the online recruitment system meant it had not met its own contractual obligations. The Army therefore agreed to amend the performance regime to address shortfalls in recruitment and reinforce its partnering agreement with the supplier.

What lessons departments can learn:
Thorough understanding of the requirements is vital before inflexible contracts are agreed, so that better outcomes can result for both departments and suppliers.

Source: Comptroller and Auditor General, *Investigation into the British Army Recruiting Partnering Project*, Session 2017–2019, HC 1781, National Audit Office, December 2018

2.14 An important part of being an intelligent client is cultivating open relationships with suppliers. Where there is a lapse in intelligent buying, this can lead to adversarial relationships and poor outcomes. To act as an intelligent client when contracting out digital change programmes, departments need individuals who can combine commercial and digital skills. The IPA's Major Projects Leadership Academy teaches senior project leaders across government to work together with suppliers, as experience shows that complex projects benefit from a partnership model based on collaboration. **Figure 10** shows how challenges can arise in the relationships between departments and suppliers if departments do not appreciate the commercial realities suppliers may face.

Figure 10

Case example: E-borders and successor programmes, 2015

The contract tied the supplier to milestones without an appreciation of the commercial realities that inhibited progress. When the Home Office terminated the contract, a protracted legal dispute followed

Main department: Home Office

Objective: The e-borders programme began in 2003, with an ambition to develop new capabilities to collect and analyse data on people travelling to and from the UK. The Home Office was due to complete the programme in 2011.

What happened: In 2007 the Home Office entered a contract which made the chosen supplier responsible for connecting e-borders to air, rail and ferry carriers' systems. The contract strongly incentivised the supplier to deliver the roll-out to the agreed schedules but provided less incentive to offer a wider choice of interfaces. The supplier's initial plans for roll-out would have placed some carriers at a disadvantage to their competitors in terms of costs and the burdens on passengers, and the supplier encountered resistance, particularly from overseas-based carriers. In 2010 the Home Office terminated the contract, claiming failure to deliver against milestones. A protracted legal dispute ensued between the Home Office and the supplier who eventually reached an out-of-court settlement in 2015.

Outcome: Between 2011-12 and 2014-15, the Home Office spent £89 million improving systems that e-borders should have replaced. The Home Office is still processing information about travellers on two systems that do not share data or analysis effectively. The Home Office expects these existing systems to remain in use until at least March 2022.

What lessons departments can learn:
Departments should maintain an awareness of the commercial realities faced by external stakeholders and avoid complacency in the way they manage stakeholder relations.

Source: Comptroller and Auditor General, *E-borders and successor programmes*, Session 2015-16, HC 608, National Audit Office, December 2015; and Comptroller and Auditor General, *Digital Services at the Border*, Session 2019–2021, HC 1069, National Audit Office, December 2020

Approach to legacy systems and data

2.15 The government relies on legacy systems for many important services.[5] Older legacy systems are often difficult and expensive to support, lacking in resilience, and can be vulnerable to cyber-attacks. If the underlying legacy systems fail, key government services, such as tax and benefit systems, will not run effectively. Changing legacy systems can be a complex and risky undertaking. The Financial Conduct Authority's report *Implementing Technology Change* found that in the financial services sector, "firms with a lower proportion of legacy infrastructure and applications had a higher change success rate".[6]

5   We define legacy systems as systems and applications that have been operationally embedded within a business function but have been overtaken by newer technologies or no longer meet changed business needs.

6   Financial Conduct Authority, *Implementing technology change*, February 2021. Available at: www.fca.org.uk/publications/multi-firm-reviews/implementing-technology-change (accessed 15 July 2021).

2.16 Legacy systems need a significant level of resource to make more regular, incremental changes over time. The legacy system environment exposes government to what is likely to be an uncertain but high level of financial risk from potential operational and cyber-related incidents. The government established the Legacy IT Programme to address this problem and it reported its findings internally in November 2020. The programme made recommendations on how the government can make progress in reducing its reliance on legacy systems. It is important that the government responds effectively to these recommendations. As part of the 2020 Spending Review HM Treasury prioritised investment in legacy IT and agreed funding for approximately £600 million to invest in modernising legacy systems. Although these are positive developments, maintenance of legacy systems is often one of the costs most likely to be cut or delayed, and business cases do not always include these maintenance costs. The size of the legacy environment means that additional investment and further work may be needed.

2.17 Failure to understand the complexity and dependencies associated with replacing legacy IT has undermined government's attempts to move away from legacy systems. Making the transition from legacy systems to modern replacements is complex and difficult, especially if the legacy system has many dependencies. Replacement systems often need extended transition time, with dual running of the legacy IT alongside its replacement for years, until departments are confident in the new systems.

2.18 The government has at times found it hard to manage these transitions and complexities. For example, **Figure 11** sets out that the Home Office has been attempting to upgrade its legacy border systems since 2003. Departments typically do not have a good understanding of their IT estate and its interdependencies, and legacy systems are often poorly understood because of their age. This can add to the time, risk and cost of the transition from legacy systems. Departmental IT strategies are an important way to help appraise and set priorities for replacing legacy IT. Departmental IT strategies and business cases could also better consider how small, iterative updates to departments' IT landscape can keep the IT estate up to date and prevent new legacy issues building up over time. Until departments have a good understanding of their IT estate, it is difficult to manage the legacy IT issues at a whole-of-government level effectively.

Figure 11
Case example: Digital Services at the Border, 2020

The Home Office has been attempting to upgrade its legacy border systems since 2003, but at the time of the review had not succeeded in translating its intent into realistic implementation plans

Main department: Home Office

Objective: The Home Office has had an ambition to upgrade or replace legacy systems and improve information at the border through digital transformation programmes since the launch of its e-borders programme in 2003.

What happened: After cancelling the e-borders programme, which it had planned to deliver in 2011, the Home Office started its Digital Services at the Border programme in 2014. This programme aimed to develop in-house replacements for the legacy systems by March 2019.

Outcome: Only one of the programme's planned three systems was in live operation by March 2019. In July 2019 the Home Office decided to reset the programme and extend its delivery timescale by three years, while reducing its scope and continuing to use legacy systems. The Home Office's contingency plan is to further extend the legacy contracts should it not meet its revised timetable for delivery of the programme.

What lessons departments can learn:
Departments may maintain a consistent vision but will not be able to deliver on that vision if they cannot develop a realistic implementation plan.

Source: Comptroller and Auditor General, *Digital Services at the Border*, Session 2019–2021, HC 1069, National Audit Office, December 2020

2.19 Many departments are using cloud technology to modernise, but this only partly addresses some of the legacy IT challenges. As we note in our *Guidance for audit committees on cloud services*, the cloud can be a potentially cheaper and more secure place to hold systems and data. This is because cloud providers can use economies of scale and concentration of expertise to offer a level of security that would be economically or operationally difficult for many organisations to provide on their own.[7] Some organisations may, however, lack the capacity and expertise to select the right services for their needs, implement them securely, and manage and optimise them effectively. Moving to the cloud can fix IT infrastructure, but some applications are too old to transfer to new infrastructure and it is not always clear where the risks lie and who will remediate these applications for transfer. This continues to build up 'technical debt'.[8] Implementation of cloud services is not a 'once and done' endeavour and simply moving legacy systems into the cloud without other improvements will not resolve all the complexity, costs and risks associated with legacy systems.

7   National Audit Office, *Guidance for audit committees on cloud services*, April 2021.
8   Technical debt refers to the future costs that will be incurred in ensuring that a system continues to remain operational and fit for purpose.

2.20 Despite a high-level acknowledgement that data are key assets, the government still has a poor appreciation of the state of the data in legacy systems and its impact on the transformation of operational services. Data issues include the data's age, quality and consistency across different systems. Building a new system from scratch starts with the data requirement, data model and data architecture. Migration from legacy infrastructure is dependent on having these in place, but government transformation programmes and business cases often fail to explicitly address data at the start, and instead it becomes an area of concern and delay further into the project. In our report *Challenges in using data across government* we recommended that business cases should include an assessment of data requirements.[9]

2.21 Government also has an ambition to join up data but has not yet addressed the underlying barriers and constraints that make this such a difficult undertaking. In our report on the *Challenges in using data across government*, we said there are no shortcuts to resolving the issue of lack of data consistency and poor-quality data across government.[10] Recent efforts have borne this out, such as creating the COVID-19 clinically extremely vulnerable list (**Figure 12**), with significant effort in combining data from different NHS and GP IT systems.

9   Comptroller and Auditor General, *Challenges in using data across government*, Session 2017–2019, HC 2220, National Audit Office, June 2019.
10   See footnote 9.

Figure 12

Case example: Identifying the clinically extremely vulnerable during the COVID-19 pandemic, 2021

Significant effort remains in combining datasets at scale across government

Main departments: NHS Digital, Government Digital Service and the Ministry of Housing, Communities & Local Government

Objective: The shielding programme was a swift government-wide response to identify and protect clinically extremely vulnerable people against COVID-19. To achieve this the government needed to bring together data from existing, separate data sources to urgently identify the people who were clinically extremely vulnerable.

What happened: At the start of the pandemic, there was no mechanism to allow a fast 'sweep' across all patients to identify, in real time, those who fell within a defined clinical category. NHS Digital developed the list in several iterations, as more data became available. The first iteration, based on hospital, maternity and prescribed medicines data, was ready on 20 March. The second iteration, using GP patient data, was released on 12 April owing to the time needed to extract these data as NHS Digital did not have ready access to this dataset. It took NHS Digital three weeks to undertake the technical task of accessing and extracting GP patient data.

Outcome: The government identified lessons from the first iteration of shielding and sought to apply them to the second lockdown towards the end of 2020. However, we reported that during the second lockdown systems remained incapable of speaking to each other, although the government set up a new national shielding service system designed to improve its ability to view and analyse data on clinically extremely vulnerable people and their needs.

What lessons departments can learn:
There are significant constraints that need sustained effort to overcome, which apply to all areas of government trying to use and share data beyond its original purpose. The government needs to address the issue in a managed and incremental way, rather than resorting to one-off exercises, which departments must repeat manually.

Source: Comptroller and Auditor General, *Protecting and supporting the clinically extremely vulnerable during lockdown,* Session 2019–2021, HC 1131, National Audit Office, February 2021

Part Three

Setting up for effective delivery

3.1 Before digital change programmes and projects can move into the delivery stage, the right conditions for success need to be in place. What sets digital programmes apart from others is that they need a design framework within which to plan their transition activities from the existing environment to the new. It also needs the right capability and experience in its leaders to shape the change, and the technical skills to deliver that change effectively.

3.2 This part discusses some of the key areas that the government needs to get right when setting up for digital delivery. Our evidence highlights three topics that departments have found particularly challenging. These are:

- using the right mix of capability;

- choice of delivery method; and

- effective funding mechanisms.

	Part One			
	Part One **Introduction**	The challenge of delivering digital change	The nature of the problem	The government's response
	Part Two **Initiating for success**	Understanding aims, ambition and risk	Engaging commercial partners	Approach to legacy systems and data
	Part Three **Setting up for effective delivery**	Using the right mix of capability	Choice of delivery method	Effective funding mechanisms

3.3 Digital leaders told us that departments need to have in place a target operating model, enterprise architecture, data model and a roadmap.[11] The roadmap should show: the sequence of changes; the transitional states between changes; the output expected at key points in the programme; and should act as a communication tool to ensure all involved are well informed. Organisations particularly need to manage their enterprise architecture. This is vital to ensure that they can deploy people, processes, systems and data as effectively as possible in support of business objectives. In this way, organisations can avoid the operational complexity and decline in performance that can occur when too much change happens too quickly and incoherently.

Using the right mix of capability

3.4 Many departments face a large capacity gap for people with digital skills. This skills shortage is replicated globally, which makes this challenging to overcome. Specialists in scarce supply, such as digital architects, service designers and technical managers, earn significantly more money in the private sector than the government is willing to pay, so it can be hard for the civil service to attract and retain them at appropriate levels. **Figure 13** overleaf shows that in 2015, digital leaders in government viewed civil service salaries, recruitment processes and external market conditions as the primary barriers to recruitment and retention. In the interviews we carried out for this report, digital leaders continued to raise these as significant barriers.

3.5 Government needs to set out clearly what skills it wants to develop and retain, and what skills are more efficient to contract out. Some departments have built in-house teams but supplemented them with suitable supplier capability. Chief digital and information officers told us they experienced better results by maintaining core capabilities within their departments. For example, the former Department for International Development (DFID) developed an aid management platform effectively that delivered the intended benefits.[12] DFID's in-house capability meant it avoided the need to rely on contractors.

3.6 If the government is to strengthen its digital profession, it must quickly expand the pool of people with digital skills. Our report on the Common Agricultural Policy Delivery programme provides an example of how the government has not always had the internal skills and capacity needed to deliver the scale and complexity of its ambitious digital programmes. The government is seeking to expand its skills capacity through the No.10 Innovation Fellowship Programme, jointly run by 10 Downing Street and the Central Digital and Data Office. The programme aims to bring senior talent from the digital and technology sector into the civil service for one year to work on projects that can be delivered in that time.

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11 Enterprise architecture is the framework which shows how the different parts of an organisation, including the technology, fit together.
12 DFID merged with the Foreign & Commonwealth Office in September 2020 to form the Foreign, Commonwealth & Development Office.

Figure 13

Barriers to recruitment and retention, 2015

Digital and technology leaders see the amount departments can pay, civil service recruitment processes, and external market conditions as the biggest barriers to recruitment and retention

Responses to the question:

What impact, if any, do you think that the following have had on your organisation's ability to recruit and retain the right people from elsewhere?

The amount you are able to pay

29   4   2

Civil service recruitment processes

29   5   1

External market conditions (demand, scarcity and competition)

28   4   1

Number of people available with the required skills

24   9   1

Perceptions of working in the civil service

22   7   5

Internal market conditions (cross-government competition and pay differentials)

20   10   2

Financial position/budget

20   11   4

Promotion prospects for digital and technology staff

16   13   4

Key

● Negative impact

● No impact

● Positive impact

Notes

1   In 2015 we asked 72 digital and technology leaders this survey question and received 36 responses.

2   Not all 36 digital and technology leaders gave a response against each potential barrier to recruitment and retention. Therefore, the figure excludes 'don't know' or no answer responses.

3   The figure shows the top eight negative impacts.

Source: National Audit Office, *The digital skills gap in government: survey findings*, December 2015

3.7 Political announcements, policy design and programme teams' ability to deliver do not always fully align. Many interviewees emphasised the need for closer working between policy, operational and technical colleagues, to give policies a better chance of successful implementation. Where programmes are not going well, departmental officials need a safe space to hold early and honest discussions with ministers. Teams of experts and practitioners need to be able to challenge unrealistic goals and prevent programmes from becoming too big to deliver, but too big to fail.

3.8 Technology expertise is often under-represented at the permanent secretary and director general level compared with other types of expertise, such as policy and finance. This makes it difficult for departmental leadership to comprehend the complexities of legacy systems, data and dependencies.

Choice of delivery method

3.9 Delivery approaches to digital change vary but the issues set out in Parts One and Two will negatively impact both agile and traditional 'waterfall' approaches.[13] Regardless of the delivery approach, digital change needs proper programme management, with risk management and assurance activities built in. Success or failure lies more often with the skills and experience of the programme team and board than the delivery method.

3.10 Agile methods (**Figure 14** overleaf) have become the default choice for delivery of government digital programmes but are not the answer to all programme delivery challenges.[14] Agile methods cannot solve the early stage issues that we have highlighted and can exacerbate problems when the complexity of the programme is not sufficiently understood. Nor can simple iterative approaches provide practical solutions in cases such as where architectural foundations are complex, missing or insufficiently developed, or back-office integration is not achievable. In our report *Early review of the new farming programme*, we said, "designing and developing technology solutions ahead of key business decisions may lead to ... the IT solution costing more, taking longer and creating a sub-optimal outcome based on an incomplete architecture and design, leading to integration issues".[15]

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13 Waterfall is a linear approach to project delivery consisting of sequential stages where each stage must be fully completed before moving to the next.

14 Agile methodology is an iterative and incremental approach to delivery frequently used in software development projects. The main alternative to agile delivery is the waterfall model. Both methods are valid, and their effectiveness will depend on the need of the project, the stage of the project lifecycle and the skills, experience and culture of the programme team.

15 Comptroller and Auditor General, *Early review of the new farming programme*, Session 2017–2019, HC 2221, National Audit Office, June 2019, paragraph 2.22.

Figure 14

Agile project delivery

Agile can lead to poor outcomes if government applies it inappropriately

Agile is not a single prescribed methodology. Its origins are as a simple set of principles that value flexibility over rigidity when developing software. However, agile is not 'better' – it is better adapted to some problems, but not so well adapted to others. We have seen situations which give cause for concern about its application to large-scale change and transformation programmes, or those involving complex legacy environments.

Our concerns are set out below against the topics in the National Audit Office's framework for the analysis of change and transformation.

Vision and strategy

- Organisations may be in danger of applying techniques for simple software development inappropriately to large-scale change and transformation programmes. Documentation may be sketchy or superficial and not evidence the fundamentals to a necessary level of depth.

- In the absence of clear governance and assurance processes, it is hard to get a clear view of how and what real progress is being made for the money spent, or to assess the likelihood of successful delivery. Recording methods may be inadequate to compensate for the lack of more formal documentation.

- For more complex business change enabled by technology, essential early activity (such as business problem identification, full discovery rather than just user journey, feasibility, options analysis, business architecture, planning, costing and so on) is at risk of either not being done up-front, or being done inadequately to a shallow and superficial level.

Governance, business model and architecture

- The flexibility inherent in an agile approach is easily abused and is not an excuse for failing to undertake the necessary thinking through of what the transformed organisation will look like. The initial foundations may not be sound.

- Senior leaders may mistakenly believe that agile means such thinking can be lightweight at the start and/or deferred to a future stage.

- Designing and developing technology solutions ahead of key business decisions may lead to nugatory or costly re-work resulting in solutions costing more, taking longer and creating a sub-optimal outcome based on an incomplete architecture and design, leading to integration issues.

Change management

- Reporting arrangements may be merely conveying project activity (such as completed sprints and epics) and not true progress on the full scope of the project.

- Organisations may confuse 'test and learn' with after-the-event rationalisation of slippages and re-work.

People, process, technology and data

- Large-scale business change requires much up-front thinking (target operating model, architecture, and so on) and careful consideration of how the legacy systems and environment will integrate into any new change.

- Such thinking needs to include clear plans for how data will be integrated, especially fixed elements such as the data model and data architecture, as well as data cleansing and migration. There is a risk that data needs are not considered sufficiently early, and where existing data sources are used, whether the current data remain fit for purpose.

- There is a risk of lack of identification of critical dependencies in complex programmes and projects that require integration with other systems, especially legacy systems.

Notes

1 This analysis is based on our internal framework designed to assess the ability of an organisation to transform digitally, either at the overall organisational level or for a major service. It provides a framework for consistent cross-government comparison and assessment against good practice.

2 An 'epic' is a group of related business requirements large and complex enough to need to be delivered in smaller, incremental steps often completed within a week or two week period, known as 'sprints'.

Source: National Audit Office framework for the analysis of change and transformation

3.11 Agile is an excellent approach when used appropriately. When programme teams get agile right, they: target specific software deliverables using the right expertise; have a small budget and short duration; consider the user perspective; and deliver in a controlled and managed way. However, **Figure 15** highlights the difficulties in introducing agile methods into challenging programmes such as Universal Credit. Where policies need to be agreed up-front, the business need and the change destination must be clear and use of the legacy environment and other service dependencies needs thorough analysis.

Figure 15

Case example: Universal Credit, 2020

Agile approaches were initially unsuccessful because the Department for Work & Pensions (DWP) focused on the IT components without fully knowing the policy and business needs. DWP improved its use of agile over time

Main department: DWP

Objective: DWP introduced Universal Credit to encourage more people into work, reduce fraud and error, and reduce administration costs.

What happened: DWP started work on Universal Credit in 2010 with an original completion date of October 2017. DWP decided to use agile methodology but was unfamiliar with agile methods and no other government programme of this size had used agile methods before. DWP recognised that an agile approach would raise risks for an organisation that was unfamiliar with it and struggled to use it appropriately.

DWP changed its approach to 'Agile 2.0' in January 2012. This was a hybrid approach which tried to combine agile and traditional approaches to the IT programme management. However, DWP lacked a detailed view of how Universal Credit should work, which led to many problems culminating in a programme reset in 2013.

Since the reset, the agile approach to developing systems and managing the programme has allowed DWP to adjust its plans based on what it learns about what does and does not work. We found DWP's agile team works well together and mainly follows good practice.

Outcome: When we reported on Universal Credit in 2018, we concluded that some parts of the programme worked well, but the extended timescales and the cost of running Universal Credit compared with its benefits meant Universal Credit was not value for money. When we reported in July 2020, we found that DWP had reduced the cost of administering each claim as the number of claimants has risen and has gradually made Universal Credit claims more cost-efficient by automating and improving processes.

What lessons departments can learn:
When using agile approaches, it is important to be clear on the business need and overall destination from the start.

Source: Comptroller and Auditor General, *Universal Credit: early progress*, Session 2013-14, HC 621, National Audit Office, September 2013; Comptroller and Auditor General, *Universal Credit: progress update*, Session 2014-15, HC 786, National Audit Office, November 2014; Comptroller and Auditor General, *Rolling out Universal Credit*, Session 2017–2019, HC 1123, National Audit Office, June 2018; and Comptroller and Auditor General, *Universal Credit: getting to first payment,* Session 2019–2021, HC 376, National Audit Office, July 2020

3.12 Some departments do not have appropriate controls in place when using agile methods. Digital leaders told us that programme teams often neglect long-term planning and programme management because of the flexibility offered by agile methods. Agile methods can be harder than waterfall methods to manage, still need detailed planning, and can sometimes make it harder to see what progress is really being made. Programme leaders need to bring together multiple teams, sprints and dependencies to deliver value through each product release and monitor progress against budget, timetable and scope. For example, our report *Early review of the Common Agricultural Policy Delivery Programme* (**Figure 16**) found that inconsistent and incomplete management information and assurance prevented effective monitoring and risk management. Without the necessary planning and programme management, departments will not make agile work at scale or intervene early if progress is not on track.

Effective funding mechanisms

3.13 Digital leaders told us that the government's largely annual funding model hinders departments from building up strategic capabilities over time and makes it difficult to maintain them when they enter live service. Programmes often last more than five years, but the government's Spending Review cycle varies in length and the funding model is largely annual. This makes long-term planning harder because there remain concerns that funding for digital programmes could be reallocated elsewhere. For some digital change, such as the transition from legacy IT, the government needs to prepare for multi-year investment over several Spending Review periods. Departments expressed a desire for more multi-year funding. However, they could help by setting out their priorities better in IT strategies. The Financial Conduct Authority's report *Implementing Technology Change* found that financial service firms "that allocated a higher proportion of their technology budget to change experienced fewer change related incidents".[16]

16 Financial Conduct Authority, *Implementing technology change*, February 2021. Available at: www.fca.org.uk/publications/multi-firm-reviews/implementing-technology-change (accessed 15 July 2021).

Figure 16

Case example: Common Agricultural Policy Delivery programme, 2015

Inadequate governance, lack of coordination and skills and insufficient reporting of true progress led to a failure to deliver using agile at scale in a complex environment

Main departments: Rural Payments Agency (RPA), an agency of the Department for Environment, Food & Rural Affairs (Defra), and the Government Digital Service (GDS), part of the Cabinet Office

Objective: Defra and the RPA established a programme to implement a new service to support more complex common agricultural policy regulations coming into force for 2015, having decided that the existing systems could not be enhanced.

What happened: The programme team initially focused on procuring IT systems. However, GDS applied spending controls to the programme and mandated changes to the approach as a condition for providing funding.[1] These changes included the use of agile methods, small- and medium-sized enterprises and a cloud-based solution.

These changes increased the risk that the programme would fail to deliver. Defra did not have the necessary skills or experience in-house for the mandated approach and failed to acquire them for several reasons including pay levels, the location of the work and retention problems. Although GDS provided some support, this was reported to be patchy with limited continuity and insufficient insight into how to adopt agile on this scale. The lack of a detailed plan agreed by all parties hampered the ability to plan, resource and identify critical paths and dependencies. The Major Projects Authority (now part of the Infrastructure and Projects Authority) raised concerns about the approach to, and governance of, agile on three occasions – in April 2013, July 2013 and January 2014.

Outcome: In March 2015 Defra recognised there was a high risk of not being ready in time to meet EU deadlines. Three separate attempts to fix the link between the web front-end screens and the claims processing system ended in failure. Defra invoked the contingency of withdrawing the online system and falling back on paper-based or emailed claim forms and maps. At this time there was limited functionality within other components of the system: they were not fully integrated; development of links to legacy systems required to make payments had ceased; accounting and payment systems had been deprioritised and delayed; and there were other significant technical issues and problems with land data.

What lessons departments can learn:
Attempting agile at scale in a large and complex programme requires strong governance, effective coordination of activities and robust reporting of true progress.

Note

1 Spending controls form part of a wider framework of expenditure controls that HM Treasury and the Cabinet Office use, alongside departments' own internal arrangements. Departments submit digital and technology spending requests to GDS for approval at key stages in a project or programme.

Source: Comptroller and Auditor General, *Early review of the Common Agricultural Policy Delivery Programme*, Session 2015-16, HC 606, National Audit Office, December 2015

3.14 Many people in government see new digital ways of working and the management of data and technology as separate from the core business of government and reflect this in the distinction between capital and resource spend. Interviewees highlighted the comparative ease of getting capital funding to invest in non-current assets, as opposed to revenue funding, which is needed to maintain those assets or consume services and is under more pressure. This can lead to departments delivering digital services without the funding to maintain them. Digital requires a continued resource budget investment in business capability, and this need will increase as the government moves toward the cloud. The cloud uses the internet to access systems and data stored outside an organisation's own premises, using software and technology 'as a service'. While cloud pricing models reduce capital expenditure, they replace it with operational costs as use of cloud services is in effect 'renting' the infrastructure of the cloud provider. This requires a different approach to financial management across departments.

3.15 The government also needs to see technology as part of a service that involves people, processes and systems. Often there is an unmeasured 'people cost' to not modernising operational services. In the legacy landscape, large numbers of civil servants need to knit together data and find workaround solutions to compensate for the inadequacies of the legacy systems. Our *Challenges in using data across government* report highlighted that departments do not measure the extra people and process costs from managing inconsistent and poor-quality data, but informal estimates are that this can take 60% to 80% of some civil servants' time.[17] The government does not properly consider the strategic business case for replacing outdated technology. Digital programmes do not always save costs or have cashable benefits, especially in the short term. It can be hard to make the economic case for investment in legacy IT.

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17 Comptroller and Auditor General, *Challenges in using data across government*, Session 2017–2019, HC 2220, National Audit Office, June 2019.

Appendix One

Our scope and evidence base

Scope

1   We prepared this report to provide insights from our previous work auditing large programmes that feature digital change, set out the challenges that we see and provide recommendations we think the government should focus on to help improve its performance.

2   For the purposes of this report, we define a digital change programme as a large-scale business change programme, which contains an aspect of technology or digital vital to achieving the business change. This definition includes programmes such as Crossrail, which is often considered an infrastructure programme, but will be the first fully digital railway to be built and operated in the UK. Bringing it into service requires Crossrail Ltd and its contractors to complete and integrate around 500,000 physical and digital assets, such as fire safety systems or platform screen doors. The work to bring the railway into service was made more complex by bespoke designs and a lack of standardisation throughout the programme, as well as needing to integrate three different signalling systems with trains.

3   Although many major programmes are not purely digital in nature, it is increasingly common for all types of major programmes to feature digitally enabled change. The report focuses on the challenges specific to operational digital change, primarily for citizen services, or which – although applicable to all types of programmes – digitally enabled change programmes experience more acutely.

4   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 the programmes featured, or in government, suffer all the issues we identify.

Evidence base

5   We analysed evidence collected between January and April 2021 to reach our conclusions on the challenges of implementing digital change in government.

Interviews

6   We conducted around 35 interviews with:

- chief digital and information officers from government departments;

- other senior digital leaders from across the public sector;

- government suppliers; and

- other stakeholders such as professional service firms.

7   We carried out these interviews to understand what stakeholders see as the biggest barriers preventing successful digital change in government, how these challenges can be overcome, and any existing examples of good or bad practice government can learn from.

Published National Audit Office reports and document review

8   This report draws on our experience of auditing large programmes featuring digitally enabled change across different parts of government and at different stages over many years. We provide the case examples to illustrate the challenges that we have identified throughout this report and how they have manifested in digital change programmes. The summaries provided in this report reflect our findings at the time of the original report. They do not reflect the current status of each programme.

9   Our previous reports on digital issues and major programmes can be found on our website (www.nao.org.uk/search/pi_area/managing-major-projects/ and www.nao.org.uk/search/pi_area/digital-service-delivery/). We have used the following National Audit Office reports to inform our findings.

- Comptroller and Auditor General, *Universal Credit: early progress*, Session 2013-14, HC 621, National Audit Office, September 2013.

- Comptroller and Auditor General, *Update on preparations for Smart Metering*, Session 2014-15, HC 167, National Audit Office, June 2014.

- Comptroller and Auditor General, *Universal Credit: progress update*, Session 2014-15, HC 786, National Audit Office, November 2014.

- Comptroller and Auditor General, *E-borders and successor programmes*, Session 2015-16, HC 608, National Audit Office, December 2015.

- Comptroller and Auditor General, *Early review of the Common Agricultural Policy Delivery Programme*, Session 2015-16, HC 606, National Audit Office, December 2015.

- National Audit Office, *The digital skills gap in government: Survey findings*, December 2015.

- Comptroller and Auditor General, *Upgrading emergency service communications: the Emergency Services Network*, Session 2016-17, HC 627, National Audit Office, September 2016.

- Comptroller and Auditor General, *Digital transformation in government*, Session 2016-17, HC 1059, National Audit Office, March 2017.

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

- Comptroller and Auditor General, *NHS England's management of the primary care support services contract with Capita*, Session 2017–2019, HC 632, National Audit Office, May 2018.

- Comptroller and Auditor General, *Rolling out Universal Credit*, Session 2017–2019, HC 1123, National Audit Office, June 2018.

- Comptroller and Auditor General, *Rolling out smart meters*, Session 2017–2019, HC 1680, National Audit Office, November 2018.

- Comptroller and Auditor General, *Investigation into the British Army Recruiting Partnering Project*, Session 2017–2019, HC 1781, National Audit Office, December 2018.

- Comptroller and Auditor General, *Investigation into Verify*, Session 2017–2019, HC 1926, National Audit Office, March 2019.

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

- Comptroller and Auditor General, *Progress delivering the Emergency Services Network*, Session 2017–2019, HC 2140, National Audit Office, May 2019.

- Comptroller and Auditor General, *Early review of the new farming programme*, Session 2017–2019, HC 2221, National Audit Office, June 2019.

- Comptroller and Auditor General, *Challenges in using data across government*, Session 2017–2019, HC 2220, National Audit Office, June 2019.

- Comptroller and Auditor General, *Transforming courts and tribunals – a progress update*, Session 2017–2019, HC 2638, National Audit Office, September 2019.

- Comptroller and Auditor General, *Digital transformation in the NHS*, Session 2019–2021, HC 317, National Audit Office, May 2020.

- Comptroller and Auditor General, *Universal Credit: getting to first payment*, Session 2019–2021, HC 376, National Audit Office, July 2020.

- Comptroller and Auditor General, *Digital Services at the Border*, Session 2019–2021, HC 1069, National Audit Office, December 2020.

- Comptroller and Auditor General, *Protecting and supporting the clinically extremely vulnerable during lockdown*, Session 2019–2021, HC 1131, National Audit Office, February 2021.

- National Audit Office, *Guidance for audit committees on cloud services*, April 2021.

External panel

10 We held a virtual panel, which 10 external experts attended. The purpose of the panel was to assess if we had identified the most important issues the government needs to tackle, and to seek views on how the government can best improve its performance in these areas. The panel included representation from both academia and industry, and we sought varied expertise to cover the different issues identified by our fieldwork.

Literature review feasibility study

11 We commissioned RAND to perform a feasibility study that considered the value of a wider literature review of research on digital change programmes that succeeded or failed. However, RAND concluded that existing literature did not add significant value to our report, as the majority of literature focused on high-level summaries of good practice or approaches for public and private sector digital change projects, analyses of national policies, or literature on small public sector projects at the local government level.

Information from the supreme audit institutions of other countries

12 We identified literature from other countries' supreme audit institutions as a potential source of relevant information. We asked for information from seven countries, received responses from five and reviewed reports or case examples from the other two. We asked the supreme audit institutions to suggest reports and resources relevant to the issues identified by our fieldwork.