National Audit Office

REPORT

Digital transformation in government: addressing the barriers to efficiency

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Key facts

£456bn

estimate of day-to-day operational costs of central government public services, grants and administration in 2020-21

£8bn

HM Treasury's 2021 Spending Review commitment to invest in digital, data and technology transformation by 2025

37%

proportion of government digital, data and technology recruitment campaigns that are unsuccessful

4%	of civil servants that are digital professionals, compared with between 8% and 12% industry average
11	cross-government digital strategies launched over the past 25 years, all seeking to address usability, efficiency and legacy systems
1974	year of introduction of the Police National Computer, the main database of criminal records still in use by all front-line police forces
20%	reduction in digital, data and technology apprenticeships from 800 in October 2021 to 637 in December 2022
7%	increase in government digital, data and technology vacancies from 3,900 in April 2022 to 4,100 in October 2022

Summary

Introduction

1 One of government's main challenges is achieving efficiency savings. The civil service employs over half a million people in the UK and runs diverse operations and services, from collecting taxes and processing benefits claims to granting a rod fishing licence. In 2020-21, central government departments expected to spend £456 billion on the day-to-day running costs of public services, grants and administration.

2 Digital transformation and modernisation of its services and data are instrumental in achieving efficiencies, with huge gains to be achieved if all government services were modernised. However, there are many challenges, and these will take many years to overcome.

3 Government's existing operational landscape is complex. It has evolved over time as new service developments have been built on top of what already exists. Across government, outdated IT systems and its ageing data are a key source of inefficiency and create a major constraint to improving and modernising government services. Many of these ageing systems were built several decades ago and are commonly referred to as 'legacy' systems (**Figure 1** overleaf). Their limitations and poor-quality data increase the cost of services.

4 Tackling legacy services is costly and complex but continuing to use them is risky and commits government to even higher future costs and risks. Failure to modernise legacy systems exposes organisations to possible service disruption, operational failure and cyber-attacks. The increasing costs of maintaining legacy systems and loss of associated specialist skills is unsustainable in the long term.

5 Government lacks data on the hidden costs in its existing services. Many of these costs arise from the unknown numbers of people and processes needed to support older services and make them work in the way government wants them to. These hidden costs include those arising from:

- additional business processes, often manual, to compensate for missing functionality in the legacy systems;
- increased complexity caused by additional interfaces with other systems; and
- costs associated with third-party agreements for support services.

Figure 1
Examples of legacy systems in government

The government continues to rely on legacy systems to perform critical functions

Department and system	Purpose	Year of introduction
Department for Work & Pensions		
Pension Services Computer System (PSCS)	Manages records of people in receipt of state pension and/or pension credit. Annual state pension payments around £104 billion and pension credit around £5 billion	1988
Home Office		
Police National Computer (PNC)	Main database of criminal records used by all front-line police forces; around 150 million searches and updates carried out annually	1974
Warnings Index	Stores and presents watchlist information for Border Force staff to check people arriving in the UK	1994
Driver and Vehicle Licensing Agency		
Drivers 90 (D90)	Holds records of all drivers	1990

Note

1 Government defines systems as being legacy if out of support, not cost-effective, hard to maintain, above an acceptable risk threshold or an end-of-life product.

Source: National Audit Office analysis of published reports

6 Government's 11 digital strategies launched over the past 25 years, all seeking to address usability, efficiency and legacy systems, show that digital transformation is a difficult and complex undertaking. Previous attempts have often prioritised developing the citizen-facing elements of a service over tackling the more complex underlying issues posed by legacy systems and poor data quality. The government's own analysis in 2022 found simple online citizen transactions have been prioritised for transformation and more complicated services have been left behind. In developing digital 'front-ends', changes to legacy systems and processes that could reduce costs are often overlooked.[1]

7 Our work over the past decade has shown that, across government, attempts at digital transformation have had little lasting success. Government cannot achieve real transformation without reshaping the business of government and understanding the challenges presented by legacy systems and data. Transformation is not simply implementing new systems and software. Government must modernise its existing ageing systems and their associated business processes to make significant and sustainable reductions in overall running costs.

1 The 'front-end' is the part of a system that the user interacts with directly.

8 In our 2021 report, *The challenges in implementing digital change*, we identified challenges that government must address before starting major digital programmes.[2] This report highlighted serious issues and constraints around government's data and services and its efforts to improve them, which are poorly conceived owing to business leaders' lack of digital capability. Digital leaders in government have a good understanding of the challenges the government faces and bring much needed expertise to the public sector. However, they often struggle to get the attention, understanding and support needed from senior decision-makers.

9 The technology community in government is often expected to drive transformation on behalf of business leaders. However, most digital change decisions are made by the business leaders – such as permanent secretaries, chief executives, chief operating officers and directors general. 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 is dependent on these leaders having the digital fluency to make the best choices and fully understand the consequences of their decisions for digital transformation.

10 Government accepts that, although there have been some technological improvements, its previous attempts at large-scale digital change have had little success and is now trying to address the underlying problems. In January 2021, the Cabinet Office created the Central Digital & Data Office (CDDO) to lead the digital, data and technology function across government. In June 2022, CDDO published *Transforming for a digital future: 2022 to 2025 roadmap for digital and data* (which we refer to as 'the Roadmap') which seeks to address some of the underlying digital problems, including those highlighted in our report.[3] The Roadmap is not intended as a programme. Instead, it sets out activities to address root causes, establish key data about services and make progress towards government's long-term ambition for a "transformed, more efficient digital government". Departments are at different levels of maturity and, in some cases, the Roadmap builds on activities which were already planned or under way. Departments are to undertake the activities set out in the Roadmap within the current Spending Review period and CDDO has deliberately designed them to be realistic given the starting point, resources and timeframe.

2 Comptroller and Auditor General, *The challenges in implementing digital change*, Session 2021-22, HC 515, National Audit Office, July 2021.

3 Central Digital & 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 3 March 2023).

Scope of this report

11 This report evaluates government's approach to addressing the underlying issues of why past attempts at digital transformation have run into problems. We focus on the approach to transforming government, how CDDO, its Roadmap and departmental leaders will support and promote this, and whether senior business leaders across government have a suitable level of digital capability.

12 The report is in three parts:

- **Part One** sets out the current landscape, drivers for change and government's new approach;
- **Part Two** examines how government is undertaking its new approach; and
- **Part Three** assesses how the Roadmap is addressing key challenges to digital transformation.

Key findings

Government is renewing its attempts to create digital change

13 Government has created a stronger central function to lead digital transformation. The Digital Economy Council's report *Organising for Digital Delivery* in September 2020 recommended a separate, smaller but more capable central function be established and the Government Digital Service (GDS), which previously led on digital transformation, be refocused as a product delivery organisation.[4] In response, Cabinet Office created the CDDO in January 2021 to lead the digital, data and technology function across government. CDDO's Chief Executive reports directly to the civil service Chief Operating Officer who is also Permanent Secretary of the Cabinet Office (paragraphs 1.11 to 1.13).

14 CDDO has taken a new approach to digital change to address previous systemic failings across government. We welcome CDDO's efforts to work more collaboratively with departments to identify problem areas that need to be tackled to create, test and refine a set of realistic commitments. Chief digital and information officers said they also welcome this new approach and believe this central support is helping to create conditions for change in their departments (paragraph 2.4).

4 Cabinet Office, *Organising for digital delivery – Report from the Digital Economy Council*, September 2020 (available at: www.gov.uk/government/publications/organising-for-digital-delivery, link accessed 3 March 2023).

15 CDDO has been realistic about what can be achieved based on an understanding of the scale of the challenge. The Roadmap sets out activities and commitments grouped into six 'missions' to be started within the current Spending Review period. Addressing systemic issues in government is complex and takes time. Four of the six missions involve detailed data-gathering from departments, to provide an in-depth analysis of the scale of the task and the resources required before implementation activities begin. The Roadmap's activities all have completion dates in this Spending Review period. However, improvement and reform is a long process, and will continue into the next Spending Review period (paragraph 2.5).

16 CDDO worked with HM Treasury to secure £8 billion for investment in digital change over the period 2022-23 to 2024-25. CDDO provided training and advice for HM Treasury officials, developed a framework for assessing the scale of legacy issues in departments, and reviewed departments' Spending Review bids. Of the £8 billion, £2.7 billion is for departments to invest in cyber and legacy IT across government.[5] CDDO has funding to deliver the Roadmap's central elements. Departments took account of their own funding when determining what they could commit to within the timeframe of the Roadmap. Initial proposals were refined with departments to balance ambition against feasibility and gain a strong commitment to delivery from departments. However, there is no additional funding for inflationary pressures. Departments must absorb this within existing budgets and funding for the missions within the Roadmap will therefore have to compete against other departmental priorities (paragraph 2.2).

Leading the Roadmap

17 CDDO has led the development of the Roadmap but is dependent on departments' business leaders to deliver the Roadmap's missions. As a relatively small central specialist function, CDDO cannot deliver on behalf of departments and so the success of the Roadmap depends on the engagement of senior departmental officials who have the required authority. To mitigate this, CDDO has involved departments in the Roadmap's development and setting of commitments from the outset. The Digital, Data and Technology Functional Leadership Group (DDaT FLG), which comprises directors general or equivalent with accountability for the digital function in departments and key arm's-length bodies, steered the direction of the Roadmap, and it was signed off at permanent secretary and ministerial level. Each of the Roadmap's six missions has a senior departmental sponsor at permanent secretary level, to encourage involvement from across the business (paragraphs 2.6, 2.9, 2.11 and 2.12).

5 The government announced it is investing £2.6 billion in cyber and legacy IT over the 2021 Spending Review period in the Autumn 2021 Budget. The actual figure was £2,661 million.

18 CDDO has created a board of permanent secretaries to support digital engagement and leadership. The Digital and Data Board was established in July 2021 as a formal sub-board of the Civil Service Board to provide senior leadership, business ownership and steering for government's digital transformation aspirations. It is jointly chaired by the CDDO Chair and the Permanent Secretary of HM Revenue & Customs. It monitors and assesses the health of government's major digital and data programmes to improve public services. It agrees and enforces cross-government digital and technology standards and identifies areas for capability improvement (paragraphs 2.6, 2.7 and 2.12).

19 CDDO has established several mechanisms for monitoring progress towards the Roadmap's objectives. CDDO holds quarterly business reviews with all departments to agree performance targets and discuss progress towards the Roadmap commitments. The DDaT FLG regularly reviews progress against agreed metrics and reports progress to the Digital and Data Board twice annually so momentum is maintained. CDDO expects the reporting arrangements to evolve as the scale of the task becomes clearer (paragraphs 2.13 to 2.15).

Progress on the Roadmap missions

20 CDDO reported to the Digital and Data Board in December 2022 that early milestones had been met but that existing risks have become more acute. CDDO tracks progress on the six missions using aggregated data from the quarterly business reviews and performance data against agreed metrics (**Figure 2** on pages 11 and 12). It reports progress against key internal milestones to the Digital and Data Board. All those due by December 2022 were reported as achieved. CDDO has identified two significant risks to further progress. First, the existing skills gap is getting worse and CDDO is concerned that digital teams in departments will not have the skills and expertise necessary to implement the Roadmap. Second, service transformation requires the support of senior leaders beyond the digital function and there is a high risk that this support will not be sustained without continued and proactive involvement from permanent secretaries in departments (paragraph 2.17).

Figure 2

The six missions of the Central Digital & Data Office (CDDO) Roadmap

We have identified several systemic challenges and risks

Mission number, name and aim	Systemic challenges to be addressed	Current activities	Risks we identify
One – Transformed public services			
Digital services should be efficient and help people access the services they need	Every service has a different starting point for improvement and to establish robust baselines, data not previously collected or quantified is needed. Services are entrenched into existing organisational structures which need to change to give end-to-end service ownership.	Detailed templates have been developed for baselining services and analysis of the first 15 services has been completed.	Departments need to collect data across digital, operations and other areas for a complete view. This is onerous for some services and may not be given the necessary priority. Funding to complete the activities could be at risk from competing budgetary pressures.
Two – GOV.UK One Login			
Make it easy and secure for people to prove who they are and log in to government services	The GOV.UK One Login programme is working to overcome the issues that beset GOV.UK Verify, mainly its inability to work for all its intended users. It is collaborating with departments to understand the full range of user needs while balancing security and privacy concerns.	A core element of the system is operational. The first few government services are now live, with more scheduled for 2023.	Agreement in principle must result in continued implementation and departments may not prioritise integrating the One Login service into their existing services.
Three – Better data to power decision-making			
Make it easier to share and use data consistently across government	Technical and cultural barriers need to be overcome, including data quality and accessibility where information is held in siloed legacy systems.	Underpinning frameworks and definitions are being agreed.	This is a complex area with no shortcuts and competing priorities. There is a risk momentum may not be sustained due to the intrinsic difficulty of the task.
Four – Efficient, secure and sustainable technology			
Government should use modern technology that runs more efficiently and at lower cost	The extent of legacy systems across government is huge and departments are finding defining and identifying them a challenge. Historic neglect and lack of asset management and maintenance has added to the difficulty.	A framework developed for legacy system assessments in departments has been piloted and is being rolled out.	Knowledge of some vulnerable systems resides mostly with suppliers and will need significant investigation. Departments may not prioritise this activity due to the resources required.

Figure 2 *continued*
The six missions of the Central Digital & Data Office (CDDO) Roadmap

Mission number, name and aim	Systemic challenges to be addressed	Current activities	Risks we identify
Five – Digital skills at scale			
Government should have the right skills for the digital future	The success of transformation depends on equipping senior business leaders to make informed decisions and acquiring and keeping enough skilled specialists on board.	A range of training has been developed for digital, data and technology professionals and for the senior civil service.	There may be insufficient levers for gaining the attention and participation of very senior non-digital leaders and to embed this further down their organisations. Uptake of training so far is slow.
Six – A system that unlocks digital transformation			
Put the right funding and delivery models in place	This mission is about getting the government finance, commercial and policy professions to understand the need to improve the way funding and delivery models are working in departments for digital change programmes.	CDDO is working with HM Treasury to reassess the way funding arrangements work for digital business-as-usual and change.	There are different legitimate perspectives which must be reconciled in how current procedures and practices are interpreted.

Source: Central Digital & Data Office, *Transforming for a digital future: 2022-2025 roadmap for digital and data,* June 2022. National Audit Office analysis of Central Digital & Data Office quarterly reporting

Mission one: transformed public services that achieve the right outcomes

21 **CDDO has identified departments' existing operational structures as an impediment to achieving greater efficiencies.** Government's objective is to move at least 50 of the government's top 75 services to a 'great' standard.[6] To reach this standard, services must minimise unnecessary time, effort, and cost for both users and the departments providing them. Initial analysis by CDDO suggests that only 10% of services have reached this standard. CDDO told us that, by April 2023, it expects to have established key data for each of these services. Data on this has not been gathered previously, partly because there is often no end-to-end ownership of services: different people are responsible for the online front-end and back-office legacy processes. This is a major barrier to redesigning services (paragraphs 3.3 to 3.7).

6 'Great' is defined in terms of usability and efficiency. The top 75 services are listed in the Annex to the Roadmap itself.

Mission two: One Login for government

22 The GOV.UK One Login programme is making steady progress but is yet to face the more difficult implementation challenges that have hampered previous attempts. It is challenging to join a new front-end authentication and identity verification system with multiple legacy citizen-facing services to make a seamless customer journey, as One Login's predecessor, GOV.UK Verify, demonstrated. Several departments, including the Department for Work & Pensions and HM Revenue & Customs, run their own verification systems to meet their specific needs. GDS intends to replace these with One Login's single entry point for users to prove and reuse their identity when accessing government services. Continued close collaboration and commitment between GDS and departments will be required (paragraphs 3.8 to 3.11).

Mission three: better data to power decision-making

23 There are significant quality issues in operational data that hinder transformation within departments and sharing data between them. This mission focuses on how data can be used and shared more effectively across government. Most work has been on developing frameworks and definitions and other data initiatives, which are intended to be brought into use from 2023-24. CDDO will use the Government Data Maturity Assessment to provide a universal assessment of government's data management maturity. This will enable future benchmarking work and help departments better understand their data challenges and opportunities, and effectively plan targeted improvements. It is currently being trialled with 11 organisations and CDDO's aim is for all departments to be using it by March 2024. By 2025, CDDO is expecting to standardise the way key facts and data about critical datasets are captured to enable shared use (paragraphs 3.12 to 3.15).

24 Despite some early steps to improve government's data, CDDO acknowledges significant technical and cultural barriers remain. CDDO raised a risk to the Digital and Data Board in December 2022 that sustained effort may fail to overcome the barriers to standardising definitions and sharing critical data assets. Government is starting from a low base given the condition of its existing data, and the scale of the task is huge (paragraph 3.16).

Mission four: secure, efficient and sustainable technology

25 CDDO has developed a framework to assess legacy system risks across government, which departments have started using. Departments have insufficient information on their legacy services. Departments have also told us that it is easier to bid for capital funding for new developments than resource funding to maintain existing services and keep them up to date. CDDO has worked with six major departments to identify and map legacy systems and assess the risks they pose. The framework is being applied by other departments. It is an important opportunity to assess the operational costs, vulnerabilities and risks of continuing to use outdated legacy systems, prioritise their replacement, and support departments in making the case for continued investment in addressing legacy issues (paragraphs 3.17 to 3.21).

Mission five: digital skills at scale

26 Progress in improving the digital capability of senior decision-makers in government has been limited. Only a small proportion of senior decision-makers in government have first-hand experience of digital business. Senior digital leaders in departments struggle to communicate their messages effectively because their wider leadership teams lack sufficient knowledge of digital issues. The current training and development for business leaders does not explicitly cover digital leadership in a legacy environment and more is needed to improve senior civil servants' digital capability. To date, only around 200 non-specialist executives have received digital awareness training against the target of 6,500 set in the Roadmap. More significantly, many of this group do not have the digital leadership skills to make informed decisions on digital issues. Since the Roadmap was published, CDDO has asked the Digital and Data Board to promote digital training for all senior civil servants in 2023-24. If government is serious about digital capability-building for senior business leaders, it needs to devote appropriate priority and focus (paragraphs 3.22 to 3.24).

27 The activities set out in the Roadmap do not fully address the reality that government cannot easily fill its digital vacancies and skills gaps. The scope of the Roadmap assumes that departments can strengthen their offer to existing and prospective digital recruits and reduce the average time taken to hire them. Government already has a specialist skills deficit and CDDO estimates that only 4% of civil servants are digital professionals, compared with an industry average of between 8% and 12%. There is a major digital skills shortage in the UK and skilled digital professionals command a premium in the market, making it hard for departments to recruit. CDDO reports that 37% of government recruitment campaigns have been unsuccessful. The number of government digital, data and technology vacancies rose by 7% from 3,900 in April 2022 to 4,100 in October 2022. The number of digital, data and technology apprentices has dropped 20% from 800 in October 2021 to 637 in December 2022 (paragraphs 3.25 to 3.27).

Mission six: a system that unlocks digital transformation

28 **Progress on central reforms will depend on significant leadership to gain the support of other government professions, including policy, finance, commercial and the Infrastructure and Projects Authority (IPA).** This mission aims to ensure funding and guidelines from Cabinet Office functions work well for digital programmes. CDDO has an overall milestone that the barriers will be addressed by 2025. However, it recognises this is dependent on other parts of government, such as HM Treasury and the IPA. Digital change involves levels of complexity, uncertainty and risk which are often unique to each specific programme due to legacy systems, existing ways of operation and the difficulties of integrating something new. These differences must be reflected in business cases, funding and approvals processes, procurement of technology, audit and project review assurance and policy development. These reforms are very important to the success of the other missions. However planned progress is slow as the success of this mission is as much about influencing, tone and approach and a willingness for the other central functions to engage as it is about what CDDO does. CDDO recognises there is significant work to do and, given the complexity of the challenges, the National Audit Office is concerned that CDDO has insufficient resources to deliver this mission (paragraphs 3.28 and 3.29).

Conclusion

29 Government has established CDDO to provide fresh impetus to the digital transformation needed across government. CDDO has created its Roadmap as a framework to start addressing key systemic issues and encourage departments to take more urgent action to understand what will be required. Departments attempting to transform operational services and the associated legacy and data issues will be a major step in addressing the existing inefficiencies. CDDO has also created stronger levers for delivery, with permanent secretary-level sponsors and boards, compared with previous digital strategies.

30 CDDO is laying good foundations but many of the critical and more challenging milestones lie in the future. CDDO's small budget and headcount are already affecting the intended reforms to government central functions' treatment of digital programmes. In addition, departments are finding that, in current market conditions, they cannot acquire sufficient digital skills and expertise in their teams. It is therefore too early to say if the aims of the Roadmap can be achieved. Many business leaders do not yet have the expertise required to comprehend and tackle the challenges the civil service faces in a digital age. Stronger digital expertise and capacity-building, sustained support from the centre of government and the continued goodwill of department senior business leaders are needed to maintain momentum. Without these, the Roadmap will peter out as its predecessors have done and government is unlikely to address the systemic issues and achieve the efficiencies the Roadmap has identified.

Recommendations

31 CDDO should:

a continue to enlist proactive engagement and involvement from permanent secretaries in securing the support of senior leaders beyond the digital function;

b increase its capability-building through formal training and mentoring support to help senior non-specialist business leaders develop their understanding of government's operating environment and the constraints posed by legacy data and systems;

c continue to push for central reforms in the way digital change is justified, funded and procured and work with policymakers, who often do not have the digital skills to understand how digital services work, to improve policy-making in this area;

d work with HM Treasury to address the balance between capital and resource in departments' spending requirements;

e review what departments can realistically achieve in terms of closing their skills gaps and keep the scope of Roadmap activities under continuous review to ensure it matches available resources, accepting that prioritisation may be necessary.

32 Departments should:

f appoint at least one non-executive director with digital, data and technology expertise;

g ensure that membership of their most senior decision-making board includes at least one senior digital leader;

h appoint senior service owners for all major services with accountability for the full end-to-end service, decision-making authority to deliver all aspects and responsibility for developing, operating and continually improving the service;

i establish an approach to stop new services being built on the existing costly and inefficient legacy foundations.