



National Audit Office

Report

by the Comptroller
and Auditor General

Cross-government

Managing the risks of legacy ICT to public service delivery

Key facts

£480bn

estimate of government revenue reliant on legacy ICT

£210bn

estimate of government non-staff expenditure reliant on legacy ICT

£193bn

collected or paid out in 2011-12 by the four public services reviewed in this report

£865m

total cost in 2011-12 of operating the four public services reliant on legacy ICT as reviewed in this report

Strategies for delivering change from legacy ICT

	No change to the legacy ICT	Enhance and maintain the legacy ICT		Replace most of the legacy ICT
The four public services reviewed in this report	OFT's consumer credit licensing service	HMRC's VAT collection service	DWP's pension payment service	NHSBSA's prescription payment service
Collected or paid out in 2011-12	£0.01 billion	£99.6 billion	£84.3 billion	£8.8 billion
Full cost of service in 2011-12 (ICT, processes, enforcement and overheads)	£10.4 million	£429.6 million	£384.6 million	£40.7 million
Cost of legacy ICT in 2011-12	£0.7 million	£4.5 million	£8.9 million	£0.1 million
Legacy ICT cost as a percentage of the full cost of service	7 per cent	1 per cent	2 per cent	0.3 per cent

Summary

1 There have been changes in the government's approach to improving value for money from Information, Communication and Technology (ICT). We have examined the steps the Cabinet Office has taken to save money to begin to introduce reform and implement its new ICT, digital and cyber security strategies. In this report we focus on legacy ICT which we define as systems and applications that have been operationally embedded within a business function but superseded by newer and more effective technologies or changed business needs.

2 Both private and public organisations have legacy ICT challenges to manage to some degree. This is because it would not be value for money to constantly replace all systems when a new need or a more effective technology is identified. We estimate that in 2011-12 at least £480 billion of the government's operating revenues and at least £210 billion of non-staff expenditure such as pensions and entitlements were reliant to some extent on legacy ICT. Good practice in managing legacy ICT as an integrated part of public service delivery is therefore crucial to maintaining the performance of these services.

3 The government's ICT strategy, published in March 2011, recognised legacy ICT as a barrier to the rapid introduction of new policies and particularly the move to 'digital by default'. Legacy ICT reduces the flexibility to improve public services, makes it harder to protect against evolving cyber threats and increases government's reliance on long-term contracts with large ICT companies. It is also likely to increase the cost of operating public services by preventing higher levels of automation and hinder data sharing intended to prevent fraud and error.

4 The risks of legacy ICT will increase over time as the gap between the system functionality and business need widens and the complexity of the systems and software increases. The management and technical resources needed to maintain and make further changes also increases.

5 The cost and risk of retaining the legacy system has to be balanced against the cost and new set of risks of implementing a new system. These risks include migrating data, operations staff and customers (citizens and business) on to the new service while ensuring business and service continuity. In the public sector, system changes often have to be planned in parallel with an evolving policy environment. Making a convincing and robust financial case to replace or adapt and extend a system's life in a period of austerity is a significant challenge, but also an opportunity for government. This has become increasingly important as departments move ahead with transforming their services to digital, at potentially less cost.

6 Deficiencies in planning for legacy ICT and the failure to modernise ICT infrastructure across government are now more visible and open to challenge by the Cabinet Office through its review of all ICT business cases of £5 million and above. This is highlighting the challenges that government bodies share in managing legacy ICT.

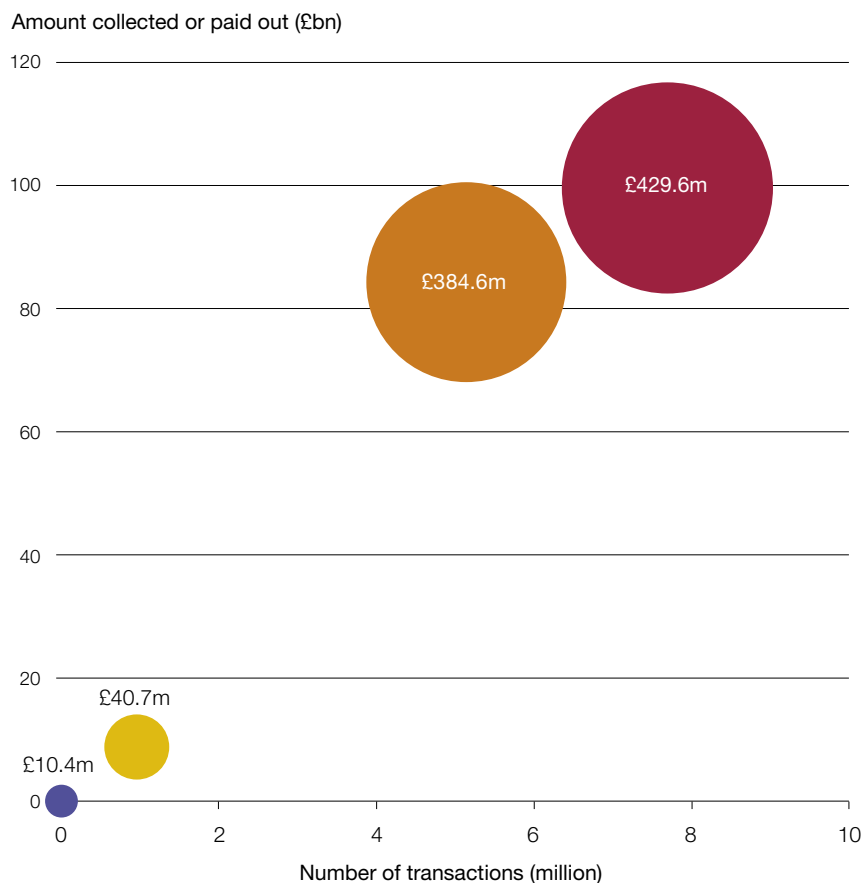
7 This report draws on the government's experience in managing legacy ICT risks and applying different strategies for delivering change and improvement in four public services: state pension; Value Added Tax (VAT) collection; prescription payment; and consumer credit licensing services. Our analysis of each service is available at www.nao.org.uk/search/year/2013/monthnum/08/sector/ict-and-systems-analysis/type/report. These case studies were selected to illustrate the range of approaches that small and large government bodies are taking to address the issues arising from legacy ICT (**Figure 1**). Their experience provides valuable insight for others who have legacy ICT and are considering transforming their services.

8 The four case studies shown in Figure 1 are:

- The Department for Work & Pensions' (DWP) **pension service**. This assesses entitlement to state pension, pension credit and winter fuel allowance. Originally introduced in 1987, the service had 13 million customers in 2011-12, processed 5.2 million new claims or adjustments, cost £385 million to run and had 6,000 processing staff.
- HM Revenue & Customs' (HMRC) **VAT collection service**. This processes, collects, repays, risk assesses and, where appropriate, enforces VAT. Introduced in 1973, the system has been heavily developed and moved on to new hardware since that date. In 2011-12, the service was used by 1.9 million customers, processed 7.7 million VAT submissions, had 5,900 staff and cost £430 million to run.
- The NHS Business Services Authority's (NHSBSA) **prescription payment service**. This is operated by two systems working in parallel, one new, the other a legacy ICT system dating from 1996. This service administers payments to pharmacists and others who handle NHS prescriptions. It cost £41 million to run in 2011-12 and is operated by 930 staff.
- The Office of Fair Trading's (OFT) **consumer credit licensing service**. This supports around 70,000 businesses that provide goods or services on credit or for hire and deals with 25,000 applications, renewal notifications and licence surrenders each year. The credit licensing service cost £10 million to run in 2011-12, with 110 processing, compliance and enforcement staff. Its ICT system, PROMOD, went live in 2007, is an illustration of how relatively new systems can develop the characteristics of legacy ICT.

Figure 1
Comparative analysis of the four services

Case studies range from the small consumer credit licensing service to the large VAT collection service



- HMRC VAT collection service
- DWP pension payment service
- NHSBSA prescription payment service
- OFT consumer credit licensing service

Notes

- 1 Size of bubbles represents the full cost of the services (ICT, processes, enforcement and overheads). VAT service cost excludes registration processes as these processes are supported by a separate system.
- 2 The HMRC figure of £429.6 million includes the cost for all staff using the VAT service, many of whom spend only a small proportion of their time using the legacy system in the course of their day-to-day work.
- 3 For NHSBSA, a transaction is defined as the processing of 1,000 prescription line items.
- 4 Based on 2011-12 annual data.

Source: National Audit Office

Key findings

9 The failure of legacy ICT would have a significant impact on government.

The reliance on legacy ICT is highlighted in our case studies. In 2011-12, the DWP legacy ICT system paid out £84.3 billion of state pension and associated benefits, and the HMRC systems administered £99.6 billion of VAT receipts (net of repayments). This makes them of considerable significance and their failure would potentially endanger the payment of pensions and benefits and the collection of revenues (paragraphs 3.3, 3.4 and 3.6, Figure 5).

10 The case studies demonstrate three strategies typically used for managing legacy ICT systems, each with their own associated risks and benefits. The four government bodies we audited had adopted the following strategies:

- Due to uncertainties about the nature of, and responsibility for, consumer credit licensing following government announcements, OFT was constrained in investing in its legacy ICT and had little choice but to apply a **'no change' strategy**. Since April 2013, it has been clear that a new system will replace PROMOD from April 2014 (Part Two).
- Both DWP and HMRC applied an **'enhance and maintain' strategy** to respond to evolving business need, including introducing new digital channels for users of their pension payment and VAT collection services. Consequently, for these systems they have left the legacy ICT intact but built interfaces to new ICT systems to provide additional functionality. DWP's overall strategy is a combination of 'Digital transformation' and 'replace' (Part Three).
- NHSBSA decided upon a **'replace' strategy**, investing in a new system to meet new business needs that successfully replaced its core legacy ICT. This was done without either radical transformation of the overall service or decommissioning of the legacy system, which continues to operate in parallel (Part Four).

11 Well managed legacy ICT systems deliver continuity of service and suggest the lives of such systems can safely be extended. We examined two older legacy ICT systems: DWP's Pension Strategy Computer System (PSCS) which began service in 1987; and HMRC's collection of VAT legacy ICT systems which originated in 1973. Both have been successfully adapted, were well managed and provided stable platforms, with availability typically above target and few technical problems (paragraphs 3.2, 3.4 and 3.5).

12 Well planned strategic investments have been successful in enhancing the functionality of legacy ICT, for example to improve customer service, while minimising risk to service continuity and reducing the full cost of service.

DWP reduced the cost per customer of its pension payment service by 30 per cent between 2008-09 and 2011-12. It did this by successfully implementing a new Customer Account Management system that draws together customer information from multiple legacy ICT systems to simplify the processing of pension cases (Figure 5 and paragraph 3.11).

13 The NHSBSA has implemented a more cost-effective replacement for its legacy ICT system.

The new system introduced automation to improve capacity processing. With the growth in issued prescriptions, it would eventually become unsustainable and too costly to process them by hand using the legacy ICT system. In 2011-12, the NHSBSA handled 965 million line items of prescription data. The cost of processing 1,000 prescription line items on the legacy ICT system is 90 per cent more than for the new system. In bringing the new system into operational service, however, there was a fall in the accuracy levels achieved (paragraphs 4.3 to 4.6 and Figure 6).

14 In contrast, adopting a strategy of no change may impede organisational efficiency.

OFT's ICT system has had a number of faults since implementation and has quickly developed the characteristics of legacy ICT as it has not been able to adapt to changing business needs. From April 2014, OFT's credit licensing service will be replaced by the new Financial Conduct Authority's (FCA) authorisation service. This has created uncertainty about the future service model and so OFT has not invested in any changes to its legacy ICT. The credit licensing service continues to process transactions on a timely basis for its users. However, the cost of the credit licensing service on a per customer transaction basis rose by an average of 10 per cent per annum between 2008-09 and 2011-12. Between 2008-09 and 2011-12, the total cost of the credit licensing service (compliance, enforcement and transactional) rose by 2 per cent but the number of customer transactions declined by 23 per cent as the overall size of the licensed population fell. Since introducing PROMOD, statutory changes have meant that OFT has to carry out more rigorous checks of applications than it previously did. It also undertakes more compliance and enforcement activity. OFT could not fully split out this additional work from the underlying transactional cost and therefore we could not determine whether the increased cost was due to the extra activity or an adverse impact from the legacy ICT (paragraphs 2.5, 2.6 and 2.9).

15 Legacy ICT systems expose organisations to particular risks which the organisation has to understand and have the resources to manage. The size and likelihood of risks occurring will increase over time and require an increasing amount of management effort to mitigate. The common risks we have seen in our four case studies that departments need to manage are (paragraph 1.13):

- **Higher security vulnerabilities.** Among our case studies, the legacy ICT within OFT is operating with software that is no longer supported by its suppliers.
- **Lock-in to uncompetitive support arrangements with a single supplier.** When the original outsourcing arrangements were coming to an end in June 2012, OFT had doubts whether any suppliers other than the original developer could support the system due to it being complex, bespoke and not fully documented. OFT made the decision to extend its contract with the existing supplier after consideration of a wide range of options, and in the context of the government consulting on changing the nature of credit regulation, including shifting responsibility to another body. HM Treasury approved this approach in March 2012.
- **Skills to maintain and support legacy ICT become scarcer, leading to gaps in capability.** HMRC is facing a shortage of the skills it needs to sustain the VAT legacy ICT due to the current age profile of its staff. DWP also recognises the skills and knowledge it needs are declining both within DWP and its supplier. We also found that within NHSBSA, its wider ICT estate required a large support team because of the complexity created by its diverse range of legacy ICT.
- **Manual processes proliferate to overcome the difficulty in adapting legacy ICT to meet changing business needs.** In DWP, although benefit processing legacy systems have been integrated with online channels, this has not been undertaken for the PSCS for business reasons. This has resulted in new claims made online having to be manually re-entered by staff into the legacy system.
- **Legacy ICT is harder to adapt to meet changing business needs. We found that where an organisation has replaced its legacy ICT system, adaptability has increased.** OFT commissioned an efficiency and effectiveness review in April 2010, which recommended the redesign of business processes to streamline consumer credit processing. While most changes were implemented, some could not be supported by the legacy ICT and therefore were not adopted. NHSBSA had developed a new system adaptable to changing business needs. Although it was designed to capture data from scanned images of prescription forms, its design included support for prescriptions submitted electronically via the Electronic Prescriptions Service (EPS). This is a far more accurate and efficient means of processing prescriptions.

- **Hidden costs arise as new business processes are introduced to compensate for the limited adaptability of the legacy ICT system.** The administration cost involved in using legacy ICT can be considerable. There can also be hidden costs when the information to make informed decisions is not available. We found that HMRC had designed exception processes to manually intervene in the normal straight-through processing. These processes represented 20 per cent of cost.
- **Increased complexity caused by additional interfaces and connections with other systems makes routine changes to legacy ICT costly and protracted.** The existing complexity of DWP's pension legacy system means changes take up to 18 months from planning to deployment. This can be due to funding limits and the ability of the business to take on change as well as the nature of the technology and related development processes.

We note elsewhere in this report the actions the case study organisations are taking to address these risks (paragraphs 2.8 to 2.12, 3.10 to 3.17 and 4.10 to 4.15).

16 Business transformation, including the drive for digital transformation is proving challenging for departments when it involves legacy ICT. Many legacy systems require data to be processed as a sequence of batches that is incompatible with a fully real-time digital service. In the pension system, for example, online applications have to be manually re-entered into the main system by a DWP operator, as the website and the main legacy ICT system are not integrated. The approach of adding functionality through the addition of interfaces to the core legacy ICT is likely to be insufficient to achieve full digital transformation (paragraph 1.2).

17 We found a lack of cost and performance data for the four public services we audited. We found gaps in both the time series and breakdown of cost and performance data from which management could assess the impact of legacy ICT. This becomes critical when decisions need to be made about the financial and risk trade-off between the retention of legacy systems and the benefits of replacement. Without a full analysis of service performance, operational efficiency and cost breakdown for the service over recent years, it is impossible to generate a robust business case for change (paragraphs 2.7, 3.14, 3.15 and 4.15).

18 Business owners were not fully aware of the risks to their department posed by their legacy ICT. Our audits of two of the four services found legacy ICT strategies and decisions being the responsibility of the ICT function with insufficient dialogue with the business owner. A more integrated approach between ICT and business functions is necessary to optimise decision-making about legacy ICT and its impact on future digital services (paragraphs 3.2 and 3.6).

Conclusion

19 We estimate that at least £480 billion of central government revenue and at least £210 billion of non-staff expenditure in 2011-12 is reliant on legacy ICT. Legacy ICT could present a very significant risk to public service delivery and value for money if handled poorly.

20 We found examples where government has understood and managed the short-term risks of legacy ICT well. Specifically, for VAT collection, state pensions and prescription payments, legacy ICT has delivered satisfactory levels of performance. Government bodies have developed strategies to deliver incremental business change and service improvement from their legacy ICT. These strategies have inevitably, in times of austerity, become more focused on short-term decision-making, seeking to minimise both investment need and the risk to service delivery.

21 However, government is changing the way it commissions public services, to make them digital, cheaper and more adaptable to user needs. The strategies that government bodies have been applying to legacy ICT are unlikely to be sufficient to deliver the level of transformation envisaged by the government's digital strategy. The lack of a full end-to-end view of the service, gaps in cost and performance information and the siloed working of ICT and business functions also restrict decision-making.

Recommendations

For those responsible for transforming public services involving legacy ICT

- a Public bodies should ensure that they have a full analysis of the cost, performance, and risks of their services over time and of the impact of legacy ICT.** With the pressure on resources, the challenge of digital transformation and the need to gain the approval of the Cabinet Office for all ICT business cases that exceed £5 million, all government bodies should make sure their business cases for change involving legacy ICT are robust from many perspectives: user; operational efficiency; commercial; financial; and technical. They should also examine the running costs of legacy ICT to identify the scope for ongoing efficiencies.
- b Public bodies should draw more on cross-government comparisons and examples of best practice of managing legacy ICT while transforming to digital.** There is good experience in government and teams are becoming more open to sharing.
- c Public bodies should ensure that service managers are fully aware of the risks to their services, posed by legacy ICT.** The requirement for every public service to have a service manager taking responsibility for the whole life cycle and performance of the service, as identified in the Government Digital Strategy, is a good opportunity to develop this more holistic view.

For the Cabinet Office

- d There is demand across government for the Cabinet Office to do more to support public bodies in making change and delivering service improvement involving legacy ICT.** Its growing visibility of service performance, risks and capabilities gained through the working of the Government Digital Service and the IT spend control process, puts the Cabinet Office in a good position to share knowledge and to offer practical advice. This would be particularly beneficial to smaller public bodies lacking the breadth of digital and commercial experience needed to optimise decision-making.
- e Organisations should follow existing Cabinet Office guidelines and advice. However, in deciding what form of additional support to offer, the Cabinet Office should listen to the needs of service managers and those undertaking digital transformations across government.** Options include:
- Making good practice case studies available illustrating successful strategies for delivering change or managing complex legacy ICT infrastructure.
 - Harnessing the Cabinet Office's resources such as strategic supplier relationship management, the ICT asset register and ICT professional development networks to improve cross-government management of risk and service delivery with legacy ICT. For example, using the ICT asset register to identify the extent of dependency on specific legacy technologies, stimulating opportunities such as supplier negotiations and sharing skills.
 - Developing advice about the business and commercial analysis needed to underpin digital transformation and decision-making on legacy ICT in particular. This will raise the quality and consistency of government business cases, reducing the time and resources needed for their evaluation.