National Audit Office

Report
by the Comptroller
and Auditor General

**Department of Health & Social Care, NHS England &
NHS Improvement, NHS Digital**

Digital transformation in the NHS

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Preface

These are unprecedented times for the United Kingdom. The coronavirus pandemic is having an extraordinary impact on the National Health Service and its staff as well as on all parts of government, society and the economy. The effects will last long after the pandemic has subsided.

This report describes the state of digital services in the English NHS and examines its readiness to deliver digital transformation. It focuses on the plans, governance arrangements, resources and technical challenges. We carried out the fieldwork and prepared the report before the pandemic hit the UK.

I have decided to publish the report at this time because digital transformation in the NHS will increase in importance as a result of the crisis. Digital services can enable health and care services to be delivered flexibly and remotely where necessary and provide better information. Over time, more patients should be able to access medical information and advice without face-to-face contact with clinicians, and risks to everyone can be managed more effectively. Better data will underpin clinical decision making, vital research and government planning to help the NHS manage anticipated demand as well as threats like those we are experiencing now.

I am grateful to the Department of Health & Social Care and the NHS for their help in confirming the factual accuracy of the report and hope that its findings are of assistance as they take forward the digital transformation of the NHS when the current emergency allows.

Gareth Davies
Comptroller and Auditor General

Key facts

£8.1bn

estimated cost of the updated digital transformation strategy (excluding £1.6 billion for live services), the great majority to be spent between 2019-20 and 2023-24

July 2019

NHSX unit launched to lead digital transformation in the NHS

2024

target date for NHS trusts and NHS foundation trusts (trusts) to reach a "core level of digitisation"

£4.7 billion budget for the digital transformation strategy between 2016-17 and 2020-21, including live services

£3 billion amount trusts are expected to contribute to the £8.1 billion digital transformation cost, between 2019-20 and 2028-29 (the majority being expected to be invested in the first five years)

16% proportion of trusts that self-assessed their digital capability as low (in 2017)

1998 the year the NHS identified the importance of seamless sharing of data between IT systems and the use of national standards to achieve this

15% proportion of trusts reporting that their information technology (IT) systems were mostly compliant with the SNOMED CT standard of clinical terminology (in 2017)

54% proportion of trusts reporting that their staff could rely on their digital records for the information they needed, when they needed it (in 2017)

Summary

1 The NHS's health and care services are dependent on people, processes and information technology (IT) systems, and some of these IT systems are outdated and inefficient. The Department of Health & Social Care (the Department) and NHS England & NHS Improvement (NHSE&I) believe that it is essential to implement new ways of working and that improved digital services are central to this. In other words, the NHS will need to undergo a digital transformation. However, the previous attempt to achieve this, between 2002 and 2011, was both expensive and largely unsuccessful. Since then the Department, NHSE&I and NHS Digital (the arm's-length body that seeks to use information and technology to improve health and care) initiated the Digital Transformation Portfolio (the Portfolio) to deliver their 2014 digital strategy. The Department and NHSE&I are now updating their strategy and the Portfolio, and in July 2019, they set up a new unit, NHSX, to lead digital transformation in the NHS. NHSX intends to use a different approach to digital transformation to that attempted in 2002, though the objectives are similar. In particular it will allow over 220 NHS trusts and foundation trusts (trusts) more autonomy to develop their overall approach to digital transformation and the IT systems they implement so long as they comply with national standards which are currently being specified.

2 This report describes the current state of digital services in the NHS and examines the readiness of the NHS to deliver digital transformation, focusing on:

- strategy and implementation plans, including lessons from past strategies and progress made to date (Part One);
- the governance of digital transformation (Part Two);
- financial and human resources (Part Three); and
- technical challenges (Part Four).

Key findings

Digital services in the NHS

3 **Digital transformation of the NHS is a huge challenge.** The need for large-scale process and behavioural change and for substantial financial investment in IT systems mean that digital transformation is inherently difficult. In the NHS, transformation is further complicated by major challenges including aged ('legacy') IT systems, the nature of healthcare information, the large number of organisations and stakeholders, complex governance arrangements, and existing commercial arrangements with technology suppliers (paragraphs 1.2 to 1.4, 1.23, 2.2 to 2.5, 2.16, 4.2 and 4.3, and Figure 2).

4 **The NHS has not made the expected progress since 2014, including against a headline target to achieve a 'paperless' NHS.** The Department's arm's-length bodies have attempted to implement practical solutions. However, the Portfolio (to deliver the 2014 strategy) has been restructured and some objectives were unclear, making it difficult to assess progress against the original aims. A significant target – a paperless NHS by 2018 – was missed and redefined in a new target to reach a "core level of digitisation" by 2024. Internal reporting shows that progress is being made for many programmes (paragraphs 1.13 to 1.16).

5 **Recent investment in digital transformation has not been sufficient to deliver the national ambitions.** The government committed £4.7 billion to deliver the Portfolio between 2016-17 and 2020-21. This was an increase on expenditure in prior years, but an independent review considered it to be insufficient to fully deliver the ambitions. NHSE&I acknowledged the funding was not enough to deliver everything, but felt it was enough to make a good start and thereby make the case for additional funding. At a local level, trusts' expenditure on IT varies widely and collectively they spend less than the recommended level: NHSE&I estimates that less than 2% of trusts' expenditure is on technology, compared with a recommended 5% (paragraphs 3.2, 3.3, 3.9 and 3.12, and Figure 5 and Figure 7).

6 **Current plans are based on very limited cost data and it is uncertain that planned funding will be sufficient.** NHSE&I expects the NHS will need around £8.1 billion to deliver its digital transformation ambitions. The proposed funding comprises:

- £5.1 billion from national bodies, between 2019-20 and 2023-24 (£2.2 billion of revenue funding, which is already committed, and £2.9 billion of capital funding which is dependent on spending reviews); and
- £3 billion to be funded by trusts between 2019-20 and 2028-29. NHSE&I has not set out how much of this it expects to be funded in the first five years, but national ambitions suggest the majority will be spent in this period.

A further £1.6 billion is allocated to live services between 2019-20 and 2023-24 (for the maintenance of core IT systems and services which support day-to-day running of the NHS – this is mostly committed revenue funding). NHSE&I has sought to improve its cost model over time, in particular by adding data from more trusts (it originally estimated costs based on one trust but now uses data from 14 trusts). This has had the effect of roughly halving its planning estimate to £8.1 billion, with the most significant adjustments being substantial reductions in estimated infrastructure costs. However, we consider the current estimate to be based on very limited data, and there is a significant risk that trusts will be unwilling or unable to fund the £3 billion expected of them (paragraphs 3.4 to 3.6 and 3.10).

7 **The Global Digital Exemplar (GDE) programme is helping a small number of trusts**. The GDE programme, run by NHSX, aims to create a cadre of high-performing trusts which other trusts can follow (in particular partner trusts, known as "fast followers"). The programme provides £385 million of funding between 26 relatively digitally mature trusts to enable them to become world leaders (with smaller shares going to the fast followers). These trusts report they are improving in digital maturity (the use of digital technology to run a health and care system that is paper-free at the point of care), but it is less clear whether good practices will spread to other trusts. The Department and its arm's-length bodies have previously been unsuccessful in other (non-digital) programmes that sought to spread good practice through exemplars (paragraphs 1.18 and 3.11).

8 **Trusts' digital maturity has improved, although significant challenges remain.** According to self-assessments by trusts, their digital maturity improved between early-2016 and late-2017. For example, 83% of trusts assessed their digital readiness (their ability to plan and deploy digital services) as high in 2017, compared with 65% in 2016. There are examples of trusts which are digitally mature and scored highly against an international assessment. But digital capability (the use of technology to deliver care) remains a significant challenge, with 16% of trusts assessing their capability as 'low'. For example, only 54% of trusts reported that staff can rely on digital records for information they need when they need it (paragraphs 1.19, 1.20, and Figure 4 and Figure 10).

Strategic challenges

9 **Changing national strategies have contributed to a fragmented environment, which makes achieving current ambitions more challenging.** Digital services in the NHS rely on a vast array of IT systems critical for delivering services. Many systems are aged, 'legacy' IT (operationally embedded, but superseded by more effective technologies or changed business needs). National strategies have moved between centrally managed and 'hands-off' approaches to digital transformation, and this has contributed to the proliferation of legacy systems. NHSE&I is now seeking to plan and coordinate care through local health and care organisations. This makes it essential that those organisations can share data effectively. NHSE&I expects that working in partnerships will improve organisations' data sharing, but many of the existing IT systems within these organisations predate this approach (paragraphs 1.2, 1.3, 1.7, 1.9 and 4.10, and Figure 3).

10 Digital transformation is essential to the NHS's Long-Term Plan to improve services and will need a high-quality implementation plan. The *NHS Long-Term Plan* (2019) states that digitally enabled care will be rolled out across the NHS to help transform the provision of services and it sets some ambitious targets. However, there is no digital implementation plan setting out how this will be done in clear detail, including the role of national bodies, and to a realistic schedule. NHSX intends to publish a comprehensive technology plan for health and care in the autumn of 2020 (paragraphs 1.5 and 1.15).

Uncertainty over accountability and local costs

11 National governance arrangements for digital transformation remain confused, despite attempts to clarify them. Since 2016 management of the Portfolio of national programmes has been overseen by the Department, NHSE&I and NHS Digital in a complex governance arrangement. Attempts to improve governance of the Portfolio were unsuccessful, for example because accountability for managing development costs and for achieving programme benefits were shared across different organisations. The Department then set up NHSX in July 2019 to lead digital transformation across the NHS, although the new arrangements have still not been finalised and NHSX does not have a statutory basis. NHSX's chief executive reports to both the Department and NHSE&I (paragraphs 2.2 and 2.3, and Figure 2).

12 Arrangements for national oversight of digital transformation at a local level are not in place. Outside the Portfolio, mechanisms for ensuring trusts' investment in technology is consistent with the national strategy are still being developed. This work includes the implementation of spending controls on trusts' digital and IT expenditure, in which NHSX is being assisted by the Government Digital Service. There is currently no governance mechanism to make existing data and technology compatible with national plans (paragraphs 2.4 and 2.5).

13 NHSX is unclear about the whole-life costs and benefits of the different approaches to digital transformation at a local level. NHS organisations use electronic patient record systems to store and share information and these systems are essential to digital transformation. NHSX expects trusts to take one of three approaches to developing a system consistent with national ambitions: to buy an enterprise-wide system; to integrate multiple record systems; or to build their own system. NHSX noted the trusts with an enterprise-wide system tended to be more digitally mature. However, they also tend to have the highest upfront costs and this approach is not affordable in every trust. But NHSX does not have comparable whole-life-cost information for the three approaches, nor does it know the hidden costs which trusts incur as a result of the inefficiencies of legacy IT systems (paragraph 1.3, 1.7, 4.11 and 4.12).

Interoperability of IT systems and data

14 Achieving interoperability of data and IT systems is a longstanding aim and essential to current plans for digital transformation, but it will be very challenging to fully achieve. Interoperability means seamless sharing of data so that all parties understand it in the same way. The Department has recognised the importance of this since 1998, and interoperability is fundamental to the aims of its current strategy. But achieving interoperability will be very challenging. For example, only three of the 10 sets of standards so far identified by NHS Digital are ready. And in 2017 only 15% of trusts reported being mostly compliant with the standard for clinical terminology (SNOMED CT) (paragraphs 1.5, 4.4 to 4.6, and Figure 8 and Figure 9).

15 NHSX does not have a timeframe for achieving interoperability and its plans are under-developed, which risks making interoperability harder to achieve in the future. There has been some progress towards achieving interoperability but much uncertainty remains. NHSX does not have a clear schedule for completing this work. Stakeholders felt that achieving interoperability had been made more difficult by the previous attempt to implement standards, since this resulted in the use of multiple standards or different versions of the same standard. It is our view that if NHSX does not develop and implement a carefully considered plan with a realistic schedule then it not only risks failing to take the right steps towards interoperability in the short-to-medium term, but risks making it harder to achieve in the longer term (paragraphs 4.7 and 4.8, and Figure 8).

16 There could be a tension between the ambitions to achieve interoperability and the aim to increase the number of technology suppliers to the NHS. The Department's *Vision for digital, data and technology* (2018) sets out plans to expand the supplier market, and NHSX and NHS Digital intend to use contractual frameworks to ensure all technology suppliers meet standards that will allow interoperability between IT systems. Nonetheless, increasing the number of suppliers could make interoperability more difficult to achieve because there will be more system-to-system integrations required. NHSX intends to address this problem by asking local organisations to build a 'data layer' to support data access and exchange across different systems (with the intention that these layers will eventually be linked). However, NHSX has not yet defined what work is needed to achieve this; our previous work shows that other parts of government found similar approaches to be expensive and problematic (paragraphs 2.4, 2.8, 2.16, 4.16 and 4.17, and Figure 8).

Developing workforce skills and public trust

17 Specialist skills are in short supply and national bodies have not finalised plans to improve the workforce's digital skills. Health Education England estimates between 40,600 and 53,900 full-time-equivalent NHS staff hold roles in informatics (4% to 5% of the NHS workforce). Most trusts now report having board-level representation for their digital transformation agenda, although stakeholders feel there is a shortage of digital and data skills. There is an existing programme of work in the Portfolio to support the improvement of digital skills across the workforce and at board level in trusts, although its budget is less than 1% of the Portfolio budget to 2020-21. This programme is being consolidated with other initiatives into a workforce implementation plan. It is still in the planning stage, but NHSX intends that this new workforce programme will significantly increase support for improving digital skills (paragraphs 2.6 and 3.13 to 3.16).

18 Maintaining public trust about the use of data is essential to achieving national ambitions. Patient information is used both to inform the direct care the patient receives and for secondary purposes such as planning services and undertaking medical research. The public can opt out of having their information used for secondary purposes if it can be used to identify them. Currently, the opt-out rate is low (below 3%). However, if large numbers of people have concerns and choose to opt out, then planning and research will be less effective. The failure of NHSE&I and NHS Digital to maintain public trust previously resulted in the closure of the care.data programme in 2016. A related risk arises from cyber security. The NHS's legacy IT systems are especially vulnerable to cyber-attack and loss of data. Although work has been undertaken to improve cyber security since the 2017 WannaCry attack, it remains a concern (paragraphs 1.5, 1.7, 2.13 to 2.15 and 4.3).

Applying the lessons from the previous national programme

19 The previous attempt at digital transformation in health was expensive and largely unsuccessful, but we are not convinced that all the lessons are being applied now. In 2011 the National Programme for IT (the Programme) was stopped early and did not deliver key benefits, despite the Department spending an estimated £9.8 billion on the Programme, although some national digital services were delivered successfully and are still in use (for example, the NHS Spine to enable sharing electronic information between organisations). Many factors contributed to the failure, including the insufficient understanding of, and support from, key stakeholders such as clinicians and the need for adaptive change (changes in the way people work) alongside technological change. For current efforts to be successful, it will be essential to avoid previous mistakes. While some high-level lessons were identified in the *Wachter Review* (2016), we have not seen evidence that the lessons of this and other programmes have been captured systematically. In our view, significant risks to successful implementation remain in all areas (**Figure 1** overleaf) (paragraphs 1.9 to 1.12).

Figure 1

Progress made by NHS national bodies in mitigating the causes of the failure of the National Programme for IT (the Programme)

Although national bodies have responded to problems identified with the Programme when planning their current work, risks remain in all areas

Problem identified by the Wachter Review	National Audit Office assessment
1 Lack of national engagement with clinical staff: focus on technology not the service change and adaptive change (by the workforce) needed.	Clinicians are now more involved in national programmes and digital leadership of trusts. But national programmes are still more focused on technology than on adaptive change.
2 Controlled, top-down approach to implement standardised IT systems, with insufficient support of local organisations and professionals.	The national approach is to prescribe standards but not IT systems (which trusts can choose). It is likely there will be more diversity in the approaches used. There is little national support available for local implementation of systems and the corresponding adaptive change required by trusts' workforces.
3 Felt to be politically-driven with a rushed deployment. Unrealistic expectations and too much additional work was added to the original scope.	There is a target to reach a 'core level of digitisation' by 2024 but the implementation plan has not yet been produced. Implementation is likely to take many years, during which time there might be pressure to increase the scope to incorporate new technological advances.
4 Trusts felt they lacked central support to implement the systems (despite a substantial funding allocation).	It is unclear whether national bodies have allocated sufficient funding to deliver the strategy. Even the existing cost estimate assumes trusts will meet £3 billion of the costs, but they might not be willing or able to do so.
5 Procurement and contracting arrangements were problematic, with nearly-impossible delivery timeframes and contracts in which scope was unclear.	National procurement arrangements are more flexible, with national bodies providing a non-mandatory framework for trusts. There could be significant procurement and contract risks at a local level.
6 Continuous leadership changes and a shortage of individuals with relevant skills.	There has been a high turnover of senior staff at the national level, and NHSX is not fully staffed. There is a general shortage of digital skills in the NHS.

Note

1 The full reference of the Wachter Review is: National Advisory Group on Health Information Technology in England, *Making IT Work: Harnessing the Power of Health Information Technology to Improve Care in England*, 2016.

Source: National Audit Office analysis of the Wachter Review

Conclusion on value for money

20 The Department and its arm's-length bodies have ambitious plans for digital transformation, intended to enable many of the wider service changes set out in the *NHS Long-Term Plan*. However, the track record for digital transformation in the NHS has been poor, with the previous major national programme being closed early without achieving its objectives. Currently, £4.7 billion of national funding is delivering some national digital services and improving the digital maturity of some NHS trusts. However, the target of a 'paperless' NHS by 2018 has not been achieved. NHSE&I now expects the NHS to reach a core level of digitisation by 2024, with important information routinely available to clinicians when and where they need it.

21 Local NHS organisations face significant challenges in working towards digital transformation. This includes outdated IT systems that do not connect to other systems and competing demands on their resources. The Department and its arm's-length bodies need to set a clear direction for local organisations and to ensure resources are directed to the right priorities nationally. Doing so will require financial investment, but the government does not have a reliable understanding of how much funding is required. It will also require strong governance and accountability for delivery, which are not yet in place and which are to be led by a new unit, NHSX, which has no statutory footing. National bodies must manage other significant risks including insufficient skills and capability and major technical challenges such as how to embed interoperability between systems in such a complex environment. Unless the Department and its arm's-length bodies address these issues far more effectively than they have managed previously, then they are unlikely to achieve value for money for the up to £8.1 billion they estimate will be spent on digital transformation between 2019-20 and 2023-24.

Recommendations

The Department and its arm's-length bodies should:

a **Maintain a comprehensive set of lessons for digital transformation from NHS and wider government experience.** This should include lessons about digital transformation where organisations vary in their digital maturity and reliance on legacy IT and data. Future plans should be tested against these lessons.

b **Ensure that the expected technology plan for health and care includes an implementation plan with specific objectives and measurable actions that are required.** The plan should include milestones for the implementation of all standards required for interoperability and must take account of the varied readiness of NHS organisations. The plan should be realistic about the time and investment required. It should also be clear about the responsibilities of local organisations, and the support available to them.

c **Collect more data to enable a better understanding of the full cost of delivering digital transformation and prioritise the work programme.** Essential work to lay the foundations of digitisation and interoperability (including data standardisation) should be done before investment in newer technologies. There should be robust assessment of the whole-life costs and benefits of different approaches to implementing electronic patient record systems.

d **Alongside the implementation plan, develop specific resources and plans for high-risk issues:**

- Establish a resource to provide bespoke support to trusts in managing the adaptive change required for digital transformation.
- Prepare a communication plan to ensure trusts, clinical staff, suppliers and the public are kept informed about what is happening and what is expected of them.
- Strengthen the incentives and levers to encourage local organisations to invest sufficient resources in digital transformation.
- Prepare a strategic workforce plan to support digital transformation.
- Prepare plans for determining specific national requirements for clinical records, data quality, and privacy and how they will be met.

e **Simplify and strengthen national governance arrangements.** This should include further work to provide national bodies with the levers and monitoring capability to ensure local NHS organisations and suppliers comply with national standards for existing and new technology, and for data.

f **Use digital maturity assessments of local organisations to gather additional information.** NHSX should continue these assessments, which provide the only comparable information about trusts' progress and identify common areas of strength and weakness. The assessments could also collect information on the costs and benefits of electronic patient record systems.