

Guidance for NHS Trusts Adopting AWS Cloud Services

September 2019



Notices

Customers are responsible for making their own independent assessment of the information in this document. This document: (a) is for informational purposes only, (b) represents current AWS product offerings and practices, which are subject to change without notice, and (c) does not create any commitments or assurances from AWS and its affiliates, suppliers or licensors. AWS products or services are provided “as is” without warranties, representations, or conditions of any kind, whether express or implied. The responsibilities and liabilities of AWS to its customers are controlled by AWS agreements, and this document is not part of, nor does it modify, any agreement between AWS and its customers.

© 2019 Amazon Web Services, Inc. or its affiliates. All rights reserved.

Contents

- Introduction 1
- Procurement Routes..... 1
 - Working with the AWS Partner Network..... 2
- Key Considerations for Migrating to AWS 2
 - The cloud policy statement 2
 - The total cost of ownership (TCO)..... 4
 - Cloud compliance..... 4
 - Tools to help manage security 5
 - Cloud governance 5
 - New cloud computing skills..... 6
- AWS Healthcare Success Stories..... 6
 - HLSC — Integrated Care System (ICS) 6
 - NHS Digital — Data Processing Service 7
 - NHS Business Services Authority — AI Call Center 7
 - Black Pear Software — FHIR integration engine 7
- Document Revisions..... 8

Abstract

This whitepaper is an introductory guide about the opportunities and key considerations for NHS Trusts preparing for migration to Amazon Web Services (AWS). This paper is intended to brief CIOs, CEOs, CCIOs, CTOs, and other senior NHS leaders.

This document is closely aligned to the [AWS Cloud Adoption Framework \(AWS CAF\)](#). The AWS CAF helps organizations understand how cloud adoption transforms the way they work, and provides the structure necessary to identify and address gaps in skills and processes.

The AWS CAF and this document leverage our experience and best practices in assisting healthcare organizations around the world with their cloud adoption journeys.

Introduction

Adopting AWS Cloud services offers NHS trusts the opportunity for improvements to business operations, patient flow, and patient outcomes. Digital transformation of healthcare can personalize the patient health journey, improve data-driven decision making, and accelerate precision medicine. Broadly, adopting AWS Cloud technologies offers three main opportunities:

1. Transformation and automation of business processes for greater reliability, accessibility, and lower cost.
2. Support for medical practitioners through artificial intelligence (AI) and automation of first-line triage, diagnoses, patient record-keeping, note transcription, and the increase in patients' access to care via telehealth and related technologies.
3. Security with greater granularity of controls and visibility over resources.

With AWS, the cost of managing your IT estate is reduced, both in financial terms and in terms of the time-cost of maintaining infrastructure. With its inherent scalability and elasticity, the AWS Cloud has liberated NHS Trust IT staff to innovating, rather than focusing on the maintenance of the existing IT estate.

The ability to experiment without having to deal with failed experiments can dramatically improve the speed, flexibility, and accessibility of healthcare in the UK. Liberation from the consequences of failed investments means that NHS trusts (which may be struggling to keep their IT online) can make radical improvements quickly, while highly technology-driven NHS trusts can experiment with the most novel innovations in cloud technology.

AWS maintains several skilled practices across the healthcare sector, including [healthcare providers](#), [genomics](#), [life sciences](#), [biotechnology](#), [pharmaceuticals](#), and more. We work with many healthcare organizations in the UK and Ireland, including NHS Digital, NHS Business Services Authority (NHS BSA), Healthier Lancashire & South Cumbria Integrated Care System (HLSC ICS), Genomics England, EMIS.

Procurement Routes

NHS Trusts may procure AWS Cloud services in a variety of ways, either directly from AWS, or (more commonly) through an AWS Consulting Partner from the [AWS Partner](#)

[Network](#) (APN). NHS Trusts can procure AWS Cloud services through the following routes:

- From the G-Cloud framework contract, via the Crown Commercial Service (CCS) [Digital Marketplace](#).
- NHS Shared Business Services Cloud Solutions Framework (via APN Partner).
- A full competitive procurement process with terms defined by the purchasing NHS Trust (this is a considerably more complex and time-costly option).

Working with the AWS Partner Network

It's important to understand the relationship and relative responsibilities of AWS, APN Partners, and customers (NHS Trusts).

AWS maintains, develops, and expands the AWS Cloud. The APN is a network of AWS-recognized partners that architect, deliver, and/or manage solutions for customers — which customers then use to undertake a variety of workloads. In this relationship, NHS Trusts consume the services and are therefore the “customer” rather than the partner.

The process of designing and deploying solutions is typically undertaken by a project team consisting of personnel from the customer and an [APN Consulting Partner](#). AWS provides the infrastructure and services that these project teams deploy.

[APN Technology Partners](#) offer discrete products and solutions built on AWS infrastructure, including products and solutions, which are compliant to [DCB 0129](#) and [DCB 0160](#).

AWS also offers [AWS Professional Services](#) to deliver specific project goals, or to fill a capability gap in the partner or customer organization.

For more information, refer to the [AWS Partner Network website](#).

Key Considerations for Migrating to AWS

The cloud policy statement

When you begin your journey to the cloud, your leadership team must agree on a cloud policy statement. Your cloud policy statement defines the objectives of your migration to the cloud and your high-level methodology.

The following examples demonstrate successful UK public sector cloud policies. NHS Trust leadership should seek to emulate the simplicity and clarity of these policies, both in terms of their objectives and how they measure success. Their alignment with the “ground-level” needs of departments and citizens, and the strategic direction of government, means that they have gained sufficient buy-in from all stakeholders.

Cloud policy example: DHSC “Public Cloud First” policy

In October 2018, the Department for Health and Social Care (DHSC) published the policy paper [The future of healthcare: Our vision for digital, data, and technology in health and care](#). This policy paper includes the DHSC “Public Cloud First” policy, which states, “**all our cloud services should run in the public cloud, with no more locally managed servers.**” The stated objectives of this cloud policy statement are:

1. Resilience and backups of some of the most cyber-aware and heavily invested companies in the world.
2. Running and growth of projects that work with infinite amounts of data or have unpredictable processing needs.
3. Sharing of data to increase security, where only those with appropriate access are able to see the data that they need.
4. Continually upgraded and improved commodity services (like word processing) without massive migration projects.

This policy is successful because of the clear strategic objectives, scope, and success criteria. It aligns with other important healthcare policies such as [NHS Digital’s guidance on the use of public cloud services](#) and the [NHS Long-Term Plan](#) objectives to increase productivity of NHS staff and deliver digitally enabled care, which has promoted stakeholder commitment to the policy.

Cloud policy example: GDS Cloud First

Another example of successful cloud policy is the [Government Digital Service’s \(GDS\) Cloud First policy](#), which was introduced in 2013 for all technology investments. The policy was built around two pillars:

1. Consider cloud solutions before alternatives – non-cloud technologies may be considered but must demonstrably offer better value for money.
2. Public cloud first – public cloud should be favored over other cloud deployment models such as community, hybrid, or private cloud.

More recently, GDS has evolved their Cloud First policy into a Cloud Native policy, with more outcomes-based objectives. This change happened because of the success of the Cloud First policy in driving cloud adoption; and it now aims to encourage departments to meet business needs entirely in the cloud.

The total cost of ownership (TCO)

A key advantage of migrating to the AWS Cloud is reduced cost. In order to effectively set targets for successful adoption, NHS Trust leadership should estimate the total cost of ownership (TCO) of their current IT estate, relative to their prospective AWS Cloud estate.

AWS helps reduce cost by reducing the need to invest in large capital expenditures. Instead, the pay-as-you-go model empowers you to invest in the capacity you need, and use it only when the business requires it.

Our [TCO calculators](#) allow you to estimate the cost savings achieved by using AWS, and provide a detailed set of reports that can be used in executive presentations. The calculators also give you the option to modify assumptions that best meet your business needs.

Cloud compliance

Compliance to relevant security standards is vital to cloud adoption. AWS is compliant to a series of UK, EU, and global data protection standards, including:

- [NHS Digital - Data Security and Protection \(DSP\) Toolkit](#)
- International Organization for Standardization (ISO) 27001, 27017, 27018, 9001
- Cyber Essentials Plus
- General Data Protection Regulation (GDPR)/Data Protection Act 2018
- National Cyber Security Center (NCSC) Cloud Security Principles

For a more complete list with the full range of AWS compliant security features and standards, visit [AWS Compliance Programs](#).

NHS Trusts looking to use the AWS Cloud may do so either by using services over the public internet or, if desired, the secure Health and Social Care Network (HSCN). In line with the [Internet First policy](#), NHS Trusts need not constrain themselves to HSCN-only services.

If NHS trusts have an overriding need to access AWS Cloud services via HSCN, they can do so. AWS is connected to HSCN through several partner organizations.

Engage the APN to help manage security

APN Partners enrolled in the [APN Healthcare Competency Program](#) and the [APN Security Competency Program](#) are well placed to help NHS Trusts achieve compliance to standards such as NCSC's 14 Cyber Security Principles. They provide [DCB 0129](#)-compliant technologies (Clinical Risk Management standards), adopt them in compliance to [DCB 0160](#) (Clinical Risk Management: its Application in Deployment and Use of Health IT Systems), and generally help you achieve your cloud security objectives.

NHS Trusts may choose to outsource some of their responsibility to an APN Partner. They may choose to use an APN Technology Partner's application, or perhaps engage an APN Consulting Partner to manage their security. AWS and our partners offer hundreds of services and features to help organizations meet their security objectives for visibility, auditability, control, and agility.

Alternatively, you may wish to insource some or all management of security in the cloud. To support you in this, AWS has published literature on the [selection and implementation of security controls for AWS Cloud services in the healthcare sector](#). This guidance closely follows the NCSC's 14 Cyber Security Principles, with specific guidance on how NHS Trusts can implement and maintain them.

Tools to help manage security

As part of the adoption of AWS, NHS Trusts should familiarize themselves with the suite of security and monitoring tools available, and take advantage of the increased visibility and granularity of information they provide. The tools available include AWS Identity and Access Management (IAM), firewall and distributed denial of service (DDoS) protection services, AWS Artifact management, and incident response.

For more information on the wide range of security, identity, and compliance services, see [AWS Security, Identity, and Compliance](#).

Cloud governance

Governance should be considered as a pattern of practices and behaviors that not only ensure compliance to legislation and regulations, but also protect the security and integrity of your organization at large.

For more information on how NHS Trusts can implement AWS Cloud services according to NCSC guidance and NHS guidance on the secure use of hyperscale cloud services, see [Using AWS in the Context of NHS Cloud Security Guidance](#). This paper is the first point of inquiry for NHS Trust leadership looking for guidance on how to implement AWS Cloud services.

New cloud computing skills

[AWS Training](#) is designed to help individuals delivering cloud-based solutions gain proficiency with AWS Cloud services and solutions. AWS offers [instructional videos](#), [self-paced labs](#), and [instructor-led classes](#). Our role-based technical training courses are designed around the three primary roles in engineering teams delivering cloud-based solutions: Solutions Architect, SysOps Administrator, and Developer. Whether you are just getting started, or looking to deepen your skills, we offer training to help you learn to design, develop, and operate available, efficient, and secure applications in the AWS Cloud.

Career and incentive management

Cloud adoption introduces changes to NHS Trusts' IT staff career paths, requiring HR managers and people managers to update career management skills and processes so that they can ensure that their team members understand their new roles and career options.

Incentive management is key to attracting and retaining employees. Consider incentives as part of cloud adoption work streams. Your organization's culture and ability to provide an environment for attracting and retaining talent plays a key role in successful adoption. Teams need to develop new skills to manage culture and new processes for talent management.

AWS Healthcare Success Stories

AWS is already helping healthcare organizations in the UK to deliver improvements to care in a variety of ways.

HLSC — Integrated Care System (ICS)

Healthier Lancashire and South Cumbria (HLSC) is a partnership of NHS Trusts and other organizations working together to radically improve healthcare in the Region. By aggregating patient records across the region into an Integrated Care System (ICS),

they have leveraged AI-driven services to deliver improvements in care and cost savings. HLSC has also provided a patient portal for Multi-Disciplinary Teams (MDTs) to access data and communicate directly with patients.

HLSC is currently testing [Amazon Comprehend Medical](#) to automatically scan patient records and unstructured data (for example, PDFs appended to the patient record) and present pertinent information to clinicians.

NHS Digital — Data Processing Service

NHS Digital created a highly secure data environment on AWS, allowing external researchers to securely access important, encrypted data using [Amazon EMR](#). By leveraging Amazon EMR, NHS Digital achieved a 26-fold performance improvement in data processing time as part of the project. Average data processing time fell from 137 minutes to 137 seconds using Amazon EMR.

NHS Business Services Authority — AI Call Center

NHS Business Services Authority (BSA) uses AI to handle calls for the European Health Insurance Card (EHIC) Prescription Prepayment Certificate (PPC) and HR Shared Services.

By routing incoming calls through an [Amazon Lex](#)-enabled chatbot, 42% of calls were resolved without ever being attended by a human operator. This represented a saving of approximately £520,000, drastically reduced wait times for callers, and more time to focus on calls that require human expertise.

Black Pear Software — FHIR integration engine

Black Pear Software offers general purpose Fast Healthcare Interoperability Resources (FHIR) integration engine functionality on AWS to automatically share patient data and return clinically coded outcomes to care teams. Dunmail Hodgkinson, CTO, explains, “Black Pear uses AWS scalable infrastructure to provide FHIR APIs for a broad range of apps including clinical systems, appointment books, and patient apps. For example, at NHS.”

Document Revisions

Date	Description
September 2019	First publication