
DIRECTIONS

NATIONAL HEALTH SERVICE, ENGLAND

NHS Digital (Establishment of Information Systems for NHS Services: NHS App) Directions 2018

The National Health Service Commissioning Board¹ (known as NHS England) gives the following Directions to the Health and Social Care Information Centre², now known as and hereafter referred to as NHS Digital, in exercise of the powers conferred by sections 254(1), (3) and (6), section 274(2) and section 304 (9), (10) and (12) of the Health and Social Care Act 2012³ and Regulation 32 of the National Institute for Health and Care Excellence (Constitution and Functions) and the Health and Social Care Information Centre (Functions) Regulations 2013⁴.

In accordance with section 254(5) of the Health and Social Care Act 2012, NHS England has consulted NHS Digital before giving these Directions.

Citation, commencement and interpretation

1. These Directions may be cited as the NHS Digital (Establishment of Information Systems for NHS Services: NHS App) Directions 2018 and shall come into force on **27th September 2018**.

2. In these Directions–

“The 2012 Act” means the Health and Social Care Act 2012;

“the Regulations” means the National Institute for Health and Care Excellence (Constitution and Functions) and the Health and Social Care

¹ The National Health Service Commissioning Board was established by section 1H of the National Health Service Act 2006 (2006 c 41.) and operates as NHS England.

² The Health and Social Care Information Centre, now known as NHS Digital, is a body corporate established under section 252(1) of the Health and Social Care Act 2012

³ 2012 c.7

⁴ S.I. 2013/259

Information Centre (Functions) Regulations 2013;

“Relevant Organisation”	Means all General Practices in England;
“Specification”	means the NHS App Technical Definition version 0.1 approved on 30/08/2018, and annexed to these Directions at Annex A or any subsequent amended version of the same document approved by the Board which supersedes any previous version;

Developing and Operating the NHS App Systems Delivery Functions

3. (1) In accordance with section 274 of the 2012 Act and Regulation 32 of the Regulations, NHS England directs NHS Digital to exercise such systems delivery functions of NHS England as are necessary for it to deliver the (Establishment of Information Systems for NHS Services: NHS App) Directions 2018.

(2) NHS England directs NHS Digital to exercise the functions described in sub-paragraph (1) in accordance with the service levels, support and monitoring requirements, and the reporting and governance requirements notified by NHS England in writing to NHS Digital as at the date these Directions come into force, or as those requirements are amended and notified by NHS England in writing to NHS Digital from time to time.

Establishing and Operating the NHS App Information System

4. – (1) Pursuant to its powers under sections 254(1) and 254(6) of the 2012 Act, NHS England directs NHS Digital to establish and operate a system for the collection of audit, monitoring and user support information described in sub-paragraph (2) from Relevant Organisations, such system to be known as “NHS App Information System”.

(2) The information referred to in sub-paragraph (1) is set out in the Specification.

(3) NHS England directs NHS Digital to carry out the activities described in sub-paragraph (1) in accordance with the Specification and generally in such a way as to enable and facilitate the purposes that are described in the Specification at Annex A.

S254(3) - Requirement for these Directions

5. In accordance with section 254(3) of the 2012 Act, NHS England confirms that it is necessary or expedient for it to have the information which will be obtained through NHS Digital complying with these Directions in relation to NHS England's functions in connection with the provision of NHS Services.

Fees and Accounts

6. Pursuant to sub-section 254(7) of the 2012 Act, NHS Digital is entitled to charge a reasonable fee in respect of the cost of NHS Digital complying with these Directions.
7. NHS Digital must keep proper accounts, and proper records in relation to the accounts, in connection with the Establishment of Information Systems for NHS Services: (NHS App) Directions 2018 .

Review of these Directions

8. These Directions will be reviewed when the Specification is amended. This review will include consultation with the NHS Digital as required by sub-section 254(5) of the 2012 Act.

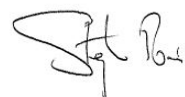
Signed by authority of NHS England

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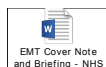
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27th September 2018



Annex A – Specification



Document filename:	NHS App Technical Definition		
Directorate / Programme	NHS App Programme		
Document Reference		Status	Draft
Information Asset Owner	Andy Callow	Version	0.1
Author	Lee Gathercole	Version issue date	30 Aug 2018

NHS App Technical Definition

Document Management

Revision History

Version	Date	Summary of Changes
0.1	30 Aug 2018	Initial draft

Reviewers

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Document Control:

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1 Introduction

1.1 Purpose of Document

At the Health and Care Innovation Expo 2017, the Secretary of State for Health and Social Care outlined '8 challenges' for the NHS which, if addressed, would deliver significant benefits and empower patients to help take control of their care.

In response to these challenges, NHS England have commissioned NHS Digital to establish the NHS App Programme and develop the **NHS App**. The **NHS App** will provide a range of digital services to the public, available through a mobile app, initially meeting 6 of the Secretary of States challenges, then extending it to encompass a wider range of digital tools and services.

The programme has previously been referred to as 'NHS Online'. Its name has now been formally established as the **NHS App** Programme.

This document summarises the Architecture for the NHS App Programme
The document will be refreshed as the solutions and architecture evolves.

1.2 Audience

The primary audiences for this document are:

- NHS Programme team
- NHS England

1.3 Definitions

Where used in this document set, the keywords **MUST**, **SHOULD** and **MAY** are to be interpreted as follows:

- **MUST**: This word, or the terms "**REQUIRED**" or "**SHALL**", means that the definition is an absolute requirement of the specification.
- **SHOULD**: This word, or the adjective "**RECOMMENDED**", means that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications **MUST** be understood and carefully weighed before choosing a different course.
- **MAY**: This word, or the adjective "**OPTIONAL**", means that an item is truly optional. One implementer may choose to include the item because a particular implementation requires it or because the implementer feels that it enhances the implementation while another implementer may omit the same item. An implementation which does not include a particular option **MUST** be prepared to interoperate with another implementation which does include the option, though perhaps with reduced functionality. In the same vein an implementation which does include a particular option **MUST** be prepared to interoperate with another implementation which does not include the option (except, of course, for the feature the option provides).

2 Problem Description

The NHS App programme is a key ministerial commitment and aligns with key policies and strategies including the National Information Board's "Personalised Health and Care 2020" initiative (Oct 2014) and NHS England's "Five Year Forward View" (Oct 2014), which focus on integrating digital health and care services as well as improving the patient experience. Successfully delivered, the NHS App would see patients in England having access to the first national digital health app of its kind and scale anywhere in the world.

"For many of us using digital tools is an everyday occurrence whether that is online banking, booking holidays or posting on social media. In health, most of us don't do this but digital apps and products have enormous potential to empower patients to take control of their healthcare and improve the services we can offer. That's my aim and the aim of the teams across NHS England and NHS Digital – to provide digital services, alongside and integrated with traditional services, so people can take control of their own health and we can increase access.

Juliet Bauer – Chief Digital Officer, NHS England

The NHS App programme has evolved from the long-term vision articulated within PHC2020 Domain A's 'Visual Proposition'¹, which set out how the integration of digital health and care services with central NHS website will provide contextualised and personalised services, with transactions, that support users to manage their own health and be more engaged in their care as well as improve quality and efficiency within health and care services. A visual proposition has been developed for the NHS App (Appendix C) to go alongside the Visual Proposition for the NHS.uk Programme.

The objective of the NHS App is to deliver functionality and services that address a number of key needs for patients and clinicians, to be released in regular tranches over a 3-year period. The NHS App will seek to empower patients by giving them access to core NHS transaction services and visibility of their records. Key aims are to:

- Give access to digital services whenever, wherever and however users want to consume them;
- Make it straightforward for local / regional providers, commissioners and 3rd parties to create and iterate consistent high quality services;
- Reduce pressure on frontline NHS services, and administrative costs through increased use of digital channels; and
- Use patient record information (with appropriate permissions) to inform digital triage and promote approved digital apps from a competitive and vibrant marketplace.

The first tranche of functionality and services prioritised by the Secretary of State to be delivered by the end of 2018 are summarised as follows:

1. Online symptom checking and triage (connected to NHS 111 Online)
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2. Patients' GP record access
3. GP Appointment booking
4. Repeat prescriptions
5. Data sharing preferences
6. Organ donation preferences
7. End of Life care choices (de-scoped for 2018 delivery)
8. Suite of personalised apps (de-scoped for 2018 delivery)

What we do know

We know from the outputs of the Discovery work that there is a need for an NHS App. Specifically the ability to Book Appointments and Order Repeat Prescriptions via a mobile application was high on the feature list. Whilst these services are already possible via a number of subsidiaries such as EMIS Patient Access, TPP SystemOne, Evergreen, it is not widely publicised and has a low level, but growing rate of take up. In addition to the App there will also need to be a change in GP behaviour to improve the success of the application. Currently only 11% of appointments are made available via the online route. If the intention here is for a channel shift into consuming services digitally, it requires significant business change.

One of the original hypotheses tested during discovery was the idea of an NHS App acting as a 'wrapper' application and invoking CCG procured local applications. Whilst this fits the current commissioning arrangement, it was poorly received from a usability perspective and would likely to be prohibitive to uptake. The Discovery outcome was to build a core NHS Application offering the core GP services (Appointment Booking, Repeat Prescriptions and Patient Record Access) in a consistent manner, irrespective of the source GP System (EMIS, TPP, Vision or MicroTest). Where additional services already exist (111, Health A-Z, Organ Donation, National Data Opt Out) these will be surfaced through the application in their current state.

2.1 Stakeholders and their Concerns

The key stakeholder-defined future requirements for the Architecture are outlined below:

Category	Stakeholder and Stakeholder Needs Identified
Programme Benefits Realisation	<ul style="list-style-type: none"> • NHS Digital Programme – meet the defined objectives for the programme • GPs and practice staff – Reduce burden of managing appointments and repeat prescriptions • Citizens/Public – Access digital services via a convenient mobile application
Reuse (operational)	<ul style="list-style-type: none"> • Other NHS Organisations – Mobile channel for other NHS services • Third-party suppliers – Provide a platform to open up their services to a wider audience
Operational	<ul style="list-style-type: none"> • NHS Digital - Minimise the cost and effort in managing the NHS App • NHS Digital – Leverage the application to provide future NHS and Market applications through a single conduit

IG and Security	<ul style="list-style-type: none">• NHS Digital - Secure and consistent processing of Patient Data• Third Parties (GP System Suppliers) – compliance with their existing Subsidiary connection standards
Privacy	<ul style="list-style-type: none">• NHS Digital - User consent for data processing

2.2 List of Issues/Scenarios to be addressed

The key scenarios for the Citizen Identity Platform, which the Architecture must support, are outlined below:

High-Level Scenario	Architecture Implications
User wants to book a GP Appointment	Assumes identity is assured and requires connectivity to backend GP systems for all 4 providers in order to retrieve and book appointments
User wants to order repeat medication	Assumes identity is assured and requires connectivity to backend GP systems for all 4 providers in order to retrieve and order repeat prescriptions
User wants to view their patient record	Assumes identity is assured and requires connectivity to backend GP systems for all 4 providers in order to retrieve medical record
User wants to set their data sharing preferences	Optimal user experience in consuming an existing service
User wants to set their organ donation preferences	Optimal user experience in consuming an existing service
User wants to check their symptoms	Optimal user experience in consuming an existing service

3 High-Level Objectives

The high-level objectives of the NHS App Programme are presented in the Programme Business Case, repeated here:

1. One singly available application, that will be NHS branded (carrying with it the weight of the NHS's authority) that will give unparalleled access and unrivalled power to patients. The application will ensure that the Secretary of State's commitments are delivered in a timely way (see below).
2. To give the public access to high quality, efficient and safe digital services with the intent that so doing will achieve better health outcomes for individuals and populations.
3. To make it straight-forward and quick for local and regional service providers, commissioners and third parties to create and iterate excellent services that meet user needs, are consistent and are able to interoperate with other local, regional and national services.
4. To save money by removing inefficiency and waste from the system.
5. To support wider portfolio and organisation strategy to create the conditions for a vibrant, competitive ecosystem of digital applications that are of a consistent quality, safety and security and which meet the range of user needs.
6. Integrate and Leverage the Citizen Identity solution for Identity Assurance

The architecture for the NHS App solution must support these objectives.

4 Environment and Process Models

4.1 Current Process Description

Currently there is no means of consuming the services laid out by the Secretary of State under one roof. Whilst all of these services can be consumed in their own right and existing applications such as Patient Access, Evergreen and Wiggly Amps provide a digital means of interacting with GP systems. It is not well publicised and therefore poorly adopted.

4.2 Future Process Description

All services will be available via a single Mobile application and NHS branded. This will be supported by a national advertising campaign to stimulate interest and improve uptake.

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4.3 Information Flow

The following Data Flow Diagrams describe how information flows through the system. The service is predominantly a data processor. However, for the purpose of Audit, it will capture the NHS Number of the user that has committed an action on the system.

For the Organ Donation, Symptom Checker and National Data Opt Out services, there is no information flow as the application will just invoke the existing web service. The information flows for the Login, Appointments, Prescriptions and Medical Record are detailed below. The overarching Data Flow Diagram is shown below

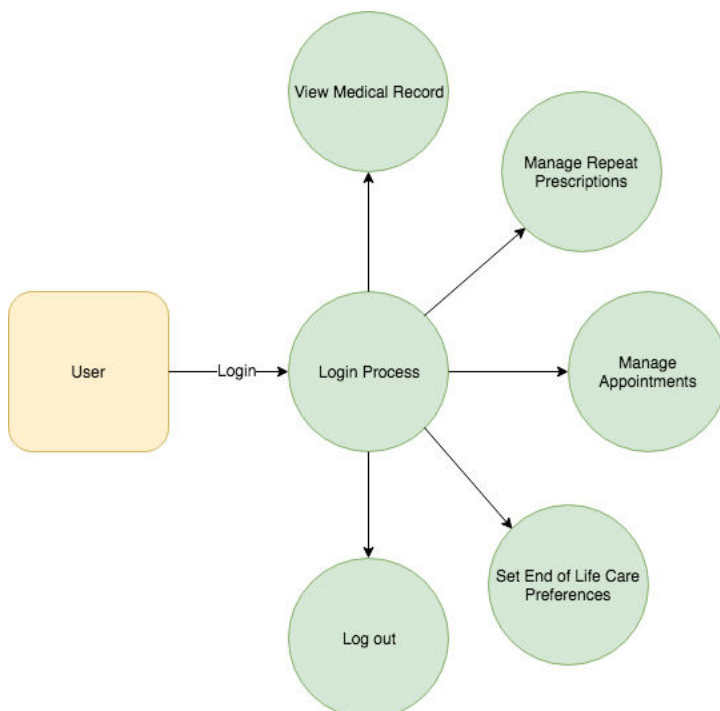


Figure 1 Overall Data Flow Diagram

4.3.1 Login

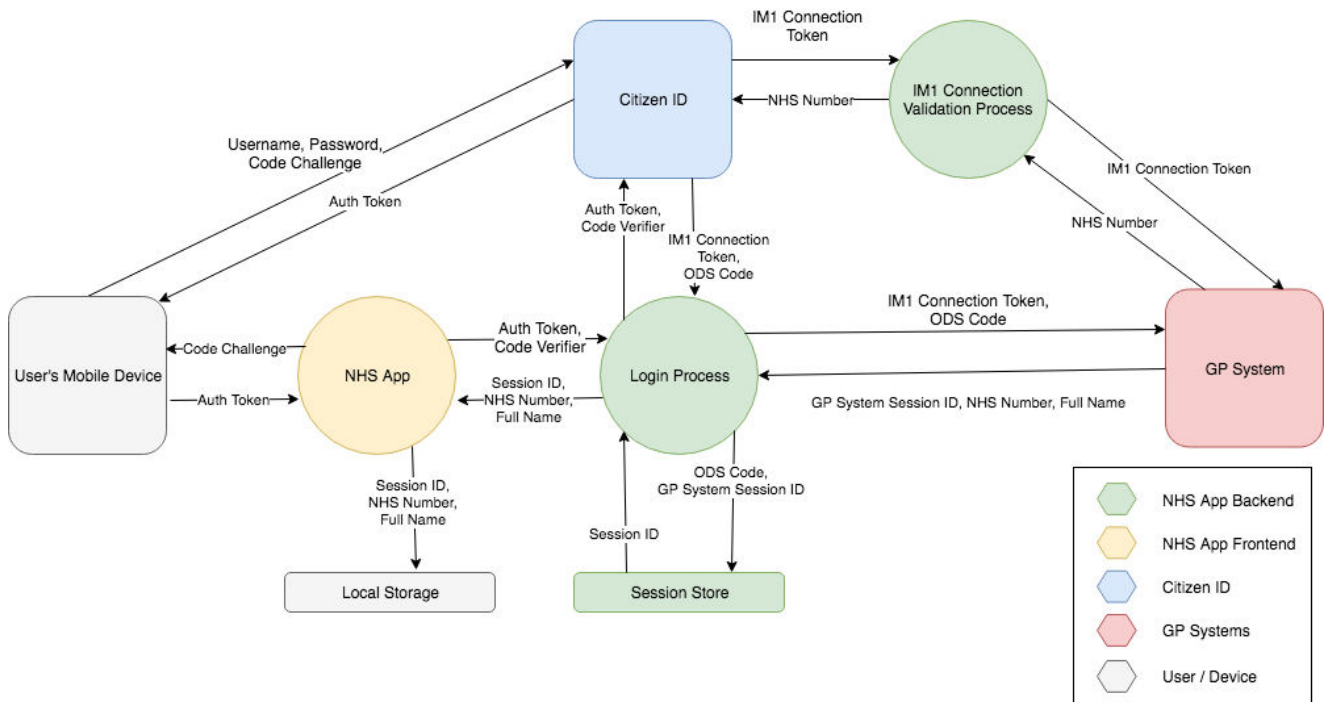


Figure 2 Login Data Flow Diagram

4.3.2 Manage Appointments

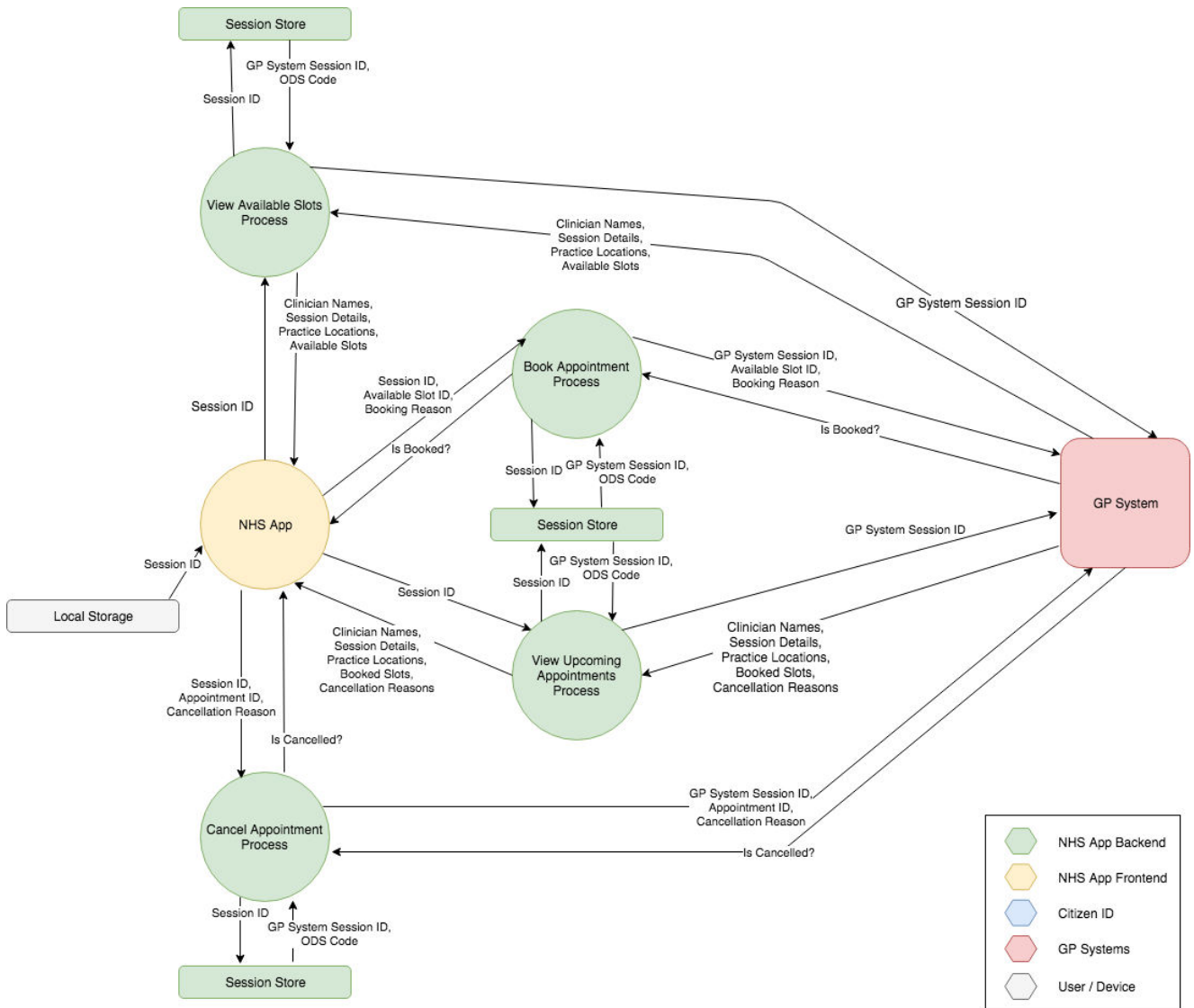


Figure 3 Manage Appointments Data Flow Diagram

4.3.3 Manage Repeat Prescriptions

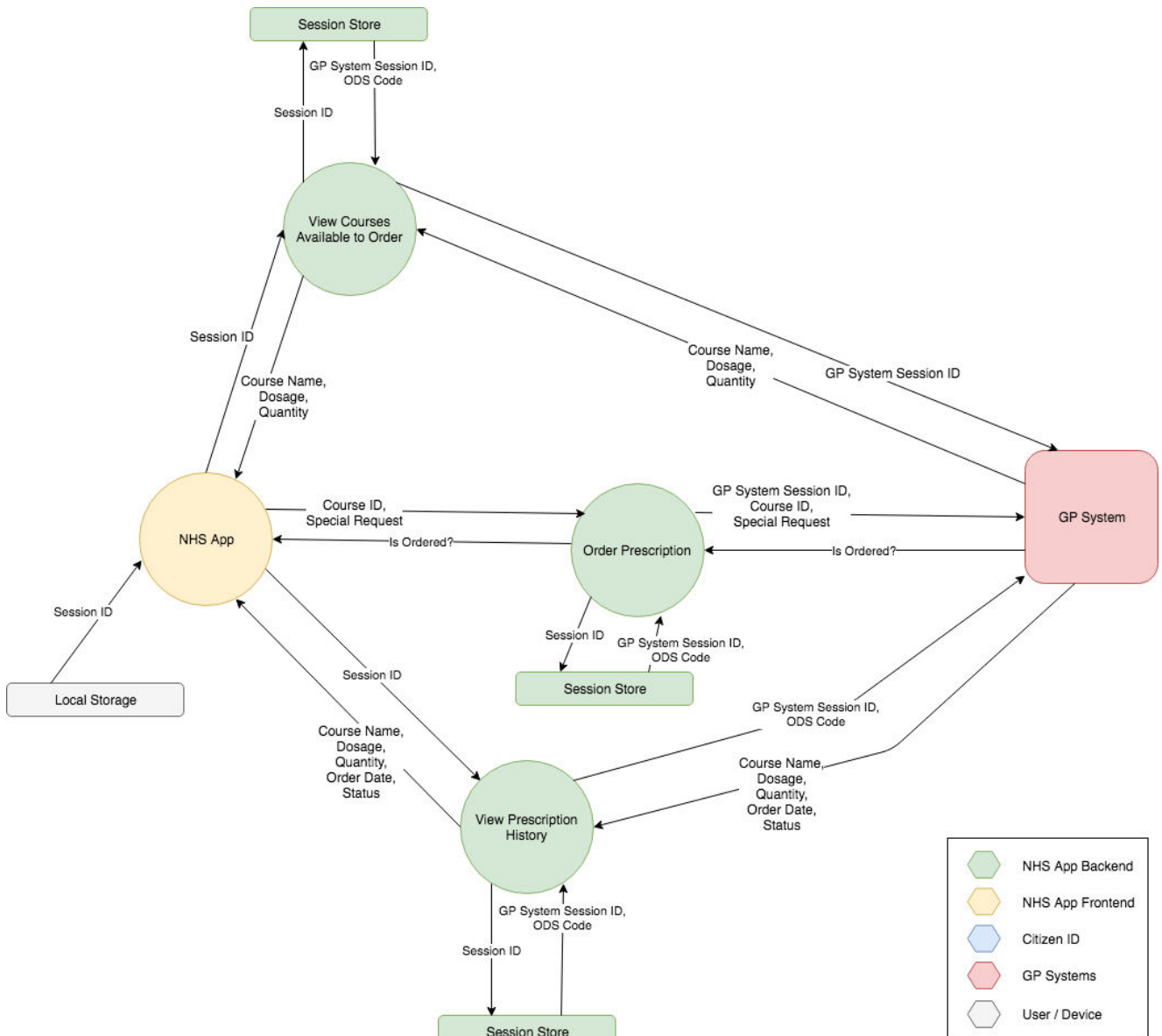


Figure 4 Repeat Prescriptions Data Flow Diagram

The NHS App is transient in nature. In most scenarios data is pulled from the 3rd Party GP System Supplier’s databases and displayed to the Citizen. Some data is stored in the transient Session Cache and in the persisted Audit store

- NHS Number

The above shows the main flows, the key points being:

- Data necessary for the application to function, is only maintained for the length of a user session
- Audit data contains NHS Number for traceability and issue resolution reasons
- This data is retrieved from external systems rather than being supplied by the user

4.4 Participating Organisations

The NHS Number will be passed from Citizen Identity. This will be in accordance with the Citizen ID process of onboarding Organisations

4.5 The Data that will be Collected

The DPIA covers the processing and controlling of data in more detail and can be found here <https://hscic365.sharepoint.com/:w:/r/sites/Pilot/NHSUK/Shared%20Documents/Information%20Security%20and%20Risk/NHS%20App%20Docs/NHS%20App%20Data%20Protection%20Impact%20Assessment%20%20V0.6.docx?d=w34c88da21c294894ab0b73172005292e&csf=1>

In summary, NHS Digital is the Data Controller in 2 scenarios.

Audit Data. The NHS App Programme wishes to audit the interactions the user has with the service. This is so that, should any issues arise, there is a forensic log of how the user has interacted with the system. In respect of Audit data collected by the NHS App, NHS Digital are a Data Controller. The Audit records will contain the user's NHS Number, but no other personal data or clinical information will be stored.

Service Desk. The Service Desk needs to interact with the end user to resolve system problems. In this instance, NHS Digital will be the Data Controller for that data. This data will contain the following personal data and will be stored in Cherwell.

- First name
- Surname
- Email Address

The user will be explicitly asked for their consent

Subsequent phases of delivery will further impact the logical information flow, and potentially the data collected. This document (and DPIA) will be updated accordingly.

5 Actors and their Roles and Responsibilities

5.1 Human Actors and Roles

The existing human roles described in the table below will interact with the NHS App.

Role	Actor
Citizen	Any member of the general public within England
Digital Delivery Centre Operations Staff	NHS Digital staff operating the platform

5.2 System Actors and Roles

The table below summarises the computer actors and roles.

Role	Role Description	Actor
Digital Services	These are health and/or care applications and tools – in this context, their service is surfaced through the NHS App	Applications/tools provided by NHS Digital, other NHS and private sector organisations
GP Systems	These are systems procured by GP Practices. They hold the Patient Data and manage the appointments and prescriptions functionality.	GP Systems provided by GP Systems of Choice framework (GPSoc)
Identity Provider	Identity assurance and authentication is delegated to an Identity Provider. The Identity provider delivers claims used by the NHS App	This is Citizen ID in this instance

6 Resulting Architecture Model

6.1 Constraints

The following have been identified as constraints on the Architecture Model for the NHS App:

- Technology selection must reflect the operational capabilities of NHS Digital
- Where possible, Personal identifiable data will not be stored within the system
- Given the nature of the application and its potential to result in a large uptake. The solution must be capable of scaling up and down depending on the demand.

6.2 Requirements

- The architecture must abstract away the GP System Supplier specific implementations and offer a consistent API and User Experience
- The abstraction should be such that additional GP System Suppliers could be added easily
- It should use Citizen Identity for its Authentication and Identity Assurance
- The architecture must support multiple Digital Services, providing a consistent user and technical interface
- The architecture must be capable of flexing to user and service volumes on a day-to-day basis – Scalability
- The architecture should, where possible, consume platform services, rather than build

6.3 Design Principles

The key Architecture and Design principles are defined in the table below:

Priority	Principle	Implications/What this means in the design
1	Design for security	<p>Integrate security testing, vulnerability scanning as part of the automated delivery pipeline.</p> <p>Build a culture where security is a priority</p>
2	Design for operational simplicity and efficiency	<p>Do not build platforms that can be consumed.</p> <p>Spend time and effort in building a robust, automated deployment pipeline</p> <p>Ensure monitoring, logging and auditing are baked into the service at the earliest point possible</p>
3	Keep it Simple	<p>Build for what is known, do not spend wasted engineering effort on unknown requirements.</p> <p>For SOLID Principles to ensure appropriate Segregation and Isolation of Components</p>
4	Provide interfaces to the 'outside' using open standards	<p>Stay within published standards - extend only where permitted by the standard</p>
5	Design for Scalability	<p>Use technologies which are simple to scale and manage - serverless, or containerised</p> <p>Scale horizontally where possible</p> <p>Allow the underlying platform to manage scale rather than our own additional tooling</p>
6	Choose technologies to support rapid delivery	<p>Choose products and technologies that support rapid procurement (none if possible)</p> <p>Choose technologies which we have skills to deliver in</p>
7	Platform Portability	<p>Avoid decisions which unnecessarily lock the architecture into specific platform providers</p>
8	Design for Failure	<p>Expect components to fail, especially 3rd party systems. Ensure error handling and processing is managed well for the user.</p> <p>Implement Chaos Testing as part of the deployment pipeline</p>

Alignment with wider NHS Digital Principles, Policies and Standards will be ensured through the NHS Digital governance processes.

In addition, the principles included in the GDS Service Design Manual will be adopted for the Citizen Identity Platform solution.

7 Logical Architecture View

Figure 4 shows the logical architecture view

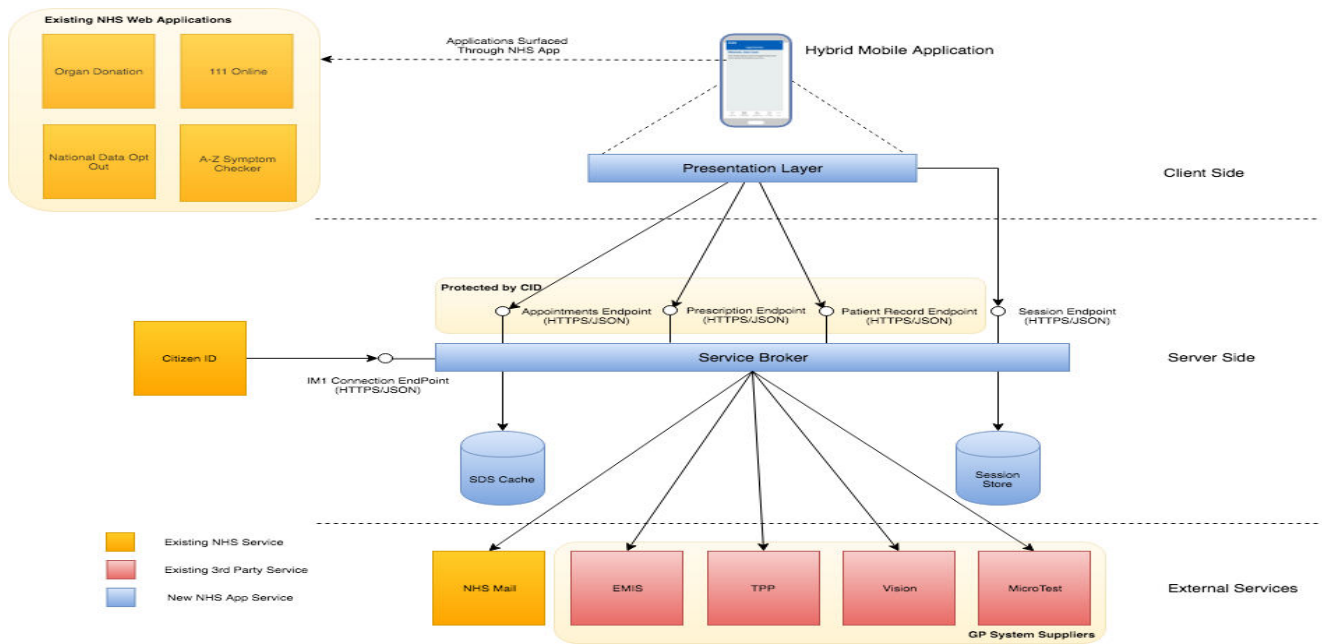


Figure 5 Logical Architecture Diagram

8 Technology Architecture View

The technology architecture view encompasses two main perspectives; the software platform on which the service will be developed and run, and the infrastructure platform on which the service will be delivered.

8.1 Technology Colophon

At a high level, the NHS App service is a thin container mobile application that consumes a web application, which in turn consumes an API layer to interact with GP Systems.

The diagram below details the various technologies used to deliver this service.

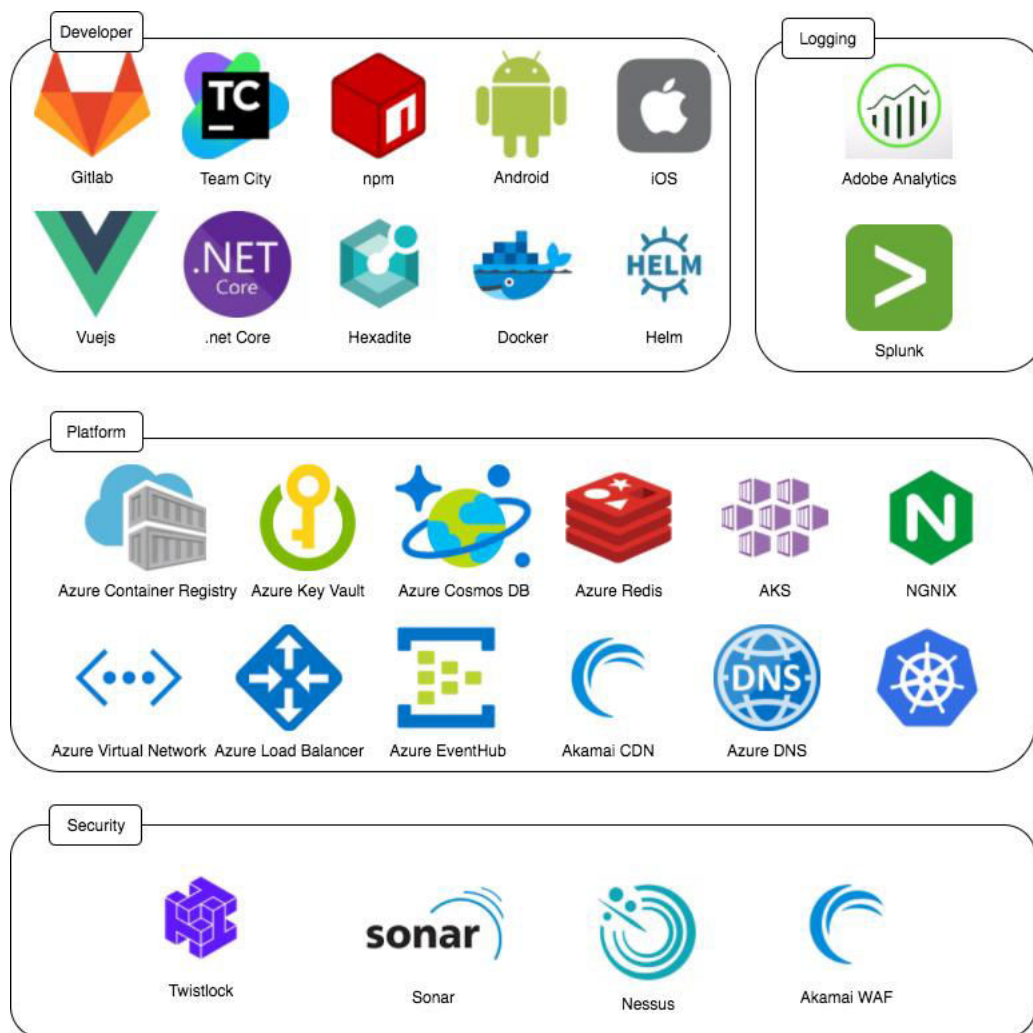


Figure 6: Current View of Technologies – will evolve during the life of the service

8.2 Infrastructure Architecture

The NHS App Service is deployed on the Azure cloud service and where possible will leverage Platform Services, rather than Infrastructure Services. The main deployment uses Azure Kubernetes Service, which consumes the Cosmos DB service for Audit information and the Redis Service for caching session purposes.

The diagram below details the infrastructure deployed for Private Beta

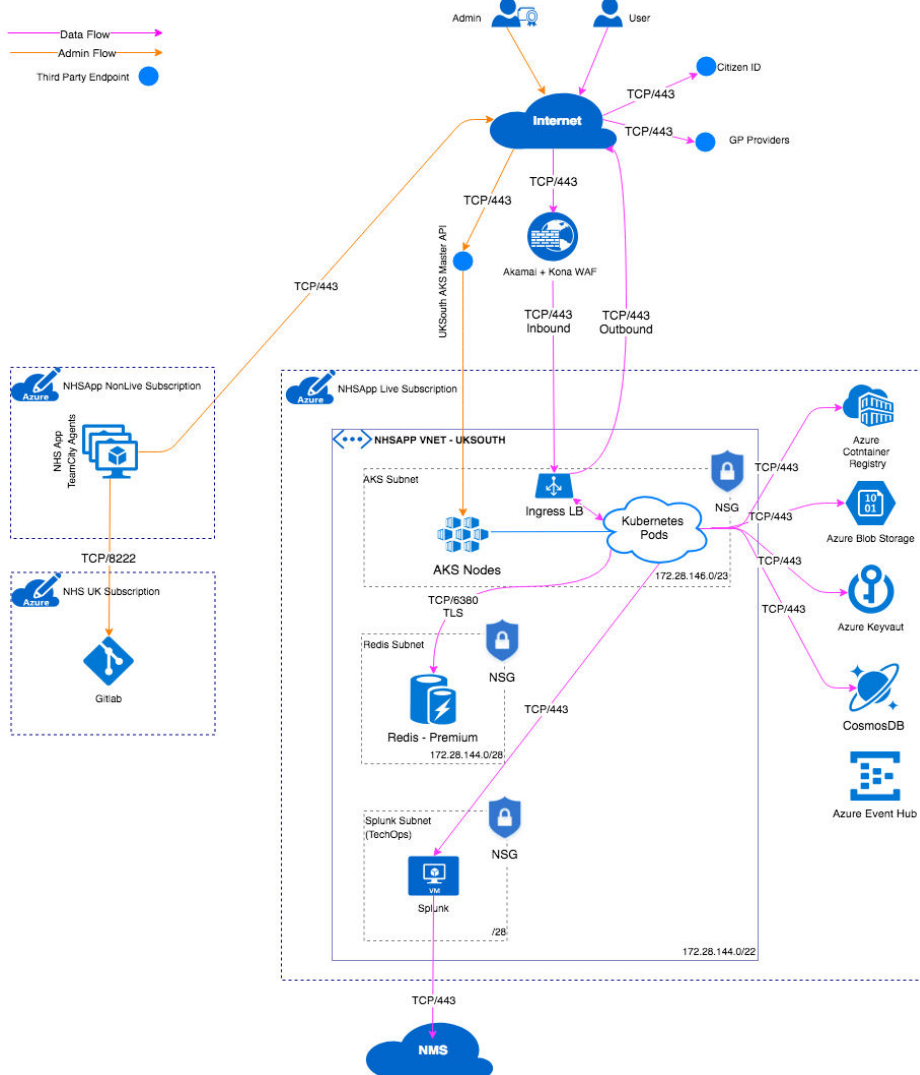


Figure 7 Infrastructure Single Site Deployment

Post Private Beta, once the UK West Data centre has AKS deployed to it, the service will be distributed over 2 sites in an active/active arrangement

9 Enterprise Architecture Alignment

9.1 Architecture Governance

Key capabilities of the Architecture will be captured within the 'NHS Digital EA Portal' capability cards. These capability cards are peer reviewed and published on the NHS Digital "EA Portal" website [<https://enterprisearchitecture.digital.nhs.uk>].

NHS App Key Design Decisions are reviewed by the NHS Digital Technical Reference Group (TRG) using the appropriate forms as vehicles for describing the architecture, key decisions required from the group, and key architecture waivers.

The Enterprise Architecture Board (EAB) acts as a gateway for business cases. Once the related Key Design Decisions have been through a TRG review and waivers approved, the business case can proceed to TDIB for review.

Further details of the NHS Digital Architecture Governance Model and Architecture Principles can be found on the EA Portal.

9.2 Architecture Re-use

The NHS Digital Architecture Principles and NHS Digital's aim to support national NHS system live services through a common DevOps capability drive the need to ensure a level of consistency between national systems from a component perspective.

Component re-use is evaluated at multiple levels during the lifecycle of programme:

- Through the TRG – this group generally considers entire functional component re-use at a sub-system level.
- Through the IDA – this group generally considers component re-use from an interoperability and messaging perspective – for example promoting standards and patterns of integration which can be consistently applied across multiple systems
- Through peer-review of capability cards – this identifies overlaps and consistencies across programmes
- Through architect review meetings between programme architects – these meetings identify technical products and patterns which can be re-used across programmes. E.g. the pattern of integration with SDS is common between Spine II and e-RS.

Within NSH App, a "Key Design Decision" is recorded using the Architecture Decision Log <https://git.nhschoices.net/nhsonline/nhsapp-architecture>. Part of the evaluation required in a Key Design Decision document is an evaluation of the re-use options within NHS Digital.