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# NHS App Technical Specification

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# Document Management

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1.1	Sep 2023	Updated to include API integration with the Electronic Prescriptions Service
2.0	Oct 2023	Taken to version 2.0 for publication

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This document must be reviewed by the following people:

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\* NB: This table reflects the most recent version reviewed by an individual.

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[redacted]	Assistant Director	Oct 2023	2.0

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# 1 Introduction

## 1.1 Purpose of Document

The NHS App is one of the National Digital Channels (NDC) providing citizen access to ‘public-facing digital health’ services. The NHS App was announced by the Secretary of State for Health at Expo 2017. The NHS App programme is subject to a number of key ministerial commitments and is a committed investment as part of the NHS Long Term Plan (LTP). The NHS App focuses on integrating digital health and care services into a single, easy to use and standardised channel, to improve the citizen experience and to empower patients to take more control of their health and care.

The NHS App is a mobile and tablet application, currently available for download in both the Apple and Google Play stores, that provides a simple and secure way to access a range of face to face and digital NHS services and advice, as well as access to third-party digital tools. Users can also access NHS App services from the browser on their desktop or laptop computer<sup>1</sup>.

The NHS App’s coherence with NHS login requires an uplift to the same commission in place for NHS login, as such, the NHS legal direction has been updated to reflect a commission from the Department of Health and Social Care (DHSC). The NHS App will submit supplier integration approvals via the relevant approval boards to meet the continued criteria required to provide the NHS App service.

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 App team
- Senior leadership in NHS England (NHSE)
- NHSE
- DHSC
- NHS App Governance boards (as relevant)

## 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.

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<sup>1</sup> Some features available on the Mobile App may not be available via Desktop

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- **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).

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## 2 Programme Description

The NDC Programme is a pivotal part of NHS England's Citizen Experience agenda, giving people, patients, service users and carers the tools to access information and services directly. This supports the improvement of patient experience, efficiencies in the delivery of care and improving health outcomes for all. The intention is to now further evolve the NDCs and respond to the ambitions of the health prevention agenda to support proactive, predictive and personalised prevention.

The NHS App was announced by the Secretary of State for Health at Expo 2017. It is a mobile and tablet application, currently available for download in both the Apple and Google Play stores, that provides a simple and secure way to access a range of face to face and digital NHS services and advice, as well as access to third-party digital tools. Full details on the NHS App and its functions and roadmap can be found online at: <https://www.nhs.uk/using-the-nhs/nhs-services/the-nhs-app/>

The NHS App programme is subject to a number of key ministerial commitments and is a committed investment as part of the NHS Long Term Plan (LTP). The NHS App focuses on integrating digital health and care services into a single, easy to use and standardised channel, to improve the citizen experience and to empower patients to take more control of their health and care.

The NHS App has evolved significantly since 2019 and the launch of the NHS App strategy, which set out how we can help make the digital infrastructure that the NHS App is built on available to others so they can benefit from it. In December 2020, a number of NHS App roadmap items were taken forward to support Citizen Health Technology (CHT) strategy, planning and prioritisation discussions.

The objective of the NHS App is to deliver functionality and services that address a number of key needs for patients and clinicians.

The NHS App supports the strategic priorities of the NHS by:

- Providing an easy to access platform through which people can access health services available to them
- Improving its core capability, which can be made use of by the services integrated into it (notifications etc)
- Providing people with always-on access to their health and care information
- Improving uptake of digital services by making them available from one place using a single sign-on

### 2.1 Strategic Context

In September 2017, the then Secretary of State for Health and Social Care, Jeremy Hunt, announced plans for a digital-led NHS starting in 2018. At the core of this strategy was citizen empowerment, enabled through the NHS website and NHS App.

The NHS Tech Vision in October 2018<sup>2</sup> set out that the NDC would be key to 'public-facing digital services', supporting and empowering people to stay healthy and independent for longer, enabling secure online access, providing personalised and relevant health information,

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<sup>2</sup> <https://www.gov.uk/government/publications/the-future-of-healthcare-our-vision-for-digital-data-and-technology-in-health-and-care/the-future-of-healthcare-our-vision-for-digital-data-and-technology-in-health-and-care>

and supporting the evolution of digital tools and advice to meet the growing expectations of consumers.

In January 2019, the NHS Long Term Plan<sup>3</sup> set out the ambition for digital transformation within the NHS. The NDC formed a critical element of the Plan’s digital strategy for individuals to access health information easily, securely access digital services and tools in a standard and consolidated way, take a much more proactive and responsible approach to monitoring their own health and wellbeing, and enabling rapidly paced integration to promote both innovation and personalisation of services.

DHSC and NHSE/I have long set out their ambition for people to have access to digital tools and services to enable them to access care and manage their health:

- Contribute to and support the NHS’s recovery from the COVID-19 pandemic, using digital to facilitate better communication and the ability to self-serve
- Protect the public’s health through the health and social care system’s response to COVID-19
- Improve healthcare outcomes by providing high quality and sustainable care at the right time in the right place and by improving infrastructure and transforming technology
- Deliver the Long-Term Plan (LTP) ambition for a unified, personalised and data-driven health service. Enabling people to have more control of their care, be a co-contributor to the data held about them and provide a more personalised experience.
- Ensure that people can enjoy at least 5 extra healthy, independent years of life by 2035 while narrowing the gap between the experience of the richest and poorest
- Invest in preventing disease as well as curing it to tackle the underlying causes of increases in NHS demand by empowering people with lifestyle-related conditions such as obesity to live healthier lives
- Improve, protect, and level up the nation’s health, including reducing health disparities<sup>4</sup>

## 2.2 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"> <li>• NHS England teams – Meet the defined objectives for the programme</li> <li>• GPs and practice staff – Reduce burden to staff by provisioning services to the patient digitally</li> <li>• Citizens/Public – Access digital services via a convenient mobile application and online service</li> <li>• Elective Care Clinicians – Reduce burden to staff by provisioning services to the patient digitally</li> </ul>
Reuse (operational)	<ul style="list-style-type: none"> <li>• Other NHS Organisations – Mobile channel for other NHS services</li> <li>• Other NHS Organisations – Improved data access and management that may be applied to other NHS services - potential reuse of core application for other digital uses</li> </ul>

<sup>3</sup> <https://www.longtermplan.nhs.uk>

<sup>4</sup> <https://www.gov.uk/government/news/new-era-of-public-health-to-tackle-inequalities-and-level-up-the-uk>

	<ul style="list-style-type: none"> <li>• Third-party suppliers – Provide a platform to open up their services to a wider audience</li> </ul>
Operational	<ul style="list-style-type: none"> <li>• NHS England – Minimise the cost and effort in managing the NHS App</li> <li>• NHS England – Leverage the application to provide future NHS and Market applications through a single conduit</li> </ul>
IG and Security	<ul style="list-style-type: none"> <li>• NHS England – Secure and consistent processing of Patient Data</li> <li>• Third Parties (GP System Suppliers) – Compliance with their existing Subsidiary connection standards</li> </ul>
Privacy	<ul style="list-style-type: none"> <li>• NHS England – Legal basis for personal data processing, transparency, and fairness</li> </ul>

## 2.3 List of Issues/Scenarios to be addressed

The key scenarios for the NHS App Platform, which the Architecture must support, are outlined below:

High-Level Scenario	Architecture Implications
<p>User wants to manage a GP Appointment.</p>	<p>Assumes identity is assured and requires connectivity to backend GP systems provided by approved suppliers to retrieve and book appointments.</p>
<p>User wants to manage a Secondary Care Appointment/Booking/Referral including but not limited to:</p> <ul style="list-style-type: none"> <li>• Booking, changing, and cancelling</li> <li>• Access to relevant resources whilst waiting for care</li> <li>• View waiting times</li> <li>• Accessing letters and documents</li> <li>• Answering questionnaires</li> <li>• See notifications related to their secondary care appointments</li> </ul>	<p>Assumes identity is assured and requires connectivity to Patient Care Aggregator Service and trust portal systems. Identity proofing using NHS login.</p> <p>Driven by deep-link functionality - built using the NHS App web-integration process - to hand off to specific services to enable edit and cancel functions.</p> <p>Existing Manage Your Referral (MYR) synchronous-booking functionality re-used.</p> <p>Mixture of synchronous and asynchronous rebooking and cancelation journeys presented within Patient Engagement Portal (PEPs).</p> <p>Driven by deep-link functionality - built using the NHS App web-integration process - to hand off to specific services to enable edit and cancel functions.</p> <p>Dynamic presentation of Trust-curated documents to patients via App, based on Specialty - available within PEPs only.</p> <p>Addition of Wait Times Service(s) to Aggregator.</p> <p>API integration with <a href="#">My Planned Care</a> data set and Wait List Minimum Data Set for personalisation of content.</p> <p>Additional view of waiting lists provided in the NHS App.</p> <p>Addition of Letters and Documents Service(s) to Aggregator.</p> <p>Integration &amp; reconciliation between NHS App Letters &amp; Documents Functionality and PEP Letters &amp; Documents Functionality.</p>

	<p>Single easy-to-use view of all correspondence for patients, in one place.</p> <p>Will utilise existing deep-link functionality to link to relevant questionnaires at a point in time.</p> <p>Driven by notification functionality, avoiding Aggregator integration. Existing notification mechanisms, such as SMS or email, will act as a fallback.</p>
User wants to manage/book vaccinations.	Use NHS login Single Sign On to connect to the National Booking Service.
User wants to order and manage medication.	<p>Assumes identity is assured and requires connectivity to backend GP systems provided by approved suppliers to retrieve and order repeat prescriptions.</p> <p>Integration with the Electronic Prescription Service (EPS) Prescriptions for Patients API in order to retrieve and display prescription information and prescription barcode (digital prescription).</p>
User wants to view their patient record, downloading files or attachments which have been made available by their Health care professional.	Assumes identity is assured and requires connectivity to backend GP systems for all provided by approved suppliers to retrieve medical record.
User wants to manage their National Data Opt-out data sharing preferences.	Optimal user experience in consuming an existing service.
User wants to manage 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.
User management of NHS account and profile.	No architecture implications – currently some features are available via NHS login.
Manage linked profiles (proxy).	Managed linked profiles is a feature accessible via the NHS App but not established by the NHS App.
NHS App Service wants to enrol users in User Research to improve the functionality of the NHS App; support user needs; support clinician needs; and to understand the future service requirements.	Passing NHS login Id to 3 <sup>rd</sup> Party services contracted by NHS App, to register interest.
User wants to access a 3 <sup>rd</sup> Party NHS procured transactional service for example Online Consultation (OLC) (including video consultation) and Personal Health Record (PHR) services. As part of the consultation, the user will be able to upload documents to support the consultation. The feature	Use NHS login Single Sign On to connect to 3 <sup>rd</sup> party service.

will also publish entries into the user's calendar to support the management of appointments.	
User wants to manage their nominated pharmacy	NHS App needs to connect via HSCN to Spine.
Users who want to use the NHS App services to connect to services which provide a Health and/or a Social Care benefit.	Use NHS login for authentication to connect to 3 <sup>rd</sup> party service – the authentication mechanism can either be directly from the App, or via the Single Sign On feature.
Users who want to be notified when something in the NHS App needs their attention (NHS App Notification Service).	Native app Push Notifications to be used by the various integrated services in the NHS App to alert users when something needs their attention. The services that can send a push notification include both 3 <sup>rd</sup> party services as well as NHS App services.
Users want quick access to the various messaging services they could use to communicate with their health and care providers.	Through the IM1 interface and web integration with Patients Know Best (PKB), messaging is facilitated through the NHS App to give users a single place to find and access the messaging services their health and care providers. Access to these services will be facilitated by NHS login to enable a seamless patient experience.
Users want a single place to access the messages they receive through the NHS App and respond.	<p>NHS App Message hub, a national messaging service for people who use health and care services in England to receive communications safely and securely from their healthcare providers and other national health services. Initially available to users of the NHS App who have fully verified their identity. Onboarding of 3<sup>rd</sup> party sending services who are either a health and care provider or communication supplier (operating on the provider's behalf) to the NHS App Messaging API. Securely receive, store and present message content containing personal and clinical information from third parties.</p> <p>Enable users to reply to a message, with features such as keyword replies and free text replies.</p> <p>In order to ensure that patients receive and process information about their health and care, we need to track the delivery status of the messages</p>

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received and inform the sending services in a timely manner.

In order to help sending services determine the best way to communicate with a patient, we need to report on if a recipient of a message is using the NHS App to receives messages.

Note: The message content is effectively a black box to those building and running the service and is not used for any other processing.

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## 3 High-Level Objectives

The key spending objectives categories identified in the National Digital Channels and NHS login Programme Business Case, are as follows:

1. Drive efficiencies to the NHS – by providing information, tools and services to people digitally enabling people to self-serve, we will help to drive efficiencies.
2. Improvements in People’s Experience – by bringing everything together for people regardless of where the service is commissioned, masking the complex structure of the NHS; making it easy to interact and transact digitally; giving people greater access to their information and providing transparency and clarity.
3. Improve Health Outcomes – by providing easier digital access, greater engagement through greater transparency, more information, tools, and services and better being able to target messages to people through their channel of choice, we will improve health outcomes and respond to the prevention agenda aspirations.

The data processed by the NHS App Services will be used:

- 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.
- To make it straightforward and quick for local and regional service providers, commissioners and third parties to interact with other local, regional, and national services.
- To deliver a service with consistent quality, safety, and security and which meet the range of user needs.
- To provide secure access to systems by integrating with the Identity Verification and Authentication solution provided by **NHS login**.<sup>5</sup>
- To support commissioners and policy teams by providing anonymous statistical data which may be used to understand health issues and challenges better.
- To support strategies which may improve health outcomes for the population and reduce inequalities in health

The NHS App has identified NHS login as a dependency for delivery. The use of NHS login is required for verification and authentication to enable successful verification of patients when accessing personal services via NHS App and NHS.uk.

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

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<sup>5</sup> <https://digital.nhs.uk/about-nhs-digital/corporate-information-and-documents/directions-and-data-provision-notice/secretary-of-state-directions/nhs-login-directions-2021>

# 4 Environment and Process Models

## 4.1 Current Process Description

NHS England have set out an ambition for the NHS App to be part of a vibrant ecosystem of health digital services, playing a role in driving up digital activity not just through the app but through other digital services as well. In addition, the Long-Term Plan’s objectives state that the NHS App will create a standard online way for people to access the NHS and that the app will work seamlessly with other services at national and local levels and, where appropriate, be integrated into patient pathways.

There are various existing systems and applications available to patients to access online NHS services.

## 4.2 Future Process Description

The NHS App will act as a Digital Front Door to services via a Mobile application and NHS branded.

## 4.3 Information Flow

NHS App invokes an existing web service for the Symptom Checker and Health A-Z services, as such there is no information flow from these services to the NHS App. The information flows for the NHS login, Appointments, Prescriptions, Medical Record, Nominated Pharmacy, User Research, Data Sharing, Organ Donation, and 3<sup>rd</sup> Party Integrations are detailed below.

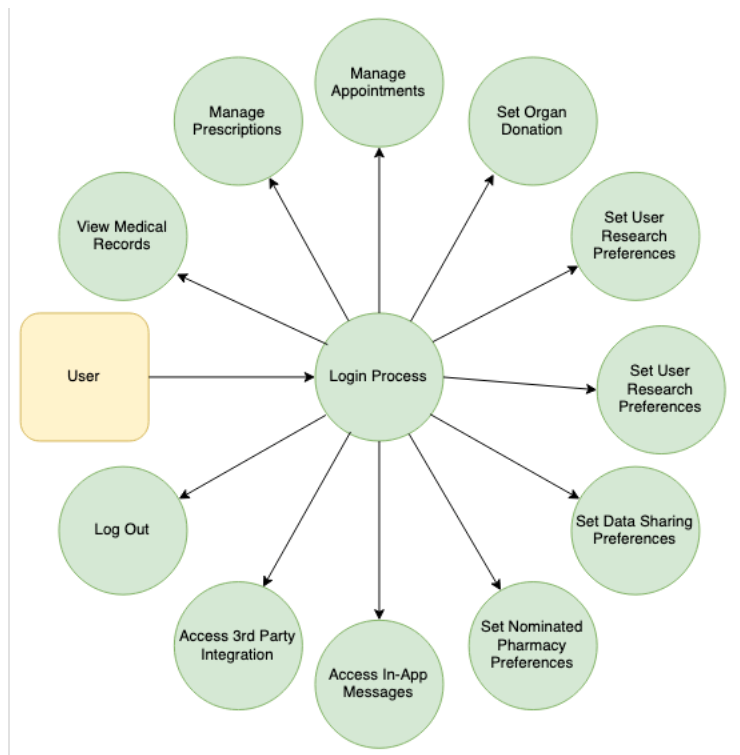


Figure 1 Overall Data Flow Diagram

### 4.3.1 NHS login

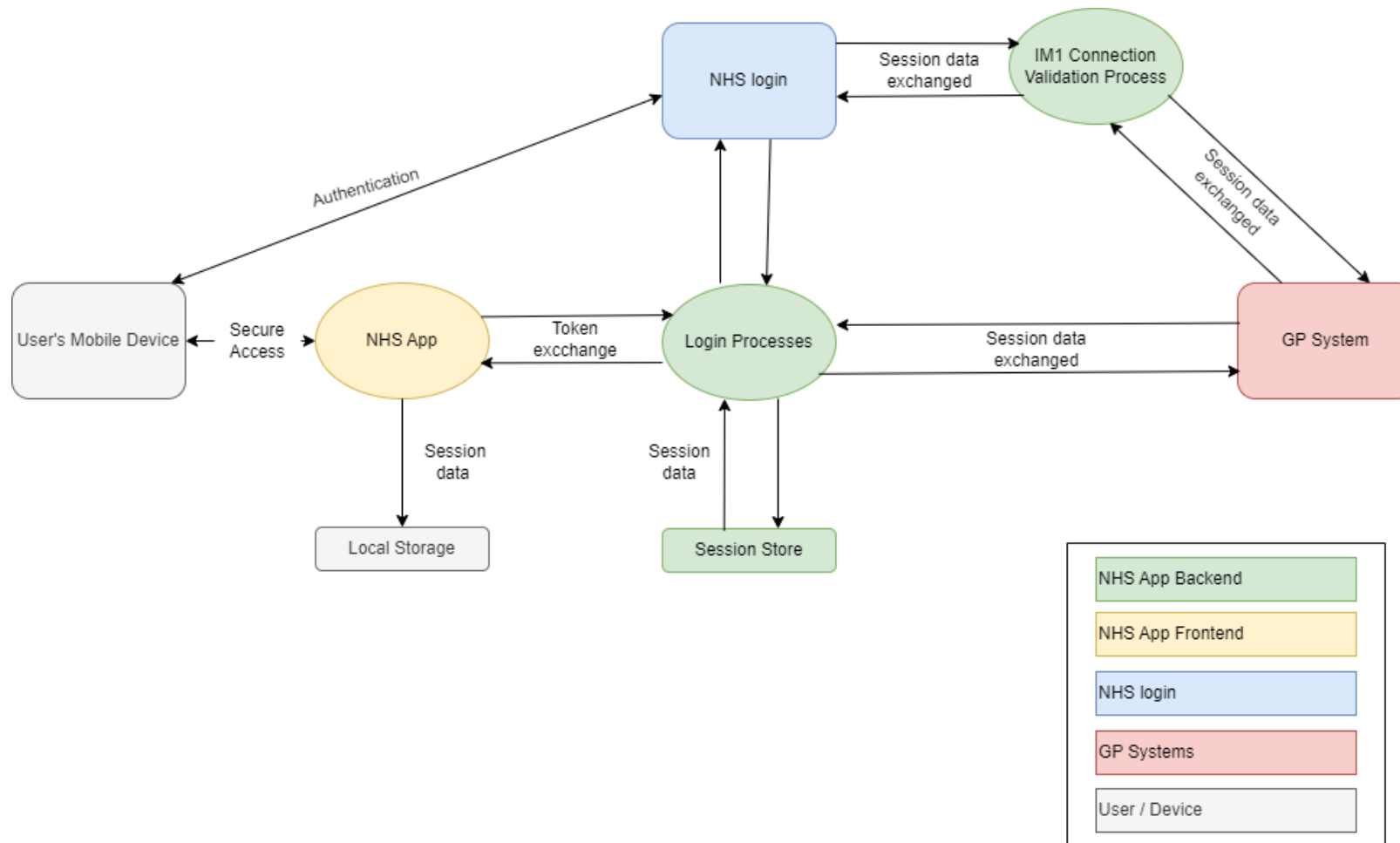


Figure 2 NHS login Data Flow Diagram

### 4.3.2 Manage Appointments

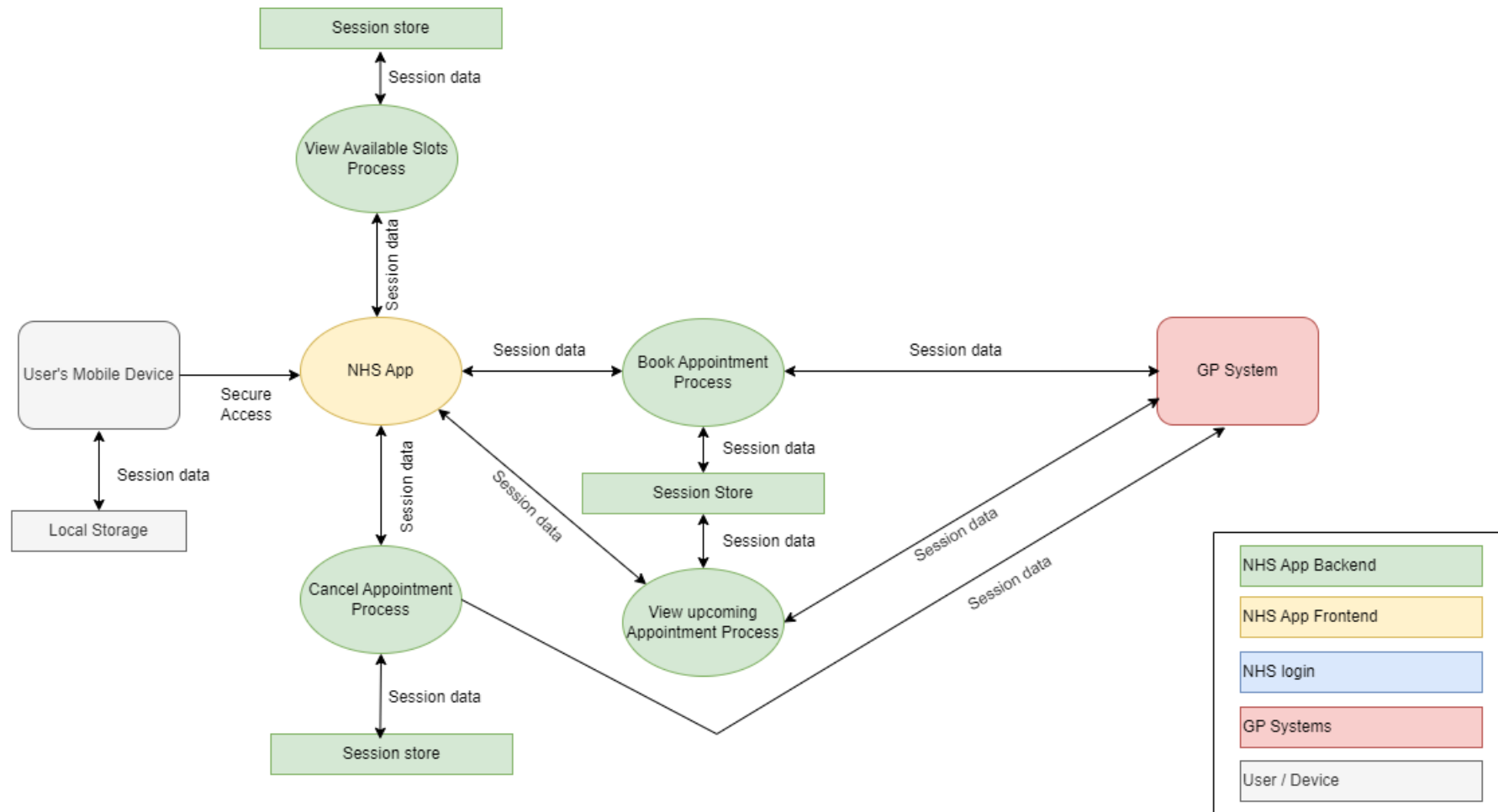


Figure 3 Manage Appointments Data Flow Diagram

### 4.3.3 Manage Prescriptions

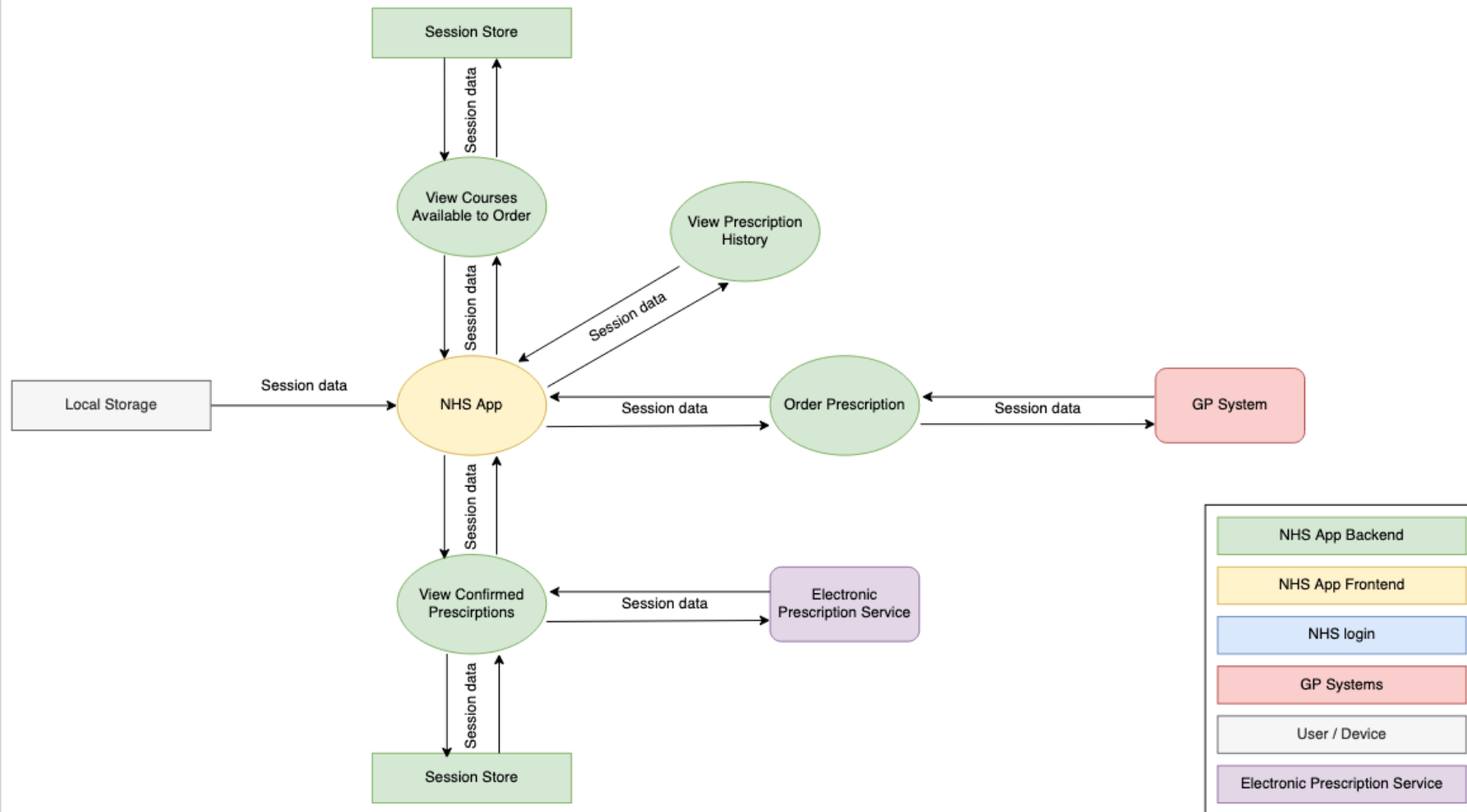


Figure 4 Manage Prescriptions Data Flow Diagram

### 4.3.4 View Medical Record

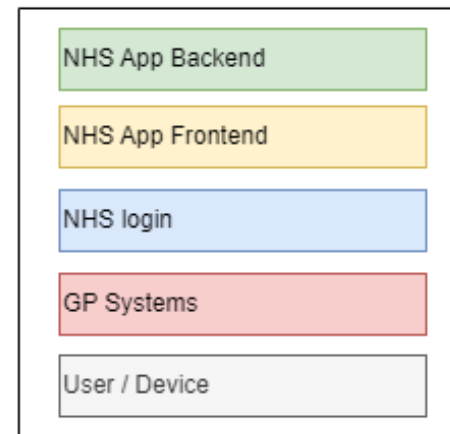
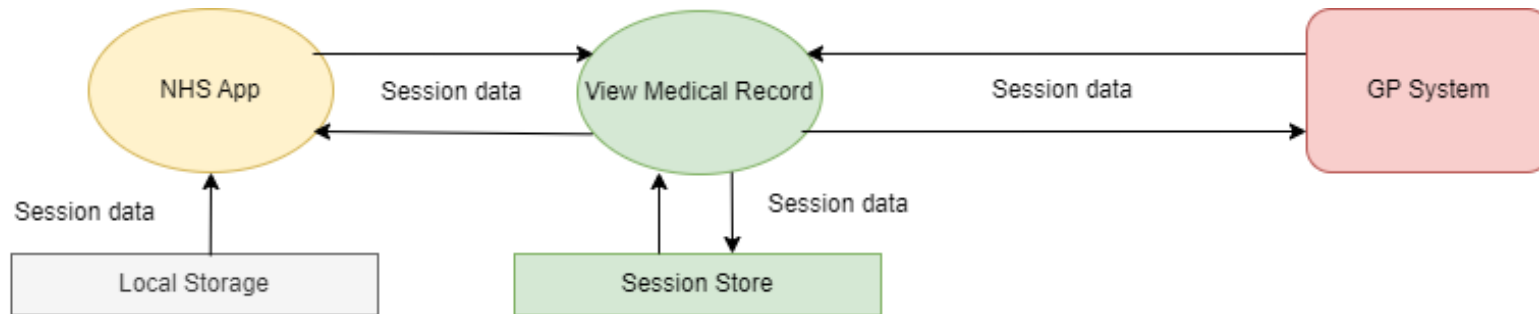


Figure 4 View Medical Record Data Flow Diagram

### 4.3.5 Manage Organ Donation Preferences

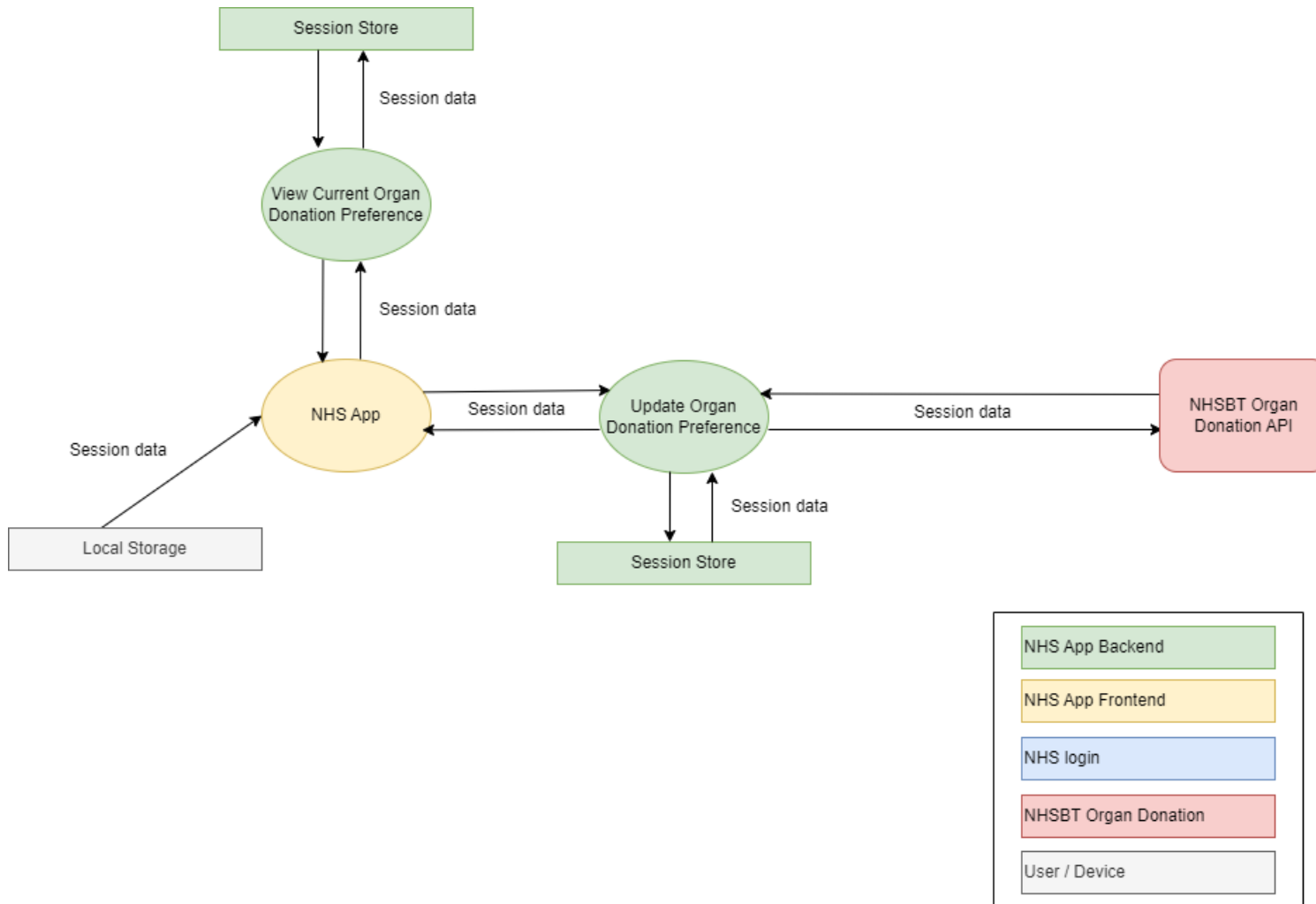


Figure 5 Manage Organ Donation Preferences Data Flow Diagram

### 4.3.6 Manage Data Sharing Preferences

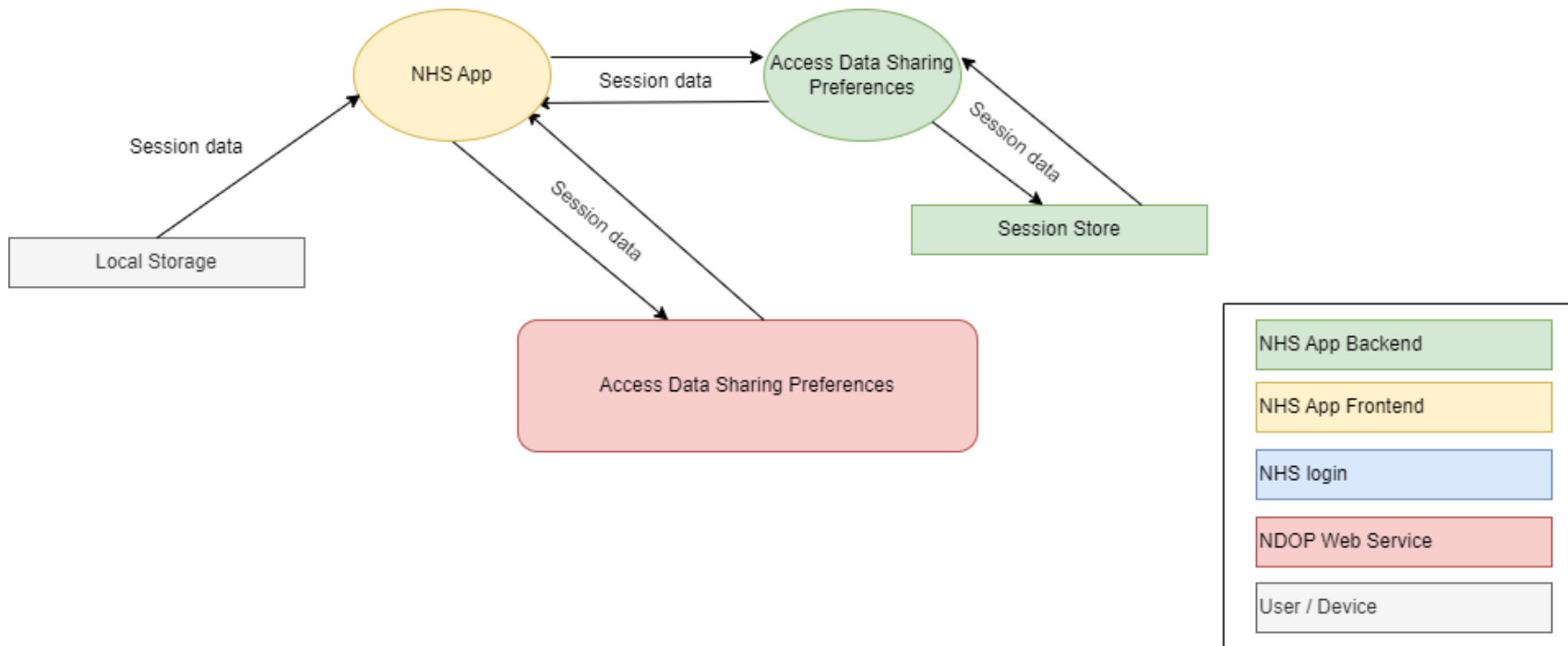


Figure 6 Manage Data Sharing Preferences Data Flow Diagram

### 4.3.7 Manage User Research Preferences

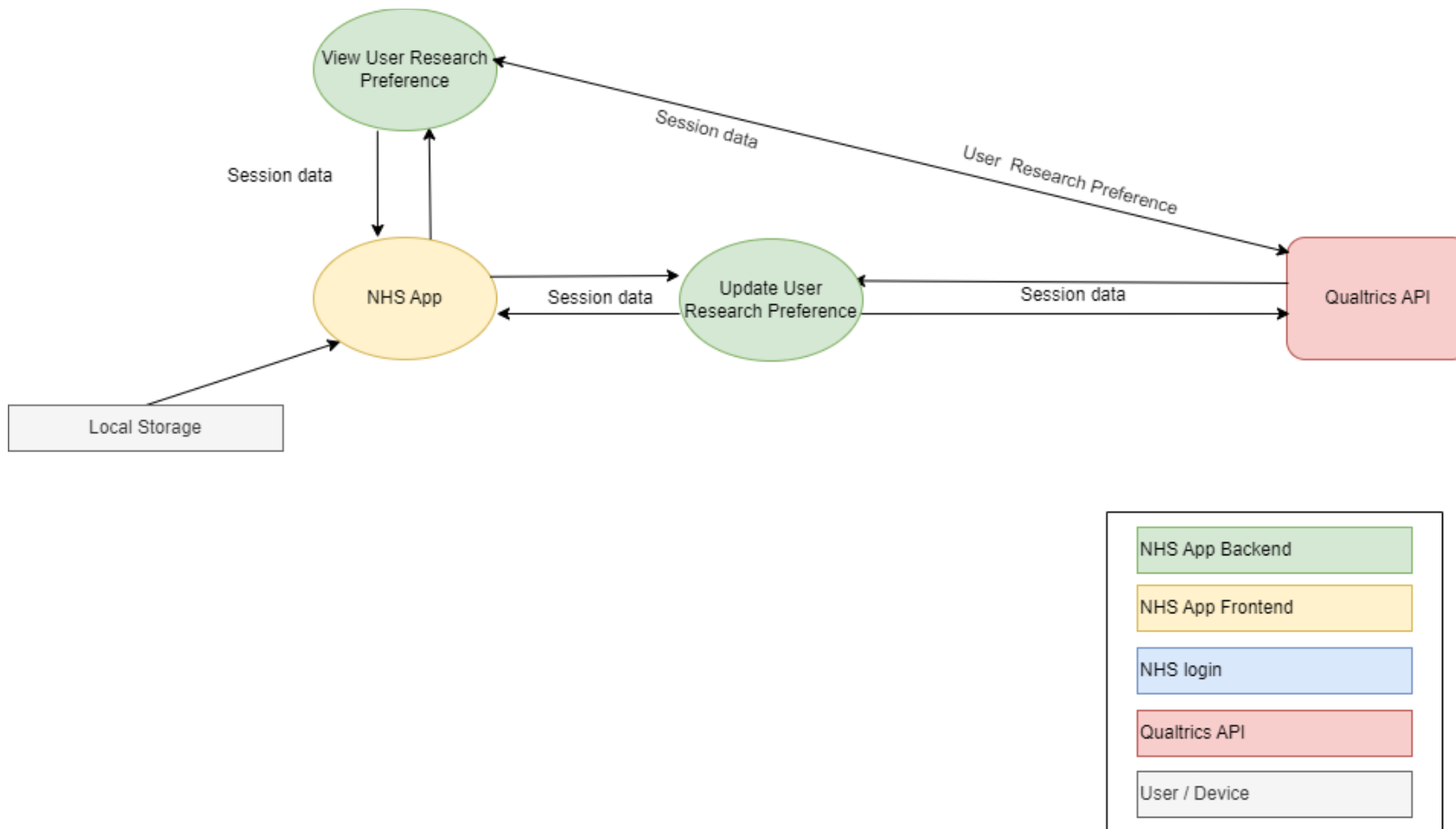


Figure 7 Manage User Research Preferences Data Flow Diagram

### 4.3.8 Manage Nominated Pharmacy Preference

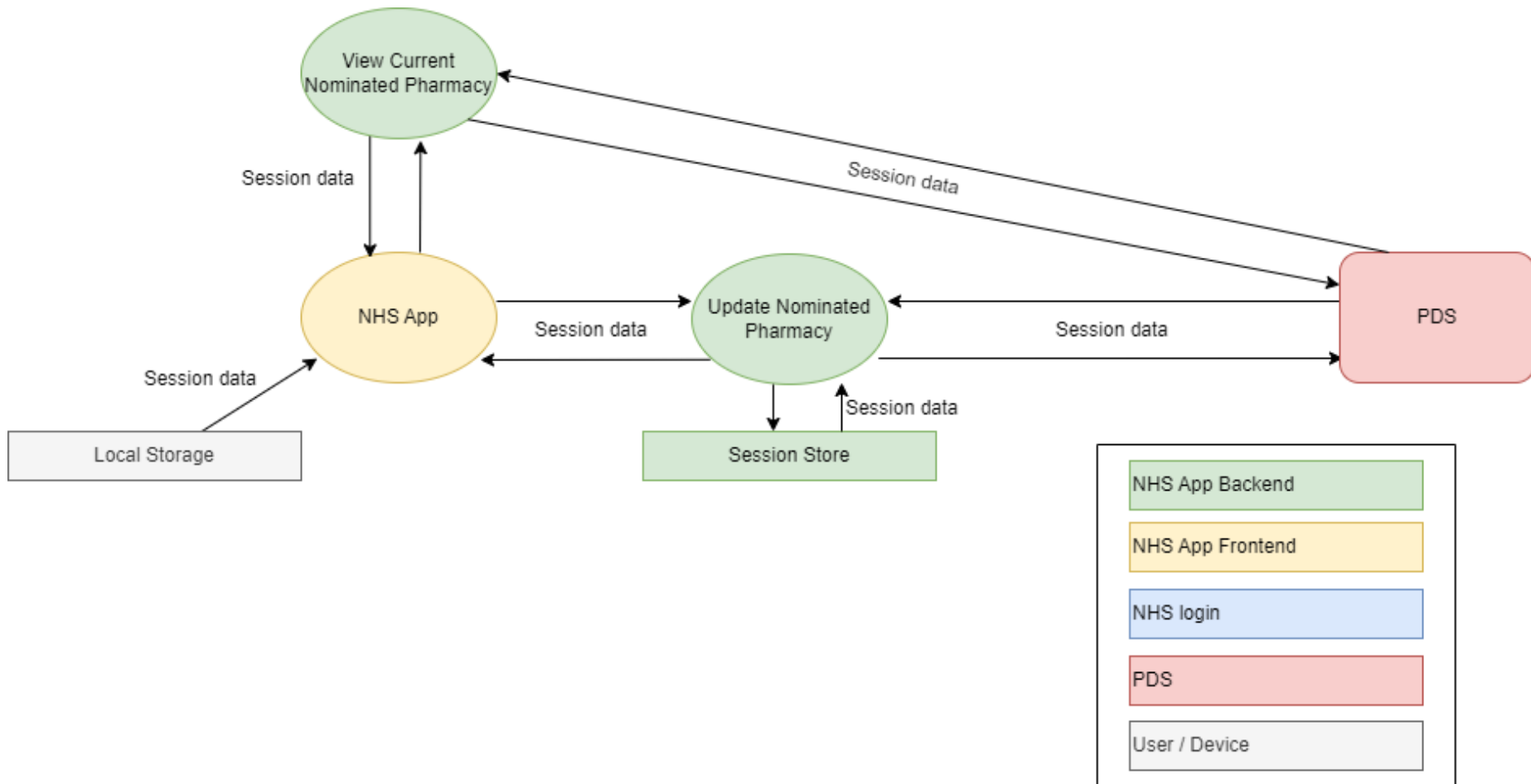


Figure 8 Manage Nominated Pharmacy Preference Data Flow Diagram

### 4.3.9 Access 3<sup>rd</sup> Party Transactional Integrations

We offer two types of integration with a 3<sup>rd</sup> Party Suppliers. API integrations or web integrations, both have a slightly different data flow, as described below.

#### 4.3.9.1 API Integration

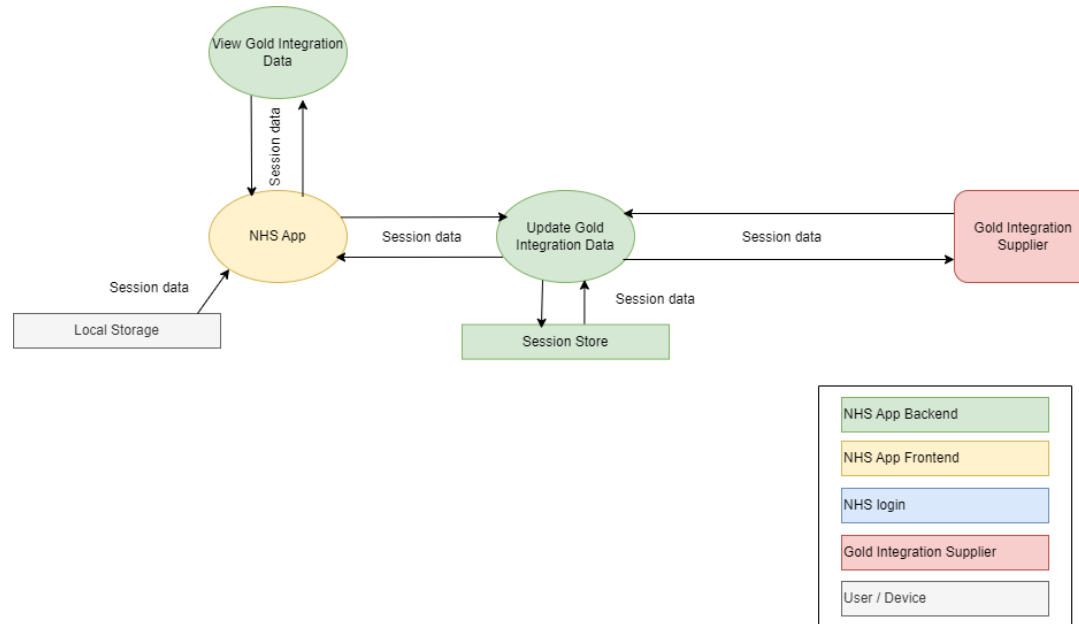


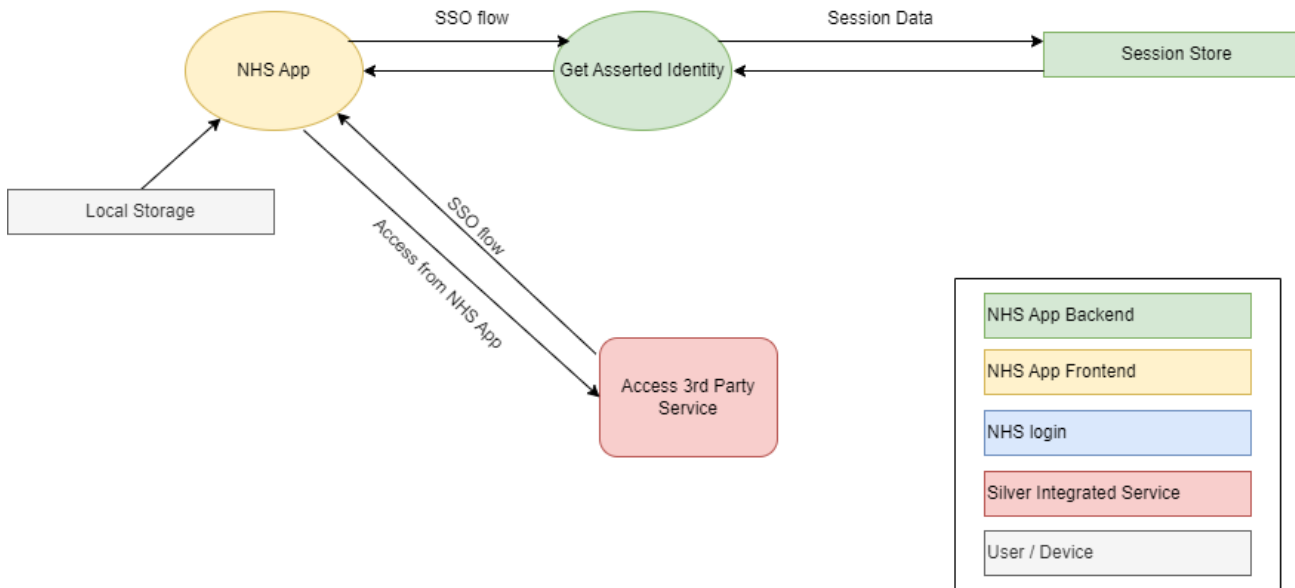
Figure 9 API Integration Pattern Data Flow Diagram

Each integration will have specific requirements about the type of information that is exchanged with the 3<sup>rd</sup> Party, however the pattern will be the same. The table below defines the Data Payloads described in the diagram for each integrated 3<sup>rd</sup> Party.

Vendor	API Integration Read Payload	API Integration Read Response Payload	API Integration Update Payload	API Integration Update Response Payload
eConsult*	N/A	N/A	NHS Number, ODS Code, Surname, DOB, Triage Answer	Triage Question

\* eConsult is currently the only API integrated third party. This table will be updated as other third parties are approved for API integration.

### 4.3.9.2 Web Integration



**Figure 10 Web Integration Data Flow Diagram**

There will be numerous suppliers that will have utilise a Web Integration with the NHS App. In these instances, the NHS App is used as a facilitator of single sign on, there are no backend-to-backend integrations. All information is passed from the client device.

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### **4.3.9.3 NHS App Messaging and NHS App Notification Services**

#### **4.3.9.3.1 NHS App Notifications**

Push notifications are available to users of the app who choose to enable them. Once enabled, users will be alerted to things that require their attention in the App; this could include new unread messages, appointments or other actions. This is how notifications are currently surfaced on mobile devices.

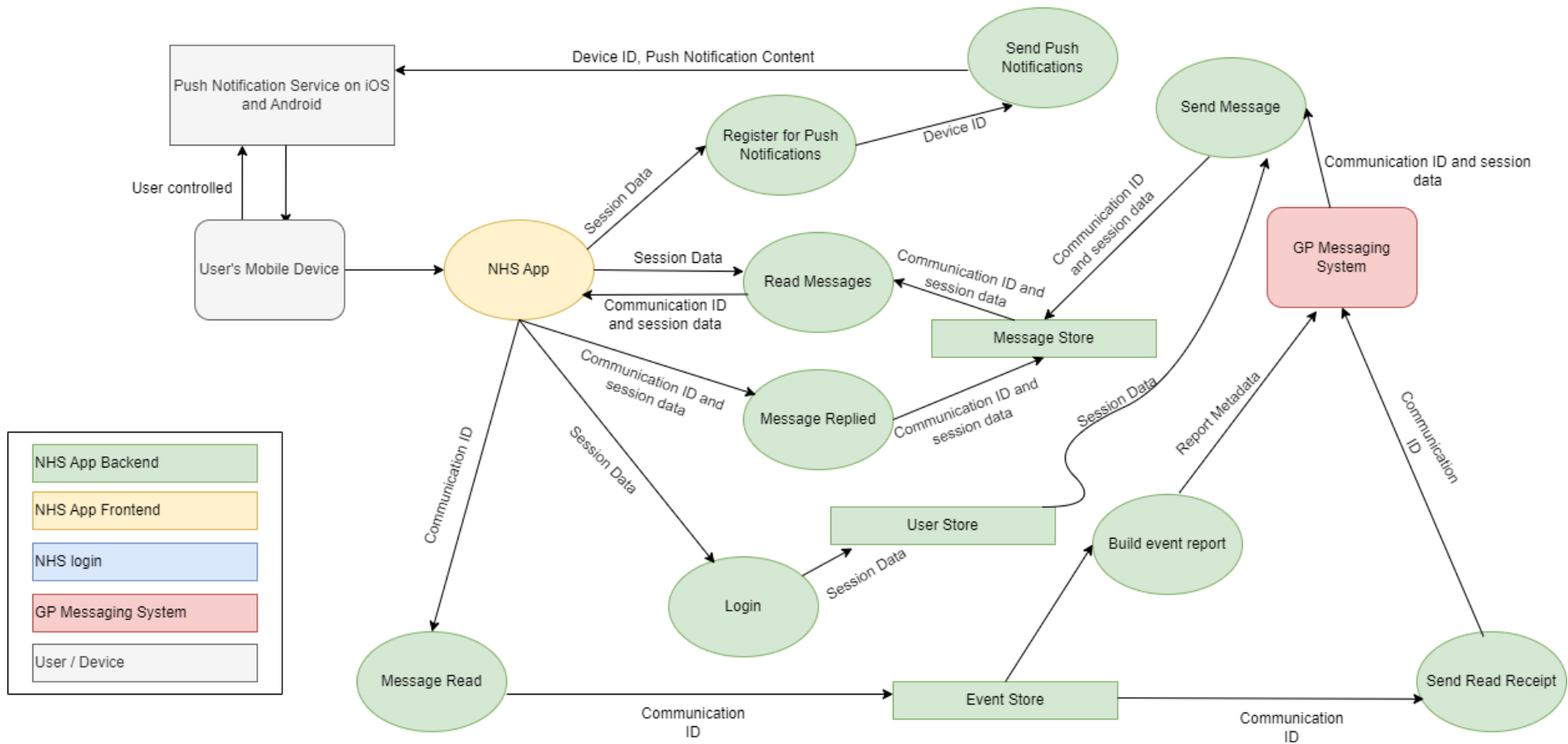
#### **4.3.9.3.2 NHS App Messaging Aggregator Feature**

The NHS App aims to help users by giving them a single place to quickly access the various messaging services that could be used as part of their care. Via the web Integration pattern, 3<sup>rd</sup> party messaging services are available in the App.

#### **4.3.9.3.3 NHS App Messaging Service**

NHS App Messaging provides users a safer and more secure way to receive their communications whilst saving the NHS money. Messages are addressed to users NHS Number, and they can access their messages via the web or native app versions of the NHS App. If the user has the native NHS App installed and is opted into notifications, then the native notification features will help them know when there are new and/or unread messages.

It is intended that over time this service all NHS commissioned health and care providers in England will be able to use this new national service to message people as part of their direct care and NHS England teams will continue to work with parties to make it available to them; this will be conducted as part of the ongoing NHS App onboarding and prioritisation process.



**Figure 12 Notifications & Messaging Data Flow diagram**



## 4.3.10 Patient Care Aggregator

### 4.3.10.1 Aggregate Appointments

Aggregation layer: The below diagram represents how the Patient Care Aggregator returns the 'read-only' list of appointments to the NHS App to present in a single coherent list.

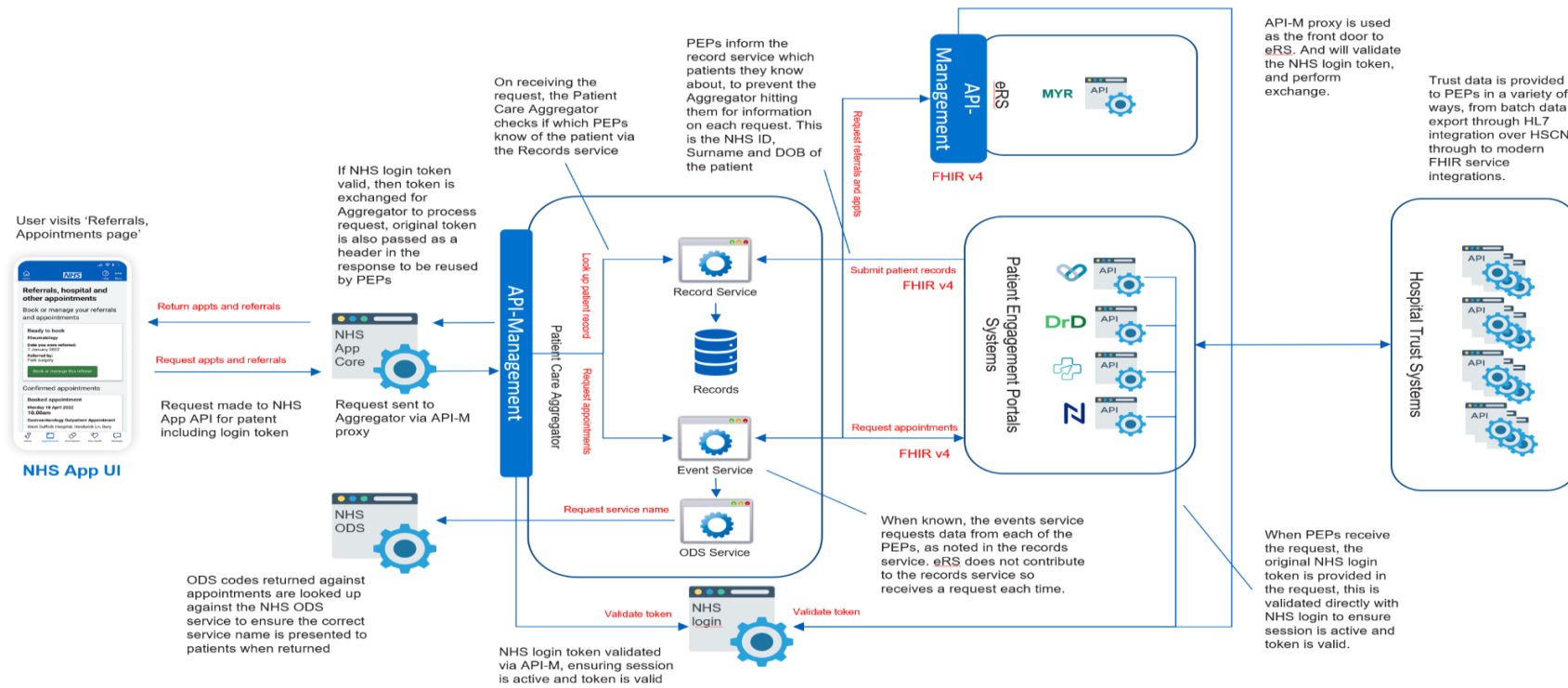


Figure 14 Patient Care Aggregator Data/Authentication Flow Diagram

### 4.3.10.2 Deep-link layer

When the aggregated list is complete, each object returned will include a URL provided by either e-RS or the PEPs. The user can paunch this URL, which provides a pass-through to either e-RS or PEP systems, where the user can interact with their appointment details. This includes amendment and cancellation of appointments and the surfacing of data such as a single point of contact at the Trust/ hospital relevant to the referral or appointment and relevant clinic documents.

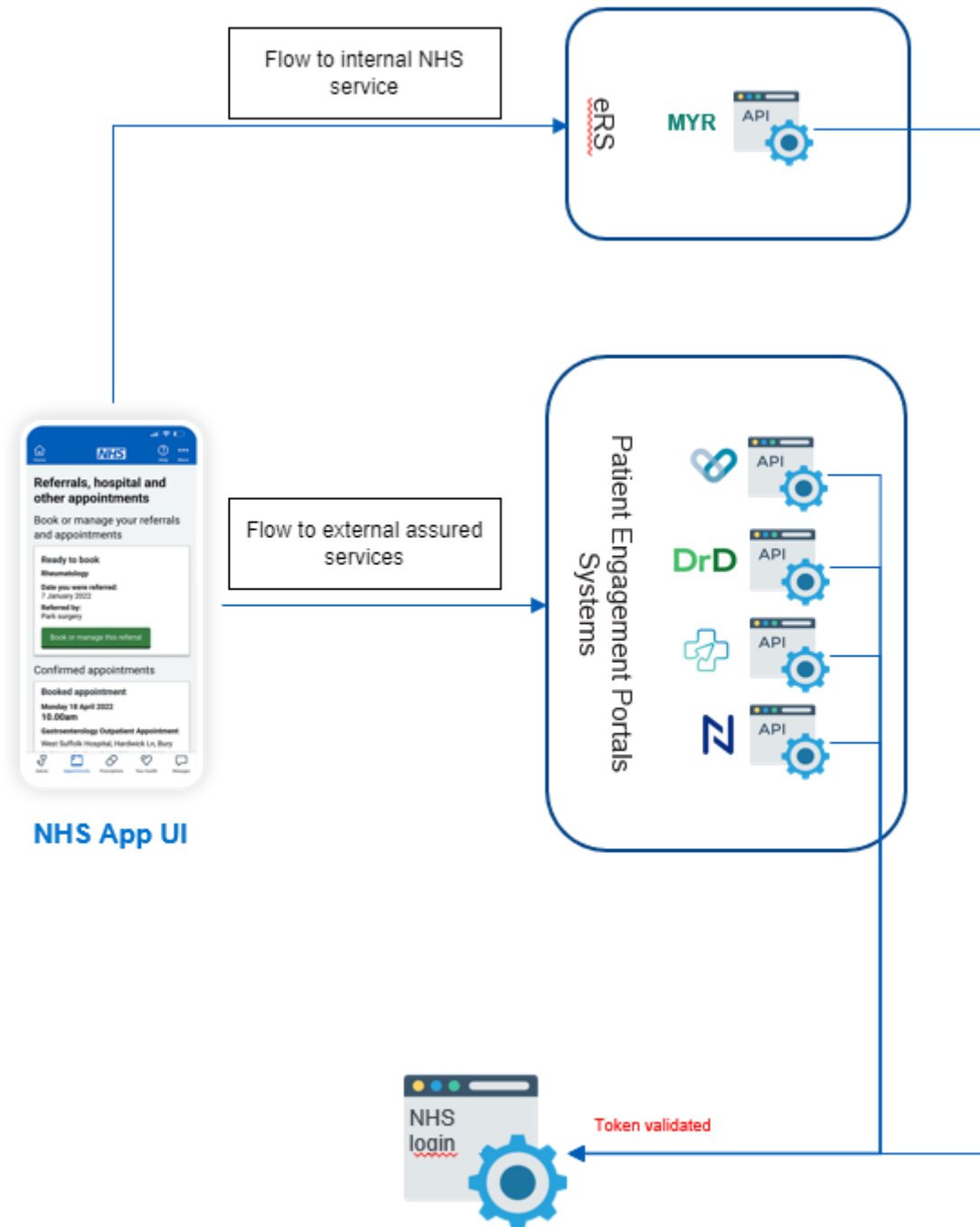


Figure 15 Patient Care Aggregator Deep Link Data Flow Diagram

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### 4.3.10.3 Access 3rd Party Integrations

The Services will use a hybrid model for integration, leveraging:

- Existing NHS England API integration patterns to aggregate appointment data from e-RS and PEP systems
- Web integration patterns, to enable user access to e-RS and PEP systems, where they will interact with their appointment details

NHS England will operate and maintain the API integrations, while e-RS, PEP systems and the Patient Care Aggregator will provide and collate the web integrations, which are then presented to users in the NHS App (owned by NHS England).

See section 4.3.9 regarding integrations

### 4.3.11 NHS App Data Approach

The NHS App is transient in nature. In most scenarios data is pulled from the 3<sup>rd</sup> Party System Supplier's databases and displayed to the App user. Some data is stored in the transient Session Cache, however data does persist within the NHS App data repositories. In summary:

- Data necessary for the application to function
- Audit data
- NHS App Messaging and NHS App Notification Services message content

#### 4.3.11.1 Patient Care Aggregator Data Approach

The Patient Care Aggregation service is operated and maintained by NHS England. It stores minimal patient data and only stores data from Patient Engagement Platforms (PEPs) while data exists for a patient within that third party system.

The Records service persists data submitted by PEPs which informs the Patient Care Aggregator that the PEP has data on a patient. This is to prevent needless and expensive calls to third-party services for each patient request, targeting only PEPs which have relevant data on the patient. The data stored is:

- NHS Number
- Surname
- Date of Birth
- PEP ID

**NB:** This data is only retrieved from those Trusts who have agreed to take part in bringing secondary care information to the NHS App.

Data is kept up to date by PEPs, and only submitted when appointment information is available. If a patient has no appointment information, then no record is persisted in the Records service and is actively removed.

e-RS does not interact with the Records service and all requests are submitted to e-RS every time - adding e-RS to the Records service could improve performance in the future, but the work is currently unplanned.

When an Events service returns a set of appointments and referrals, they are returned once to the user and not persisted, and as such, thrown away.

Data collected and stored on PEP systems is covered under existing relationships with NHS Trusts and their own DPIAs. Access to PEP systems will persist via direct login mechanisms

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but will be limited to NHS login within the NHS App experience and subject to PEP-specific Terms and Conditions.

## 4.4 Participating Organisations

For users of the NHS App, the NHS Number will be passed from NHS login to the NHS App as part of the transaction – both NHS App and NHS login are part of NHS England.

### Secondary Care Appointments:

- NHS login
- NHS App
- Patient Care Aggregator
- e-RS
- PEP Providers (on behalf of the trust)

### NHS England:

- e-RS
- NHS App both in mobile and desktop formats
- NHS login
- Servita: Patient Care Aggregator and Live Services third line support provider
- PEPs:
  - Tranche 1: Patients Know Best; Netcall; Zesty (Induction Healthcare); DrDoctor
  - Tranche 2: Healthcare Communications; GNCR/ Healthcall; Accurx

NHS Trusts who choose to take part in bringing secondary care information to the NHS App and who have integrations with one of the aforementioned PEPs.

## 4.5 The Data that will be Collected

Personal data will additionally be collected for purposes relating to the monitoring of the App's usage and resolving system problems, as follows:

Audit Data. NHS England 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. The Audit records will contain the user's NHS Number, but no other personal data or clinical information will be stored. Splunk Cloud performance monitoring software will be used to manage and monitor the platform and to send log and audit data to the Cyber Security Operations Centre (CSOC). NHS England is the Data Controller in respect of personal data processed for audit purposes.

Service Desk. The Service Desk needs to interact with the end user to resolve system problems. The Service Desk will need to collect the following personal data for this purpose (which will be stored in Service Now and Zendesk):

- First name
- Surname
- Email Address
- Telephone Number

User data will be processed in line with the processing commitments set out within the Privacy Policy.

User feedback. NHS England uses tools (such as Hotjar and Qualtrics) and enable research functionality to enable users to provide optional feedback, to inform future improvements in the App. User data will be processed in line with the processing commitments set out within the Privacy Policy.

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

Patient Care Aggregator. NHS England will not collect data in its delivery of the Services. NHS England process a combination of personal and non-personal data to the extent necessary to make available the relevant appointment information to the user through the NHS App, to meet the Purpose set out in the Direction.

The NHS App will present but will not store appointment information, which it will source from the Patient Care Aggregator.

NHS England will process but not store the following data in delivering its part of the Services:

**Personal Data:**

- NHS Number
- Surname
- Date of Birth

**Non-personal Data:**

- Referral Identifier (UBRN)
- Referring organisation (ODS Code and name)
- Referral date
- Referral status
- Referral due date
- Specialty
- Service
- Appointment Identifier
- Appointment Date
- Appointment Type/description
- Appointment consultation medium
- Appointment Status
- Appointment Requested Status
- Appointment Priority
- Appointment Location
- Appointment NHS Organisation (ODS Code and name)
- Portal URL (deep link)
- Portal identifier (e-RS, the PEP systems)

For the appointment information to be displayed in the NHS App, the following processing will take place.

Role	Role Description	Actor
<b>Patient Care Aggregator</b>	The Patient Care Aggregator is made up of 2 services: a Records Service and an Events Service. The Records Service uses NHS number, surname and date	NHS England have contracted with Servita to develop and manage the Patient Care Aggregator. NHS England is the controller for this processing.

	<p>of birth and matches in with the PEP client ID to check whether information should be sought for a given patient. This is the only data that the aggregator stores. The Events Service is then used to request appointment data from e-RS and the PEPs as and when requested by the patient via the app. If a patient never uses Wayfinder services, their data will not be pulled into the Patient Care Aggregator.</p>	
<b>NHS App</b>	<p>Present an aggregated view of all outpatient referrals and all secondary care outpatient appointments associated with the user's NHS Number. Referrals and appointments will be sourced via API integration with the NHS England Patient Care Aggregator.</p>	<p>NHS England is the controller for the data processed in the NHS App, including the NHS Login. NHS England and the Secretary of State are joint controllers in relation to presenting the appointment data in the NHS App.</p>
<b>Manage Appointments</b>	<p>Enable users to access further details about and manage their appointment using deep-link functionality, which will take users direct to the relevant PEP or e-RS.</p>	
<b>eRS</b>	<p>National e-Referrals Service, returns referral and appointment data for first outpatient appointments. Integrated with aggregator for appointment data and allows deep-links into existing Manage Your Referral functionality</p>	<p>NHS England is the controller for e-RS under the Spine Directions 2014.</p>
<b>PEPs</b>	<p>Patient Engagement Portal supplier. Returns appointment data. Allows deep-links into Portal to enable interaction from patient.</p>	<p>Each individual PEP is contracted by individual NHS Trusts. Those NHS Trusts are the controllers of the appointment data in their appointment systems.</p>

<b>AWS</b>	The Patient Care Aggregator will be stored in NHS England's instance of AWS cloud storage. NHS England manages the AWS infrastructure for the Wayfinder application but does not have direct access to the Patient Care Aggregator functionality or the data.	NHS England is the data controller for the Patient Care Aggregator. AWS is a data processor.
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## 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
<b>User</b>	Any member of the general public within England and Isle of Man
<b>NHS England Platform Teams and Operations</b>	NHS England staff operating the platform
<b>Live Service Support Engineers</b>	Third party staff in relation to the management and support of services that are connected to the NHS App. NHS England staff in relation to operating the NHS App and API Management (APIM) platform.
<b>Live Service Support Staff</b>	Third party staff in relation to handling end user queries and incidents.

### 5.2 System Actors and Roles

The tables below summarises the computer actors and roles.

Role	Role Description	Actor
<b>Digital Services</b>	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 England, other NHS and private sector organisations.
<b>GP Systems</b>	These are systems procured by GP Practices. They hold the Patient Data and manage the appointments and prescriptions functionality.	GP Systems provided via the GP IT Futures Framework (GPITF), previously GP Systems of Choice framework (GPSoc).
<b>Identity Provider</b>	Identity assurance and authentication is delegated to an Identity Provider. The Identity provider delivers claims used by the NHS App	This is NHS login in this instance.
<b>API Management (APIM)</b>	Out-of-the-box proxy service which enables consistent management of requests and NHS login integration. Undertaking the assurance and onboarding of PEPs, e-RS and NHS App access to the Patient Care Aggregator API and the EPS Prescriptions for Patients API, including preparing template conformance documentation (SCALs), collating completed conformance documentation and managing connection	NHS England

	agreements where needed (to be entered into by NHS England)	
<b>Patient Care Aggregator</b>	Aggregation service which pulls data from e-RS and PEPs, data outputs are sent to NHS App for render.	NHS England have contracted with Servita to develop and manage. The Patient Care Aggregator will be stored in the organisation's instance of AWS cloud storage. Please see section 8 for further details.
<b>e-RS</b>	National e-Referrals service, returns referral and appointment data for first outpatient appointments. Integrated with Patient Care Aggregator for appointment data and allows deep-links into existing Manage Your Referral functionality	NHS England
<b>PEPs</b>	Patient Engagement Portal supplier. Returns appointment data. Allows deep-links into Portal to enable interaction from patient.	PEP development cell
<b>Electronic Prescription Service (EPS)</b>	Electronic Prescription Service, returns confirmed prescriptions data for the patient via the Prescriptions for Patients API, to enable the patient to view their prescriptions and use the prescription barcode when collecting their medication.	NHS England

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## 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 England
- Where possible, personal data will not be stored within the system where there is a justified requirement and for only as long as required
- 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

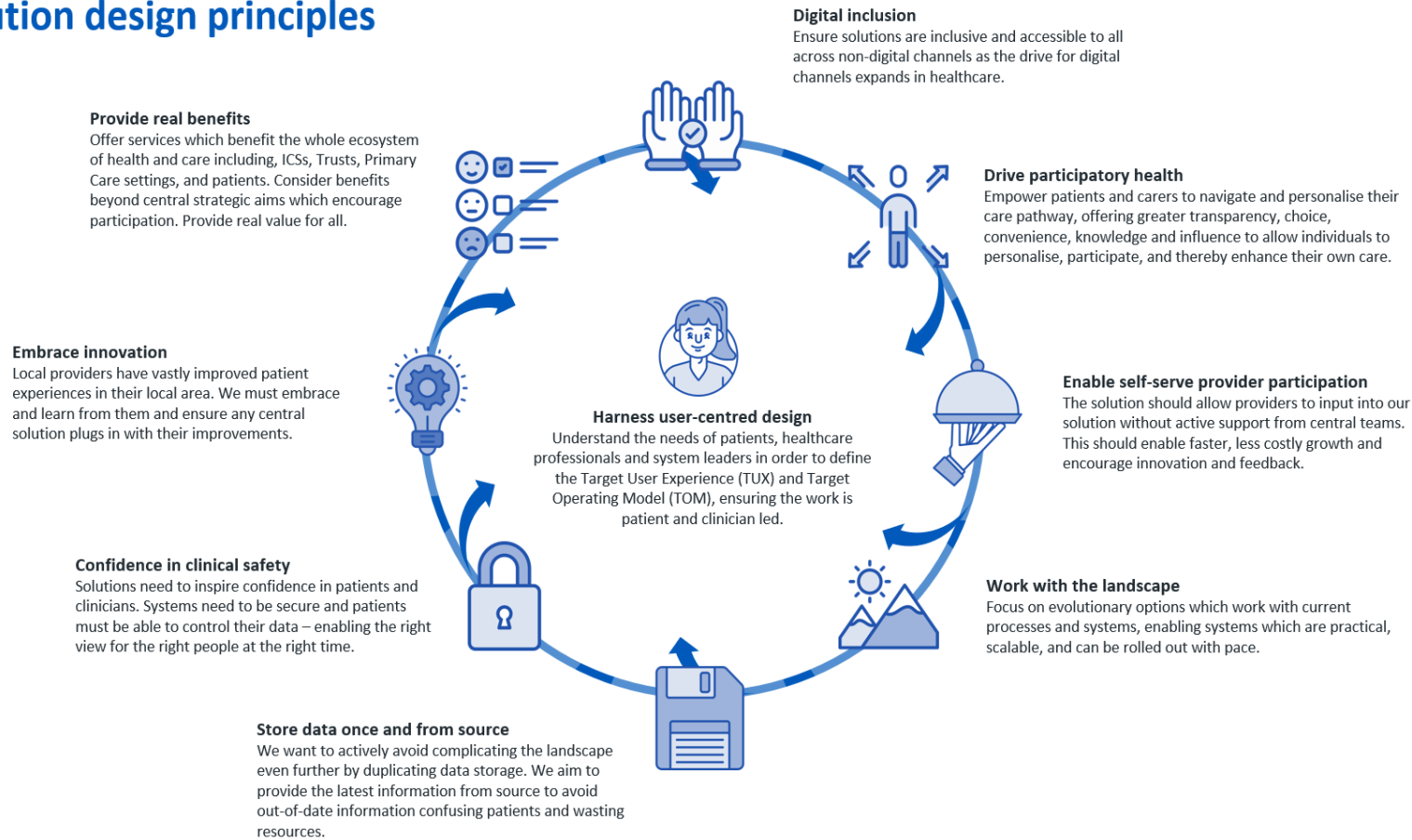
### 6.2 Requirements

NHS App will use personal information processed within the service to analyse or share data that is aggregated or anonymous with organisations within, or whose work helps, the NHS, so that the NHS can understand how an NHS account is being used. This will help with improvements to the NHS App and other NHS services. As the methods of sharing will depend on the service and organisation, the NHS App Technical Specification will not be able to illustrate every provision, however, the NHS App will ensure that the sharing of aggregated or anonymous data is done so using secure protocols and methods which have been approved by NHS England cyber security and information governance teams and in accordance with information governance procedures and controls, including where required, advice from the Advisory Group for Data.

- 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 can be added as required
- It should use NHS login 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
- Architecture should enable user activities to be collated to provide statistical data to policy teams and commissioners to support strategies to improve health outcomes for populations and reduce inequalities in health.

## 6.3 Design Principles

### Solution design principles



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>

Priority	Principle	Implications/What this means in the design
7	Platform Portability	Avoid decisions which unnecessarily lock the architecture into specific platform providers.
8	Design for Failure	Expect components to fail, especially 3 <sup>rd</sup> party systems. Ensure error handling and processing is managed well for the user.  Implement Chaos Testing as part of the deployment pipeline.

### 6.3.1 Technical Design principles

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

Alignment with wider NHS England Principles, Policies and Standards will be ensured through the NHS England governance processes. In addition, the principles included in the GDS Service Design Manual will be adopted for the NHS login Platform solution.

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## 7 Logical Architecture View

- The Native Mobile App client can be installed on iOS and Android mobile devices.
- The NHS App service serves the native client via a restful API.
- The App service provides patient access to services and information held on NHS and external supplier services through restful API integrations.
- Both the native client and the App service utilise NHS login for user Authentication and Identity proofing.
- Through web integration the native client surfaces approved national NHS services and third-party services.
- All other native client facing services are provided via the App service.
- When a logged in user, on any platform, requests their secondary care referrals or appointments, the NHS App service requests the data via an API Management (API-M) proxy.
- The API-M is managed by NHS England. Provision of this includes undertaking the assurance and onboarding of PEPs, e-RS and NHS App access to the Patient Care Aggregator and the EPS Prescription for Patients API, including preparing template conformance documentation (SCALs), collating completed conformance documentation and managing connection agreements where needed (to be entered into by NHS England)
- API-M validates the patient's NHS login token, performs token exchange and provides original token to Patient Care Aggregator (PCA) service.
- PCA checks if the patient is known to PEPs via the Record Service.
- Event Service sends synchronous requests to PEPs (where records exist in Record Service) and e-RS (every time).
- Events are collated into a coherent list and returned to NHS App service. NHS App client displays to patient.
- If patient selects an event (referral or appointment) then web integration is utilised and the patient is handed over to PEP or e-RS to manage the request. NHS login tokens are passed in the transition to be validated by PEPs or e-RS. Patients can interact with their appointment or referral in the external service.

Figure 16 shows the logical architecture view

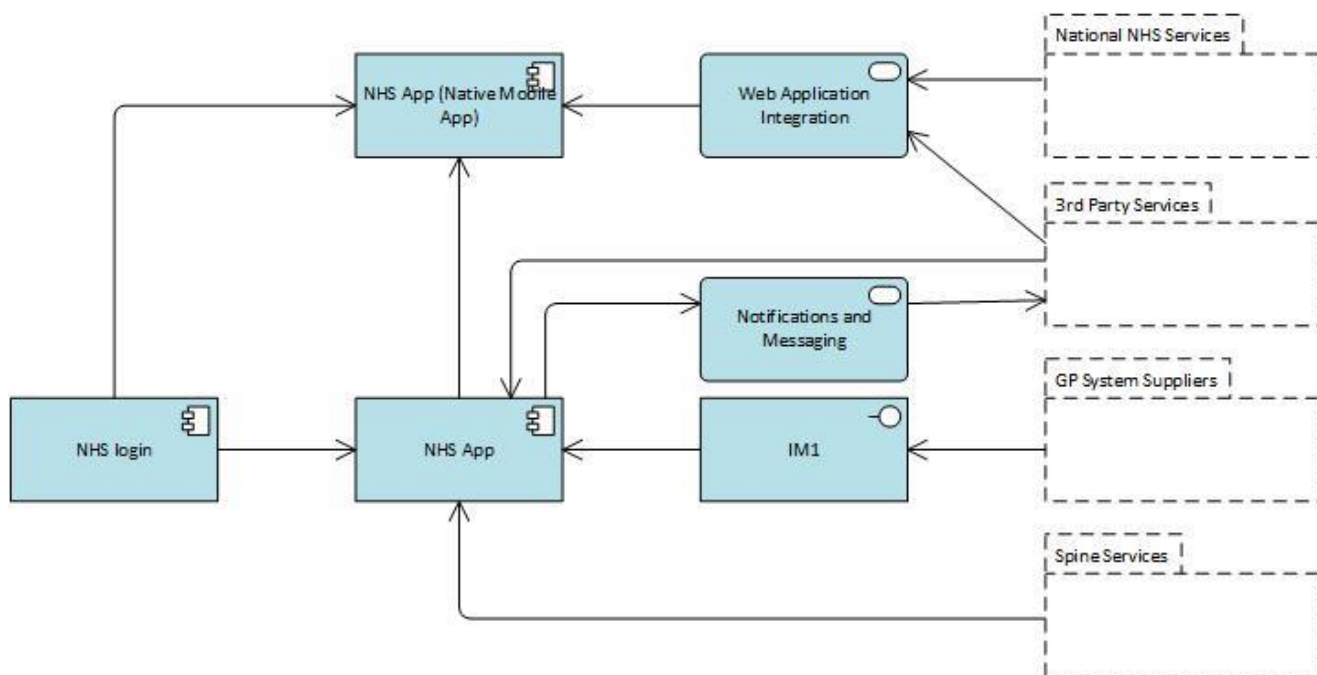


Figure 116 Logical Architecture Diagram

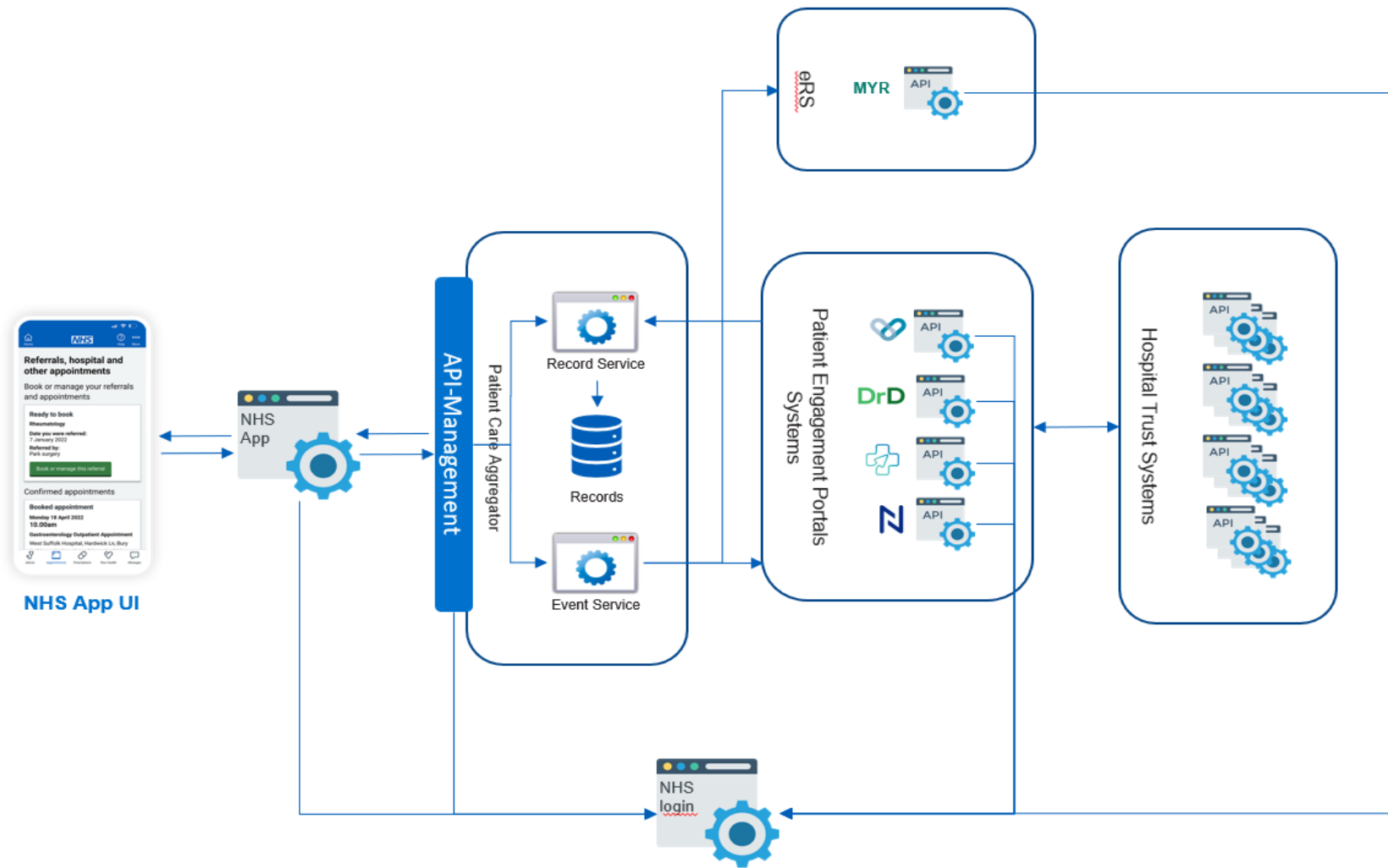


Figure 17 Patient Care Aggregator Diagram

# 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.

Figure 18 details the various technologies used to deliver this service.

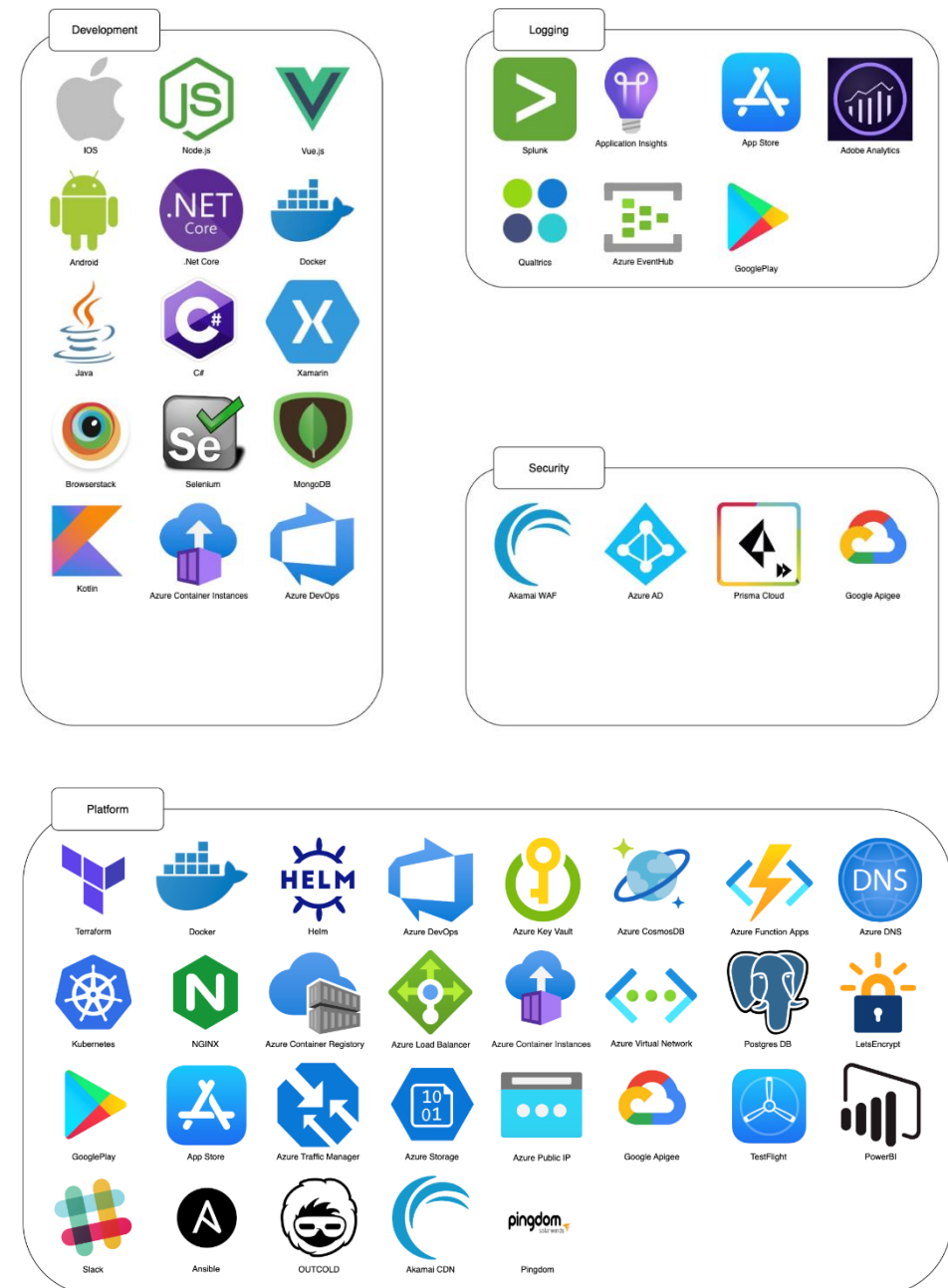


Figure 18: Current View of Technologies – this will evolve during the life of the service

## 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 service is deployed across two regions for high availability and each deployment make use of Azure Kubernetes and Azure Cosmos DB Services.

Traffic is routed via Akamai to provide Web Application Firewall security before Azure Traffic Manager load balances the requests between regions.

Figure 19 details an overview of the deployed infrastructure.

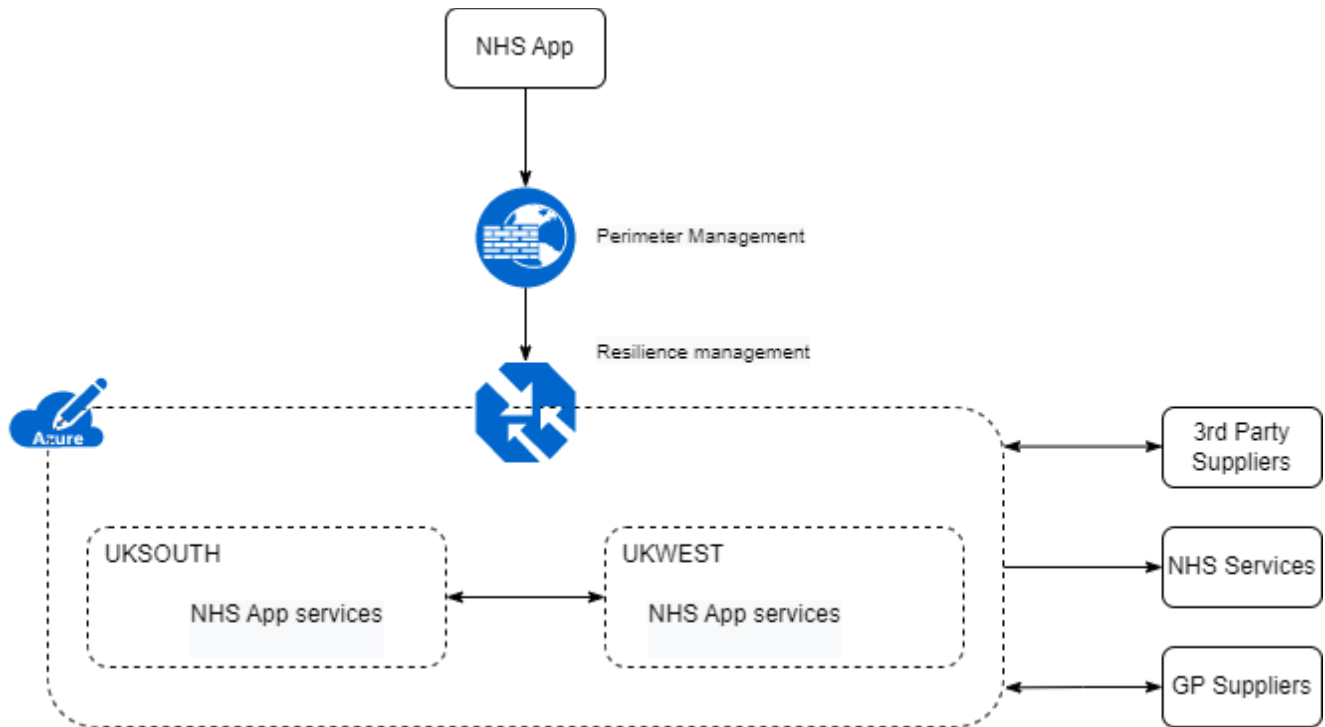


Figure 129 Infrastructure Deployment diagram

### 8.2.1 Patient Aggregator

The below diagram of the Patient Care Aggregator (PCA) architecture describes both technologies used and also the configuration of the platform deployment within Amazon Web Services (AWS). The AWS account utilised is that managed by NHS England - this provides consistency of security and centralised cost management.

NHS App is hosted in Microsoft Azure, but the PCA service is deployed in AWS. It was agreed by the NHS England Technical Reference Group (TRG) that this was acceptable given NHS App is only a consumer of the service and is not key to NHS App's core infrastructure.

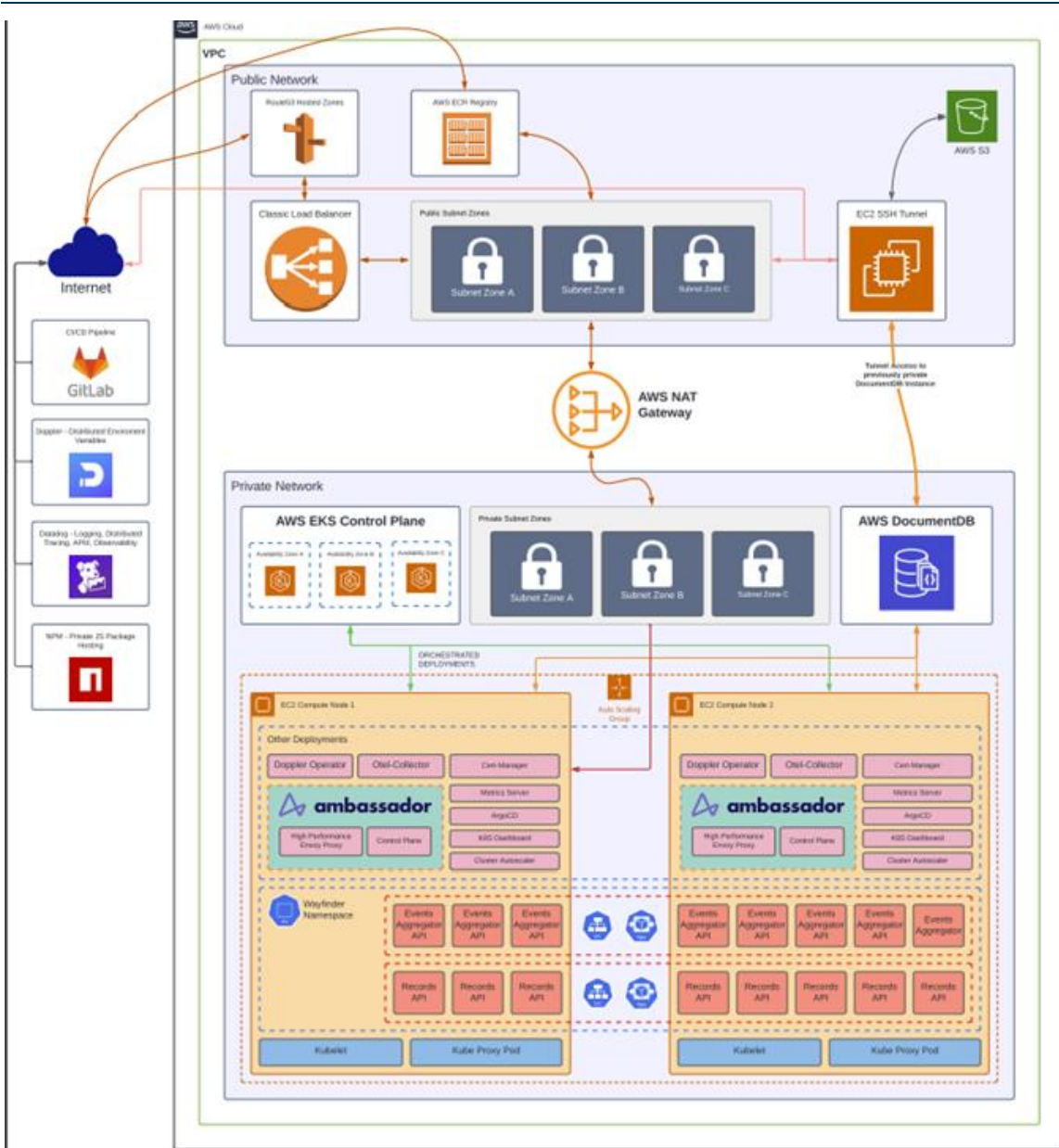


Figure 20 Patient Care Aggregator architecture diagram

**Please note:** NHS England manages the AWS infrastructure used to bring secondary care information to the NHS App. NHS England will not have direct access to the Patient Care Aggregator functionality and will not have direct access to the Patient Care Aggregator's data pre-processing.

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## 9 Enterprise Architecture Alignment

### 9.1 Architecture Governance

NHS App Key Design Decisions are reviewed by the NHS England 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 Architecture Governance Model and Architecture Principles can be found on the EA Portal.

### 9.2 Architecture Re-use

A common DevOps capability will drive the need to ensure a level of consistency between national systems from a component perspective using organisational frameworks.

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 Infrastructure Design Authority (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 NHS App, a “Key Design Decision” is recorded using an Architecture Decision Log. Part of the evaluation required in a Key Design Decision document is an evaluation of the re-use options within NHS England.

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## 10 Change control process

NHS England will manage any changes to this Specification in conjunction with, and by written agreement of an authorised officer of the Department of Health and Social Care on behalf of the Secretary of State. Where necessary, DHSC will be consulted on the changes.