Description / Context

This card covers the technical integration with the NHS Terminology Server. The goal is to enable our AI clinical agents and backend services to access official NHS clinical terminologies in real-time to ensure coding accuracy, compliance and interoperability.

The NHS Terminology Server provides access to:

- SNOMED CT UK Edition (clinical terms, conditions, symptoms, procedures, body structures)
- Dictionary of Medicines and Devices (dm+d) – used for medicine coding
- ICD-10 – for diagnostic classification and reporting

This integration will allow the system to:

- Map free text to structured codes
- Validate that structured data is correctly coded
- Ensure any coded content (conditions, observations, procedures, medications) uses the right standards

This will be a foundational service used by the FHIR Coding Agent and other related components.

Update

A system-to-system access request form has been completed and submitted to NHS England. This will provide us with programmatic access to SNOMED CT, dm+d, and ICD-10 vocabularies for internal, read-only use within our agentic workflows. Approval is pending.

Objectives

1. Set up authenticated access to the NHS Terminology Server API.
2. Enable real-time lookup and mapping for SNOMED CT, dm+d, and ICD-10 terms.
3. Build a wrapper or utility service that makes it easy to call the terminology server from other components or agents.
4. Ensure support for key operations:
    - Text-to-code search
    - Code validation
    - Retrieve full concept metadata (preferred term, description, parents/children)
5. Record provenance (i.e. the terminology source, version, and concept ID) in each FHIR resource created using these codes.

Developer Notes / Technical References

- NHS Terminology Server Overview: https://digital.nhs.uk/services/terminology-server
- API documentation (FHIR-compliant): https://termbrowser.nhs.uk/fhir

- Account setup instructions: https://digital.nhs.uk/services/terminology-server/training-guides/new-to-the-terminology-server/account-management
- Developer training guides: https://digital.nhs.uk/services/terminology-server/training-guides

Authentication & Access

- System integrations require **OAuth 2.0 Client Credentials Flow**:
  - Use settings: client_id, client_secret, token_endpoint
  - Example token endpoint: https://ontology.nhs.uk/authorisation/auth/realms/nhs-digital-terminology/protocol/openid-connect/token
- Developer user account onboarding does not automatically enable API access — **separate approval for system-to-system credentials is needed.**
- Environments supported:
  - Authoring
  - Development
  - Production (clinical)

- Use the **Production1 (sandbox/test)** edge endpoint for dev trials; **Production2** for clinical use upon approval.

Deliverables

1. A working API integration with the NHS Terminology Server
2. A helper library or service that abstracts common terminology lookup functions
3. Unit tests and documentation showing usage for:
   - SNOMED CT lookup and validation
   - dm+d medication lookups
   - ICD-10 mapping

4. Ability to pass codes and metadata into FHIR Bundles with provenance tracking
5. Integration demo or test cases used in the FHIR Coding Agent

Must also be able to export the chat with the AI to enhance the model.

🧠 Overview

We want to create a comprehensive synthetic FHIR patient record to support structured clinical workflows and reasoning agents in the digital clinic.

There are two options for generating this data:

**Use the open-source tool **Synthea

This generates realistic, population-based FHIR patient records

Can be extended or configured to simulate specific comorbidities, conditions, regions, etc.

Use the JSON schema and sample files attached to this card

Hand-crafted bundles with clinical realism

Ideal for testing specific flows, agents, or UI components

🔍 Use Cases for These Records

These records can be used for:

Simulating patient history, encounters, conditions, and meds

Testing AI agents in reasoning or triage mode

Enabling longitudinal timeline visualisation

Validating semantic and clinical interoperability (FHIR R4 compliant)

Powering prototype development across:

Care planning

Triage

Chat + voice interfaces

Condition/medication prediction

Alerts and summarisation

📘 FHIR Background

FHIR (Fast Healthcare Interoperability Resources) is the global standard for healthcare data exchange.

A patient record is made up of individual resources like:

Patient, Condition, Procedure, Observation, MedicationRequest, Encounter, CarePlan

These are grouped inside a Bundle — the equivalent of a complete digital patient file.

🧠 About the Clinical Terminologies

FHIR allows us to add clinical codes to every record. This ensures that machines can interpret medical meaning — not just humans reading labels.

🔷 SNOMED CT

A global clinical ontology used to code diagnoses, conditions, symptoms, procedures, body parts, and findings

It’s a semantic graph, not a list

Enables structured reasoning like:

“Show me all respiratory disorders” or “Group by cardiovascular risk factors”

Example

{

"system": "http://snomed.info/sct ",

"code": "38341003",

"display": "Hypertensive disorder, systemic arterial (disorder)"

}

🧪 LOINC

Logical Observation Identifiers Names and Codes

Used to encode lab tests and clinical measurements (e.g. HbA1c, blood pressure, COVID PCR)

{

"system": "Home – LOINC ",

"code": "4548-4",

"display": "Hemoglobin A1c/Hemoglobin.total in Blood"

}

💊 dm+d (UK)

The Dictionary of Medicines and Devices is the NHS/UK standard for encoding prescribed medications (e.g. metformin, paracetamol)

📎 What's Included in the Attachment

File: full_patient_bundle_v2_complete.json

This is a FHIR R4 Bundle representing a single patient (John Doe) with the following:

🧬 Longitudinal Medical Record (Historical)

Demographics: Patient, Practitioner, Organisation

Past Medical History: Hypertension, Type 2 Diabetes

Past Surgical History: Appendectomy

Current Medications: Metformin

Family History: Father with Type 2 Diabetes

Social History: Current smoker

Allergies: Penicillin

Observations: Blood Pressure, HbA1c

🩺 Current Encounter (New Visit)

Encounter: Outpatient visit for fever, cough

Review of Systems: Fever, sore throat, dry cough

Condition: Suspected upper respiratory tract infection

Care Plan: Chronic disease management

👨‍💻 Developer Instructions

You can:

Use this FHIR bundle to simulate real EMR data

Load it into a FHIR viewer (e.g. Simplifier, Aidbox, Firely)

Build test pipelines for clinical agents, prompts, APIs, or UI timelines

Extend this bundle with additional FHIR resources

Generate new records using Synthea if needed