



GS1 standards and openEHR – making a difference to patient care

Dr Paul Miller

Clinical lead, NES Technology Service;
Co-chair, OpenEHR clinical programme board



#bettercarecostsless



GS1 and openEHR:

Making a difference to patient care

- Dr Paul Miller
Clinical Lead, NHS Education for Scotland
Co-chair openEHR Clinical Program Board



About me



National Digital Platform

First proposed in the Scottish Government's Digital Health & Care strategy 2018, the National Digital Platform (NDP) aims to support delivery of software in both health and social care through development of reusable, generic services.

Services

- NDP Demographics Service
- NDP Integration Service
- NDP Data Storage Service
- NDP Core Data Service
- NDP Workforce Identity and Access Management
- NDP Developer Platform
- NDP Cloud Platform

Capability

- Product Management
- Delivery Management
- Service Ownership
- Software Engineering
- Testing
- Information Governance & Security
- Clinical Informatics

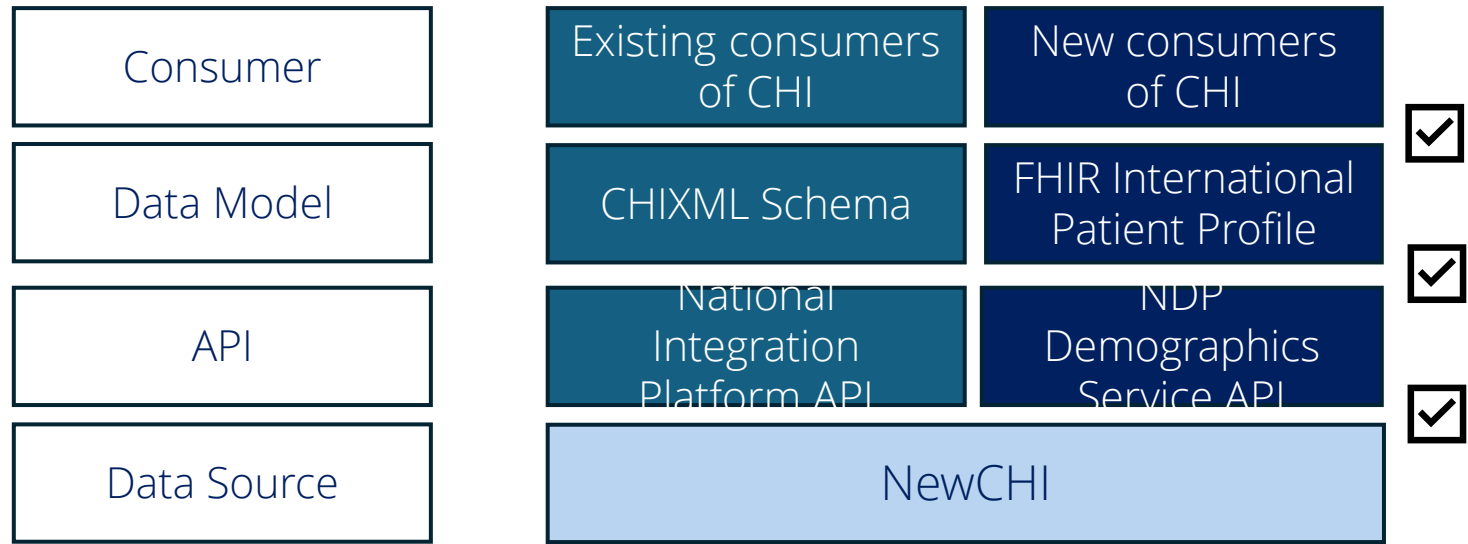
New applications

Information Platform

Existing Systems and Data Sources

NDP Demographics Service

Live



Impact

NewCHI will be able to onboard new consumers via a modern standards-based FHIR interface

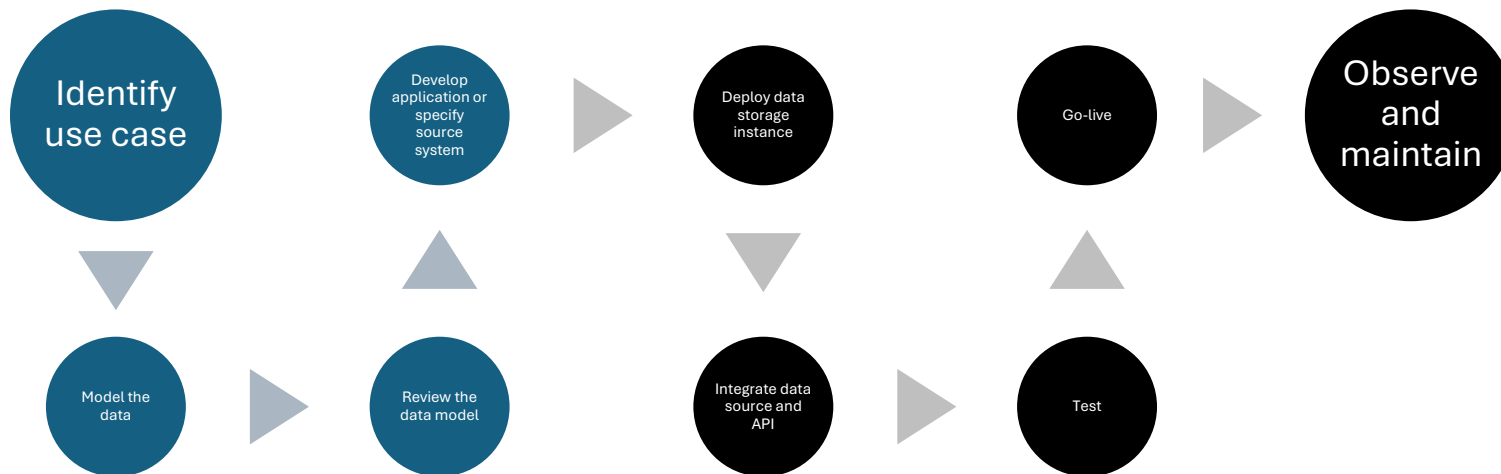
Programmes supported

NewCHI
Scan for Safety

Social Care use case: Enabling use of CHI in local government

NDP Data Storage Service

Live



Impact

A new standard for data storage needs will have been created to enable future programmes, paving the way toward semantic interoperability of data at scale.

Programmes Supported

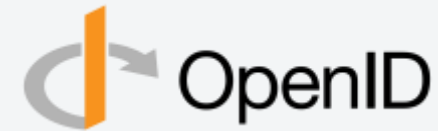
- Scan for Safety Medical Devices Data Hub
- ANIA Digital Dermatology
- SVIP Vaccinations
- ReSPECT

Vaccinations Data is integrated with SEER for Reporting and Analytics.
A strategic, reusable integration is now being explored for MDDH

Open Standards

Make things open, it makes things better

- Interoperability (FHIR)
- Persistence (OpenEHR)
- Authorisation and Authentication (OIDC)
- Medical Terminology (SNOMED CT)





Scan for Safety

Scan for Safety is the term used to cover the programme activity to implement Point of Care scanning alongside the adoption of national standards and is primarily focussed on high risk implantable medical devices in acute care settings.

What is the Scan for Safety?

NHSScotland Scan for Safety is a national programme funded by the Scottish Government to implement the scanning of high-risk implantable devices using barcode scanning technology alongside the adoption of national standards for the data being captured. It will improve patient safety via data capture at the point of care, helping to accelerate the traceability of class III and IIb medical devices.



Inventory Management
System



Point of Care Scanning



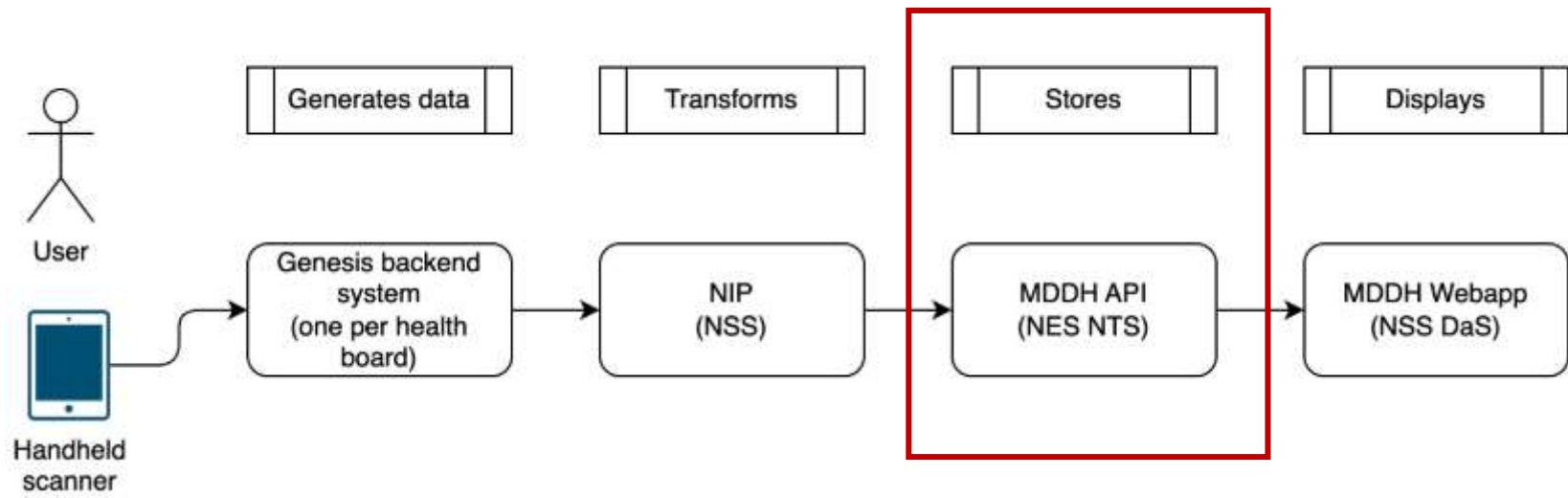
Medical Devices Data
Hub

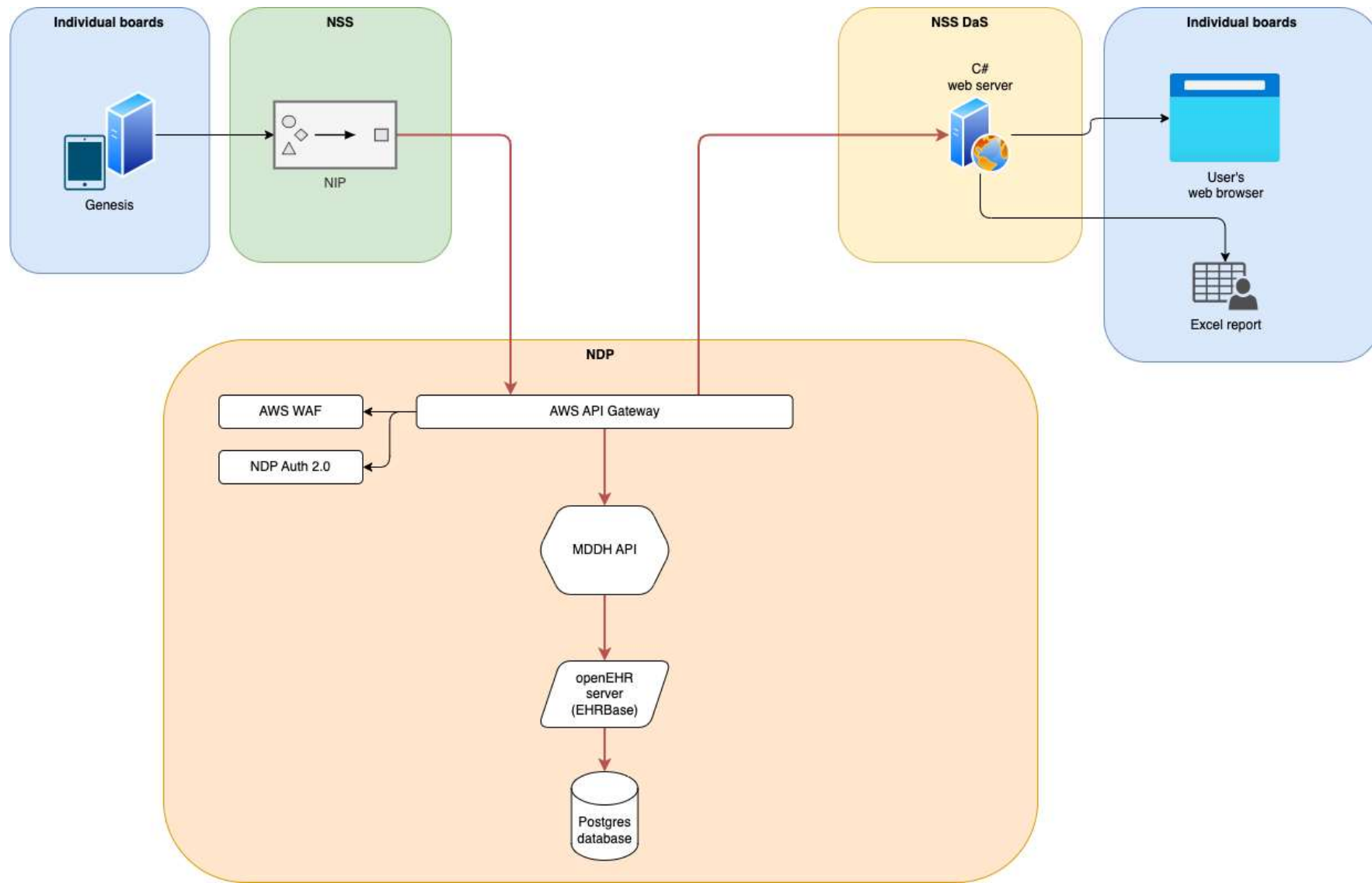
The Medical Devices Data Hub (MDDH) will link key clinical patient data, to information around the medical devices used in their care. This will enable rapid national traceability of patients who have received specific devices, as well as provide a timely electronic record for patients about devices used during their procedure.

MDDH will launch in 2025, and will be available to any boards who have implemented Point of Care.



Data and Analytics





Why openEHR?



openEHR is a non-profit organisation that publishes technical standards for an EHR platform, along with domain-developed clinical models to define content. The principal architectural concepts include the **lifelong, patient-centric shared health record, future-proof data** and **clinical process support**.



Joint Initiative Council

Joint Initiative Council for Global Health Informatics Standardization

The **Joint Initiative Council for Global Health Informatics Standardization (JIC)** is formed to further the important role of health informatics standards to:

- » Enable interoperability of information and processes across health domains;
- » Support the timely, efficient delivery of safe, coordinated, accountable, high-quality health services to individuals, communities and populations;
- » Facilitate effective global markets for health information systems.

The Future of IPS as a Global Public Good.



- openEHR is:
 - A technology for e-health, consisting of:
 - Open specifications
 - Clinical models
 - Software
 - Which can be used to:
 - Create standards
 - Build information &
 - Interoperability solutions

- openEHR is **NOT**:
 - A Software package
 - An app
 - A Database
 - A Messaging technology
 - A Terminology
 - A Platform
 - A User interface

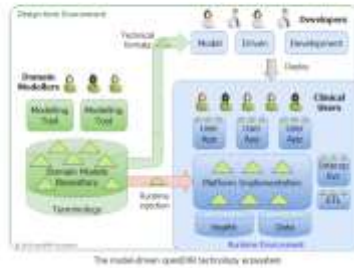
<https://medium.com/@paulagmiller/where-can-i-download-openehr-exe-d697fc2e6e3e>

openEHR Specifications

for an interoperable healthcare information platform

openEHR is the name of a technology, consisting of open specifications, clinical models and software that can be used to create standards, and build information and interoperability solutions for healthcare. It is **completely model-driven**, and separates domain semantics out from software, into **models created by domain professionals**.

The openEHR specifications consist of information models for healthcare data, including the DHR (how to record clinical observations?) and Demographics (names, roles and relationships), a portable Query Language (SQL), the Archetype formalism (adopted by ISO 15936-2:2011) for expressing domain content, the CDS Guidelines and Care Pathways, and an open API specification.



The screenshot shows the openEHR website's 'Community' page. It features a navigation menu on the left with categories like 'openEHR news', 'Community', 'Participate', 'API', 'Archetypes', and 'Demographics'. The main content area includes a 'New to openEHR?' section with a link to a guide, an 'openEHR news' section with a link to 'Announcements from openEHR international', and a 'Community' section with a link to 'Meet from the community, including...'. There is also a section for 'openEHR affiliates'.

Community

The screenshot shows the openEHR Clinical Knowledge Manager interface. It displays a 'Respiratory effort' archetype with a table of observations. The table has columns for 'Results', 'Attributes', 'Data', 'Protocols', 'Events', and 'Reference Model'. The 'Data' column shows the observation text, and the 'Reference Model' column shows the corresponding LOINC codes and their descriptions.

Results	Attributes	Data	Protocols	Events	Reference Model
Respiratory effort	Observation	Observation of the infant's respiratory effort.			0: Absent [No effort to breathe.] (LOINC: LA6725-7) 1: Weak or irregular [Some effort to breathe, moving blood.] (LOINC: LA6726-8) 2: Normal [Breathing normally or more.] (LOINC: LA6727-9)
Heart rate	Observation	Recording of the infant's heart rate.			0: Absent [No heart beat to hear, felt or heard.] (LOINC: LA6728-0) 1: < 100 beats per minute [Heart rate less than 100 beats per minute.] (LOINC: LA6729-1) 2: 200 beats per minute [Heart rate greater than or equal to 200 beats per minute.] (LOINC: LA6730-2)

Models

Specifications

Specifications

<https://specifications.openehr.org/>

<https://specifications.openehr.org/releases/UML/development/index.html>

openEHR specifications Open industry specifications, models and software for e-health

Home • Specifications • Community • Governance •

openEHR Specifications

for an interoperable healthcare information platform

'openEHR' is the name of a technology, consisting of open specifications, clinical models and software that can be used to create standards, and build information and interoperability solutions for healthcare. It is **completely model-driven**, and separates domain semantics out from software, into **models created by domain professionals**.

The openEHR specifications consist of information models for healthcare data, including the EHR (how to record clinical observations?) and Demographics (parties, roles and relationships), a portable Query Language (AQL), the Archetype formalism (adopted by ISO 13606-2:2019) for expressing domain content, the CDS Guidelines and Care Pathways, and an open API specification.

[openEHR Primer](#)

The model-driven openEHR technology ecosystem

What should I read first?

If **you are a developer** and want to get to work right away, we recommend the following:

- skim the [Architecture Overview](#),
- browse through the [global UML site](#) or [class index](#),
- make the [Implementation Technologies \(ITS\)](#) page or the [REST API](#) your home.

If **you are an architect** or just **want to understand the platform** architecture properly, we recommend reading/skimming the following guides:

Community

<https://discourse.openehr.org/>

The screenshot shows the openEHR community forum interface. At the top, the openEHR logo is on the left, and navigation links for CKM, Website, and Specifications are on the right. A search icon and a user profile icon with a notification badge are also present. Below the header, there are navigation tabs for 'categories', 'tags', and 'Categories', along with filters for 'Latest', 'Unread (11)', 'Bookmarks', 'Top', and 'Board'. A '+ New Topic' button is located on the far right. The main content area is divided into several sections, each with a category name, a topic count, and a 'Latest' post. The sections include: 'New to openEHR?' (43 topics), 'openEHR news' (79 topics), 'Community' (105 topics), 'openEHR affiliates' (83 topics), 'Regional communities' (1 topic), and 'Tool Support' (136 topics). Each section provides a brief description and a list of sub-categories or tags. On the right side of the forum, a list of recent posts is displayed, each with a user profile picture, the post title, the number of replies, and the time since posted.

Category	Topics	Latest
New to openEHR? Just starting in openEHR? Ask questions here! Some useful RESOURCES: ■ openEHR & standards ■ Resources	43	EHRbase Delete Composition - 403 Forbidden ■ Platforms 1 42m
openEHR news Announcements from openEHR International ■ openEHR days ■ Affiliates ■ Elections ■ Releases	79	Roles and competencies in an openEHR environment ■ ■ Education: education, professional-roles 0 2h
Community News from the community, including: ■ Releases ■ Procurements ■ Confs & Events 2 unread ■ News 1 unread ■ Covid-19 ■ EU Health Data Space	105 1 unread	Case-insensitive AQL queries ■ Platforms: ehrbase, aql 7 4h
openEHR affiliates Forum for general issues relating to all openEHR Affiliates. See geography level sub-categories for your region. ■ openEHR.nl ■ openEHR.de ■ openEHR.br ■ openEHR.jp ■ openEHR.cn ■ openEHR.si ■ openEHR.es ■ openEHR.uk ■ openEHR.se ■ openEHR.it ■ openEHR.uk (Private) ■ openEHR.nl (Private) ■ openEHR.no ■ APB ■ openEHR.ch ■ openEHR.de (Private)	83	Public Test Servers ■ Platform: ehrbase, rest-apis 28 7h
Regional communities ■ Nordic openEHR collaboration	1	EHRbase Sandbox, Tools and Testserver ■ Tools: ehrbase 2 8h
Tool Support For user community support for clinical modelling and other	136	Terminology namespace to URIs map ■ CSV ■ SEC 10 11h
		openEHR personas ■ ■ Collaborathon: education, test-data 3 18h
		Co-Chairs sought for APB ■ APB 4 20h

Models (and also community!)

<https://ckm.openehr.org/ckm/>

openEHR Clinical Knowledge Manager
Powered by Ocean Health Systems

Archetypes • Templates • Termsets • Release Sets • Reviews • Projects • Discussion • Reports • Tools • Help

Dashboard Find Resources

Welcome
Paul Miller
Clinical Knowledge Administrator

Last login: 30-Oct-2024
FIND OUT MORE »
FREQUENTLY ASKED QUESTIONS »

Quick Tasks

- Propose new archetype: Upload File >
- View change requests: Open List >
- Find a discussion: Search Discussions >
- Explore resources: Open Project >

Our CKM Community in Action

Users per Health Domain (Top 10)

Editor's Review Rounds

Resource	No.	Initiated	Deadline	Completed
Anatomical pathology examination	1	22-May-2024	19-Jun-2024	14/71
Pharmacogenetic test result	2	07-Apr-2024	26-May-2024	16/62

Editor's Change Requests

Resource	Title
Legal advocate	Consider renaming the concept

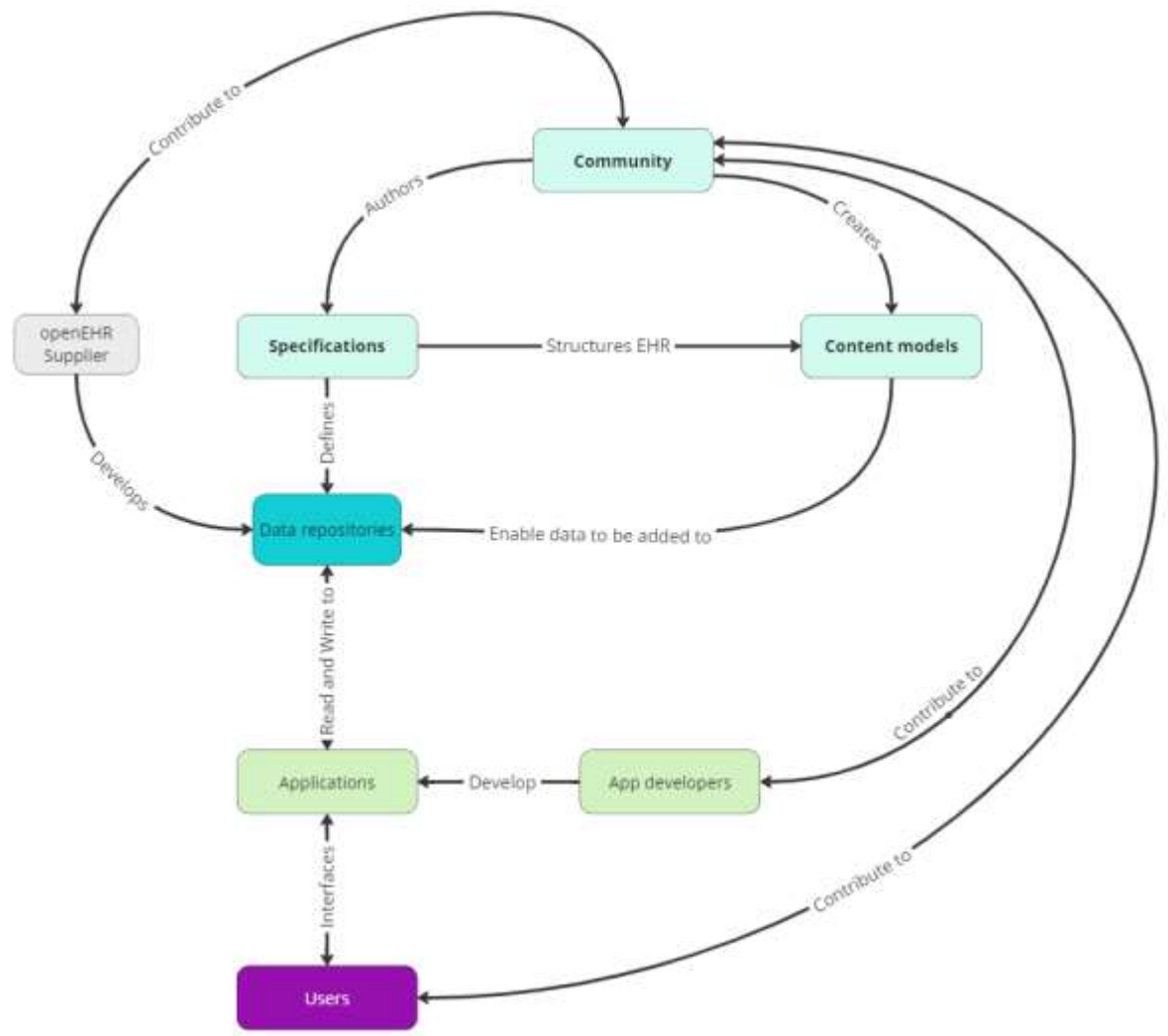
My Active Reviews

Status: invited (11 Reviews)

Resource	No.	Deadline
GIST risk assessment (Modified NIH criteria)	1	12-Nov-2024
Event summary	1	16-Oct-2024
Treatment summary	1	15-Oct-2024
Anatomical pathology examination	1	20-Jun-2024
Family history screening questionnaire	1	04-Jun-2024

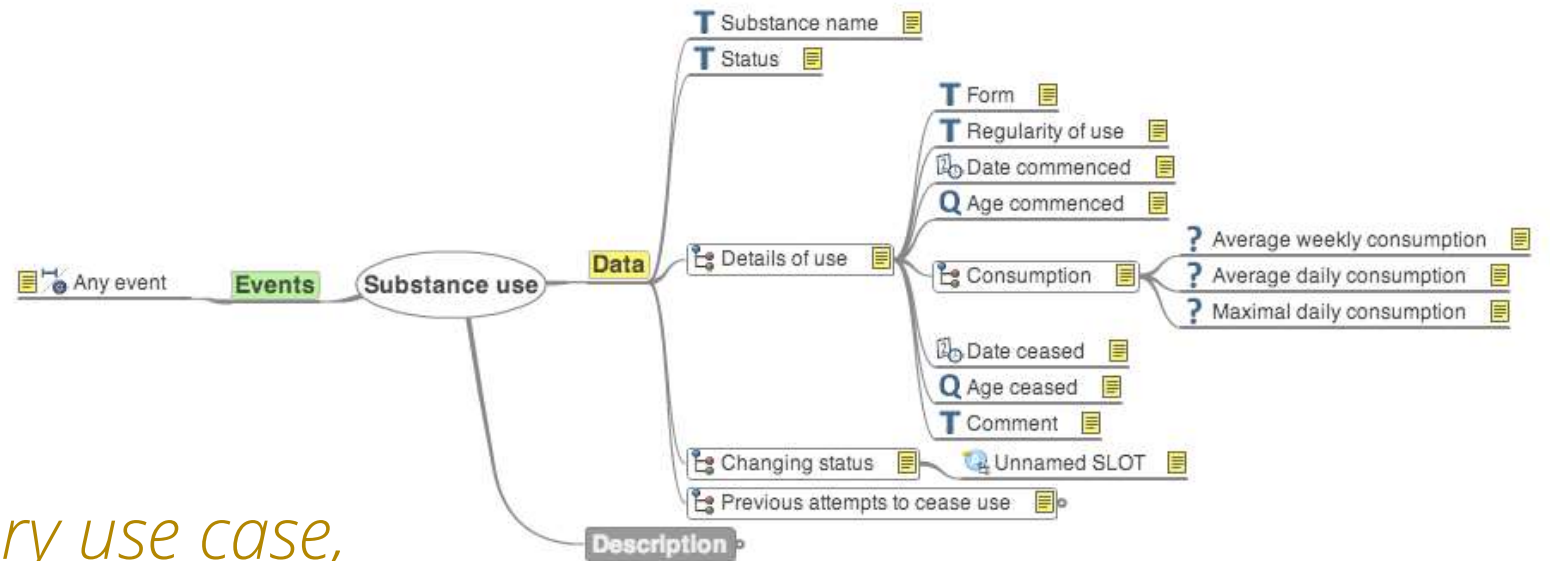
News

Title	Description	Date
Make clinical description node 0..* to enable multiple... Archetype: Examination of the scrotum Change request note	This Change Request has been closed.	12-Nov-2024



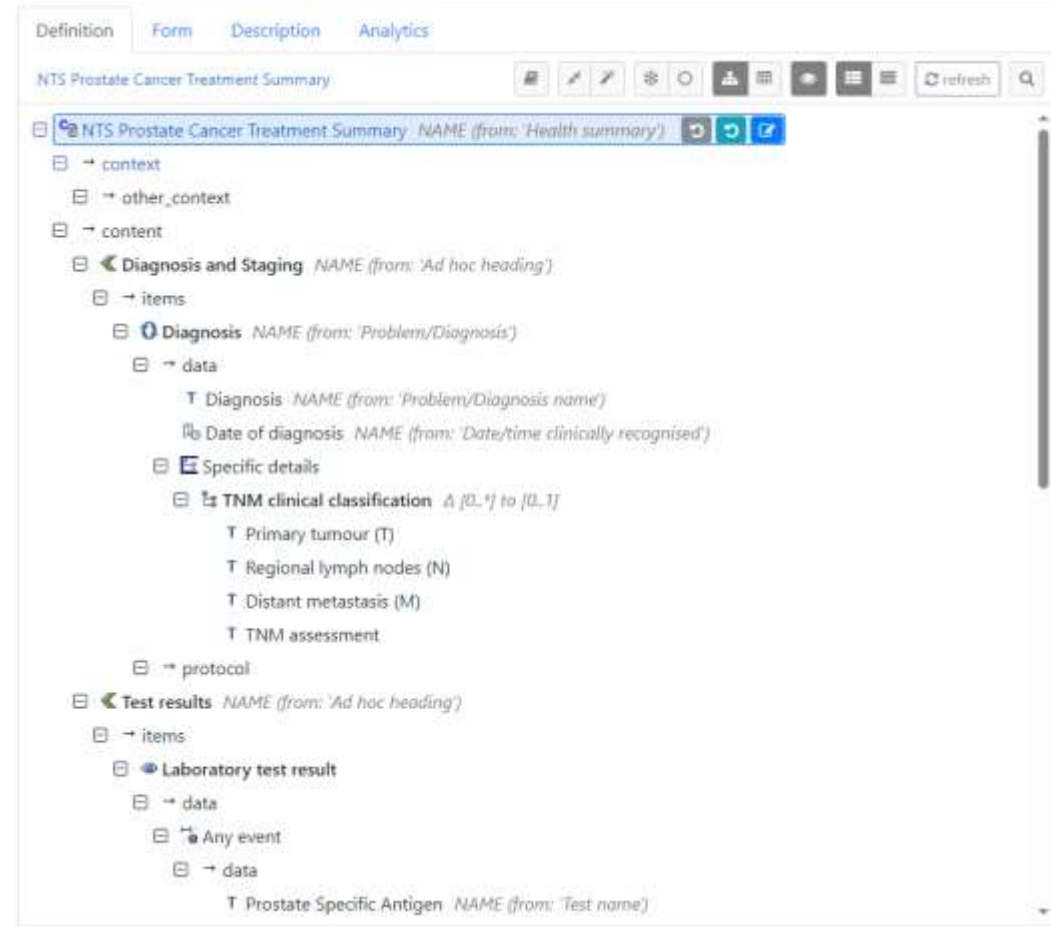
openEHR: Archetypes

- Models of discrete clinical concepts
 - *Blood pressure*
 - *Body weight*
 - *Medication*
 - *Family history*
 - *Housing status*
- 'Maximal dataset'
 - *All the data points for every use case, from every perspective*



openEHR: Templates

- Use cases
- Elements from one or more archetypes
 - Asthma review
 - GP encounter
 - NEWS2 Score
 - Frailty assessment
- Generate technical artifacts
- Stored in the EHR as a composition



Medical device LATEST REVISION / LATEST PUBLISHED | 24 [1.1.4]

English Adopted

Header Attribution Items

Concept Name	Medical device
Concept Description	An instrument, apparatus, implant, material or similar, used in the provision of healthcare. In this context, a medical device includes a broad range of devices which act through a variety of physical, mechanical, thermal or similar means but specifically excludes devices which act through medicinal means such as pharmacological, metabolic or immunological methods. The scope is inclusive of disposable devices as well as durable or persisting devices that require tracking, maintenance activities or regular calibration, recognising that each type of device has specific data recording requirements.
Keywords	device, machine, implant, appliance, catheter, prosthesis, aid, biomedical, instrument, equipment, meter, monitor, software
Purpose	To record the details of a medical device used in the provision of healthcare.
Use	<p>Use to record the details of a medical device used in the provision of healthcare.</p> <p>Use of the term 'medical device' varies depending on context. Within the Standards world, the term device tends to refer to mechanical or electronic devices that support healthcare and require rigorous documentation regarding location tracking, maintenance, calibration, software versions etc. Within the terminology context the use of device is very broad, including any medical device that can be used in direct or indirect provision of clinical care, as long as it does not act in a way that exerts a direct pharmacological, metabolic or immunological effect.</p> <p>Examples of medical devices range from simple devices such as urinary catheters, tongue depressors, contact lenses, artificial joint implants, breast implants and plain dressings through to advanced devices such as artificial hearts, syringe drivers, spirometers, mobile phone applications and computerised devices that capture point-of-care medical measurements.</p> <p>In the complex situation where a surgically implanted device is used as the means to deliver therapeutic agents such as chemotherapy directly into the body, this archetype will be used to record only the details about the medical device itself and the order for medication and details about the actual administration of the therapeutic agent will be recorded using specific medication-related INSTRUCTION and ACTION archetypes.</p> <p>This archetype is designed to provide the framework for structured representation of any medical device and the data elements that are contained here are not specific for any one type of device. Single use devices will commonly require data elements such as Lot Number and Date of Expiry. In contrast these are usually not relevant for durable devices which will often have a set of identifiers, including a UID, Serial Number, Model etc.</p>

Medical device LATEST REVISION / LATEST PUBLISHED | 24 [1.1.4]

English Adopted

Header Attribution Items

Device name T Text <input type="checkbox"/> Mandatory	<p>Identification of the medical device, preferably by a common name, a formal fully descriptive name or, if required, by class or category of device.</p> <p><i>Comment: This data element will capture the term, phrase or category used in clinical practice. For example: <brand name> <machine> (XYZ Audimeter); <size> <brand name> <intravenous catheter> (14G Jelic IV catheter); or <brand name/type> <implant>. Coding with a terminology is desirable, where possible, although this may be local and depending on local supplies available.</i></p>	
Type T Text <input type="checkbox"/> Optional	<p>The category or kind of device.</p> <p><i>Comment: Not applicable if a category is already recorded in Device name.</i></p> <p><i>Example: if the 'Device' is named as a 'luxury catheter' the 'Type' may be recorded as 'Inwelling' or 'condom'. Coding with a terminology is desirable, where possible. This may include use of GTIN or EAN numbers.</i></p>	
Description T Text <input type="checkbox"/> Optional	<p>Narrative description of the medical device.</p>	
Properties Slot (Cluster) <input type="checkbox"/> Optional, repeating	<p>Further details about specific properties about the medical device.</p>	<p>Include: All not explicitly excluded archetypes</p>
Unique device identifier (UDI) ID Identifier <input type="checkbox"/> Optional	<p>A numeric or alphanumeric string that is associated with this device within a given system.</p> <p><i>Comment: Often fixed to the device as a barcode.</i></p>	
Manufacturer T Text <input type="checkbox"/> Optional	<p>Name of manufacturer.</p>	
Date of manufacture Date/Time <input type="checkbox"/> Optional	<p>Date the device was manufactured.</p>	
Serial number T Text <input type="checkbox"/> Optional	<p>Number assigned by the manufacturer, which can be found on the device, and should be specific to each device, its label, or accompanying packaging.</p>	
Catalogue number T Text <input type="checkbox"/> Optional	<p>The exact number assigned by the manufacturer, as it appears in the manufacturer's catalogue, device labeling, or accompanying packaging.</p>	
Model number T Text <input type="checkbox"/> Optional	<p>The exact model number assigned by the manufacturer, not found on the</p>	

Device Details	Device Lot or Batch number	DeviceLotBatchNumber	The lot number or batch number associated with a specific surgical device or implant.
Operation Details	Operation Identifier	OperationID (EventID)	A code to uniquely identify the operation (case) within a health and care provider organisation.
Operation Details	Operation Date	OperationDate (Start date and end date)	The operation date of the surgical device or implant.
Operation Details	Procedure Code 1 (OPCS)	ProcedureCode1OPCS	Procedure Code 1 (OPCS) is the OPCS Classification of Interventions and Procedures used
Operation	Procedure Code 2 (OPCS)	ProcedureCode2OPCS	Procedure Code 2 (OPCS) is the OPCS
Operation	Procedure Code 3 (OPCS)	ProcedureCode3OPCS	Procedure Code 3 (OPCS) is the OPCS
Operation	Procedure Code 4 (OPCS)	ProcedureCode4OPCS	Procedure Code 4 (OPCS) is the OPCS
Operation	Procedure Code 5 (OPCS)	ProcedureCode5OPCS	Procedure Code 5 (OPCS) is the OPCS
Operation	Procedure Code 6 (OPCS)	ProcedureCode6OPCS	Procedure Code 6 (OPCS) is the OPCS
Operation Details	Procedure Description 1	ProcedureDescription1	This is intended to record the procedure(s) undertaken during surgery involving the implant, revision, replacement or removal of an implantable medical device as stated by the surgeon. The procedure(s) to be performed will usually be agreed
Operation Details	Procedure Description 2	ProcedureDescription2	This is intended to record the procedure(s) undertaken during surgery involving the implant

Header	Attribution	Description	Protocol	Pathway	Reference model
Procedure name T Text <input type="checkbox"/> Mandatory		Identification of the procedure by name. <i>Comment: Coding of the specific procedure with a terminology is preferred, where possible.</i>			
Description T Text <input type="checkbox"/> Optional		Narrative description about the procedure, as appropriate for the pathway step. <i>Comment: For example: description about the performance and findings from the the procedure, the aborted attempt or the cancellation of the procedure.</i>			
Indication T Text <input type="checkbox"/> Optional, repeating		The clinical or process-related reason for the procedure. <i>Comment: Coding of the indication with a terminology is preferred, where possible. This data element allows multiple occurrences. For example: 'Failed bowel preparation' or 'Bowel cancer screening'.</i>			
Method T Text <input type="checkbox"/> Optional, repeating		Identification of specific method or technique for the procedure. <i>Comment: Use this data element to record simple terms or a narrative description. If the requirements for recording the method require more complex modelling then this can be represented by additional archetypes within the 'Procedure detail' SLOT in this archetype. If the method is included in the 'Procedure name' via precoordinated codes, this data element becomes redundant.</i>			
Urgency T Text <input type="checkbox"/> Optional		Urgency of the procedure. <i>Comment: Coding with a terminology is preferred, where possible.</i>			
Body site T Text <input type="checkbox"/> Optional, repeating		Identification of the body site for the procedure. <i>Comment: Occurrences for this data element are unbounded to allow for</i>			

NES_TS Medical Devices Data Hub *NAME (from: 'Procedure report')*

- context
 - content
 - 🔑 **Operation** *NAME (from: 'Service')*
 - ism_transition
 - description
 - T **Operation name** *NAME (from: 'Service name')*
 - protocol
 - 🔑 **Operation identifier** *NAME (from: 'Service provider identifier')*
 - 📄 Receiver
 - 🔑 **Procedure** $\Delta [0..1] \text{ to } [1..*]$
 - ism_transition
 - 🔑 **Procedure completed**
 - description
 - 🔑 **Procedure name** $\Delta \text{ Values changed}$
 - 📄 Procedure detail
 - 🔑 **Device Details** *NAME (from: 'Medical device')*
 - T **Product description** *NAME (from: 'Device name')*
 - ID **Unique device identifier (UDI)**
 - T **Device Serial number** *NAME (from: 'Serial number')*
 - T **Device Lot or Batch number** *NAME (from: 'Batch/Lot number')*
 - 📄 Extension
 - 🔑 **Anatomical location** $\Delta [0..*] \text{ to } [0..1]$
 - 🔑 **Medical device regulatory details** $\Delta [0..*] \text{ to } [0..1]$



- Lifelong record
- Patient-centred
- Trusted source of truth
- Semantically coherent
- In context
- Interoperable
- Computable – decision support
- Findable

Scan for Safety

Device Search

Medical Device Data Hub (MDDH)

[Home](#) [Device Search](#) [Patient Device Search](#) [View Audit Records \(Test Team\)](#) [Admin](#)

SEARCH BY:

UDI-DI number: (* Required)

Batch/Lot number:

Date:

from:

dd/mm/yyyy



to:

dd/mm/yyyy



Healthboard:

All

Responsible Clinician (eESS Number):

Search

<https://youtu.be/EDOik34XU3g?si=UrQgQgvLCB9H3eGT>

OpenOutcomes

The logo for openOutcomes™ features the word "open" in a blue sans-serif font, followed by a blue circle containing a white checkmark, and then the word "outcomes" in a larger blue sans-serif font with a trademark symbol (TM) to its upper right. The background is a blurred image of a healthcare setting with a person in a white coat and another person in a blue shirt.

openOutcomes™

openOutcomes™ is an innovative "speciality and care pathway agnostic" digital platform for clinicians and patients to collect, record and analyse patient reported outcomes (PROMs/PROs) and patient reported experience measures (PREMs). It is a highly interoperable platform built on the international openEHR standard as recognised and adopted by NHS England and other international healthcare systems. It has been co-designed by NHS clinicians, administrators, outcome managers and professional software developers to help deliver data driven patient care.

<https://openoutcomes.apperta.org/>



Medical Devices and Patient Reported Outcomes (PROMs): Interoperability, Standards, and openOutcomes

[Medical Devices and Patient Reported Outcomes \(PROMs\): Interoperability, Standards, and openOutcomes | by Kanthan Theivendran | Apr, 2025 | Medium](#)



Kanthan Theivendran

Following

11 min read · 3 days ago

Summary

- GS1 GTINs as part of a patient centric record
- openEHR for a longitudinal patient record with semantic persistence
- Learning how to build
- Application going live shortly
- Maybe do vaccines?
- GS1 + openEHR a great combination