

Digital Health Ecosystem Wales

Making it easier and faster to adopt digital healthcare technology in Wales

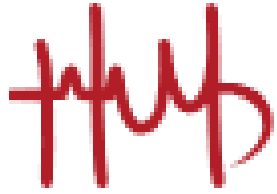
Helen Northmore / Eugene O'Sullivan

Head of Innovation Adoption – Digital and AI / Senior Product Specialist

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DIGITALHEALTH.WALES

EIDC
Ecosystem Iechyd
Digidol Cymru

DHEW
Digital Health Ecosystem Wales



Life Sciences Hub

Bring together industry, clinicians, policy makers, academics and funders to create an environment where it's easier and faster to adopt digital healthcare technology in Wales.



NWIS Ecosystem Team

Securely open up NHS Wales systems and data to developers to ease the burden of integration and improve understanding of the digital architecture

Why do we need an ecosystem?



Barriers



**New Partnership
Models Required**



**Create Digital
Innovation Culture**



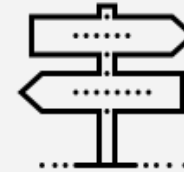
**Measurement &
Data are Hard**



**Infrastructure is
a Blocker**



**Conversations
are Slow**



**Innovation Pathway
Not Clear**



**Everyone Feels
Unsupported**



**Personality is Too
Big a Factor**



**Finances Are
Not Aligned**

What should the Ecosystem do?

4 principles/criteria

- Does it make it easier and faster?
- Does it use our ability to convene and connect?
- Does it result in practical action?
- Does it fill a gap?





Ecosystem Priorities

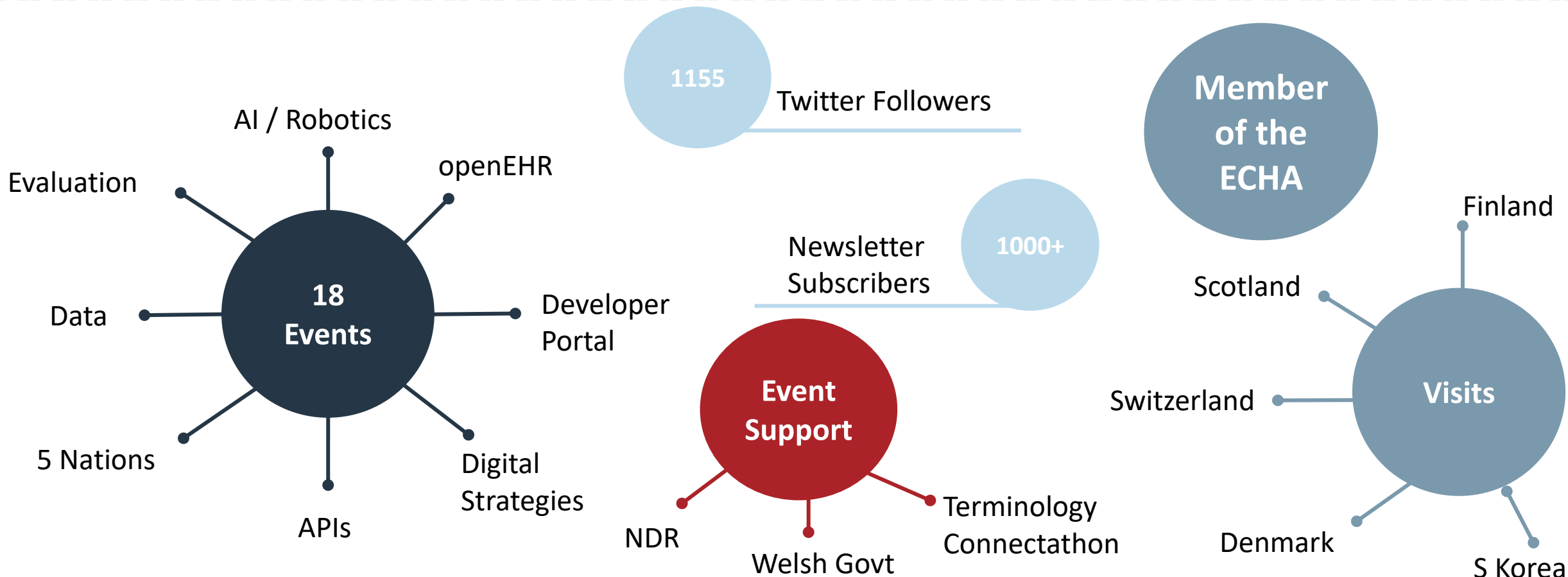
“Making it easier and faster to adopt digital healthcare technology”

- Connecting People
- Connecting Delivery
- Connecting Systems

Connecting People and Connecting Delivery



Connecting People



Covid19 Response – Digital Health

205

enquiries or
offers of support
received

Themes:

- Additional people
- COVID-19 tracking and tracing
- Remote monitoring
- Making systems more efficient
- Existing products



8 offers
taken up



34 offers of
support
reviewed

Connecting Delivery

142 applications for £30K
of WG funding
– 5 winners

Digital Solutions Fund

Physio Now – triage
chatbot

Medapod – remote
monitoring platform

MedTRiM –
emotional resilience
training

Healthy.IO – remote
wound assessment

Clinitouch Vie – remote
monitoring platform

Networked
Data Labs

AI in Health
& Care
Award

RFID
Asset
Tracking

AI pilot
Kheiron
Medical
& BTW

TEC
Cymru
Comms

Network
support
AAG
WTSB

Digitalhealth.wales

Home for information about national digital projects and programmes:

- DHEW
- Technology Enabled Care
- National Data Resource

About to come online:

- Advanced Analytics Group
- Care Improvement Cymru

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Digital Health in Wales

Your first stop-shop for the latest activity from the Welsh digital health community. Here you will find events, news, blogs, projects and information to help you on your digital health journey.

Whether you're an innovator, clinician, entrepreneur or company visit our [How We Can Help](#) page to help you get to the next stage of development or scale up.

You can also visit our library of [information](#), set out by topic or sector, that features information on digital health topics, explainer articles and podcasts, information on key organisations and more.

Don't forget to take a look at the leading digital health programmes in Wales [Digital Health Ecosystem Wales](#), [Technology Enabled Care Cymru](#) and [National Data Resource](#).



Digital Health Ecosystem Wales

Digital Health Ecosystem Wales brings together industry, clinicians, policy makers, academics, innovators and funders to create an environment of digital innovation in Welsh healthcare.



Technology Enabled Care Cymru

Technology Enabled Care offers us a way to do more with less, delivering benefits to both our patients and workforce, with care closer to home.



National Data Resource

The NDR programme is a strategic imperative for health and care in Wales and an essential component of the Digital Architecture Review. It aims to deliver a more joined up approach to health and care data across Wales.

Digitalhealth.wales

- Advice
- Information
- Opportunities
- Resources
- Developer portal

Opportunities or Services

AI in Health and Care Award

Scientific Advice Service

Topics

Artificial Intelligence (AI)

Application Programme Interfaces (APIs)

Evidence Standards / Evaluation

NHS Wales Developer Portal

An early beta version of the NHS Wales Developer Portal has been launched in order to get invaluable feedback from developers.

The Portal aims to ease the burden of integration for developers through access to test instances of APIs enabling the rapid prototyping of solutions for NHS Wales. The objective is to open up the architecture in NHS Wales and aid both internal and external developer communities in understanding and interacting with NHS Wales resources.

Take a look and let us know what you think



Advice or Funding

Are you looking for some advice or funding?

Idea or Unmet Need

Do you have an idea or an unmet need?

Research and Development

Do you need help with research and development?

Sell Outside Wales

Are you looking to sell your product outside of Wales?

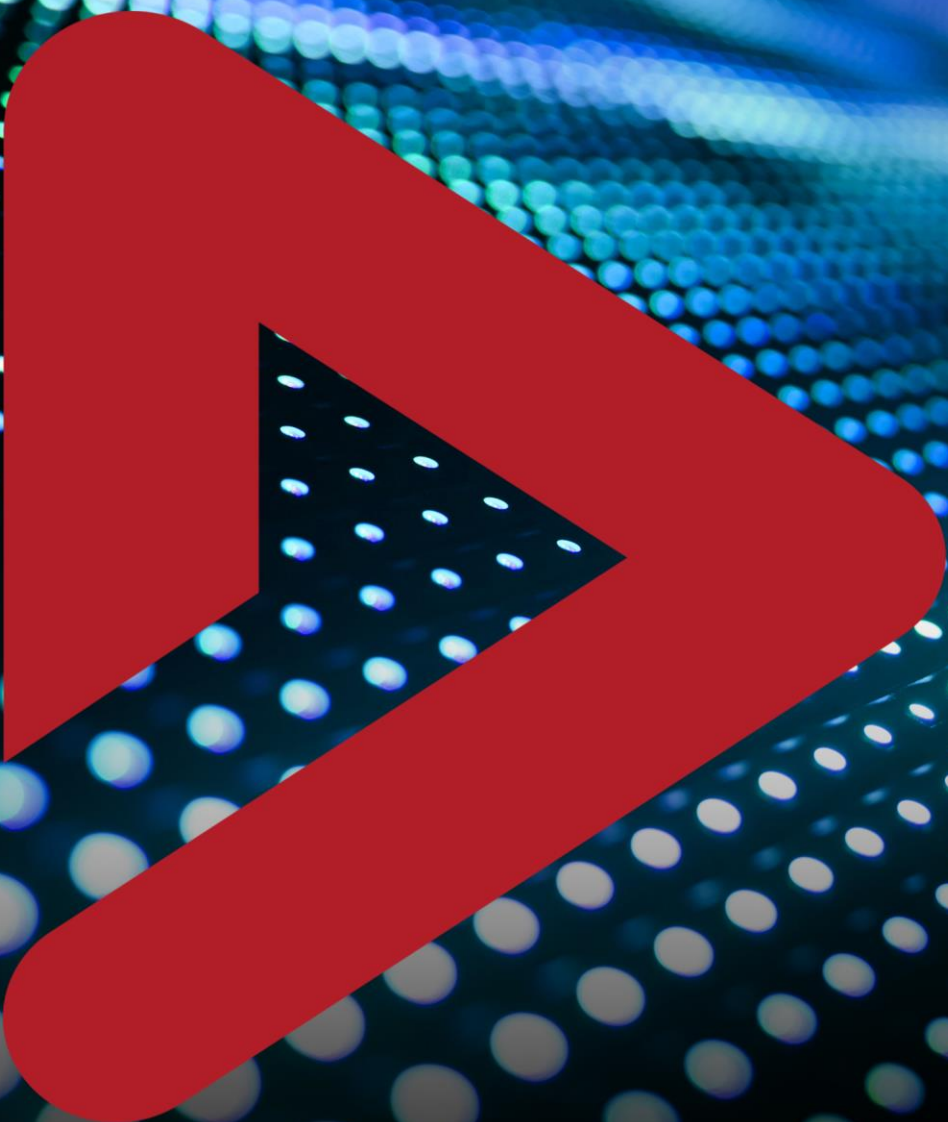
Connecting Systems - Creating a Developer Community



Background to the Ecosystem

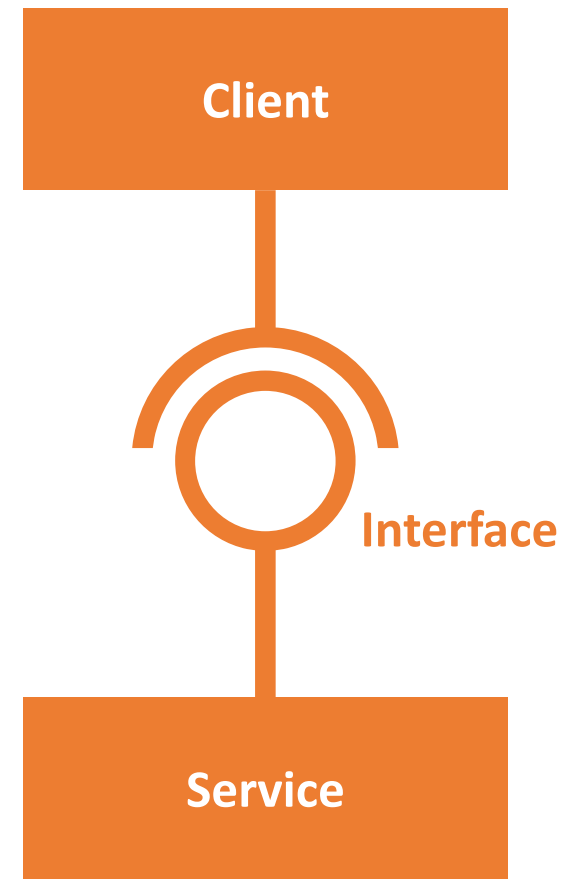
- Engagement
- Test APIs with industry using new open and interoperable standards
- Discovery/R&D
 - Baseline infrastructure
 - Adopt new open standards
 - Drive forward Interoperability of health and care systems
- Promotion of Open Architecture

APIs and Interoperability



APIs

- Application Programming Interface
- Defines a “communication contract”
 - One app *provides* the interface
 - Another app *uses* the interface
- Web APIs send/fetch data over HTTP



APIs

- RESTful (FHIR)
- SOAP
- GraphQL
- gRPC



<SOAP / >

{REST:API}

↳GRPC↲



HL7® FHIR®

APIs

RESTful APIs

Request:

```
HTTP GET: NRDSservicesApi/nrds/gettable/nrds/gppractice?nrd:GPpracticeCode=W00005
```

Returns the all attributes for the entity defined by the tablename optionally filtering using the querystring values.

Response:

```
<nrd:ResultSet xmlns:nrd="http://www.wales.nhs.uk/nrds" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:nrds="http://www.wales.nhs.uk/namespaces/NSD">
  <nrd:Row>
    <nrd:AddressLine1>30 Thomas Street</nrd:AddressLine1>
    <nrd:AddressLine2>Abertridwr</nrd:AddressLine2>
    <nrd:AddressLine3></nrd:AddressLine3>
    <nrd:AddressLine4>Caerphilly</nrd:AddressLine4>
    <nrd:GPpracticeCode>W00005</nrd:GPpracticeCode>
    <nrd:LHBcode></nrd:LHBcode>
    <nrd:Postcode>CF83 4AZ</nrd:Postcode>
    <nrd:PracticeName>Meddygfa Tridwr</nrd:PracticeName>
    <nrd:SeniorGPname>KAUSHAL SC</nrd:SeniorGPname>
    <nrd:SeniorGPno>G8615383</nrd:SeniorGPno>
    <nrd:Telephone>0844 4778635</nrd:Telephone>
  </nrd:Row>
</nrd:ResultSet>
```

SOAP APIs

SOAP POST: /nrdservices.asmx

Request:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:mes="http://www.wales.nhs.uk/namespaces/MessageRelease2">
  <soapenv:Header/>
  <soapenv:Body>
```

```
    <mes:GetResultSetRequest>
      <mes:AttributeValuePair>
        <mes:Attribute>
          <mes:Name>GpPracticeCode</mes:Name>
          <mes:Namespace>http://www.wales.nhs.uk/nrds</mes:Namespace>
          <mes:Description/>
        </mes:Attribute>
        <mes:Value>W97046</mes:Val
      </mes:AttributeValuePair>
      <mes:LookupTable>
        <mes:Name>GPpractice</mes:
        <mes:Namespace>http://www.
      </mes:LookupTable>
      <mes:AttributeToRetrieve>
        <mes:Name>postcode</mes:Na
        <mes:Namespace>http://www.
      </mes:AttributeToRetrieve>
      <mes:AttributeToRetrieve>
        <mes:Name>PracticeName</me
        <mes:Namespace>http://www.
      </mes:AttributeToRetrieve>
      <mes:ExactMatch>1</mes:Exact
    </mes:GetResultSetRequest>
  </soapenv:Body>
</soapenv:Envelope>
```

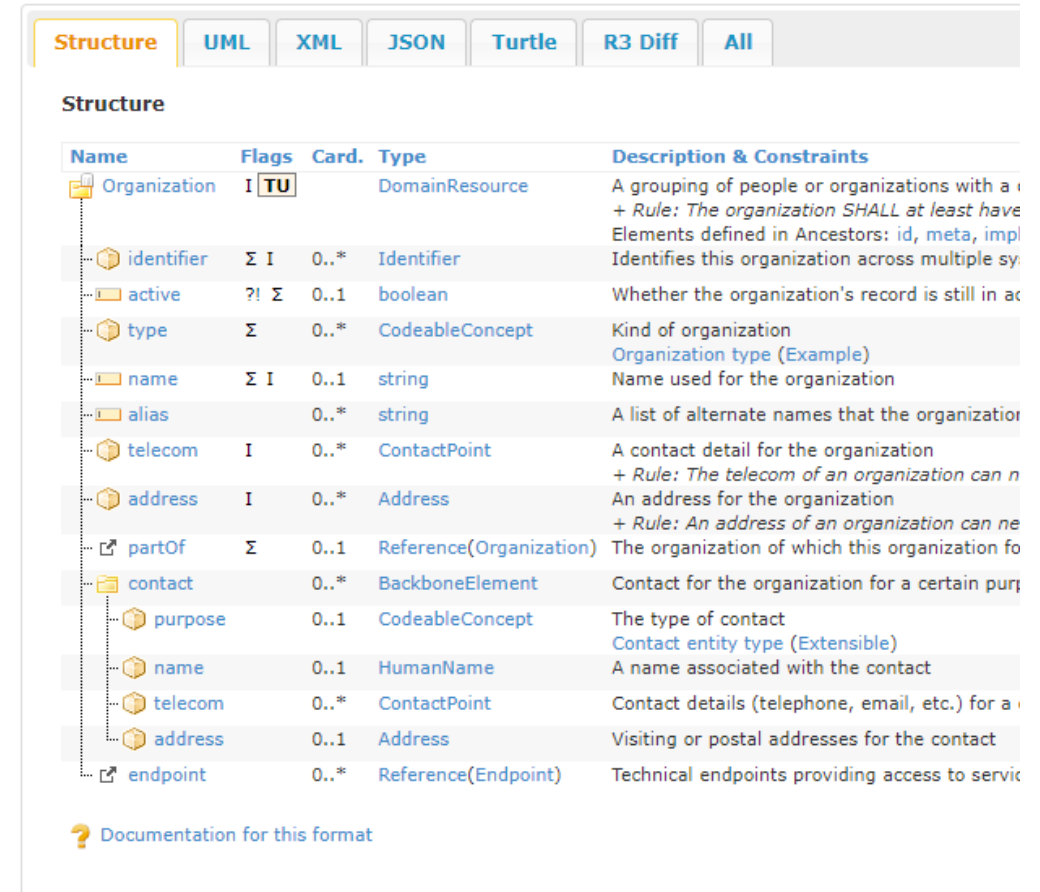
Response:

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soap:Body>
    <GetResultSetResponse xmlns="http://www.wales.nhs.uk/namespaces/MessageRelease2">
      <Row>
        <AttributeValuePair>
          <Attribute>
            <Id>ECCCA863-42B0-405F-938B-2863785B5F10</Id>
            <Name>Postcode</Name>
            <Namespace>http://www.wales.nhs.uk/nrds</Namespace>
          </Attribute>
          <Value>CF62 8AZ</Value>
        </AttributeValuePair>
        <AttributeValuePair>
          <Attribute>
            <Id>D5D15286-0B5F-41F7-BC69-01D691CF6431</Id>
            <Name>PracticeName</Name>
            <Namespace>http://www.wales.nhs.uk/nrds</Namespace>
          </Attribute>
          <Value>Ravenscourt Surgery</Value>
        </AttributeValuePair>
      </Row>
    </GetResultSetResponse>
  </soap:Body>
</soap:Envelope>
```

FHIR

FHIR is a standard for health care data exchange

Gives a structure/framework for resources common in a health care setting.



Name	Flags	Card.	Type	Description & Constraints
Organization	I TU		DomainResource	A grouping of people or organizations with a... + Rule: The organization SHALL at least have... Elements defined in Ancestors: id, meta, impl...
identifier	Σ I	0..*	Identifier	Identifies this organization across multiple sy...
active	?! Σ	0..1	boolean	Whether the organization's record is still in ac...
type	Σ	0..*	CodeableConcept	Kind of organization Organization type (Example)
name	Σ I	0..1	string	Name used for the organization
alias		0..*	string	A list of alternate names that the organization...
telecom	I	0..*	ContactPoint	A contact detail for the organization + Rule: The telecom of an organization can n...
address	I	0..*	Address	An address for the organization + Rule: An address of an organization can ne...
partOf	Σ	0..1	Reference(Organization)	The organization of which this organization fo...
contact		0..*	BackboneElement	Contact for the organization for a certain purp...
purpose		0..1	CodeableConcept	The type of contact Contact entity type (Extensible)
name		0..1	HumanName	A name associated with the contact
telecom		0..*	ContactPoint	Contact details (telephone, email, etc.) for a...
address		0..1	Address	Visiting or postal addresses for the contact
endpoint		0..*	Reference(Endpoint)	Technical endpoints providing access to servic...

? Documentation for this format

FHIR Resources

common concepts in Health care.

solve real world clinical and administrative problems

FHIR Profiles – UK Core

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1.2 Resource Index

FHIR Infrastructure [Work Group](#)

Maturity Level: N/A

Standards Status: Informative

This page is provided to help find resources quickly. There is also a more [detailed classification, ontology, and description](#). For background to the Index see the [Architect's Overview](#). See also the abstract [Base Resources Resource](#) and [DomainResource](#).

	Categorized	Alphabetical	R2 Layout	By Maturity	Security Category	By Standards Status	By Committee		
Foundation	Conformance <ul style="list-style-type: none"> CapabilityStatement N StructureDefinition N ImplementationGuide 1 SearchParameter 3 MessageDefinition 1 OperationDefinition N CompartmentDefinition 1 StructureMap 2 GraphDefinition 1 ExampleScenario 0 		Terminology <ul style="list-style-type: none"> CodeSystem N ValueSet N ConceptMap 3 NamingSystem 1 TerminologyCapabilities 0 		Security <ul style="list-style-type: none"> Provenance 3 AuditEvent 3 Consent 2 		Documents <ul style="list-style-type: none"> Composition 2 DocumentManifest 2 DocumentReference 3 CatalogEntry 0 		
	Base	Individuals <ul style="list-style-type: none"> Patient N Practitioner 3 PractitionerRole 2 RelatedPerson 2 Person 2 Group 1 		Entities #1 <ul style="list-style-type: none"> Organization 3 OrganizationAffiliation 0 HealthcareService 2 Endpoint 2 Location 3 		Entities #2 <ul style="list-style-type: none"> Substance 2 BiologicallyDerivedProduct 0 Device 2 DeviceMetric 1 		Workflow <ul style="list-style-type: none"> Task 2 Appointment 3 AppointmentResponse 3 Schedule 3 Slot 3 VerificationResult 0 	
		Clinical	Summary <ul style="list-style-type: none"> AllergyIntolerance 3 AdverseEvent 0 Condition (Problem) 3 Procedure 3 FamilyMemberHistory 2 ClinicalImpression 0 DetectedIssue 1 		Diagnostics <ul style="list-style-type: none"> Observation N Media 1 DiagnosticReport 3 Specimen 2 BodyStructure 1 ImagingStudy 3 QuestionnaireResponse 3 MolecularSequence 1 		Medications <ul style="list-style-type: none"> MedicationRequest 3 MedicationAdministration 2 MedicationDispense 2 MedicationStatement 3 Medication 3 MedicationKnowledge 0 Immunization 3 ImmunizationEvaluation 0 ImmunizationRecommendation 1 		Care Provision <ul style="list-style-type: none"> CarePlan 2 CareTeam 2 Goal 2 ServiceRequest 2 NutritionOrder 2 VisionPrescription 2 RiskAssessment 1 RequestGroup 2

Example: Organisational Reference data - FHIR

WRDS - FHIR Reference Data ▼

WRDS - FHIR Reference Data

🔍 Search operations

Group by tag

API definition ▼

[Changelog](#)

GET

Organization

GET

Organization/{id}

GET

Practitioner

GET

Practitioner/{id}

GET

PractitionerRole

GET

PractitionerRole/{id}

Retrieve organisational reference data

This API could be used to retrieve lists of practitioners, GP practices, hospitals etc., using the FHIR Organization, Practitioner and PractitionerRole resources. It should be considered experimental. Anybody can try out the demo/sandbox implementation and provide feedback. It is currently only available in the sandbox environment and not in production.

Before making calls to an API, you'll need a subscription to the [Sandbox product](#).

NOTE: Some APIs do not yet expose any functionality in the sandbox

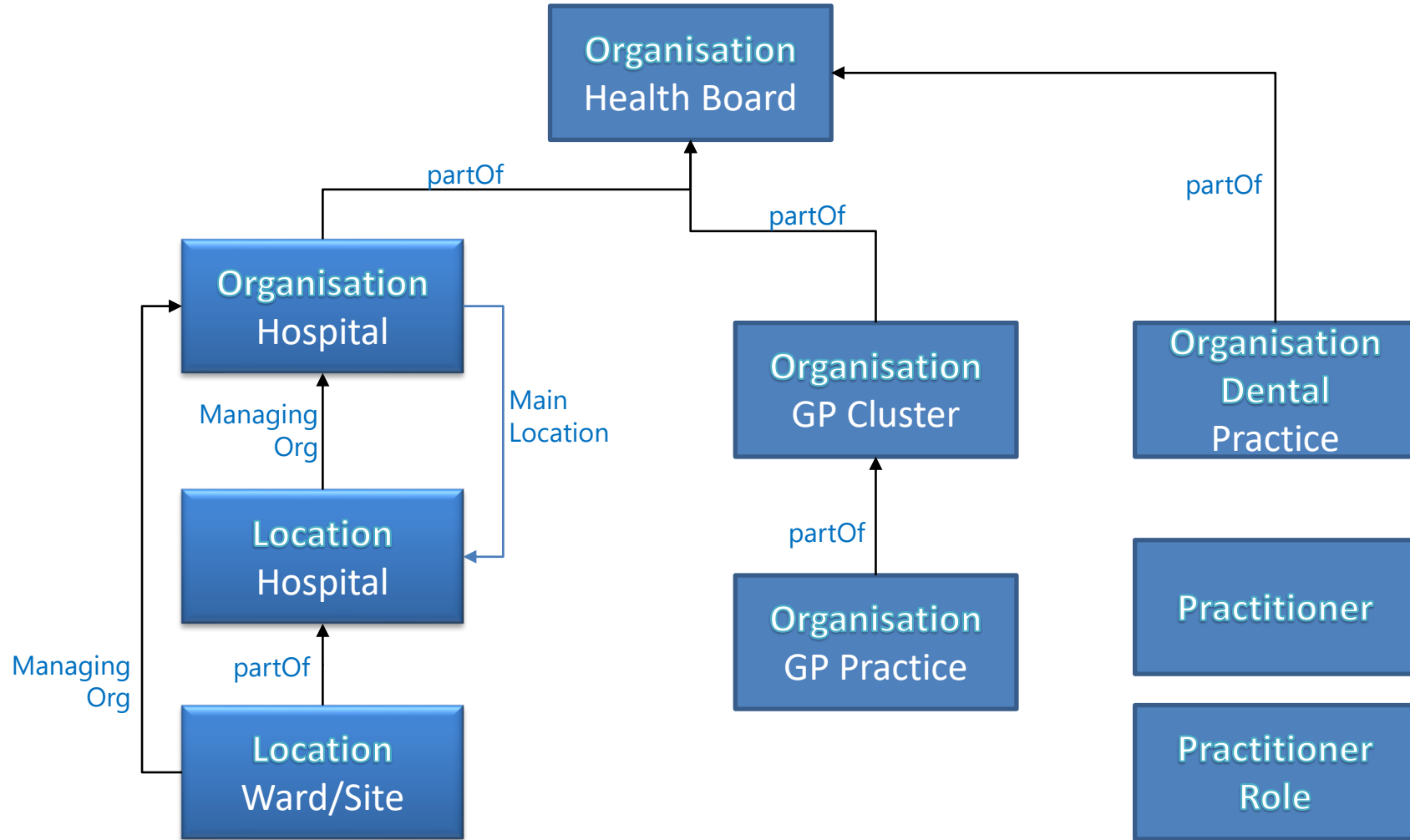
Try it ▶

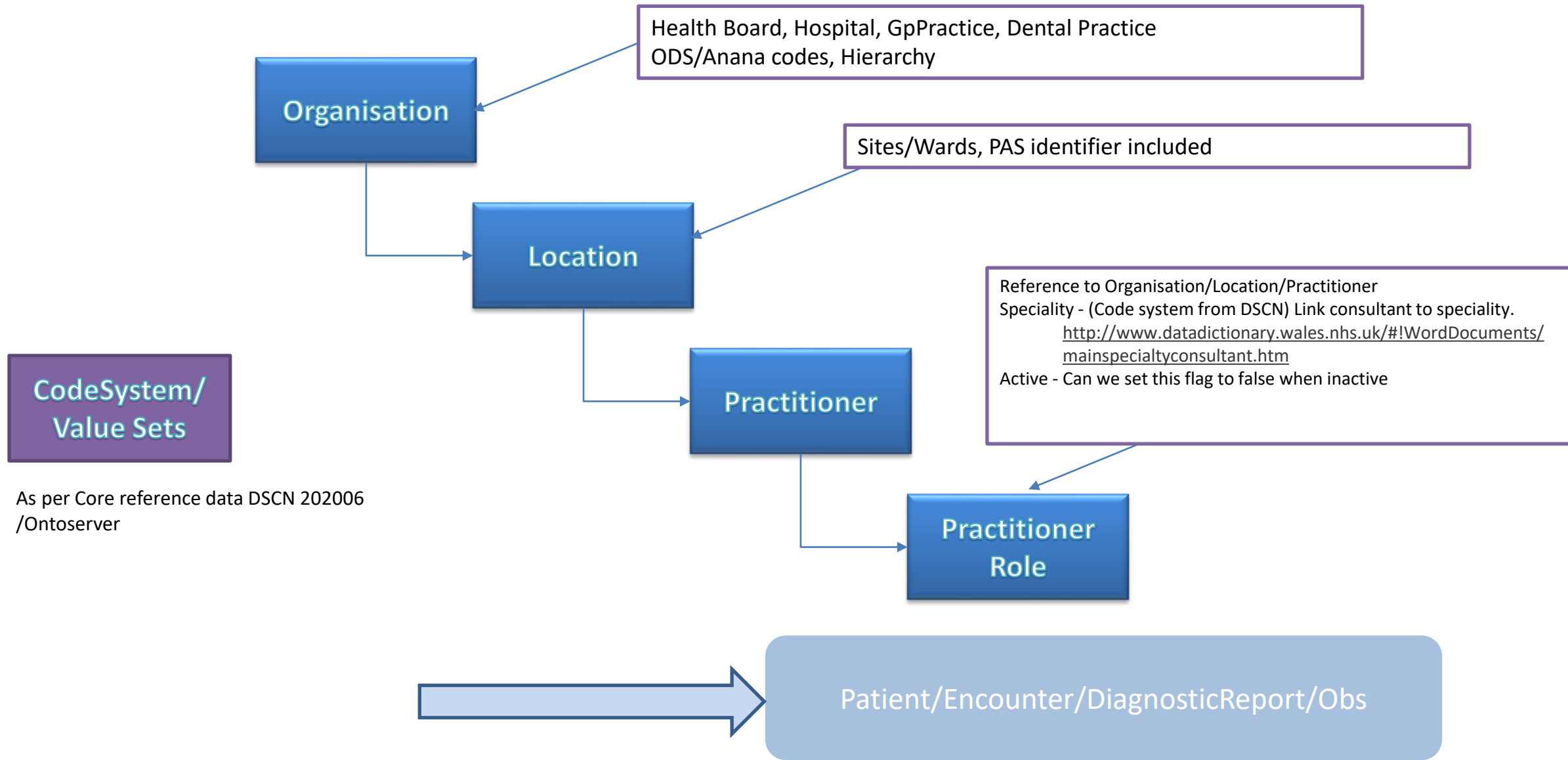
Organization

The Organization resource is used to represent Health Boards and GP Practices. They can be differentiated by the `Organization.type` property, which is 'HB' for Health Boards and 'GPPractice' for GP Practices.

Example Usage: Retrieve a list of all GP Practices

```
GET {baseUrl}/Organization?type=GPPractice
```





FHIR - Profiles

- UKCore Profiles
- Building Welsh Profiles
- Interoperability working group

HL7 FHIR® UK Core Implementation Guide R4

This is a dynamic build of the current UK Core in development and should be considered as "work in progress". The content will be refreshed dynamically as part of the development process for all changes or updates. This implementation guide is not an official product release for implementation, and nothing contained in this specification should be seen as approved.

More information can be found in the [Summary](#).



FHIR - Profiles

- Agreed interoperability standards for Wales
- Collaboration

▼ Resource Categories

or not

- Profiles
- ValueSets
- CodeSystems
- Extensions
- SearchParameters
- CompartmentDefinitions
- CapabilityStatements
- OperationDefinitions
- NamingSystems
- ConceptMaps
- StructureMaps
- ImplementationGuides
- TestScripts
- DataElements
- GraphDefinitions
- ExpansionProfiles
- Examples
- LogicalModels
- Texts
- Images
- Layouts

DataStandardsWalesMainSpecialty ValueSet	Draft
A unique code identifying each Main Specialty designated by Royal Colleges	08/12/2020
DataStandardsWalesEthnicity CodeSystem	Active
The ethnicity of a person, as specified by the person, as per the Office of National Statistics (ONS) 2011 Census Categories	11/12/2020
DataStandardsWalesEthnicity ValueSet	Draft
The ethnicity of a person, as specified by the person, as per the Office of National Statistics (ONS) 2011 Census Categories	04/12/2020
DataStandardsWalesGenderIdentity CodeSystem	Draft
Gender identity is a person's sense of identification with either the male or female sex, as manifested in appearance, behaviour, and other aspects of a person's life.	04/12/2020
DataStandardsWalesGenderIdentity ValueSet	Draft
Gender identity is a person's sense of identification with either the male or female sex, as manifested in appearance, behaviour, and other aspects of a person's life.	04/12/2020
DataStandardsWalesMainSpecialty CodeSystem	Draft
A unique code identifying each Main Specialty designated by Royal Colleges.	07/01/2021

Developer Access



API Marketplace

Patient-centric APIs are essential to improving the mortality of the human race. The existing raw data which reside in EHR/EMR (Electronic Health Record) systems needs to be transformed and aggregated into more patient-centric APIs which will help modern application developers build innovative healthcare products and applications

<https://www.infoq.com/articles/healthcare-API-marketplaces/>

Request:

```
<soapenv:Envelope xmlns:soapenv="http://www.wales.nhs.uk/namespaces/MessageRelease" >
  <soapenv:Header/>
  <soapenv:Body>
    <mes:GetResultSetRequest>
      <mes:AttributeValuePair>
        <mes:Attribute>
          <mes:Name>GpPracticeCode</mes:Name>
          <mes:Namespace>http://www.wales.nhs.uk/namespaces/MessageRelease</mes:Namespace>
          <mes:Description/>
        </mes:Attribute>
        <mes:Value>W97046</mes:Value>
      </mes:AttributeValuePair>
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        <mes:Namespace>http://www.wales.nhs.uk/namespaces/MessageRelease</mes:Namespace>
      </mes:AttributeToRetrieve>
    </mes:GetResultSetRequest>
  </soapenv:Body>
</soapenv:Envelope>
```

API Catalogue

MPI - Master Patient Index SOAP

Query for patients identifiers matched across multiple systems

These APIs implement the PIX and PDQ Integration Profiles from IHE. You can use Patient Identifier Cross Referencing (PIX) to match patients records across multiple systems. You can perform...

PROMs - Event Request SOAP

Request that a patient be sent an assessment questionnaire after clinical events

This is the standard API used to trigger PROMs capture by the National PROMs platform (<https://proms.nhs.wales>) The API is used by patient administration systems to request...

WBNS - Birth Notifications SOAP

Register births and receive an NHS Number

This API accepts HL7 ADT messages with details of a birth (mother's details, time of birth, gender, birth weight etc.) and responds with a newly generated NHS Number. It is used by maternity systems to notify...

WCCG - Clinical Documents Exchange SOAP

Send and receive clinical documents such as referral letters

The API allows registered users and applications to exchange clinical documents. It is used by GP Systems and WCCIS to exchange documents such as electronic referrals with secondary care...

WCRS - Documents SOAP

Store and retrieve patient documents and perform basic searches

This API is used to store documents in the Welsh Care Records Service (WCRS), the central patient document store for NHS Wales. You can use it to store/retrieve patient documents in a variety...

WCRS - Documents Advanced Search

Perform faceted search queries against the content and metadata of patient documents

We use Apache Solr to provide advanced search against patient documents in the Welsh Care Record Service. You can perform general searches across all document content...

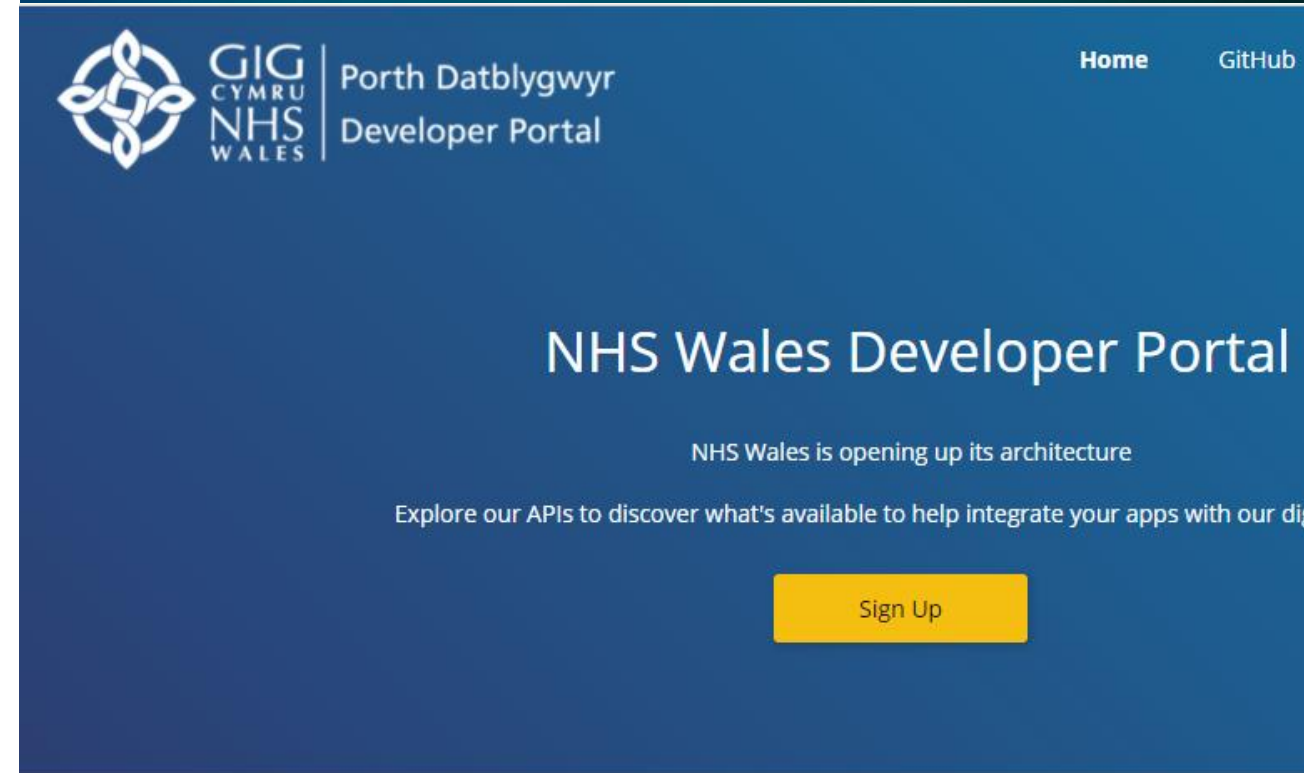
WDS - Patient Demographics SOAP

Search for patient demographic information such as Address, Date of Birth, NHS Number etc.

This API provides access to the Welsh Demographics Service. You can search for a patient by NHS Number or information such as name and date of birth and a standard...

Developer Portal

- API Catalogue
 - Sandbox APIs
 - SDK (Software development kit/guides)
 - Standards
 - Assurance Requirements
-
- Driver - open architecture approach, opening up access to NHS Wales data resources



The NHS Wales Developer Portal is in BETA. We welcome feedback so please use the widget or email [ec...](#) what you think.



Developer Portal

Original intention was to develop open access APIs. We have Multiple Sandbox APIs

- Reference data
- Demographic data
- Diagnostics observations
- SNOMED CT
- Welsh Care Record Service

It's a journey not an event

- Sandbox area
- What APIs are useful?



Benefits of the Portal

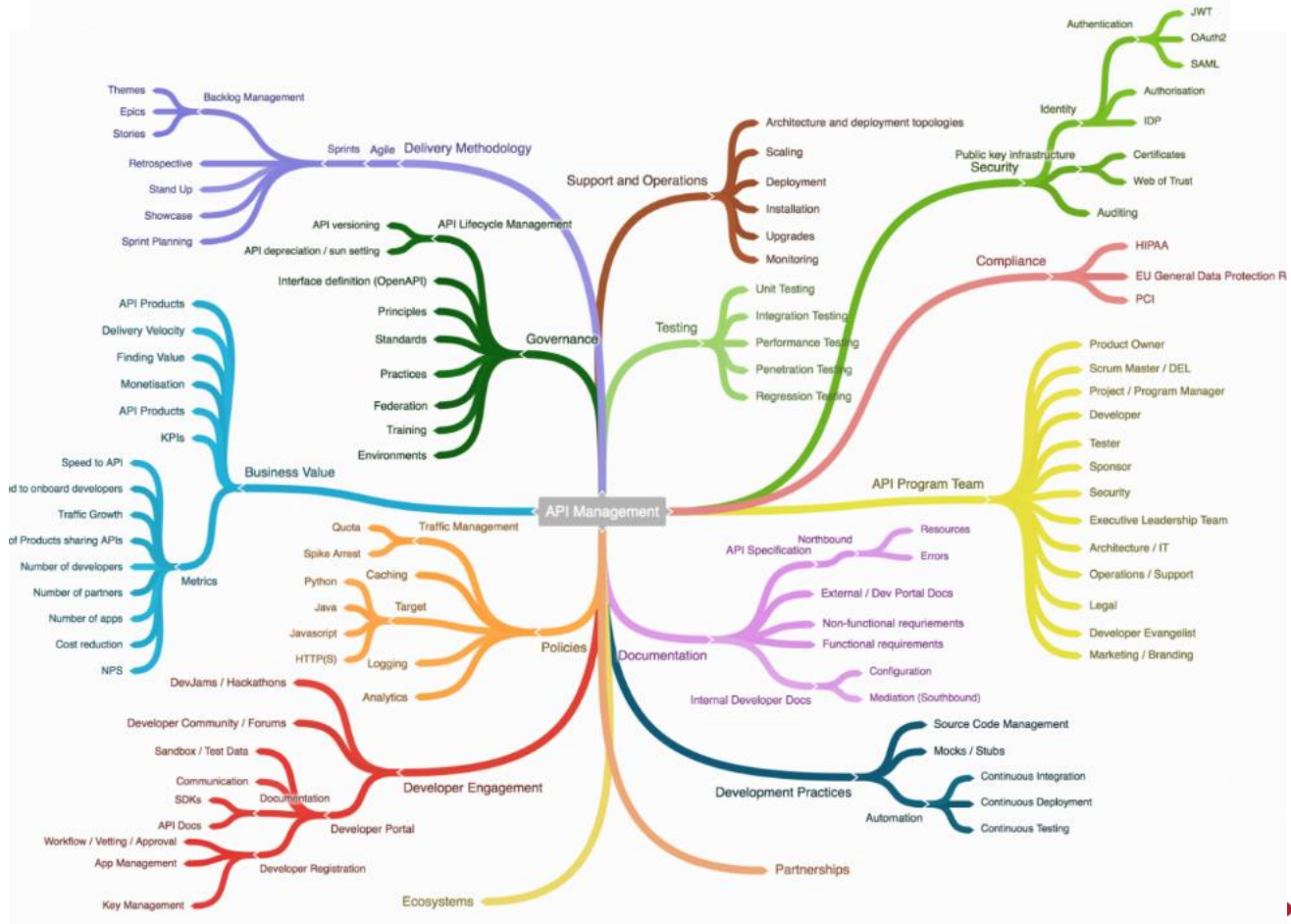
- Single place for guidance on how to access NHS Wales Resources
- Ease of Integration for systems
 - For 3rd Party suppliers
 - Promote use of consistent standards
- Open and Transparent
- Test Harness
- Reduced burden on developers
 - Developers can be pointed to the Portal to develop a POC or understand integration requirements.
- Open Technical Standards

Next Steps

- Feedback and continuously improve the Developer Portal
- Work with Life Sciences Hub Wales to further improve industry engagement on the Developer Portal
- Build a catalogue of developer focused content
- Publishing information standards such as SNOMED Clinical Terms and guidelines for Wales.
- Create an all NHS Wales Developer Portal
 - Wider Organisations
 - Health Boards
 - Social Care Wales
- Production API Management



Why is API Management Important



API Management Journey



Sandbox APIs

In order to build proof of concept demos and understand integration requirements and standards we expose Sandbox and mock APIs



API Catalogue

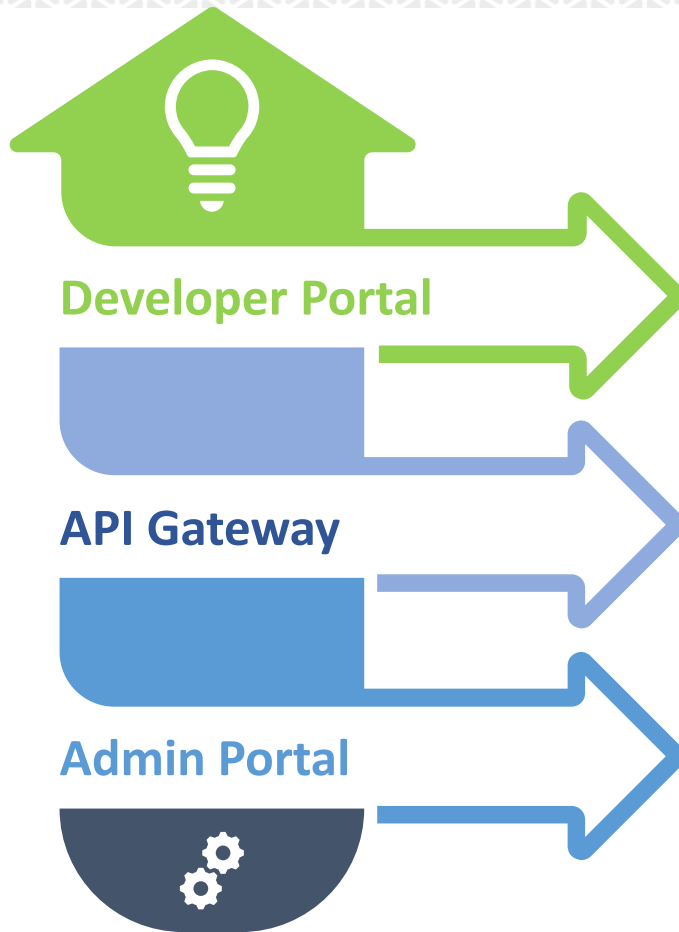
DHEW have started the process of cataloguing NHS Wales APIs



Production API Management

Build a vision for production API management in Wales to support Open Architecture and Integration

API Management



Developer Portal

Documentation / API Catalogue / Standards /
Accounts / Access Analytics

API Gateway

Accepts API Call / Routing / Verifies API Key / Enforces
Policies / Transformations / Analytics

Admin Portal

Define and Import APIs / Create Products / Set up and
administer Gateway / Analyse usage / Manage users

API Management



✓ Authentication

✓ Caching

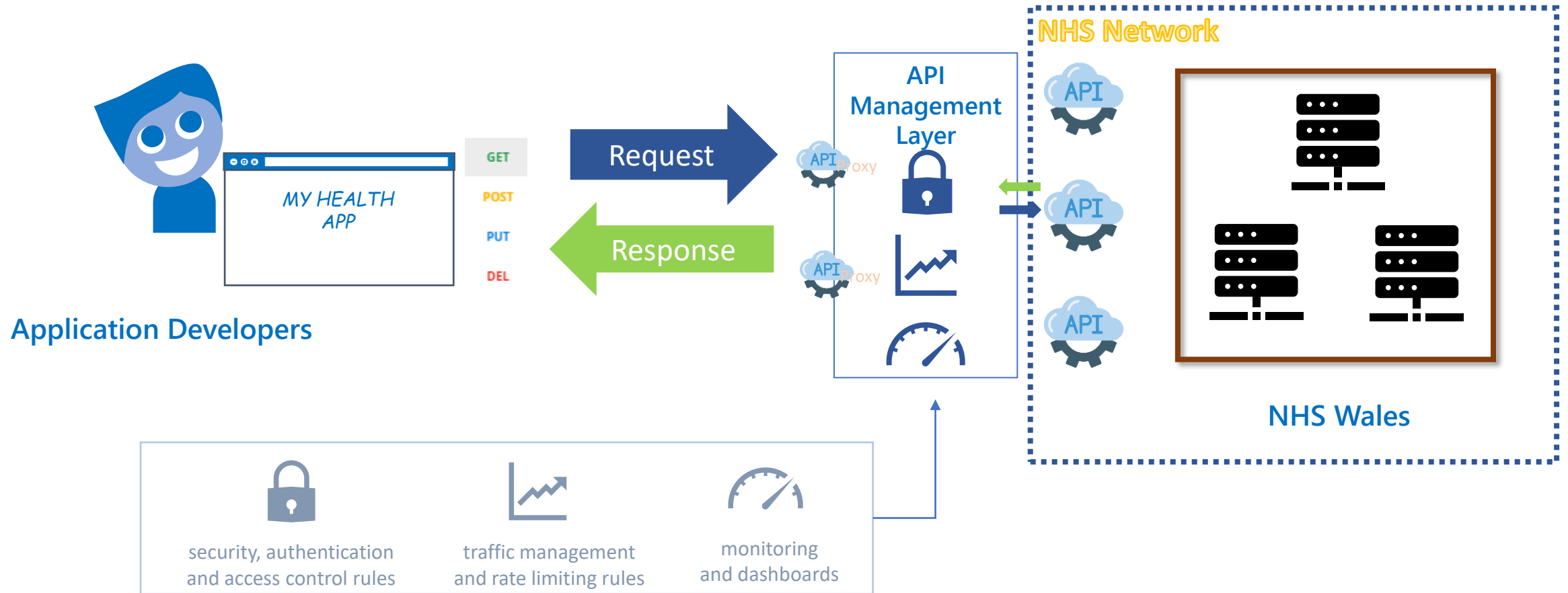
✓ Security

✓ Traffic Management

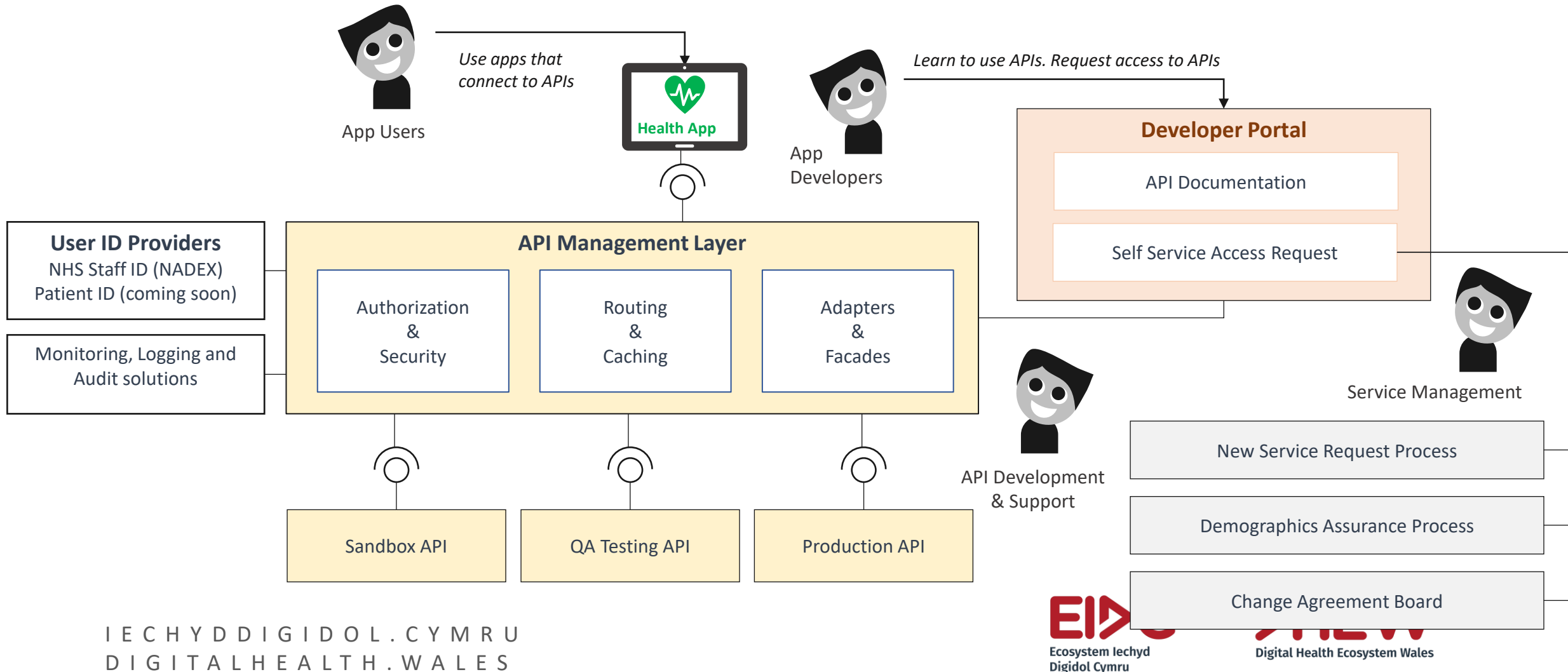
✓ Auditing & Logging

✓ Analytics

API Management

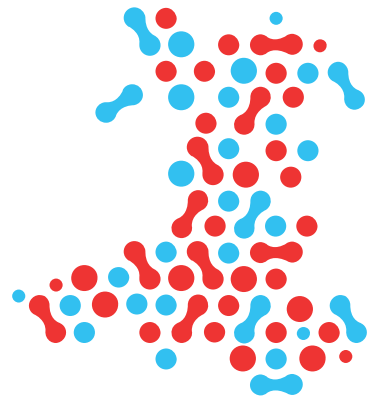


Connected Experience



Connected Experience

- API Management Supports
 - Opening up the architecture
 - Improve the way data is used.
 - Common interfaces and technical standards
 - Drive Standards based interoperability



NDR

Adnodd Data Cenedlaethol
National Data Resource

Strategic Direction

- Working as part of the NDR wider programme to open architecture
- Production API Management
- One Portal for NHS Wales
 - Roll out over time to wider orgs, other HBs and social care Wales
- A linked up process to paths to production
- Developer engagement



Contact Us

*If you have queries, suggestions or ideas of how we can work with you please
Drop us a line to discuss the Ecosystem and Portal!*



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Programme Executive

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Eugene O'Sullivan

Product Specialist

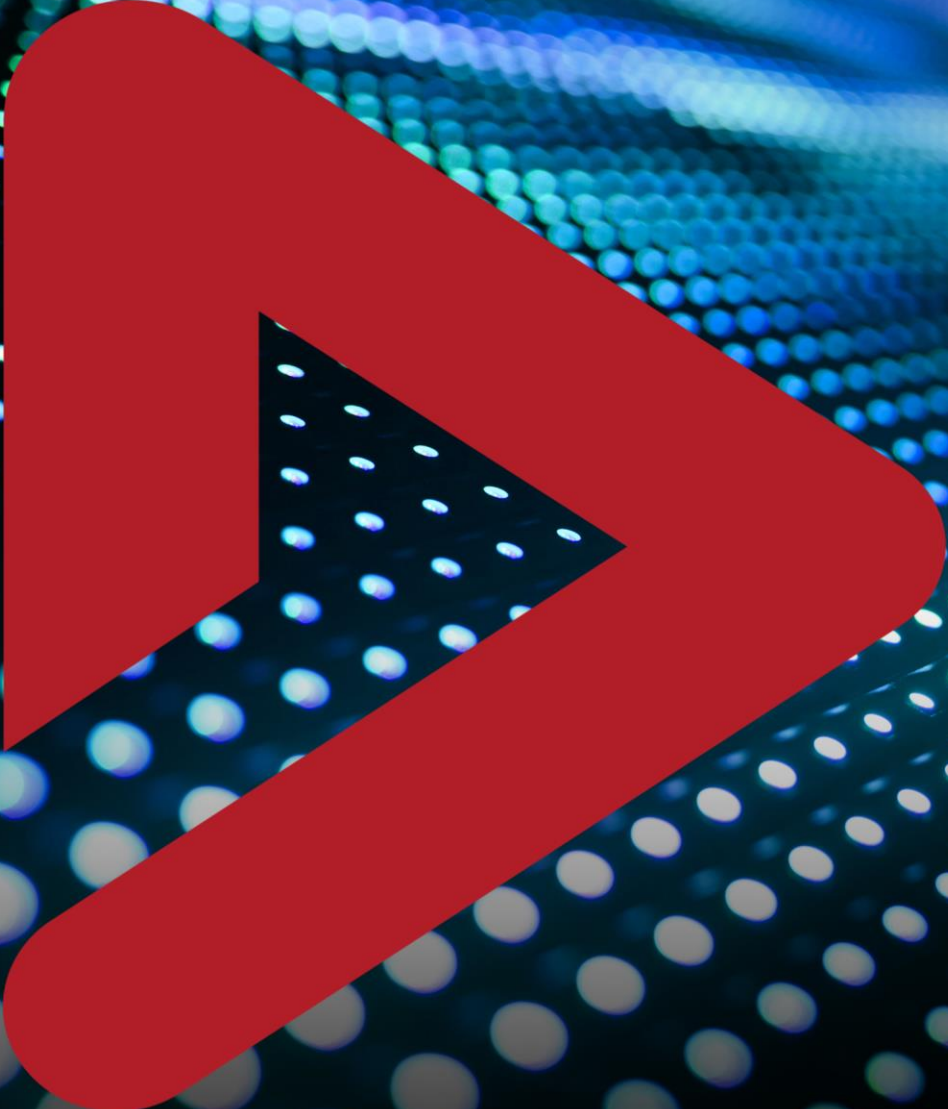
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