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Australian Government
Australian Digital Health Agency

# Introduction to the National Clinical Terminology Service (NCTS)

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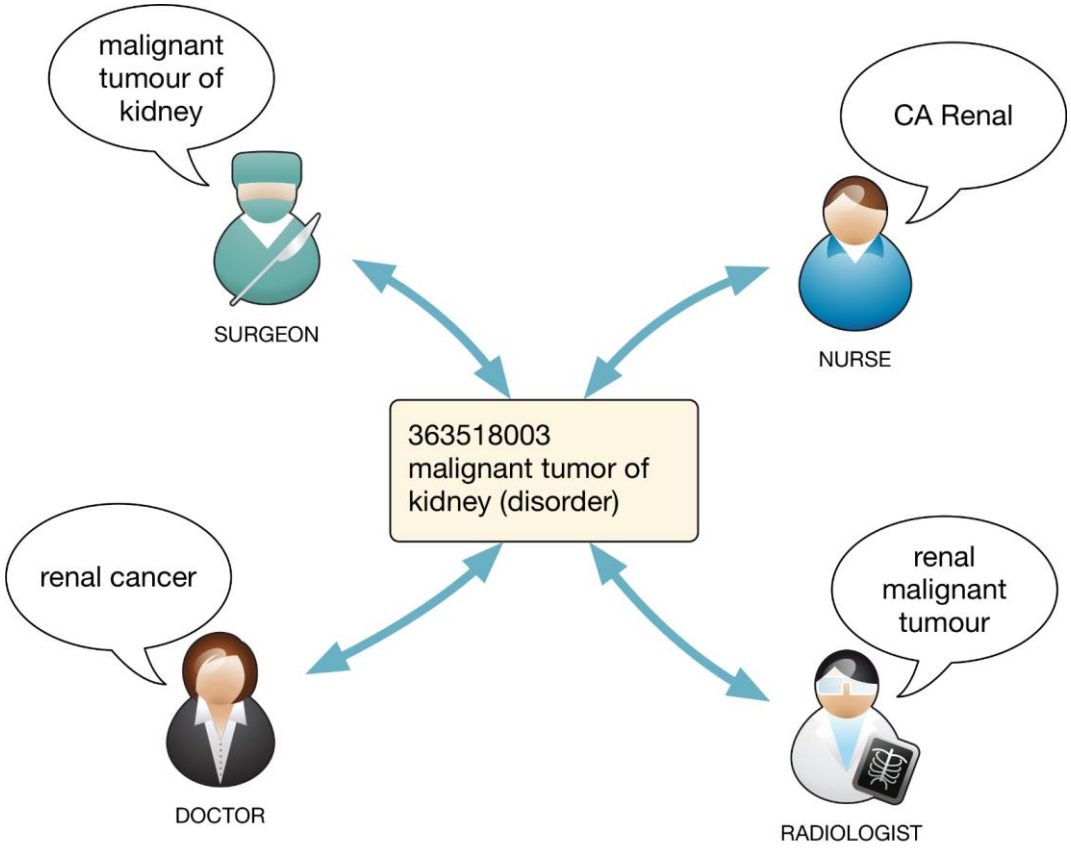
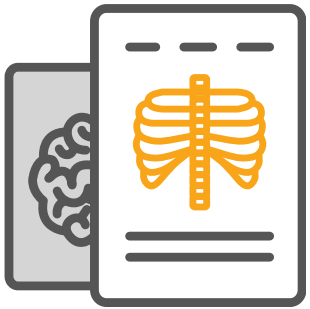
# What is Terminology?

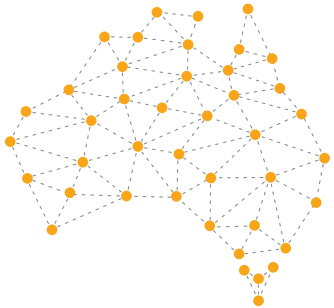
# Why terminology?



# SNOMED CT-AU

- SNOMED CT is a comprehensive, multilingual clinical terminology
- SNOMED CT-AU = Australian Edition of SNOMED CT
  - Incorporates the Australian Medicines Terminology (AMT), a standard terminology for commonly used medicines in Australia
  - Includes a number of reference sets based around common use cases
- Official release format is RF2, a set of tab-delimited text files





# Terminology adoption

BARRIER

- Time consuming and expensive for software vendors to maintain, and just another thing to manage for adopting organisations

CHALLENGE

- How can we drive consistent, meaningful use while reducing the burden on the software industry?
- How can we support localisation to meet the needs of different health professionals across Australia?

OUTCOME

- National terminologies adopted by all public and private healthcare organisations and their software providers

# VISION STATEMENT

National Clinical Terminology Service (NCTS)

*Improve the delivery of healthcare*
*through the realisation of the benefits of clinical terminology*
*by simplifying its adoption and meaningful use*

## USERS

Implementers and integrators of clinical information systems

MyHR system operator

Implementers and deployers of terminology servers

Local terminology maintainers

Publishers of proprietary clinical terminology and knowledge base products

Public health researchers

## NEEDS

Local terminology services that support coding of clinical information at the point of care

More structured clinical content within MyHR

Reduction of effort in maintaining mappings between national and existing local terminologies

Mechanism for receiving timely updates to national terminologies

Improved throughput of requests for change to the national terminologies

Better collaboration between authors of clinical terminology across Australia

## PRODUCT

A national portal that can serve as a one-stop shop for all national terminology products

Specifications that describe a standard way of representing and interacting with clinical terminology data

National services that support automatic syndication of national terminology products to clinical systems across Australia

A standard terminology server implementation that can be deployed with minimal effort

Tooling to support creation and maintenance of mappings between local and national terminologies

Structured submission of national content requests, and automated processing of them

Shared registry through which approved community-authored terminology products can be discovered and accessed

## VALUE

Improved adoption of national terminologies

Improved clinical safety outcomes, due to increased use of terminology and more up-to-date terminology

Enabling decision support capabilities within clinical information systems

Reduction in cost of setting up and maintaining local terminology services

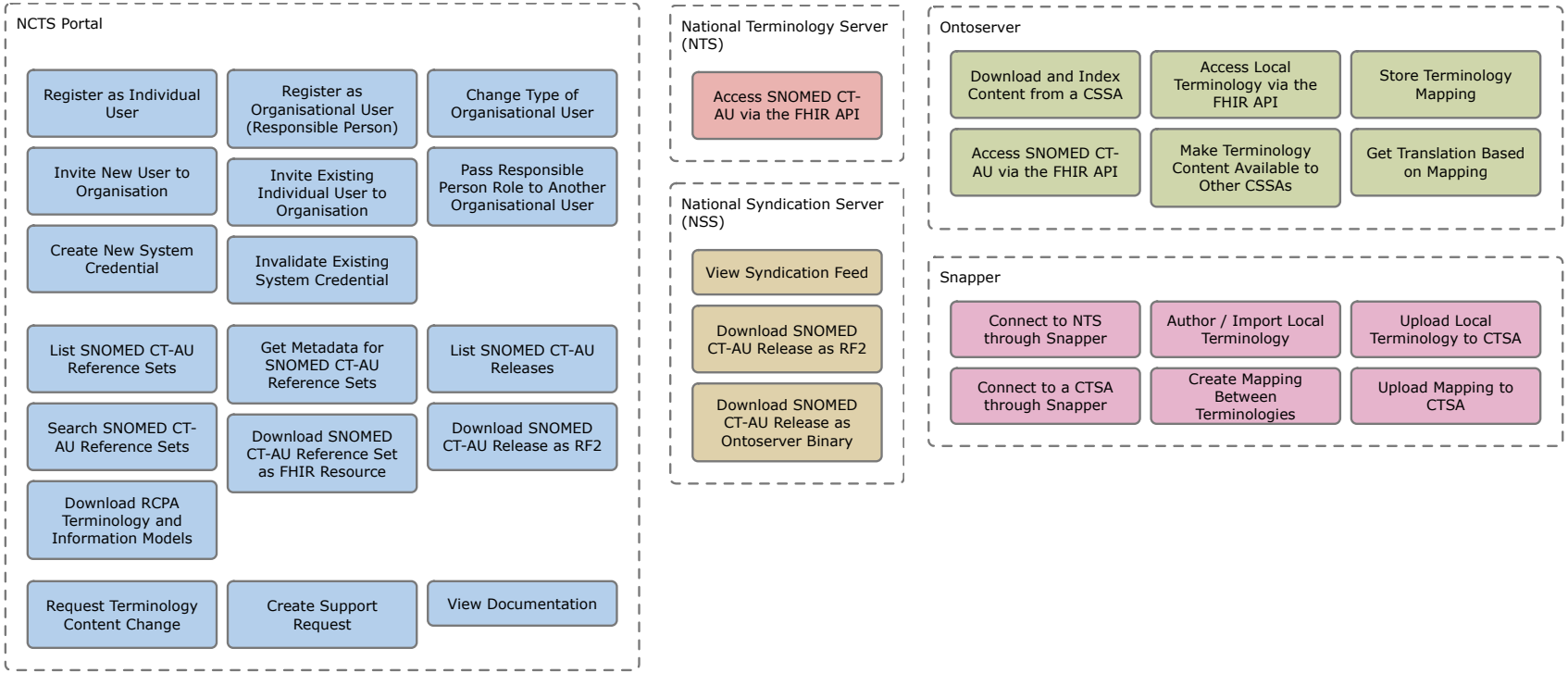
Reduction in cost of local terminology maintenance

Reduced duplication of local terminology authoring effort, due to visibility of shared content

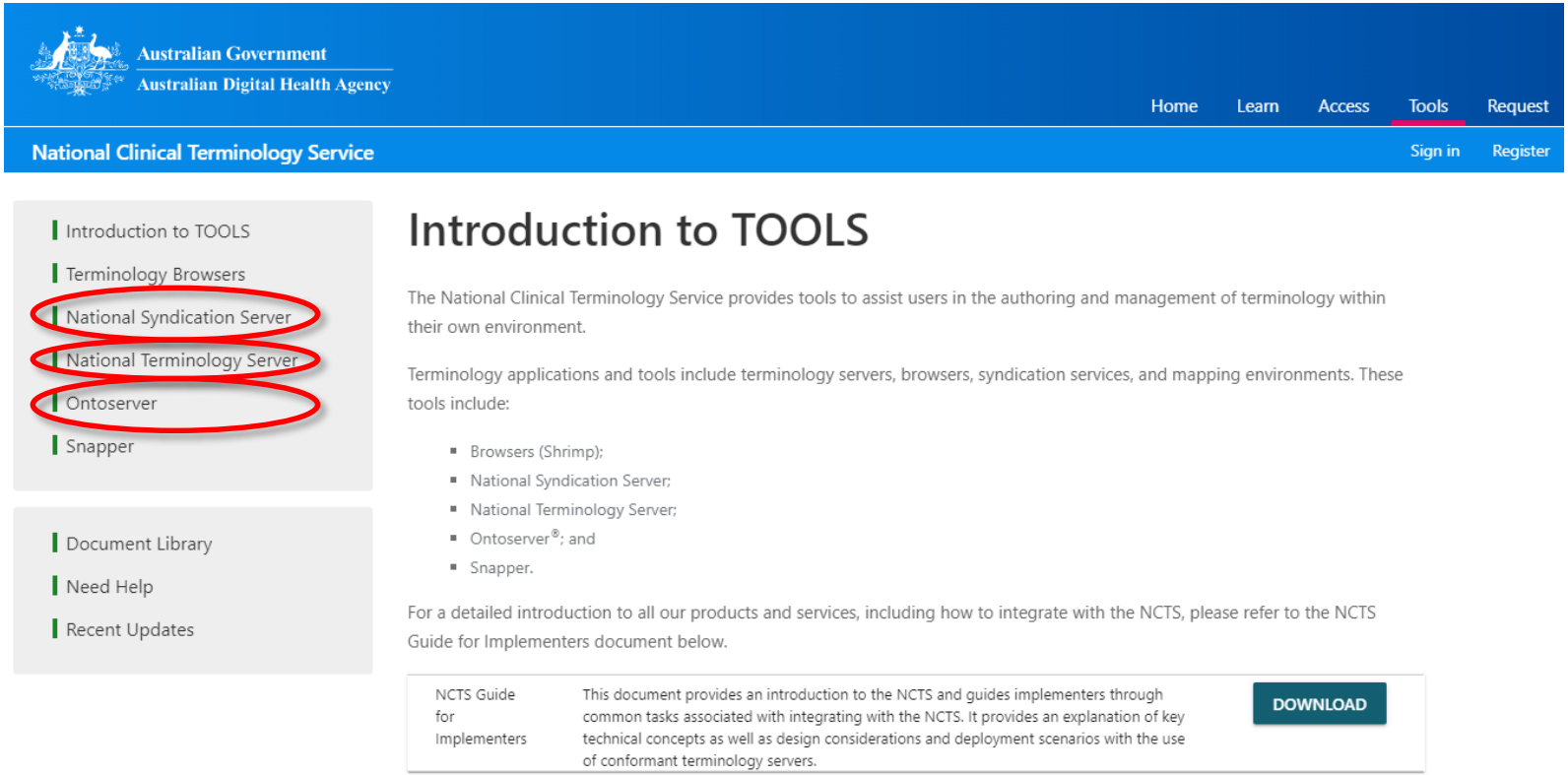
Greater proportion of structured content in MyHR, supporting complex views, improved semantic interoperability and richer analytics

# National Clinical Terminology Service (NCTS)

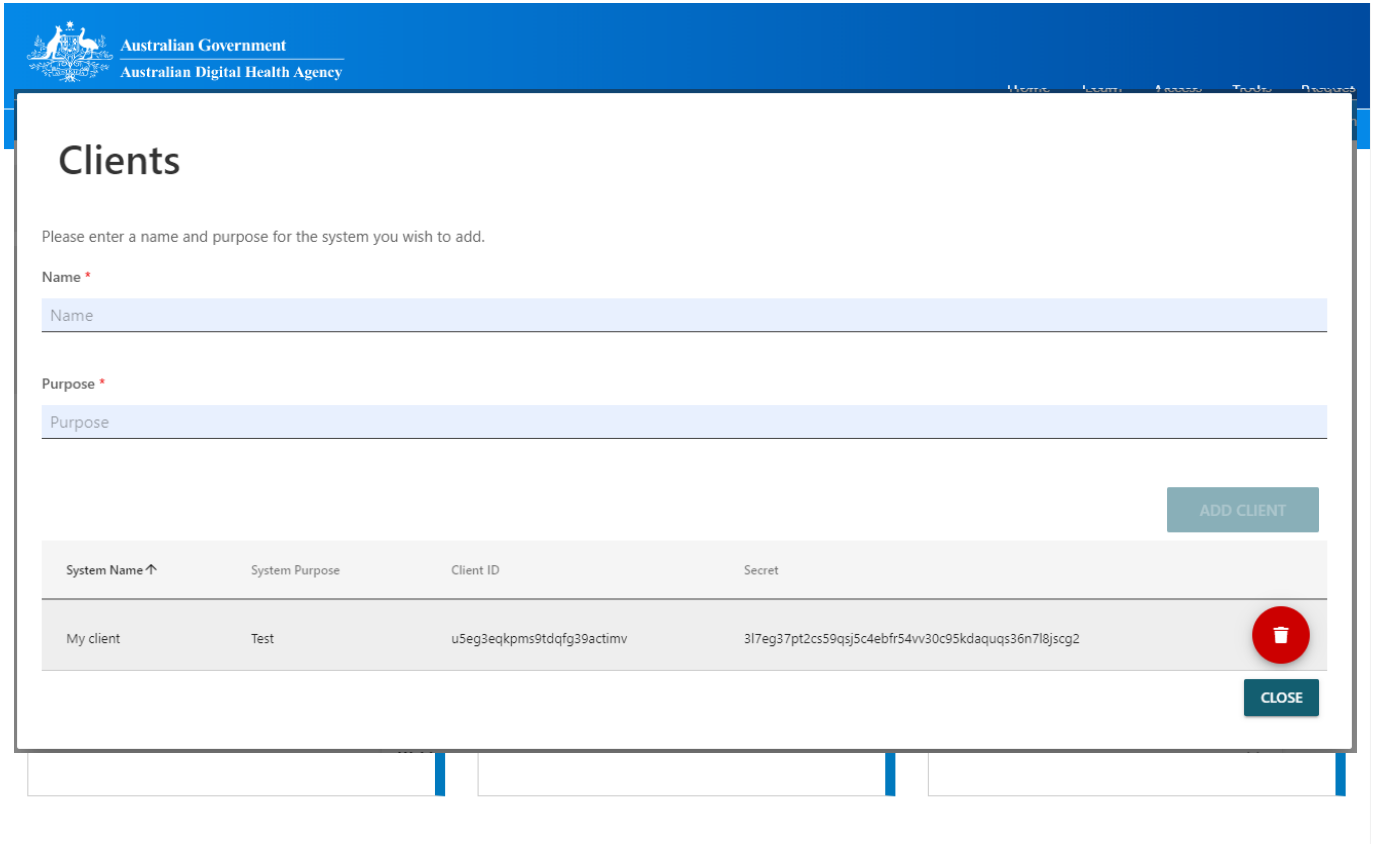
# Components of the NCTS – current state and use cases



# NCTS portal – www.healthterminologies.gov.au

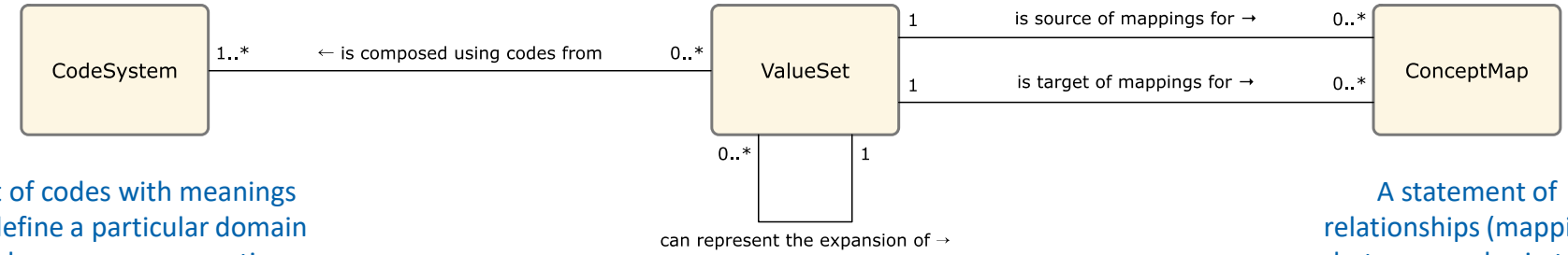


# NCTS portal – creating client credentials



# National terminology server content – what's on offer?

- The National Terminology Server (NTS) is populated from the traditional RF2 files, a vendor would traditionally have to consume
- Containing SNOMED CT Int + SNOMED CT-AU extension, including AMT
- Terminology can be queried using the FHIR® standard
- Content is represented as:




A set of codes with meanings that define a particular domain (also known as enumeration, terminology, classification, and/or ontology)

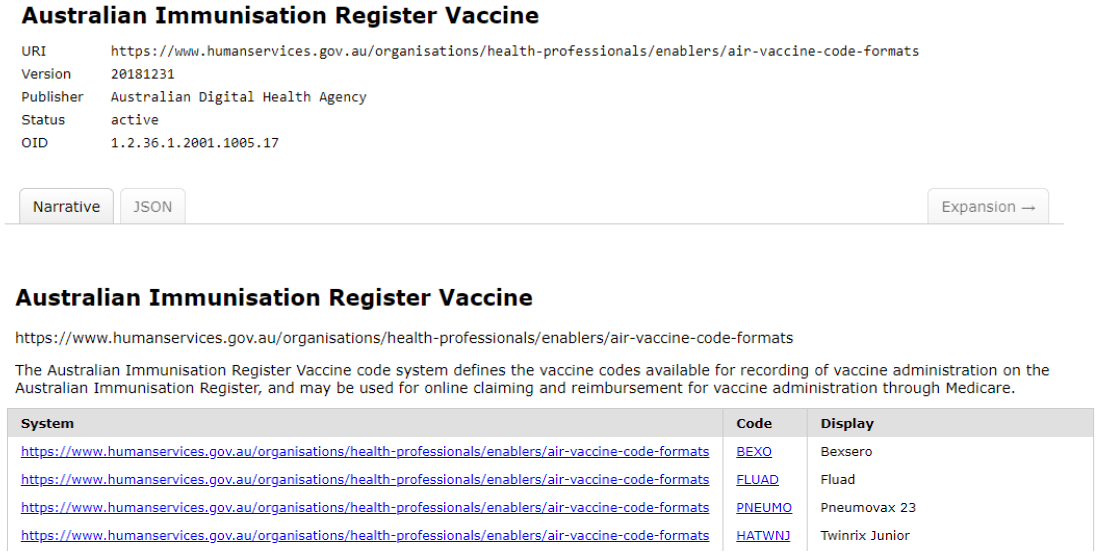
Specifies a list of codes taken from one or more CodeSystems for use in a particular context

A statement of relationships (mapping) between codes in two ValueSets

# NCTS CodeSystems

https://healthterminologies.gov.au/fhir/CodeSystem

- SNOMED CT-AU (including AMT)
- HL7®
- Australian Immunisation Register Vaccine
- ANZSCO
- METeOR based code systems
  - Australian Indigenous Status
  - Australian States and Territories
- Other Agency developed Code Systems
  - IHI Record Status
  - Australian Benefit and Payment Category
  - NCTIS Data Components
- PBS (future)
- LOINC (future)



**Australian Immunisation Register Vaccine**

| | |
|---|---|
| URI | https://www.humanservices.gov.au/organisations/health-professionals/enablers/air-vaccine-code-formats |
| Version | 20181231 |
| Publisher | Australian Digital Health Agency |
| Status | active |
| OID | 1.2.36.1.2001.1005.17 |

Narrative | JSON | Expansion →

**Australian Immunisation Register Vaccine**

https://www.humanservices.gov.au/organisations/health-professionals/enablers/air-vaccine-code-formats

The Australian Immunisation Register Vaccine code system defines the vaccine codes available for recording of vaccine administration on the Australian Immunisation Register, and may be used for online claiming and reimbursement for vaccine administration through Medicare.

| System | Code | Display |
|---|---|---|
| https://www.humanservices.gov.au/organisations/health-professionals/enablers/air-vaccine-code-formats | BEXO | Bexsero |
| https://www.humanservices.gov.au/organisations/health-professionals/enablers/air-vaccine-code-formats | FLUAD | Fluad |
| https://www.humanservices.gov.au/organisations/health-professionals/enablers/air-vaccine-code-formats | PNEUMO | Pneumovax 23 |
| https://www.humanservices.gov.au/organisations/health-professionals/enablers/air-vaccine-code-formats | HATWNJ | Twinrix Junior |

# NCTS ValueSets

https://healthterminologies.gov.au/fhir/ValueSet

- SNOMED CT-AU
  - AMT Vaccine
  - Clinical Condition
  - Observation Method
  - Medication Container Type
  - Immunisation Route of Administration
- HL7®
- Common Languages in Australia
- Other Agency developed value sets

**Australian Medicines Terminology Vaccine**

| | |
|---|---|
| URI | https://healthterminologies.gov.au/fhir/ValueSet/amt-vaccine-1 |
| Version | 1.0.1 |
| Publisher | Australian Digital Health Agency |
| Status | draft |
| OID | 1.2.36.1.2001.1004.201.10042 |

Narrative | JSON | Expansion →

**Australian Medicines Terminology Vaccine**

https://healthterminologies.gov.au/fhir/ValueSet/amt-vaccine-1

The Australian Medicines Terminology (AMT) Vaccine value set includes AMT product concepts that may be used to record a vaccine product.

| System | Code | Display |
|---|---|---|
| http://snomed.info/sct | 958371000168101 | Zostavax 19 400 PFU powder for injection, 10 vials |
| http://snomed.info/sct | 768611000168103 | Fluquadri Junior 2016 injection, 10 x 0.25 mL syringes |
| http://snomed.info/sct | 825041000168105 | Avaxim Needle Free 160 antigen units/0.5 mL injection, 0.5 mL syringe |
| http://snomed.info/sct | 845891000168107 | Meningitec 10 microgram/0.5 mL injection, 0.5 mL syringe |

# NCTS ConceptMaps

https://healthterminologies.gov.au/fhir/ConceptMap

- Support migration from Agency legacy information specifications
- Demonstrate mapping of concepts from Agency CDA® specifications to Agency FHIR® specifications

- Implicit SNOMED CT ConceptMaps are available
  - POSSIBLY EQUIVALENT TO - inexact
  - REPLACED BY - equivalent
  - SAME AS - equal
  - ALTERNATIVE - inexact

# Interacting with the NCTS via APIs

# NCTS APIs

NCTS Authentication API

- Allows client to request an access token, to subsequently interact with secure API endpoints (excluding capability statement and syndication feed)

NCTS FHIR API

- Profile of the FHIR® REST API and Terminology Service API
- Allows for terminology within a terminology server to be queried and manipulated

NCTS Syndication API

- Profile of the Atom Publishing Protocol
- Allows for a feed of available terminology content to be interrogated, along with links to download the content

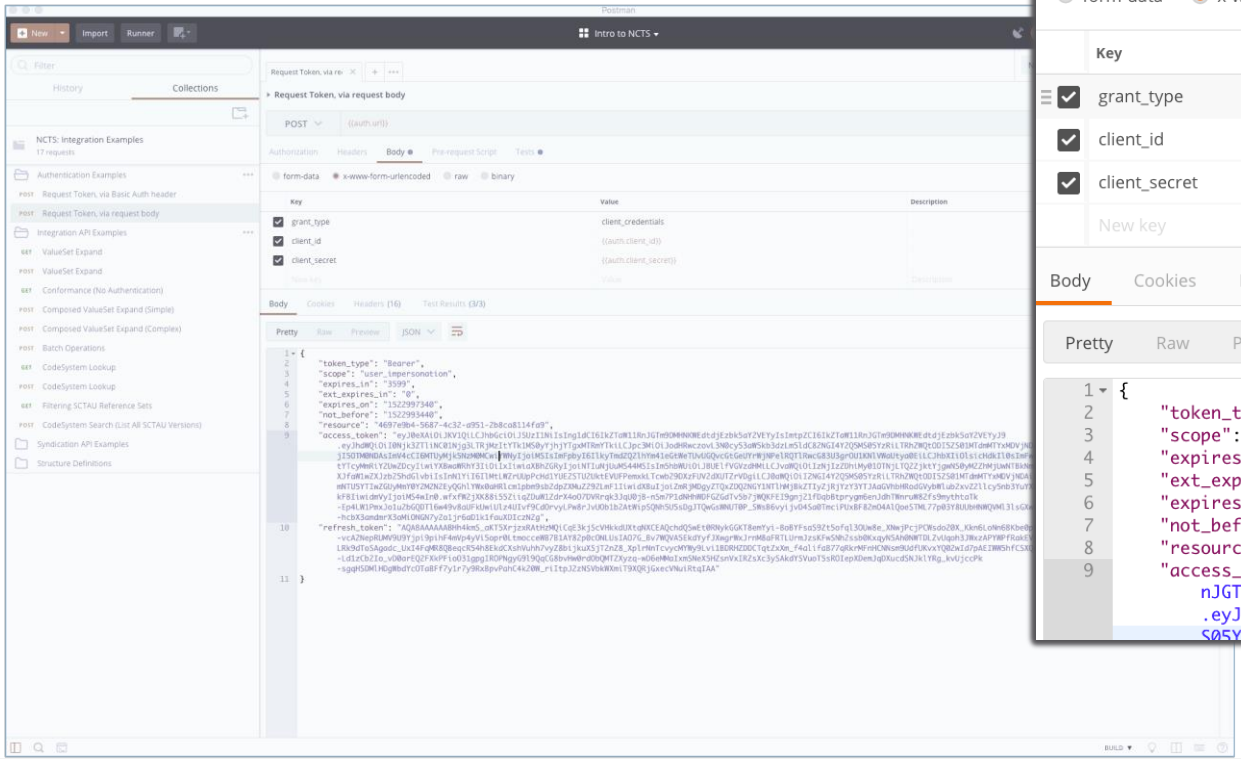
# NCTS APIs - NTS

- The NTS is a 'Fast Healthcare Interoperability Resources' (FHIR)® based terminology server. A full specification of FHIR can be found at https://www.hl7.org/fhir/
- The NCTS provides a Postman collection (found at https://www.healthterminologies.gov.au/docs/NCTS_Postman_Collection.json) of example FHIR queries, against the NTS. The examples include (but are not limited to) the following requests:

| | |
|---|---|
| **Capability Statement** | A definition of the operations supported by this FHIR server |
| **ValueSet $expand (implicit)** | An expansion of SCT codes contained within a refset based ValueSet |
| **ValueSet $expand (composed)** | A dynamic ValueSet, composed of codes that meet a definition provided by the client request |
| **CodeSystem $lookup** | Lookup the definition of a code, within a specified CodeSystem |
| **ConceptMap $translate** | Request the equivalent code in CodeSystem B, for the provided code in CodeSystem A, based on a ConceptMap within the NTS |
| **ValueSet $validate** | Verify that the provided code exists in the specified ValueSet |

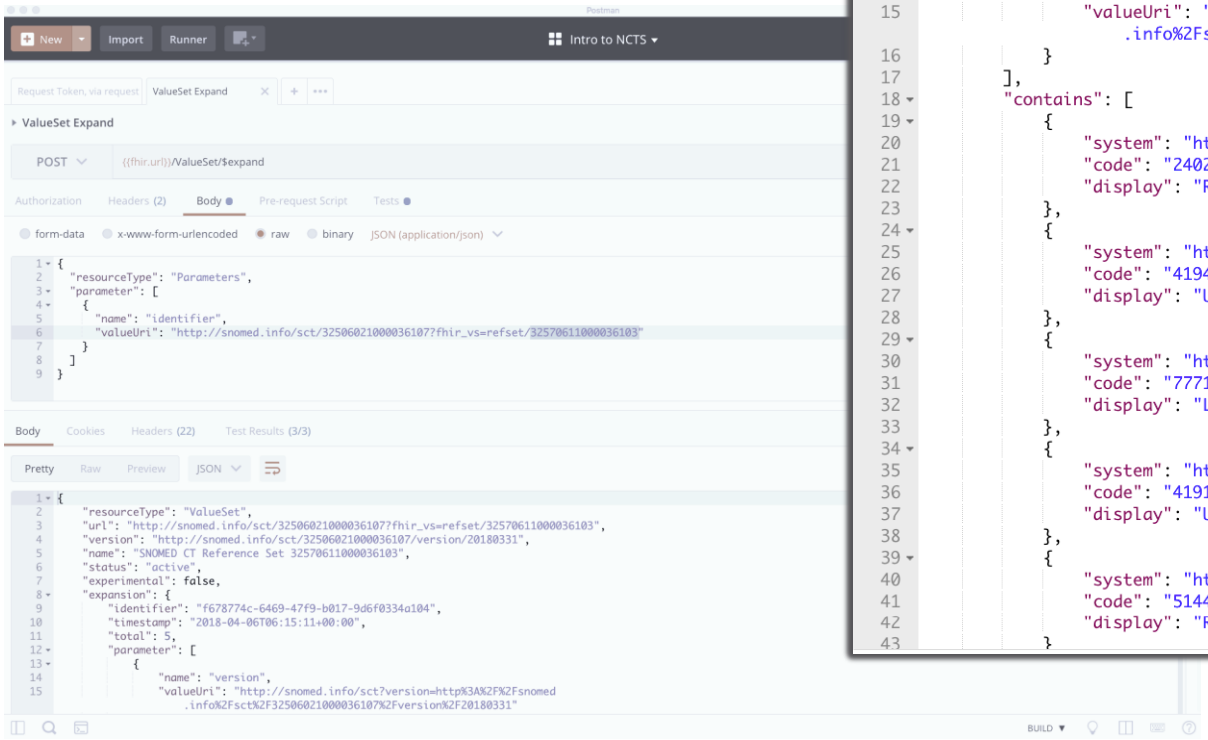
# NCTS APIs – NTS Examples

## Step 1 – Request Auth token



# NCTS APIs – ValueSet $expand

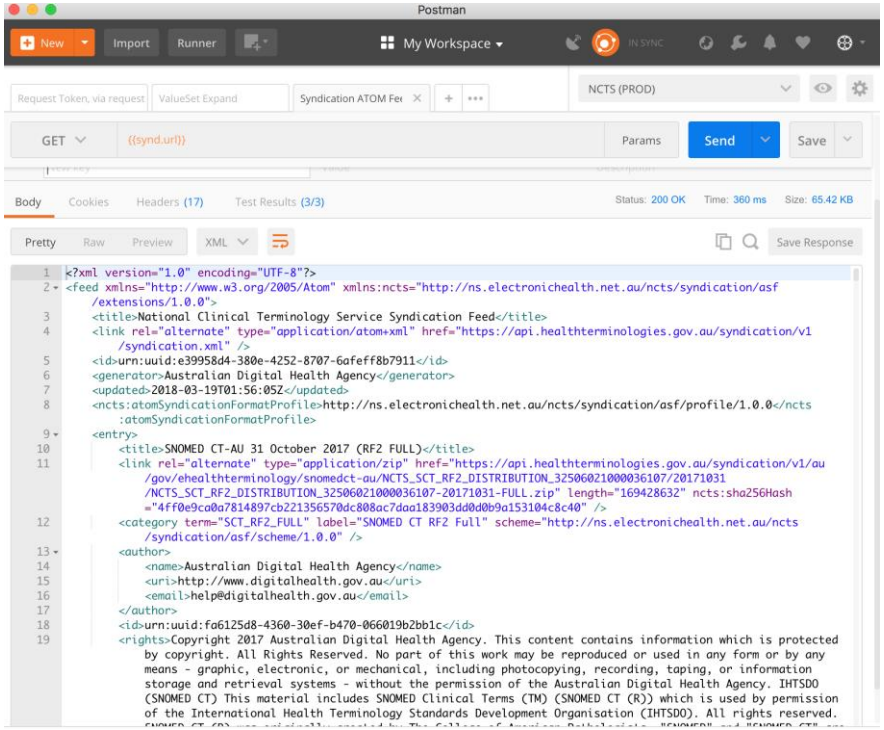
## Example 1 - Request ValueSet Expansion




```
        "identifier": "f678774c-6469-47f9-b017-9d6f0334a104",
        "timestamp": "2018-04-06T06:15:11+00:00",
        "total": 5,
        "parameter": [
            {
                "name": "version",
                "valueUri": "http://snomed.info/sct?version=http%3A%2F%2Fsnomed
                    .info%2Fsct%2F32506021000036107%2Fversion%2F20180331"
            }
        ],
        "contains": [
            {
                "system": "http://snomed.info/sct",
                "code": "24028007",
                "display": "Right"
            },
            {
                "system": "http://snomed.info/sct",
                "code": "419465000",
                "display": "Unilateral right"
            },
            {
                "system": "http://snomed.info/sct",
                "code": "7771000",
                "display": "Left"
            },
            {
                "system": "http://snomed.info/sct",
                "code": "419161000",
                "display": "Unilateral left"
            },
            {
                "system": "http://snomed.info/sct",
                "code": "51440002",
                "display": "Right and left"
            }
```

# NCTS APIs – NSS

## Example 2 - Request Syndication Feed




```
GET /syndication/v1/syndication.xml HTTP/1.1
Host: api.healthterminologies.gov.au
Cache-Control: no-cache
```

Feed response:

- Is ATOM/XML format
- Provides a catalogue of resources clients may syndicate from us
- Definitions (including hrefs) to last 6 Ontoserver binary indexes
  - 1 index per SCTAU release
- Definitions (including hrefs) to last 24 SNOMED CT RF2 bundles
  - 4 bundle per SCTAU release (Full, Snapshot, Delta, All)

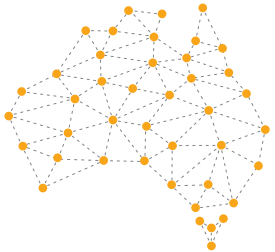
# Ontoserver™

- Terminology server appliance designed to make it easy to deploy local terminology services
- Can expose SNOMED CT and other terminologies via a FHIR® REST interface
- Supports complex querying of SNOMED CT, including subsumption, closure tables and ECL
- Removes the need to process SCT-AU RF2 for most use cases
- Can be set up to automatically retrieve updates to national terminologies from the National Syndication Server
- Supports SCRUD for FHIR CodeSystem, ValueSet and ConceptMap

GET /ValueSet/$expand?identifier=http://snomed.info/sct?fhir_vs=refset/929360071000036103&filter=amox

# Snapper

- Web-based tool for assisting with the task of maintaining mappings between different code systems
- Capable of “automapping” to SNOMED CT, finding likely matches which can then be reviewed and confirmed
- Capable of processing historical and replacement associations between concepts, in order to update mappings when new versions are released
- Can store resulting maps within an Ontoserver instance, which can then be used for translation operations



# Implementation

# Deploying local terminology services

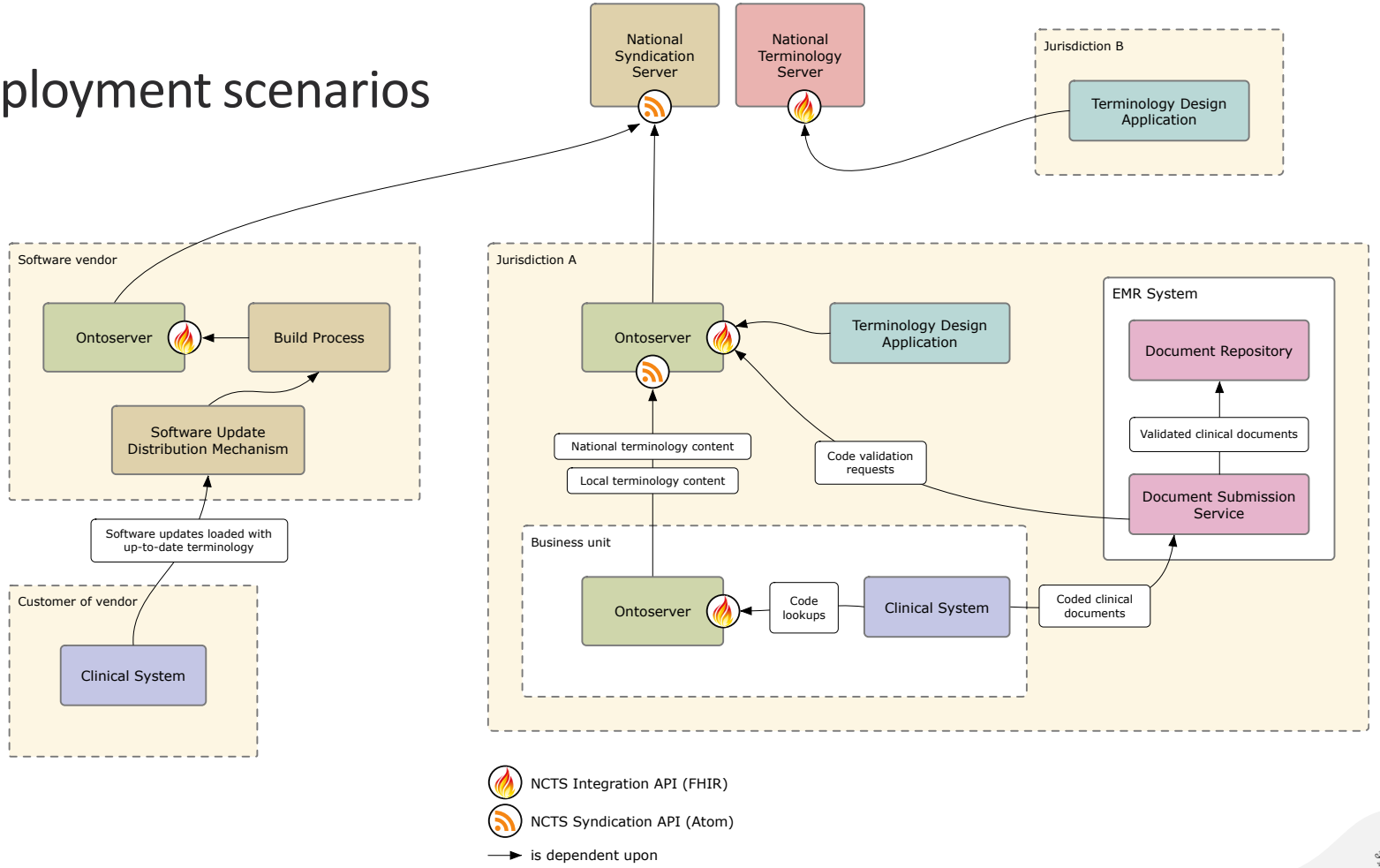
NCTS Guide for Implementers

- Explores some common deployment scenarios
- Consider the ideal topology for your planned deployment
- What is the expected scope of sharing localised content?

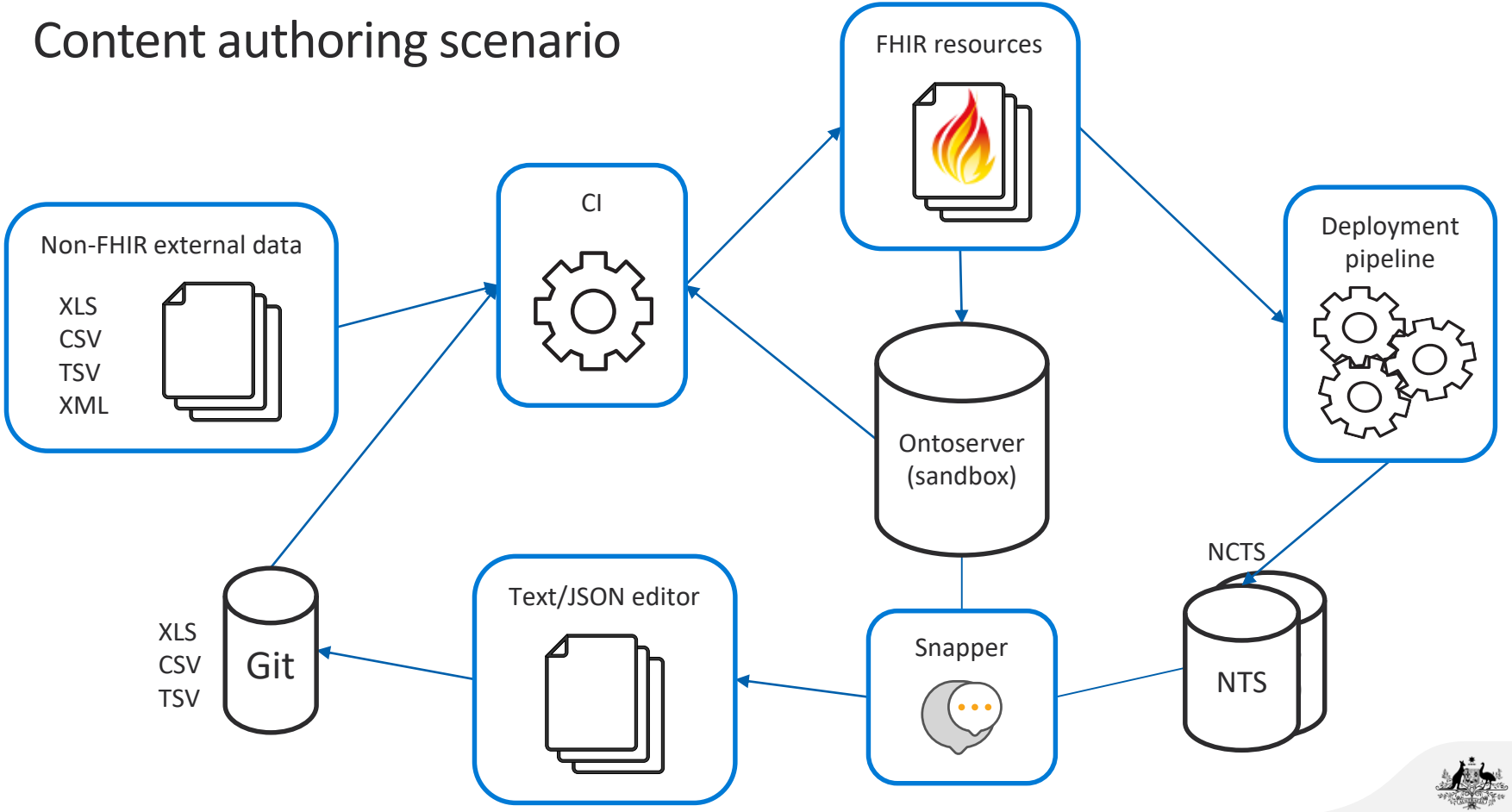
Common considerations

- Setting up a Terminology Server (Ontoserver™)
- Receiving updates. Syndicate with the NSS (or other FHIR® servers)
- Mapping between local and national terminologies, using Snapper

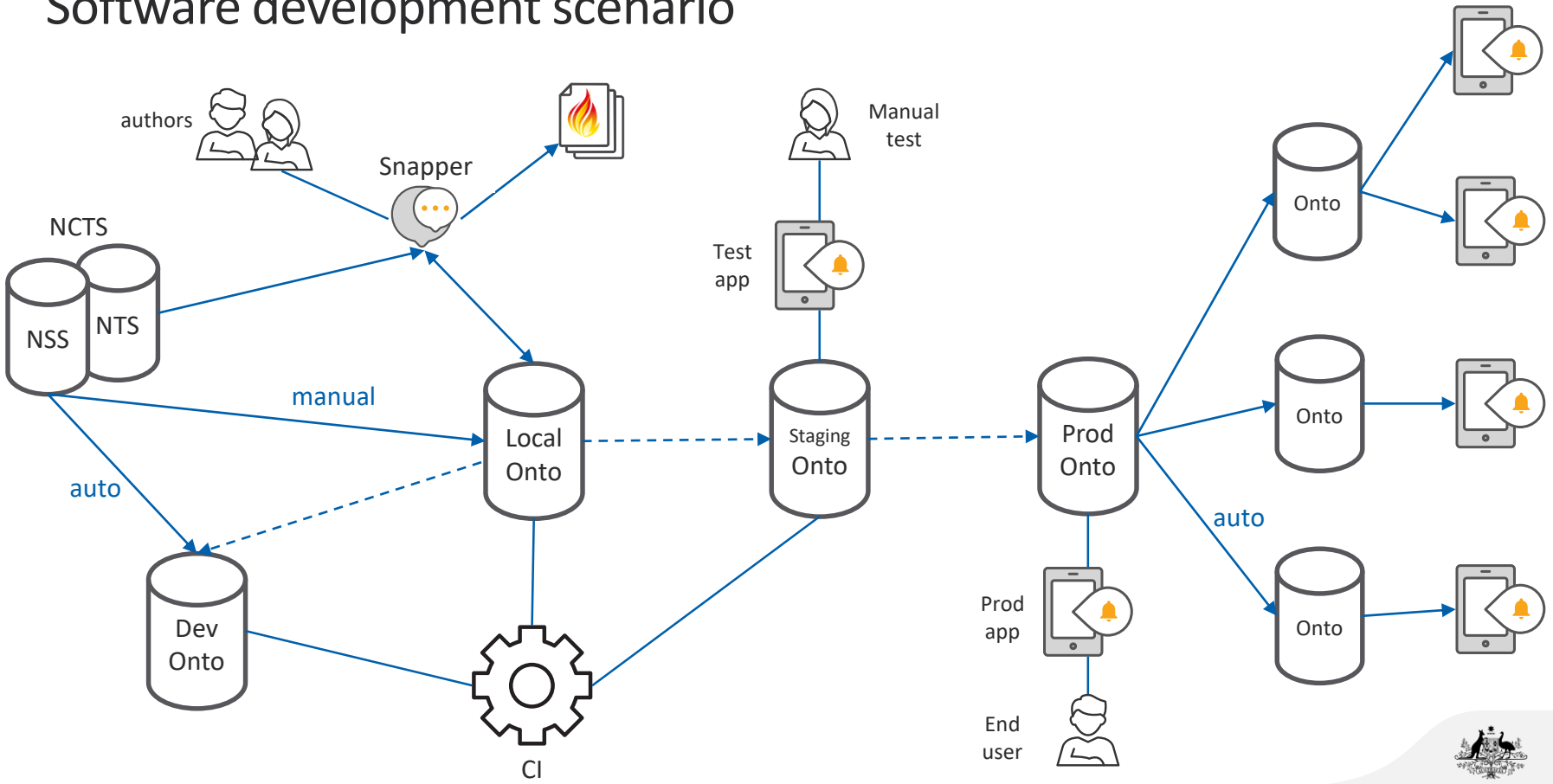
# Deployment scenarios



# Content authoring scenario



# Software development scenario



# Getting started

Resources:

- NCTS Guide for Implementers
- NCTS Specifications
- SNOMED CT-AU Technical Implementation Guide

Ontoserver™ is available for free upon request:

- Contact us via help@digitalhealth.gov.au
- Documentation available at https://ontoserver.csiro.au/docs/6/

Snapper is available on the CSIRO website:

- https://ontoserver.csiro.au/snapper2

# Questions?

# Contact us

| | |
|---|---|
| Help Centre | 1300 901 001 |
| Email | help@digitalhealth.gov.au |
| Website | healthterminologies.gov.au<br>developer.digitalhealth.gov.au<br>digitalhealth.gov.au |
| Twitter | twitter.com/AuDigitalHealth |

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