



FHIR

# Introduction to FHIR

Grahame Grieve

IHTSDO SNOMED CT EXPO

27-Oct 2016

# The FHIR acronym

- F – Fast (to design & to implement)
  - H – Health
  - I – Interoperable
  - R – Resources
- 
- FHIR is a technical specification
  - FHIR is a community of implementers, a culture

# FHIR – Web API for healthcare

## Web Technology

- JSON / HTTP / Resources / RESTful API
- URIs / linked data / semantic web
- Aligns with other web standards

## Health Standard

- Covers all of healthcare
- HL7 v2 / CDA, DICOM, IHE support

## Web community

- Built on Social Media
- Open License
- Linked to W3C / IETF communities

## Health Community

- Linked by HL7 processes
- Members from all around the world

**Clinical Reasoning** – Quality Measures, Decision Support + CDS Hooks

**Summary**

**Care  
Planning**

**Diagnostics**

**Medications**

**Payments**

**Administration** – Patient, Provider, Organization, Device etc

**Conformance** – Profiles, Capabilities, Terminologies

**Technical Base** – API, Types, Smart, Documents, etc

# FHIR Ethos

- Simplicity / Agile Standard
- Web alignment
- Serves current Healthcare community
- Implementation focused
  - Connectathons | Reference Implementations | Public test servers
- Freely available
  - <http://hl7.org/fhir> : Unencumbered – free license
- Best Practice Governance
  - Iterative publishing: community leads

# Freely available

- License: Creative Commons Public Domain (CC0):  
“No Rights Reserved”
  - You can copy, modify, distribute and perform the work, even for commercial purposes, all without asking permission
  - The most open of open licenses
- Anyone can do anything with the content
  - There can be no disputes about ownership of rights to do anything with the FHIR content
  - HL7 waived its rights
- Do need approval to use the name FHIR as a trademark

# FHIR Progress

- Half way done
- Technical foundation is solid – focus: stabilising
- Partial Healthcare support – focus: filling out support
- Patient CCDS mostly done – focus: finish it off (near term)
- Growing the Implementation activities
- Building the business case for implementations

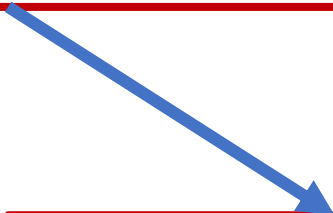
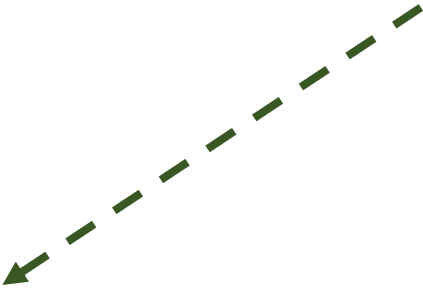
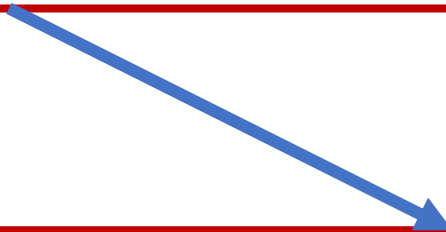
**FHIR** – platform Standard

Now split into US realm core  
+ Research Access

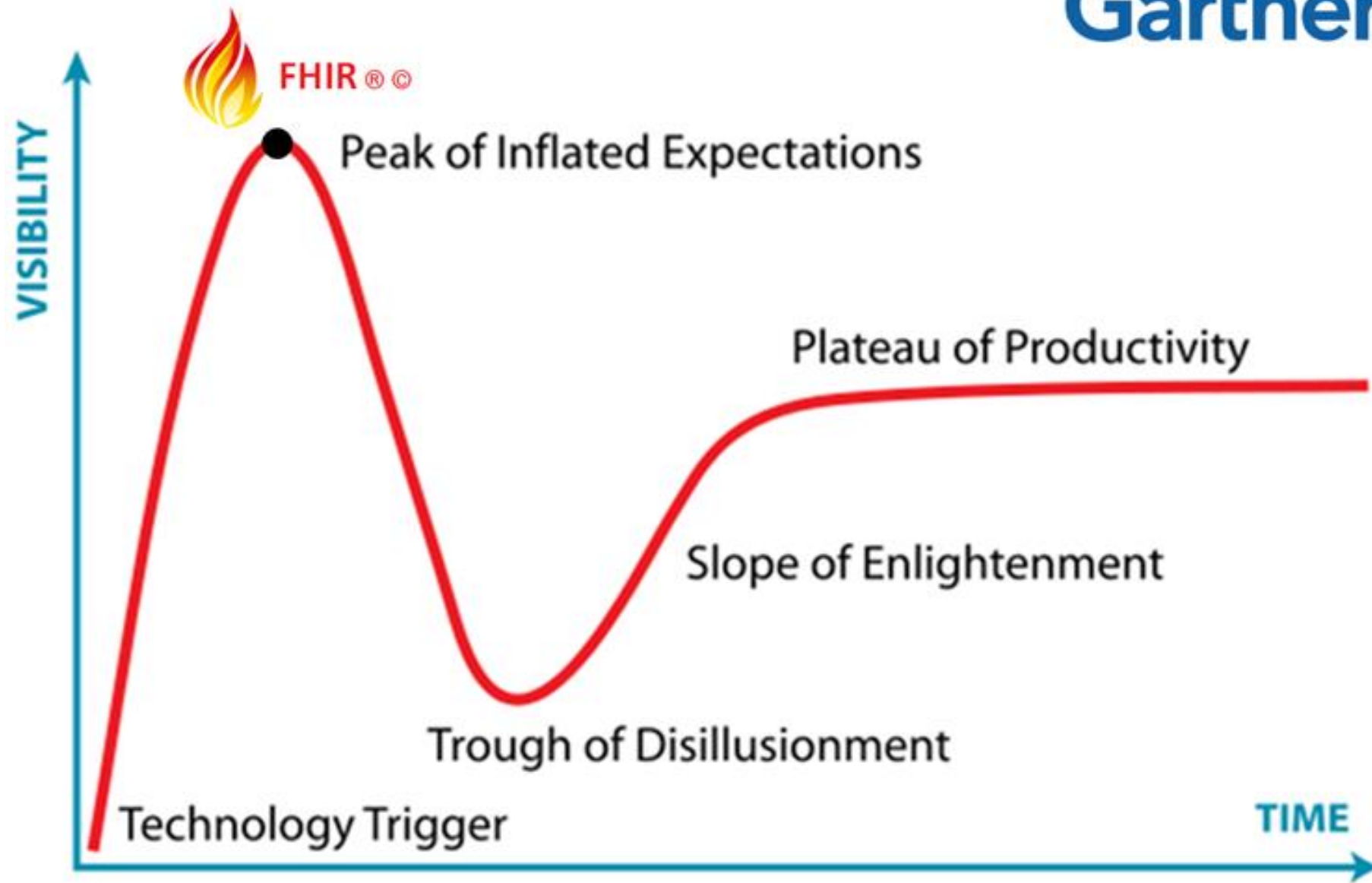
**DAF** – Access Data  
(Clinical Record)

**Argonaut** – *Tested* Access for EHRs

**S4S** – Sync for Science  
(+ a sync service)







THE HYPE CYCLE

# Life on the FHIR core team

---



# Conformance

- The base specification is very optional
- Most elements are optional because there's weird corner cases
  - E.g. Patient name is normally known, except for de-identified data
- HL7 cannot get full consensus about elements, and especially about terminologies
- Security/Provisioning/Deployment/etc not mandated
- Need a language to describe what should be done / has been done
  - National standards
  - Institution Implementation Guides
  - Vendor Documentation

# FHIR Terminology Stack

- Coding
  - Refer to a concept from a (clinical) record
- Code System
  - define & share the concepts, definitions & representations
- Value Set ( + binding)
  - Select a set of concepts for a use in a particular context
- Concept Map
  - Define the relationship between sets of concepts from different code systems
- Terminology Service
  - Expansion, Validation, Lookup, Composition, Translation, Closure Table Mgmt

# SNOMED CT in FHIR

- Example Use of SNOMED CT:

```
<code>  
  <coding>  
    <system value="http://snomed.info/sct"/>  
    <code value="39065001"/>  
    <display value="Burn of ear"/>  
  </coding>  
  <text value="Burnt Ear"/>  
</code>
```

# SNOMED CT in FHIR

```
<code>
  <coding>
    <system value="http://snomed.info/sct"/>
    <version value="http://snomed.info/sct/
      9000000000000207008/version/20160731"/>
    <code value="39065001"/>
    <display value="Burn of ear"/>
  </coding>
  <text value="Burnt Ear"/>
</code>
```

# SNOMED CT in FHIR

## 4.2.1.0.1 Summary

Source	SNOMED CT is made and managed by <a href="#">IHTSDO</a> . IHTSDO is an international organization with countries as members. IHTSDO publishes the international release of SNOMED CT (which is used in FHIR international standards and resources). Each of the IHTSDO member countries may also distribute their own SNOMED CT edition, which contains the international release plus local extension content and derivatives.
System	The URI <a href="http://snomed.info/sct">http://snomed.info/sct</a> identifies the SNOMED CT code system
Version	Where a version is used, it should be a full URI that represents the specific distribution (International Release, or National Release and version), following the <a href="#">SNOMED CT URI Specification</a> (see note below)
Code	<p>The following SNOMED CT artifacts are valid in the <i>code</i> element for the <a href="http://snomed.info/sct">http://snomed.info/sct</a> namespace: <a href="#">Concept IDs</a>, <a href="#">Expressions</a> (grammar) and <a href="#">SNOMED Legacy codes</a>.</p> <p>SNOMED CT Description Ids are not valid as codes in FHIR, nor are other alternate identifiers associated with SNOMED CT Concepts using the RF2 identifier infrastructure. Expressions SHOULD NOT contain terms, only concept IDs</p>
Display	The correct display for a SNOMED CT concept is one of the preferred terms for the concept. Preferred terms are case sensitive. The Fully Specified Name is not an appropriate choice. The source of preferred name comes from a Language Reference Set. SNOMED CT does not define displays for expressions; if no display has been associated with the expression through a value set or other mechanism, the full

- <http://build.fhir.org/snomedct.html>

# Computable Form

```
<CodeSystem xmlns="http://hl7.org/fhir">
  <!--
  SNOMED CT is a poly-versioned code system for which multiple
  releases exist. This CodeSystem resource describes 'all of SCT'.
  For the relevant elements, there are notes about how they would
  change to describe specific editions, or specific versions.

  In addition to this general canonical SNOMED CT definition,
  servers generate variants of this to describe how they
  support a particular edition/version
  -->

  <id value="snomedct"/>

  <!-- this url is unchanged for all editions and versions of SCT. There
  can only be one correct Code System resource for each value of the
  version attribute (at least, only one per server) -->
  <url value="http://snomed.info/sct"/>

  <!-- the HL7 v3 OID assigned to SNOMED CT -->
```



# SNOMED CT Expansion

- GET /fhir/ValueSet/\$expand?url=http://snomed.info/sct/32506021000036107?fhir\_vs=isa/9000000000000446008

This expansion generated 24 Oct 2015

---

This value set contains 3 concepts

All codes from system `http://snomed.info/sct`

Code	Display
900000000000003001	Fully specified name (core metadata concept)
900000000000013009	Synonym (core metadata concept)
900000000000055004	Definition (core metadata concept)

## 9.2.7.2 Mappings for SNOMED CT Attribute Binding (<http://snomed.info/sct>)

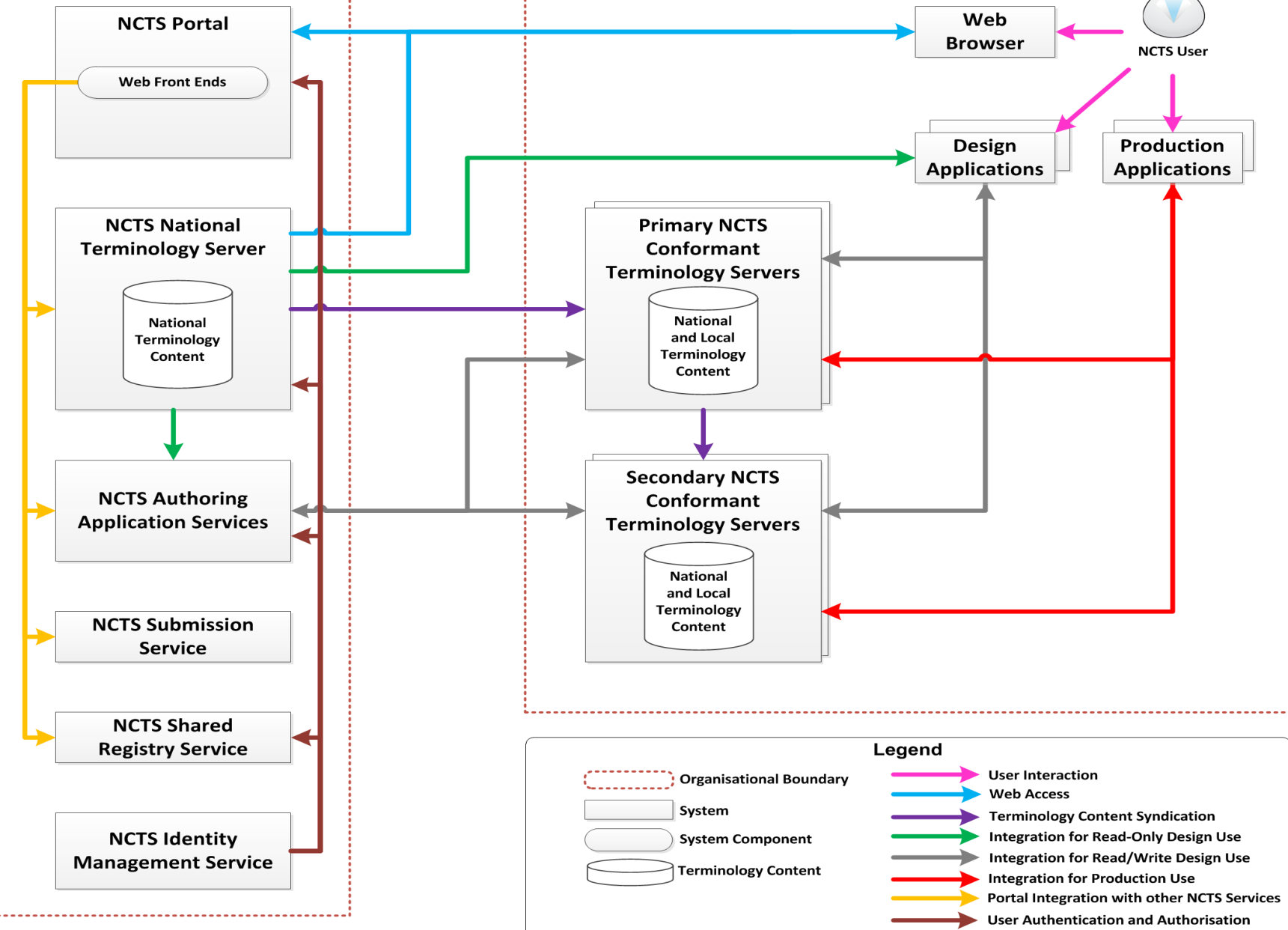
Attribute bindings link coded data elements in FHIR resources to a corresponding attribute in the SNOMED CT concept model. These bindings help to support:

- clarifying the intended meaning of the data element
- Quality checking the alignment between FHIR resource design and any corresponding SNOMED CT concept model
- Composition and decomposition of data instances by indicating the SNOMED CT concept model attribute whose value may be used to decompose a precoordinated concept into this data element

<b>Condition</b>	
identifier	
clinicalStatus	
verificationStatus	408729009
category	
severity	246112005
code	246090004
bodySite	363698007

**NCTS National Infrastructure**

**External Organisation or Jurisdiction**



**Legend**

- Organisational Boundary
- System
- System Component
- Terminology Content
- User Interaction
- Web Access
- Terminology Content Syndication
- Integration for Read-Only Design Use
- Integration for Read/Write Design Use
- Integration for Production Use
- Portal Integration with other NCTS Services
- User Authentication and Authorisation

# Proposed Joint Work on FHIR

- Processes for Review of FHIR / SCT mappings
  - Improvements on both sides
- More detailed rules for exposing SCT on FHIR Terminology Servers (joint IHTSDO/HL& publication)
  - Provision of FHIR services on <http://snomed.info>
- Ongoing work on collecting, sharing, solving implementation issues for SNOMED CT users when using FHIR
  - Possible SNOMED CT profile for FHIR?
- Work to simplify adoption of SNOMED CT for terminology service users
  - Internationalization, Simple views, Analytical tooling

# SNOMED CT on FHIR

- Questions...