

# **Implementing SNOMED CT**

## **Practicalities and Challenges**



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# What do I mean when I talk about implementing SNOMED CT?

## **National Implementation considerations**

Healthcare strategy and policies

Clinical practice/delivery differs by country.

Language.

Content.

Other reference coding schemes.

Level of interoperability/integration.

Clinical system suppliers.

## **Clinical Systems (design and build)**

SNOMED CT is a computable terminology.

It is meant to be used in electronic patient records for recording clinical information.

Therefore it follows that the route to getting SNOMED used, (implemented), is via healthcare information systems.

Healthcare information systems typically have their own record architecture.

These systems currently have to conform to a wide variety of other standard coding schemes, information models, etc.

They are not and never will be SNOMED centric.

This means that the target audience for getting SNOMED implemented is by educating and influencing the suppliers of these systems

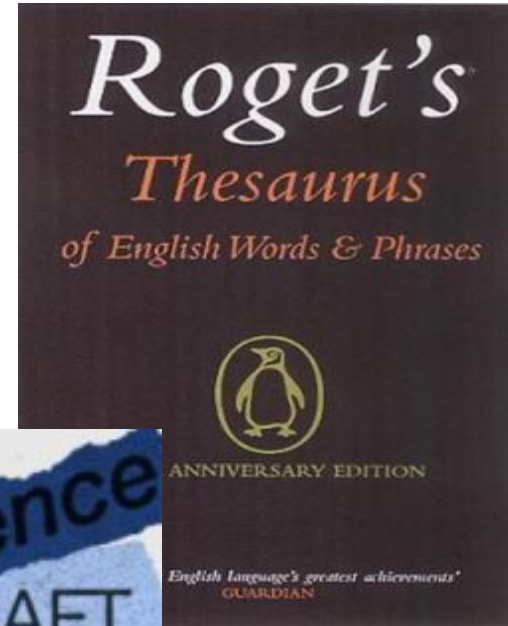
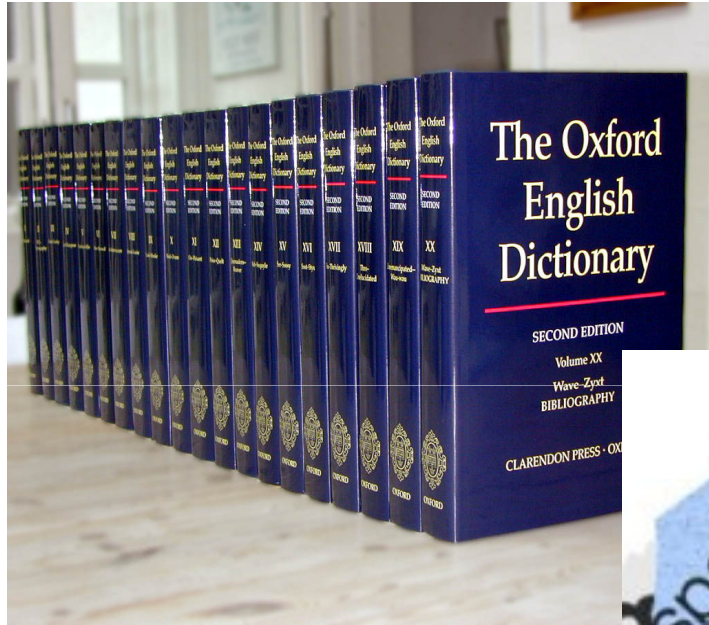
## **Clinical Systems (Users)**

These fall into three broad categories:

1. Those using clinical systems as part of the day to day care process i.e. recording problems, ordering tests, recording interventions...
2. Those responsible for maintaining the configuration of the system i.e. people who are responsible for maintaining reference data within a clinical system.
3. Those responsible for extracting data from clinical systems for clinical audit, clinical activity, research, management ,etc.

# TRIBAL

## Systems Design Challenge



- How do we get SNOMED CT data into the system?
  - How should we use the various elements of SNOMED CT?
    - Subsets
    - Hierarchies
    - Relationships
    - Synonyms
  - What data items should contain SNOMED CT data (Searching / Tagging / Binding)?
  - How should we present SNOMED CT data to the end user?
    - How are we going to handle the idea of Interface terminology vs Reference terminology.
  - What should we physically store in the database?
  - How are we going to deal with the 'other' NHS standard coding schemes (ICD10/Read/OPCS4)?
  - How should we deal with 'free text' data entry?
  - What is our policy on handling the nuances of SNOMED CT?
    - Modelling issues
    - Textual / language issues
  - How should we deal with 'Not Found' conditions?
    - What is our policy on 'Local' generation of terms?
    - What is our policy on use of Temporary codes?
  - How should we handle reporting?
  - How should we approach post coordination?
  - Physical Implementation – SNOMED server or store in LZ0 format?
-

To provide effective support to generate the greatest accuracy and quantity of structured (codified) data entry, with minimum impact on the user

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- SNOMED CT is the primary clinical reference terminology and is to be used wherever possible as the primary reference terminology to record clinical information
  - Clinical Terming will be done at the point of data entry
  - There will be no interface terminology used for data entry
  - The system will only deal with fully sanctioned/modelled SNOMED CT concepts
  - The system should not need to cater for inadequacies of the coding schemes provided
  - The end user should not be aware they are using SNOMED CT:
    - The words 'SNOMED CT' should not appear on any end user clinical screens or reports
    - Searching for SNOMED terms should not be designed as a 'stand alone' function that interrupts the flow of data entry, but should be seamlessly integrated into applications
    - The system must always manage the interface between SNOMED CT and the end-user using the systems User Interface standards
    - Post coordination will not be handled at the user interface
-

## Use of Subsets:

- Subsets need to be used to restrict the use of inappropriate data entry
  - SNOMED CT subsets should drive the generation of context relevant lists
  - Nationally provided subsets will be the default at implementation where no other subsets have been defined
  - End Users/individuals will not be able to define their own personal subsets for use within the system (Individuals may be asked to contribute to subset development within their particular care setting by whatever NHS management process is required for subset governance)
  - The content of health organisation level subsets will be defined and managed by clinical communities at the appropriate level in the organisation hierarchy
  - The NHS / CFH allows the creation of subsets specific to all levels in the organisation hierarchy and provides a governance and management process
-

- If terms are not found in SNOMED CT then the system has to decide what action to take.
  - If a data item is specified such that it must contain a SNOMED term then CFH guidance will be followed; (users should enter the closest term to what they want to record.)
  - The rendering of SNOMED CT expressions will follow CFH published guidelines
  - Use of temporary codes will not be supported
  - Use of locally defined terms will not be supported
  - Standard CFH published cross maps will be supported
  - Identifying SNOMED terms within a body of 'free text' will be used to 'tag' and prompt for formal recording. (They will not be used to formally record clinical data in the patient record).
-

# SNOMED CT in action display

32

Encounter context: ENC0000015; REFERRAL; 08-04-2008 EPR filtered by: (None)

Locally registered patient, data shown may be incomplete

Problems Allergies/ADRs Alerts

ALLERGIES LAST CHECKED ON 18-Jun-2008 by Manager,Admin [Click here to confirm allergies/ADRs checked](#)  Display inactive allergies/ADRs  Display struck out allergies/ADRs

Action/Reason: Remarks:

Group by (None) Filter by (None)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Allergy ...	Allergen	Reaction	Severity	Onset d...	Status
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Drug Allergy	Penicillin V	Skin rash	Mild	02/06/2008	Active
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Drug Adverse...	Diclofenac	Skin rash	Mild	02/06/2008	Active
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Adverse reac...	Wheat	Vomiting	Mild		Active

SNOMED CT



Record procedure

Record procedure

Performed date and time: Not known, 18/06/2008 16:10

Procedure: Excision of cyst of kidney

Approach, Direct device, Method, Priority, Performed service point, Body site, Laterality

Problems (Onset date): Absent kid, Asthma att, Bilateral ca, Bleeding fr

Performed by: ponting,

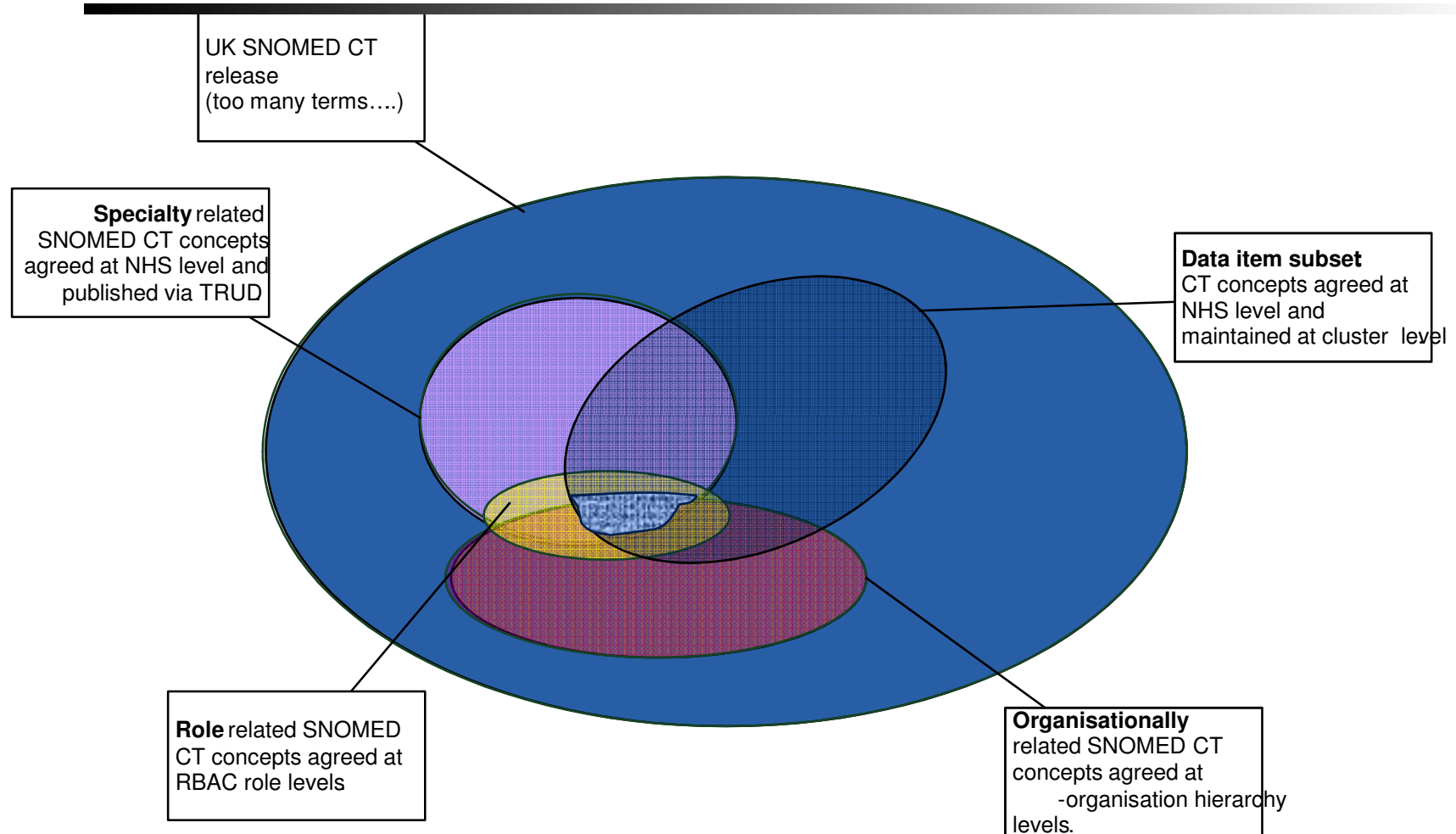
Body site	Laterality
Entire kidney	Right

SNOMED CT



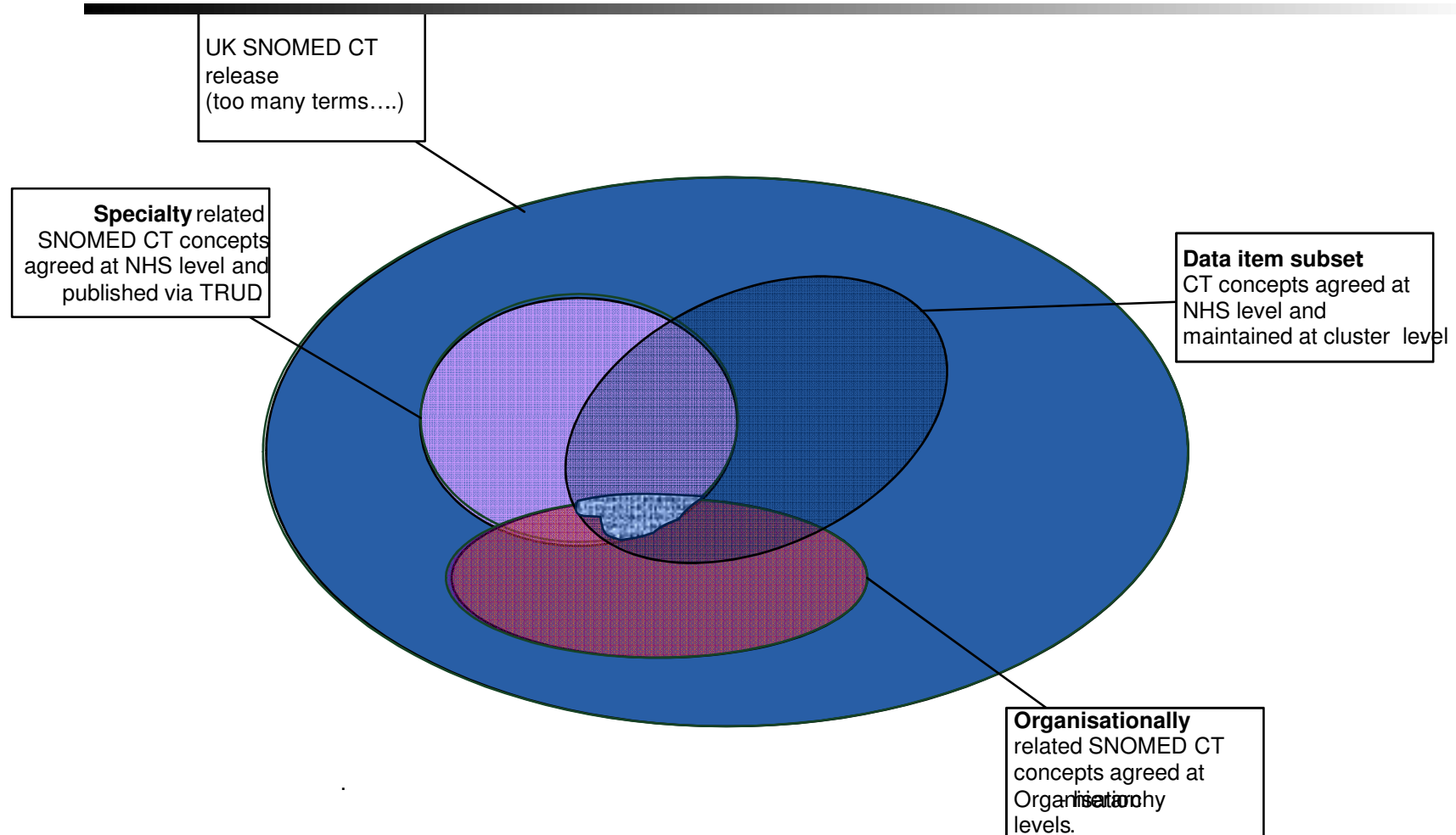
# Subsets and context sensitive lists

Initial list generated from intersection of all subsets



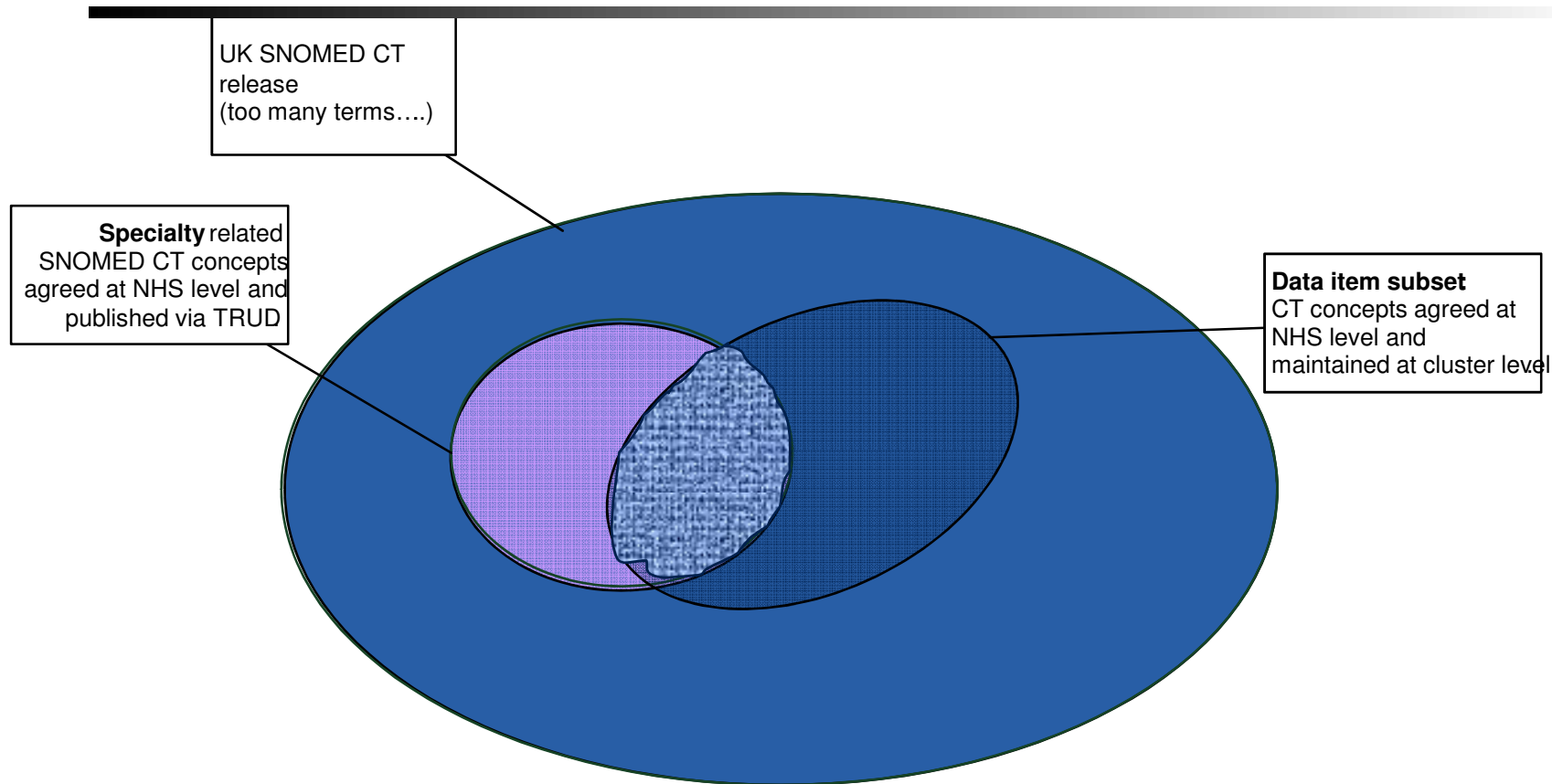
# Subsets and context sensitive lists

## Increase search drops Role subset



# Subsets and context sensitive lists

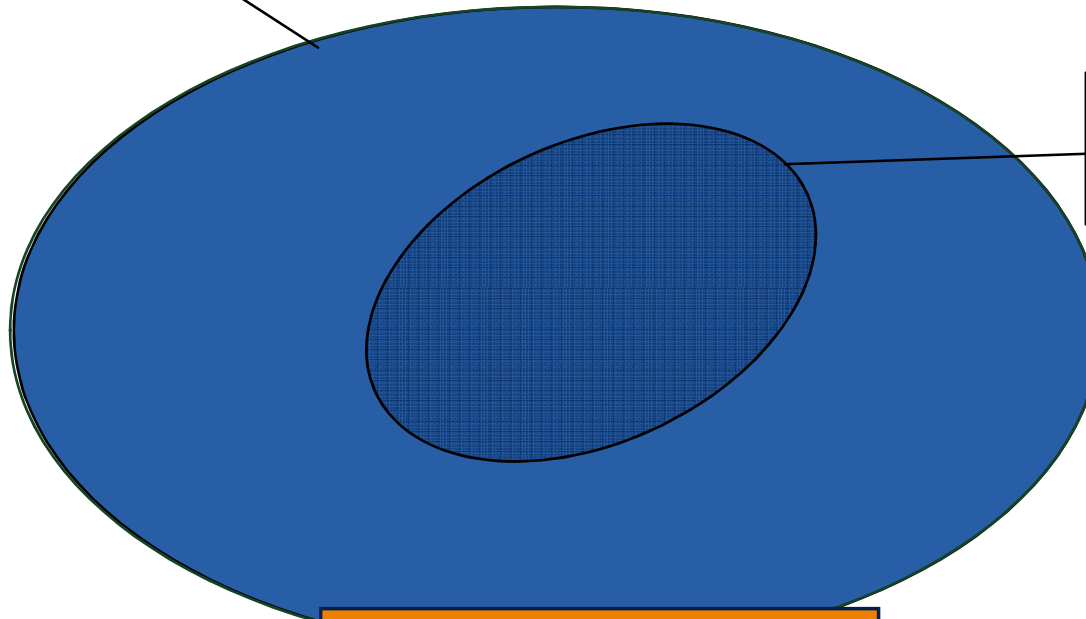
## Increase search drops Organisation subset



# Subsets and context sensitive lists

## Increase search drops Specialty subset

UK SNOMED CT  
release  
(too many terms....)



**Data item subset**  
CT concepts agreed at  
NHS level and  
maintained at cluster level

**Is it right to constrain,  
And if so who decides  
?**



# SNOMED CT in action advanced searching

The screenshot shows a web application window titled "Advanced search - Lorenzo -- Webpage Dialog". The interface is for performing an advanced search in SNOMED CT. On the left, there is a sidebar with a "Record allergy/ADR" section and a list of filterable fields: Allergy type, Allergen, Reaction, Severity, Onset date, Date, Month/Year, Confidence level, Is significant, Information source, and Comments. The main search area has a "Search for" field containing "asp\*" and a "Pattern" dropdown set to "Any order". Below this, the "Selected Term" is "Aspirin codeine". The "Search Results" list includes terms like "Aspergillus fumigatus, 3 antigen", "Aspidium", "Aspirin", and "Aspirin codeine", which is highlighted. To the right, the "Parents" section shows "Codeine" and the "Children" section shows "Co-codaprin 8mg/400mg dispersible tablet" and "Co-codaprin 8mg/400mg tablets". An "Alternative descriptions" section lists "Aspirin + codeine", "Aspirin + codeine (product)", and "Co-codaprin". A "Term Not Found" message is visible at the bottom left of the search area. The window has "Ok" and "Cancel" buttons at the bottom right.

SNOMED SFS  
Advanced search

# SNOMED CT in action Term Not Found ...

The screenshot shows a web browser window titled "Advanced search - Lorenzo -- Webpage Dialog". The main interface is for an "Advanced Search" in SNOMED CT. The search criteria are "asp\*" with a pattern of "Any order". The selected term is "Aspirin codeine". The search results list various terms, with "Aspirin codeine" highlighted. A "Term Not Found" dialog box is open, displaying the message "Please provide further information." and a text input field containing "i can't find aspirin + codeine + paracetamol.". A red arrow points from the highlighted search result to the dialog box. The dialog box has "Ok" and "Cancel" buttons. The background interface also shows a "Parents" section with "Codeine" listed, and an "Alternative descriptions" section with "Aspirin + codeine", "Aspirin + codeine (product)", and "Co-codaprin".

What happens to this info?

# Interesting things being discovered

## Implications of using Model, Subset or Hierarchy

Record allergy/ADR

Record allergy/ADR

<b>Allergy type</b>	Drug Allergy	<b>Record problem</b>	<input type="checkbox"/>
<b>Allergen</b>	Aspirin codeine	<b>MHRA form:</b>	Fill in MHRA form
<b>Reaction</b>	Diarrhea and vomiting	<b>MHRA form completed</b>	<input type="checkbox"/>
<b>Severity</b>	Mild	<b>Recorded by</b>	ponting,
<b>Onset date</b>	Fatal Mild Mild to moderate Moderate Moderate to severe Severe	<b>Recorded date/time</b>	18/06/2008 14:34:08
Date			
Month/Year			
Confidence level			
Is significant	<input type="checkbox"/>		
Information source			
Comments			

**Who decides content of subsets?**

eg

**Pruritic Rash vs Rash**

**Dropdown populated from?**

**SNOMED model**

**Subset**

**Hierarchy**

# Interesting things being discovered

## Implications of using Model, Subset or Hierarchy

**Selected via the SNOMED SFS**

**Dropdown populated from SNOMED model using Laterality relationship based on body site chosen**

**Decisions then required:**

- Take all children?
- Take first level children?
- Take first level children where no descendents plus descendents of first level children
- Take only preferred terms?
- Take all active concepts?
- Use of Bilateral?

The screenshot shows a 'Record problem' form with the following fields and values:

- Problem name:** C/O - an ache
- Body site:** Entire knee joint
- Laterality:** Specified laterality NEC (dropdown menu is open showing options: Specified laterality NEC, Laterality NEC, Right, Unilateral, Left)
- Sub type:** Working
- Mark as primary:**
- Severity:** (empty dropdown)
- Expected conclusion date:** (empty dropdown)
- On expected conclusion date:** Do not Close
- On behalf of:** (empty dropdown)
- Is confidential:**

TRIBAL

# Interesting things being discovered

## Synonyms – useful or hindrance?

Advanced Search

Search for fundus Pattern Any order

Selected Term Fundus

**Search Results**

- Entire gastric fundus
- Fundus
- Fundus
- Fundus
- Fundus
- Fundus oculi
- Fundus of eye
- Fundus of eyeball
- Fundus of gallbladder
- Gastric fundus part
- Gastric fundus structure

Parents

Region of gallbladder

Children

Entire fundus of gallbladder

Alternative descriptions

- Fundus
- Fundus of gallbladder
- Structure of fundus of gallbladder
- Structure of fundus of gallbladder (body structure)

1 - 25 of 34

Ok Cancel

Which Fundus?

TRIBAL

# Interesting things being discovered

## Implications of search text

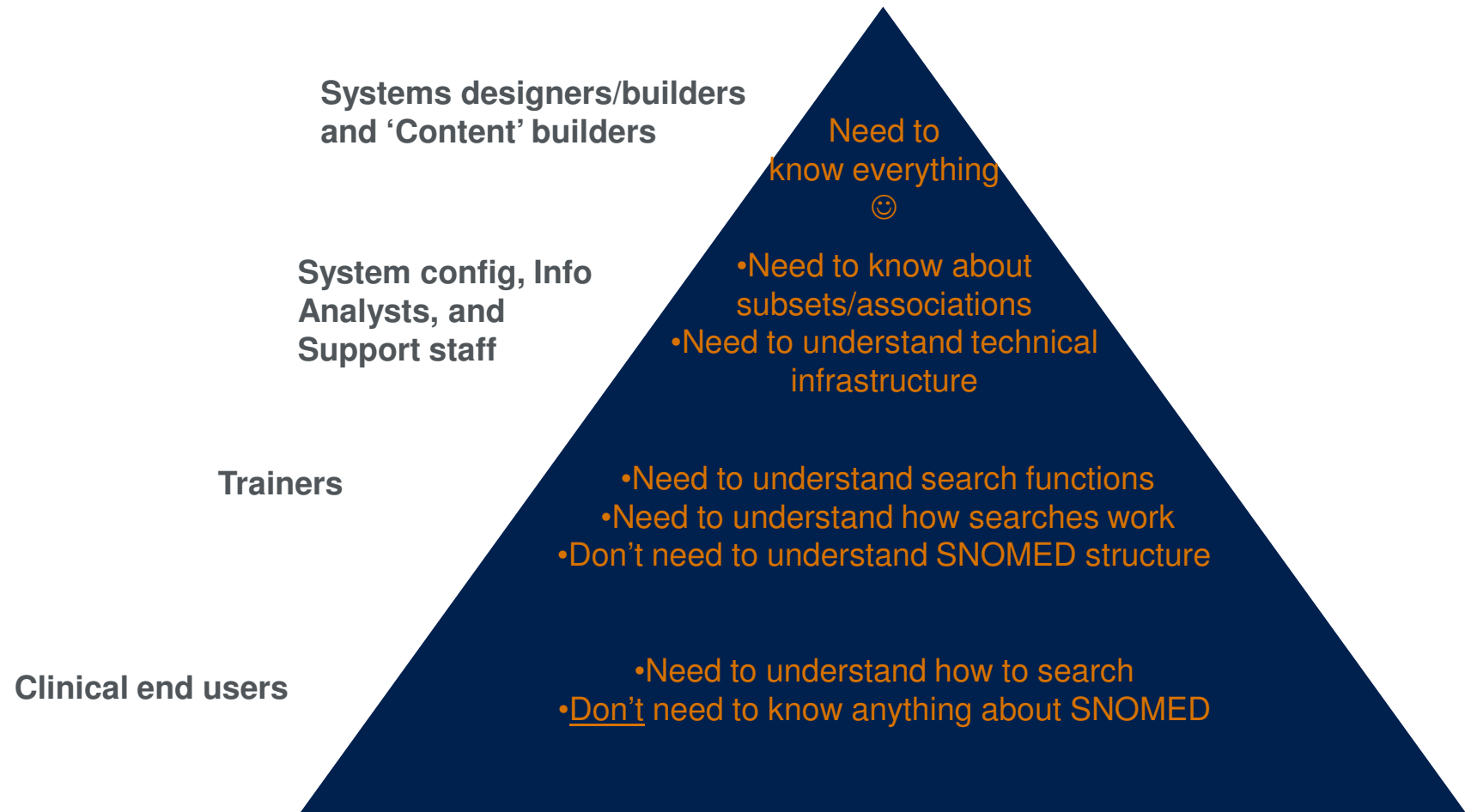
The screenshot shows a medical browser window titled "SROMEED BROWSER -- Webpage Dialog". The search bar contains the text "fundus" and the search mode is set to "Advanced". A list of search results is displayed, with "Fundus of eye" highlighted. A red arrow points from a red box below to this entry. To the right, a detailed view of the selected entry is shown, including fields for "Sub type", "Mark as primary", "Severity", "Body site", and "Laterality". The "Body site" is set to "Fundus" and "Laterality" is set to "Right". Below this is a table with columns "Body site" and "Laterality", containing the values "Fundus" and "Right". At the bottom, there are fields for "Expected conclusion date", "On expected conclusion date", "On behalf of", and "Is confidential".

Body site	Laterality
Fundus	Right

Get specific

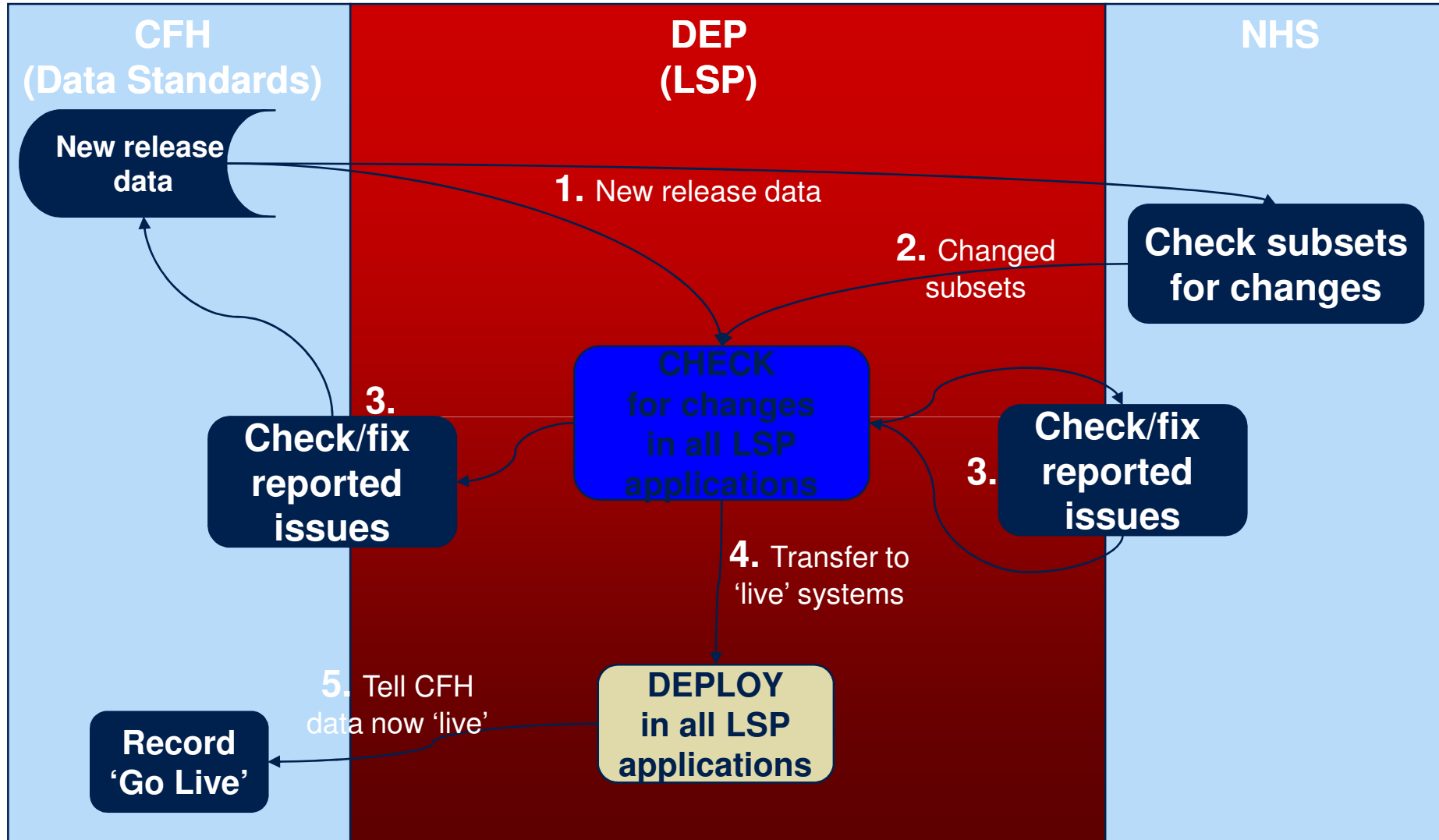


# Challenges : Who needs to know what?

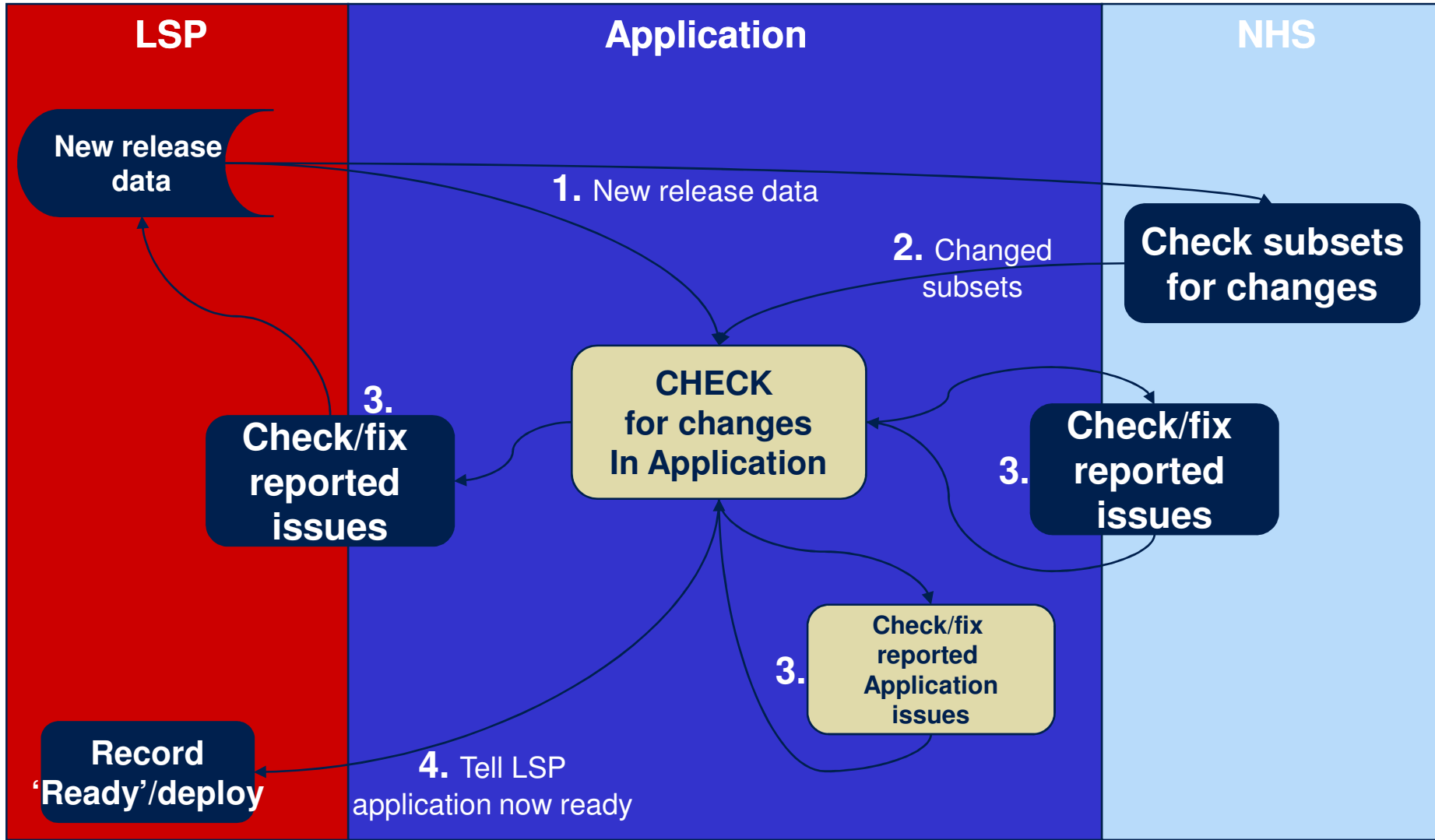




# Systems Configuration challenge



# Systems Configuration challenge



## Getting info out:

- Understanding supplier system data structures
  - Understanding how SNOMED is used in that system
  - Understanding SNOMED structures
-

- Training
    - System Designer (requirements and business analysis)
    - System Builder (technical design and build)
    - System QA (quality assurance/testing)
    - System Technical Implementer (Configuration of system parameters and 'content')
    - Expert Clinical Informatician (Content)
  - SNOMED CT
    - Core product (eg
      - modelling not there/ambiguous
      - concepts not there at level of detail required
      - Synchronisation of releases – eg dm+d
    - Subsets
      - National vs system vs user (eg in Reaction subset : pruritic rash)
      - Guidance on UK usage - Concept based, Description based....
    - Namespaces (use of)
      - Localisation, by supplier, by domain, by regions.
  - Clinical professions
    - How should they record clinical information (symptoms and diagnosis)
    - Use of language (synonyms vs preferred terms)
  - Clinical systems
    - Search functions
      - Search tool - not a browser
      - How much 'intelligence' do we give it
    - Snomed model vs system model of clinical info (what bits to use where)
-

**National Implementation.**

1. Ensure there is a national organisation to own and maintain the country namespace.
  2. Ensure that the national organisation also has responsibility for all the coding schemes/reference sets used in healthcare in that country
  3. Make it clear to all suppliers and health services where and why you expect it to be used
  4. Make it clear its relationship to other coding schemes/reference sets
  5. Define a set of standards and guidance for how you expect SNOMED to be used in your country.
  6. Define a set of compliance levels and a roadmap that shows everyone how you expect them to get to compliance.
  7. Measure implementation against that roadmap.
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# TRIBAL

# SNOMED implementation Guidance matrix

System Dev Process →	Requirements Analysis	Design	Development	QA	Configuration	Operational
<p><b>Role</b></p>	<ul style="list-style-type: none"> <li>• Process Analyst</li> <li>• Business Analyst</li> <li>• Reqm Analyst</li> <li>• Domain Specialists</li> </ul>			<ul style="list-style-type: none"> <li>• QA analysts</li> <li>• Systems Analysts</li> <li>• Early Adopter users</li> </ul>		<ul style="list-style-type: none"> <li>• Clinical user creating/maintaining patient records</li> <li>• Information Analyst</li> <li>• Researcher</li> </ul>
<p><b>Questions</b></p>	<ul style="list-style-type: none"> <li>• What other coding schemes do we use?</li> <li>• What should we use as the Reference coding scheme?</li> </ul>	<ul style="list-style-type: none"> <li>• What data items need SCT</li> <li>• How do we get SCT into the system</li> </ul>			<ul style="list-style-type: none"> <li>• How do i manage subsets, National, local, domain specific, supplier specific.</li> <li>• How do i manage new releases?</li> <li>• How do i manage maps?</li> </ul>	<ul style="list-style-type: none"> <li>• Can't find concept – is it subset content, SCT content?</li> </ul>
<p><b>SNOMED Artefacts</b> (required at both International and Country levels)</p>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Best practice guidelines on storage</li> <li>• Best practice guideline on presentation.</li> <li>• 'How to' guides on aspects of SNOMED CT eg. Subsets, Relationships, Synonyms/Preferred terms, statuses, etc</li> <li>• Education products</li> </ul>	<ul style="list-style-type: none"> <li>• Technical Reference Manual</li> <li>• Distribution / import mechanisms</li> <li>• Education on detail of how SNOMED CT structured.</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>		

**Email to Anne Casey:**

**A number of thoughts:**

- **I think it will be fairly straightforward to produce curriculum items based on work done to date and the split I outline below.**
- **I think the problem comes in getting them agreed and having some form of assessment process if required (see next bullet).**
- **The difference between this piece of work and the Editors / Mapping curriculum projects is that IHTSDO has a need to have a career/role structure that assesses/QAs those people responsible for producing the content.**

**Whereas, I see Implementers in 2 main categories:**

1. **Those that are in the Design/Developing/QAing SNOMED enabled systems. For these people I cannot see how we can assess/accredit them as they will be people working for supplier organizations who will use any material produced by IHTSDO as guidance for their internal training processes. Therefore I see the material produced as guidance only, for any system supplier to use as it sees fit.**
  
  2. **Those that are involved in managing/configuring and getting info out of these systems. I think this group are similar to the Editors in that they are dealing with SNOMED Content and using it to create subsets and maps that are used to configure systems. How they do this will affect the operation of the system, how data is extracted, validation of data entered. It is a much wider group than those in 1 above and I think some formal assessment of people in this category is necessary (maybe something similar to clinical coding training/assessment that occurs in the UK)**
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# SNOMED implementation System roadmap/compliance

4 - Imports SNOMED Concepts, descriptions, relationships, subsets, and x maps.

The application record architecture has been validated against the SNOMED model. It uses the SNOMED model to search, validate, select and record clinical information using SNOMED CT terms.

5 - Imports SNOMED Concepts, descriptions, relationships, subsets, and x maps.

The application record architecture has been validated against the SNOMED model. It uses the SNOMED model to search, validate, select and record clinical information using SNOMED CT terms.

It uses SNOMED CT as its base reference terminology.

It uses SNOMED CT concepts wherever possible as its reference data lists.

It can handle multiple different interface terminologies and their mappings to SNOMED CT concepts.

It can receive and send messages containing SNOMED CT content (as long as that content conforms to SNOMED CT model and rules)

SNOMED CT  
Implementation roadmap/compliance

0 - no use of SNOMED

1 - Uses its own internal coding scheme. Uses Snomed externally to generate lists that are then used for creating its internal coding schemes.

2 - Imports SNOMED concepts and descriptions into its reference database as a flat list. Uses SNOMED reference data alongside other coding schemes in its reference database.

3 - Imports SNOMED Concepts and Descriptions and Relationships into its internal reference database. Applications utilise these structures to allow users to navigate and select terms.



T R I B A L

Questions?