

Using SNOMED CT as the
reference terminology in
Clinical Applications –
Challenges and Lessons
Learned

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 - + System Suppliers
 - + Clinical Professions
 - + Information Analysts
 - + IHTSDO

Design Vision

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

Design Challenges

- + How do we get SNOMED CT data into LORENZO?
- + How should we use the various elements of SNOMED CT?
 - Subsets
 - Hierarchies
 - Relationships
 - Synonyms
- + What should we physically store in the database?
- + What data items should contain SNOMED CT data?
- + How should we present SNOMED CT data to the end user?
- + 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 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?

Design Principles (1)

- + 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 by health professionals
- + The system will only deal with fully sanctioned and modelled SNOMED CT concepts
- + LORENZO should not need to cater for any 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
 - LORENZO must always manage the interface between SNOMED CT and the end-user using LORENZO User Interface standards
 - Post coordination will not be handled at the user interface

Design Principles (2)

- + SNOMED CT is a very large set of concepts and terms. To make effective use of it, subsets need to be used extensively:
 - **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 LORENZO (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 multi-campus level subsets will be defined and managed by clinical communities at the appropriate level in the multi-campus hierarchy
 - Personal/individual favourites/pick lists will not be expressed as SNOMED subsets
 - The NHS / CFH allows the creation of subsets specific to all levels in the organisation hierarchy and provides a governance and management process

Design Principles (3)

- +If terms are not found in SNOMED CT, then the application has to decide what action to take (mandatory vs optional use of SNOMED CT in a data item)
- +If the LORENZO data item is specified such that it must contain a SNOMED term, then the CFH guidance will be followed (that users should enter the closest term to what they want to record)
- +The rendering (display) of SNOMED CT expressions will follow the published guidelines from NHS CFH
- +Use of Temporary codes may be supported dependent on the outcome of the CFH pilot study from the London Cluster
- +In order to ensure interoperability with other systems, the use of locally defined terms will not be supported (i.e. only terms formally distributed via the TRUD mechanism will be available)
- +Standard CFH cross maps will be used as appropriate
- +There is no requirement for identifying all possible SNOMED CT terms in free text data entry for 'formally' storing in the patient record

Design principles.... Where is SNOMED CT used

- +Within standard clinical applications
 - + Problems
 - + Allergies
 - + Procedures
 - + Risks (Alerts)
- +Within Clinical Data Capture assessment forms
- +Within Clinical Notes
- +Within Catalogues
- +LORENZO will record the Concept id, Description id and the Description text selected

Design principles.....

Searching vs Tagging

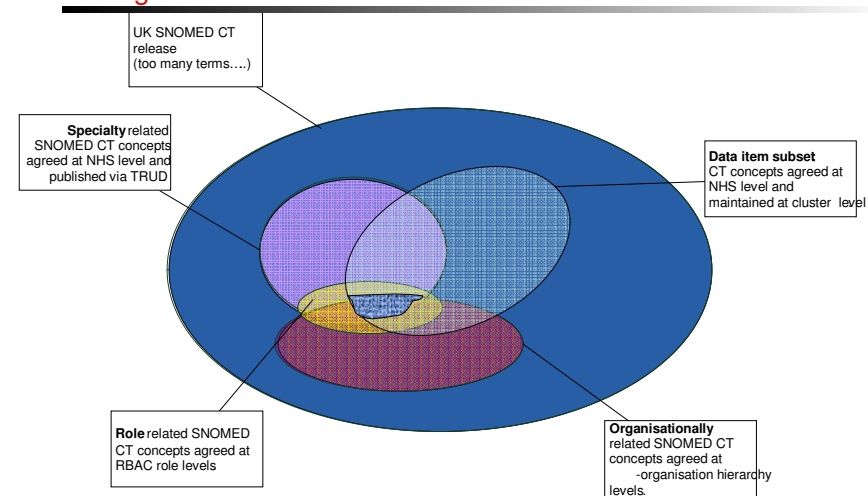
+Where a data item requires a SNOMED CT term then a standard LORENZO search will be used

- + Basic search
- + Advanced search

+Within Clinical Notes, SNOMED CT is used to 'tag' text in the note as selected by the end user

Subsets and context sensitive lists

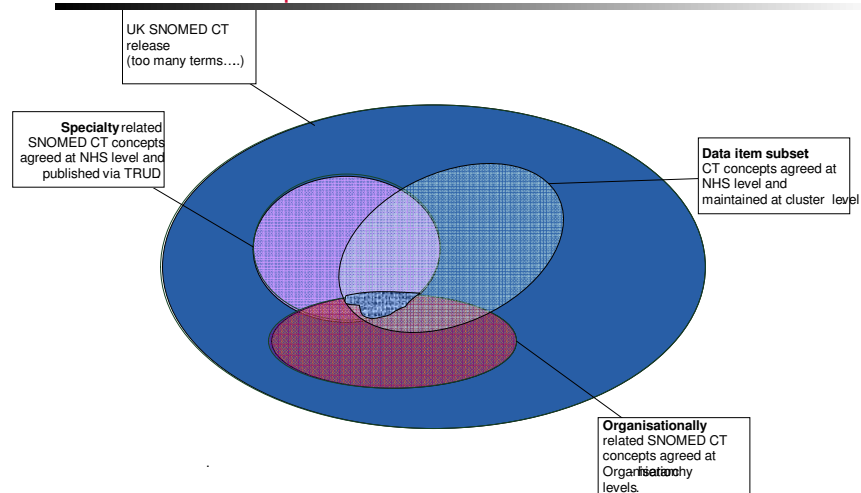
Initial list generated from intersection of all subsets



Subsets and context sensitive lists

Increase search drops Role subset

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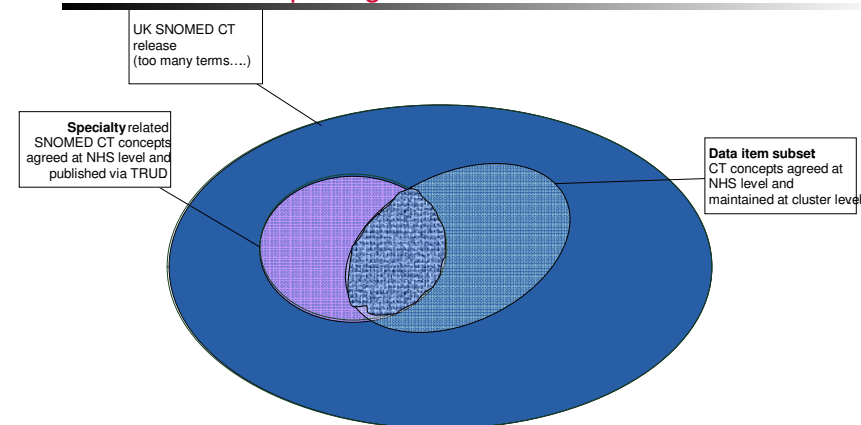


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Subsets and context sensitive lists

Increase search drops Organisation subset

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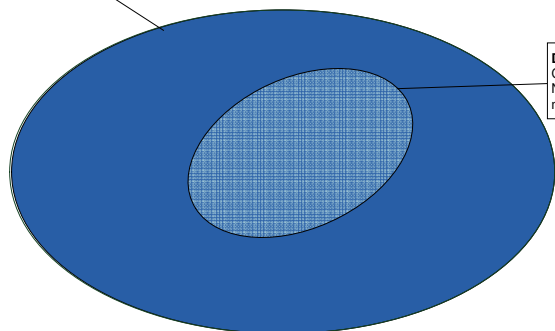
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Subsets and context sensitive lists

Increase search drops Specialty subset

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



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

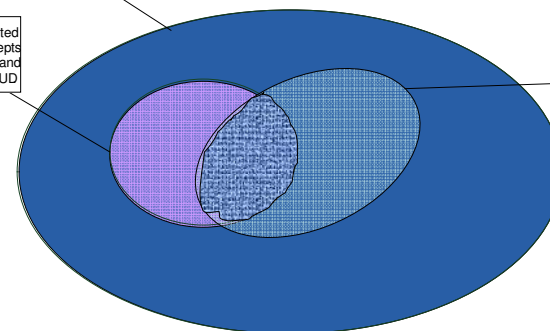
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Subsets used to limit data entry

Specialty is a constrained subset

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



Specialty related
SNOMED CT concepts
agreed at NHS level and
published via TRUD

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

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

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SNOMED CT in action Problems

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Record problem

Problem type: Symptoms
Relationship: Symptoms
Problem name: Family History
Onset date:
Comments:
Scope: All Encounters/Episodes
Scope value:
Course:
Certainty:
Is significant:
Sub type:
Mark as primary:
Severity:
Body site:
Laterality:
Expected conclusion date:
On expected conclusion date: Do not Close
On behalf of:
Is confidential:

SNOMED CT

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SNOMED CT in action Procedures

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Record procedure

Performed date and time: Not known
Procedure: Excision of cyst of kidney
Approach:
Method:
Priority:
Performed service point:
Body site: Entire kidney
Laterality: Right
Problems (Onset date):
Performed by:
Is significant:
Is confidential:

SNOMED CT

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SNOMED CT in action Allergies

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Encounter context: ENC0000015; REFERRAL; 08-04-2008

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)

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

SNOMED CT

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SNOMED CT in action Basic searching

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Record allergy/ADR

Search for: asp

Any order

Advanced

Acetaminophen+aspirin

Aluminum aspirin

Aluminum aspartate

Amphetamine aspartate

Aspirin

Aspirin + caffeine

Aspirin + codeine

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Increase Search

OK Cancel

SNOMED CT

SNOMED SFS

Use of search strings
(language) are key...
e.g. try intravenous cannula

Basic search display
sequencing?

- Alphabetic
- Preferred Terms 1st
- Duplicate synonyms

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SNOMED CT in action Advanced searching

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The screenshot shows the 'Advanced Search' dialog box in the SNOMED CT interface. The search term 'asp*' is entered in the 'Search for' field. The 'Selected Term' is 'Aspirin codeine'. The search results are displayed in a list, including 'Aspergillus fumigatus, 3 antigen', 'Aspidium', 'Aspidium oleoresin extract', 'Aspirin', 'Aspirin caffeine', 'Aspirin codeine', 'Aspirin codeine 400mg/8mg dispersible tablet', 'Aspirin 150mg suppositories (A A H Pharmaceuticals Ltd)', 'Aspirin 150mg suppositories (Martindale Pharmaceuticals Ltd)', and 'Aspirin 150mg suppositories (UniChem Ltd)'. The 'Parents' section shows 'Codeine'. The 'Children' section shows 'Co-codaprin 8mg/400mg dispersible tablet' and 'Co-codaprin 8mg/400mg tablets'. The 'Alternative descriptions' section shows 'Aspirin + codeine', 'Aspirin + codeine (product)', and 'Co-codaprin'. A 'Term Not Found' message is visible at the bottom left of the search results area.

SNOMED SFS
Advanced search

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SNOMED CT in action Term Not Found

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The screenshot shows the 'Advanced Search' dialog box in the SNOMED CT interface. The search term 'asp*' is entered in the 'Search for' field. The 'Selected Term' is 'Aspirin codeine'. The search results are displayed in a list, including 'Aspergillus fumigatus, 3 antigen', 'Aspidium', 'Aspidium oleoresin extract', 'Aspirin', 'Aspirin caffeine', 'Aspirin codeine', 'Aspirin codeine 400mg/8mg dispersible tablet', 'Aspirin 150mg suppositories (A A H Pharmaceuticals Ltd)', 'Aspirin 150mg suppositories (Martindale Pharmaceuticals Ltd)', and 'Aspirin 150mg suppositories (UniChem Ltd)'. The 'Parents' section shows 'Codeine'. The 'Children' section shows 'Co-codaprin 8mg/400mg dispersible tablet' and 'Co-codaprin 8mg/400mg tablets'. The 'Alternative descriptions' section shows 'Aspirin + codeine', 'Aspirin + codeine (product)', and 'Co-codaprin'. A 'Term Not Found' dialog box is open, displaying the message 'Please provide further information. can't find aspirin + codeine + paracetamol.' and buttons for 'OK' and 'Cancel'.

What happens to this info?

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Interesting things being discovered

Implications of using Model, Subset or Hierarchy

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Record allergy/ADR

Allergy type	Drug Allergy	Record problem	<input type="checkbox"/>
Allergen	Aspirin codeine	MHRA form:	Fill in MHRA form
Reaction	Diarrhea and vomiting	MHRA form completed	<input type="checkbox"/>
Severity	Mild	Recorded by	ponting,
Onset date	18/06/2008 14:34:08	Recorded date/time	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

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Interesting things being discovered

Implications of using Model, Subset or Hierarchy

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Record problem

Selected via the SNOMED SFS

Problem name C/O - an ache

Sub type Working

Severity

Body site Entire knee joint

Laterality Specified laterality NEC
Laterality NEC
Right
Unilateral
Left
No records to show

Expected conclusion date

On expected conclusion date Do not Close

On behalf of

Is confidential

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 descendants plus descendants of first level children
- Take only preferred terms?
- Take all active concepts?
- Use of Bilateral?

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Interesting things being discovered

Implications of using Subset

Found and tagged based on SNOMED terms from linked subsets

Create note

Verdana 8

Symptoms CC_HIACTIVE Bleeding from nose Jain, Nilesh

☐ Active allergies

AllergyType	Allergen	Reaction	OnSetDttm	AllergyStatus	Severity	RecordedByUserName
Drug Allergy	Penicillin V	Rash	02/06/2008	Active	Mild	Jain, Nilesh
Drug Allergy	Diclofenac	Skin rash	02/06/2008	Active	Mild	Jain, Nilesh
Food Allergy	Wheat	Vomiting		Active	Mild	poning,
Drug Allergy	Aspirin codeine	Diarrhea and vomiting		Active	Mild	poning,

☐ Operations and procedures

☐ Active allergies

patient said he was allergic to bee pollen(Bee pollen(Drug Allergy)) and aspirin(Aspirin(Drug Intolerance))

☐ Operations and procedures

Interesting things being discovered

Implications of content of Subset

Option to formally record Allergy based on tagged SNOMED terms from linked subsets

Bee Pollen in Drug Allergy subset – valid?

Create note

Verdana 8

Symptoms CC_HIACTIVE Bleeding from nose Jain, Nilesh

☐ Active allergies

AllergyType	Allergen	Reaction	OnSetDttm	AllergyStatus	Severity	RecordedByUserName
Drug Allergy	Penicillin V	Rash	02/06/2008	Active	Mild	Jain, Nilesh
Drug Allergy	Diclofenac	Skin rash	02/06/2008	Active	Mild	Jain, Nilesh
Food Allergy	Wheat	Vomiting		Active	Mild	poning,
Drug Allergy	Aspirin codeine	Diarrhea and vomiting		Active	Mild	poning,

☐ Operations and procedures

☐ Active allergies

patient said he was allergic to bee pollen(Bee pollen(Drug Allergy)) and aspirin(Aspirin(Drug Intolerance))

☐ Operations and procedures

Record Allergy : Aspirin(Dru...

Interesting things being discovered Synonyms – useful or hindrance?

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Advanced Search

Search for: fundus Pattern: Any order

Selected Term: Fundus

Search Results

- Entire gastric 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)

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OK Cancel

Which Fundus?

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Interesting things being discovered Implications of search text

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SHOWN BROWSER - Webpage Dialog

Search for: fundus Pattern: Any order Advanced

Search Results

- Anterior wall of fundus of stomach
- Entire fundus of eye
- Entire fundus of gallbladder
- Entire fundus of internal auditory canal
- Entire fundus of urinary bladder
- Entire fundus uteri
- Entire gastric fundus
- Fundus
- Fundus
- Fundus
- Fundus
- Fundus oculi
- Fundus of eye
- Fundus of gallbladder
- Gastric fundus part
- Gastric fundus structure
- Greater curvature of fundus of stomach
- Lesser curvature of fundus of stomach
- Posterior wall of fundus of stomach
- Structure of fundus of eye

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)

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Increase Search OK Cancel

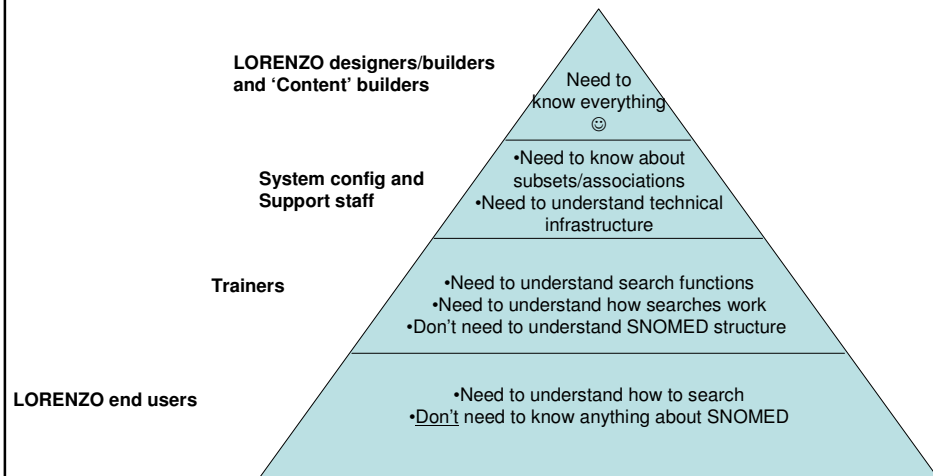
Get specific

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Challenges

Who needs to know what?

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Systems Design Challenge

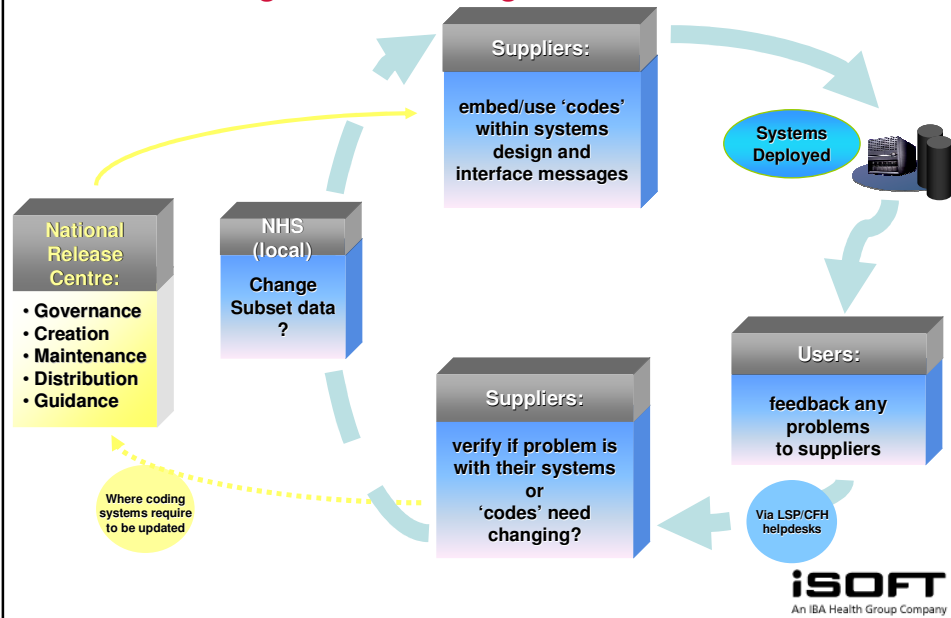
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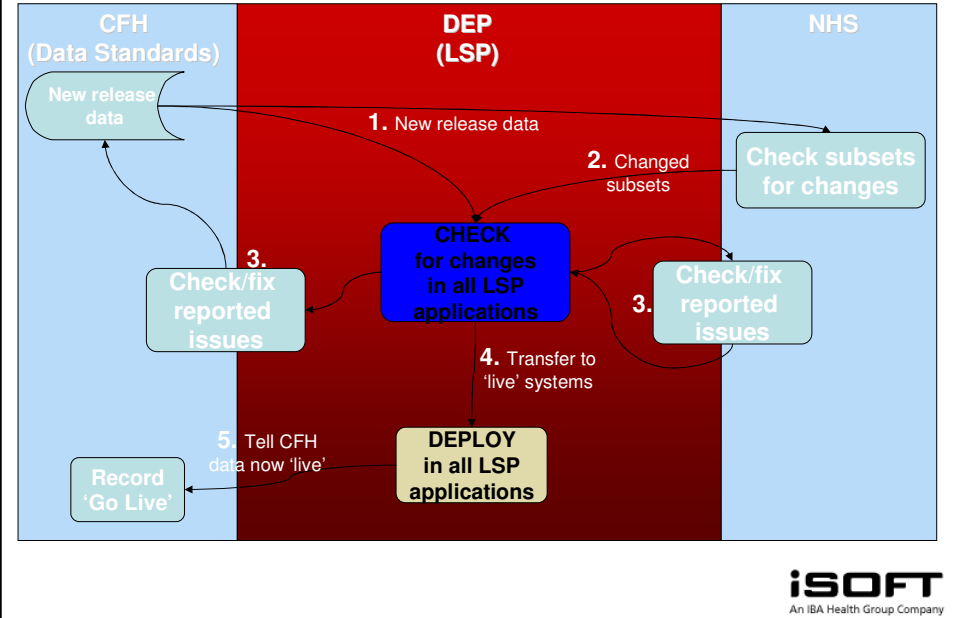
Content Configuration Challenge

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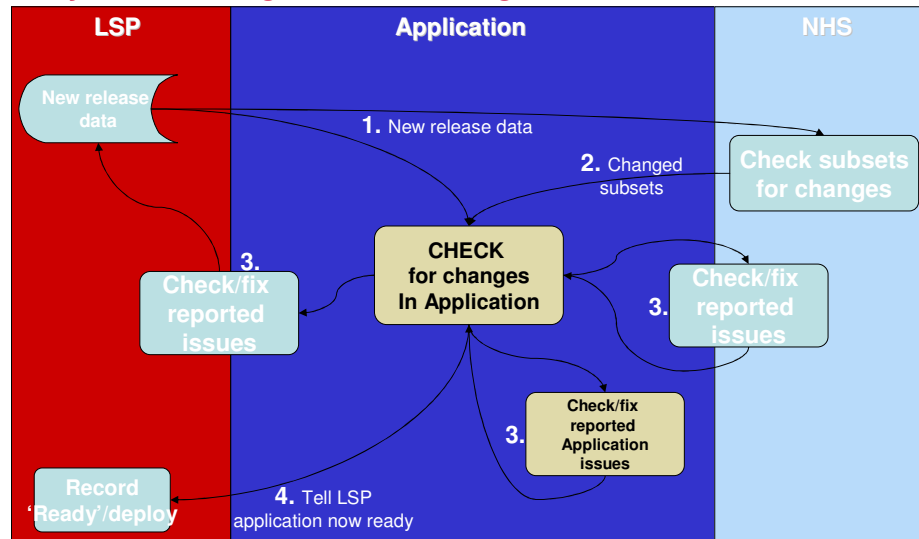
Systems Configuration challenge

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Systems Configuration challenge

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Information Analysts challenge

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Getting info out:

- + Understanding supplier system data structures
- + Understanding how SNOMED is used
- + Understanding SNOMED

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Going forward

A personal view

Categories Implementation issue:

- + 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....
- + 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)

Going forward

A personal view

+ Implementation Guidance:

- There is a lot being learnt by all suppliers and users of systems using SNOMED CT
- We need to harvest this learning and build it into guidance that is driven from the practical and real use cases rather than the theoretical
- Guidance on Design Challenges posed at start of this presentation.

+ Capacity and Capability:

- Desperate need for Education and Training of the technical people designing and building systems

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Questions?