



CSC

SNOMED in an Emergency Care Solution

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22nd September 2009

The CSC Alliance
Working with NHS Connecting for Health
to deliver the National Programme for IT



Introduction

Medical (GP) background – part time since 1994

Worked in Clinical Terminology 15 years

NHS 1994 - 2002

Read codes

SNOMED

National Programme for IT since March 2004

Accenture/CSC

SystemOne (Primary Care)

Lifenet/ECS (Ambulance)

Lorenzo (Acute/Secondary)

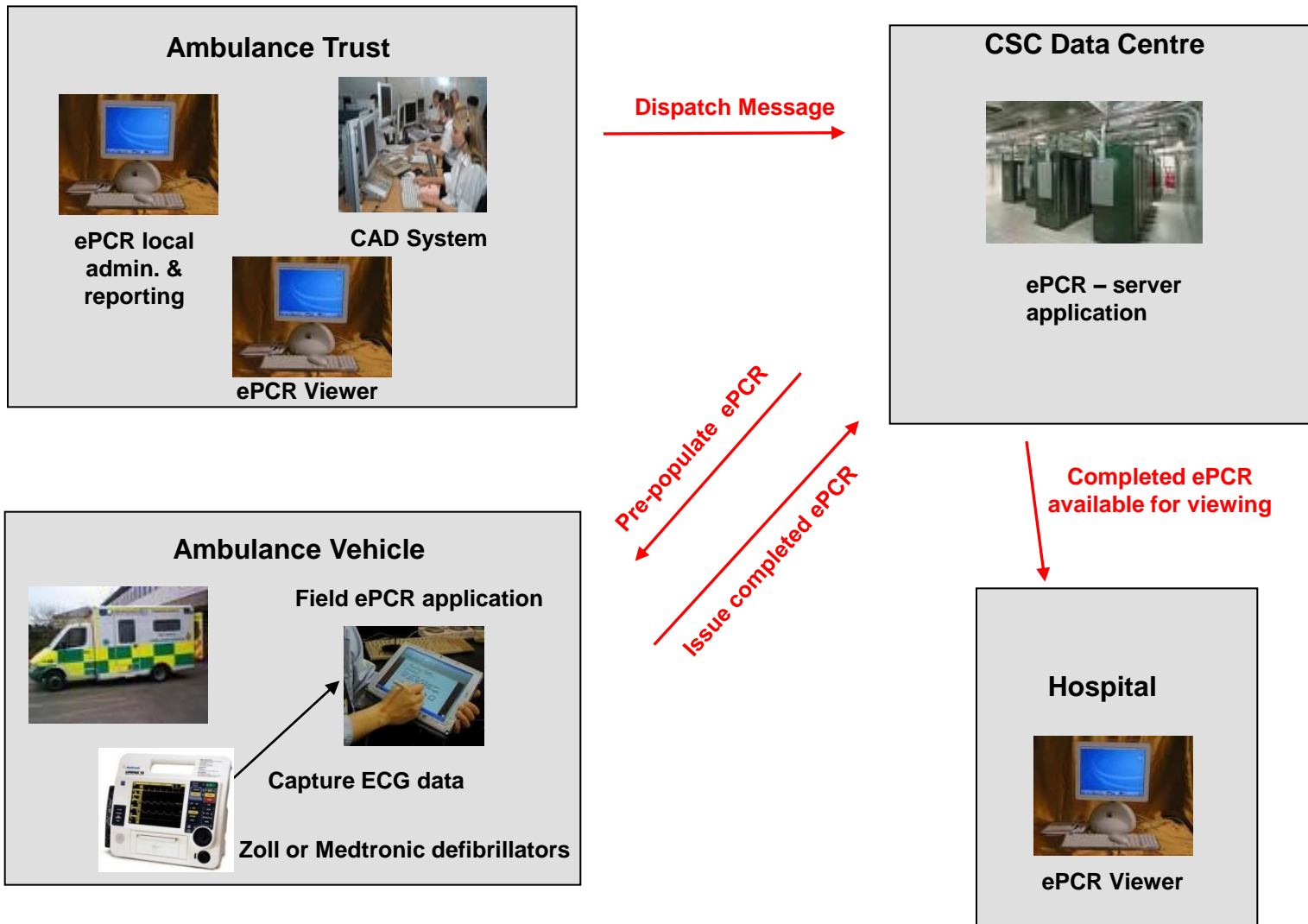
Data migration



Emergency Care Solution (ECS) for NHS Ambulance Services

- Produced by MedUSA/Medtronic
- Point-and-click tablet PC application for use by paramedic crews at the scene of an incident.
- Pen or touch-driven interface using graphical elements
- Clicking elements causes either a new screen of different options and elements to appear, or at the end point, a clinical data item is recorded.
- Implemented across England as part of National Programme for Information Technology

ECS – Data Flow Model



CAD = Computer Aided Dispatch
ePCR = Electronic Patient Care Record

ECS Interface

File Window Help Comments Filters 0 > 500

ID Pt 157, U 0 R 10:02:49

ID/CC **Systems** Site Specific Extd Systems

Hx History

1° ABCD

V/S Vitals

Exm Physical Exam

Tx Treatment

CP Care Plan

I Incident

R Review

General/skin

CVS

Respiratory

GU/GI

CNS

Eye/ENT

Musculo skeletal

Obs / Gynae

Mental Health

Respiratory

Left Upper:		Right Upper:	
Normal/Clear	Absent	Normal/Clear	Absent
Diminished	Crackles	Diminished	Crackles
Wheezes	Rhales	Wheezes	Rhales
Other <input type="text"/>		Other <input type="text"/>	
Left Lower:		Right Lower:	
Normal/Clear	Absent	Normal/Clear	Absent
Diminished	Crackles	Diminished	Crackles
Wheezes	Rhales	Wheezes	Rhales
Other <input type="text"/>		Other <input type="text"/>	

Details...
Save
Cancel

Examination Screen

The screenshot displays a software interface for a medical examination. At the top, there is a menu bar with 'File', 'Window', 'Help', 'Comments', and 'Filters'. Below the menu bar, the patient information is shown: 'Smith, J. T.', '107 Y M', and 'R 11:17:40'. The interface is divided into several sections:

- Left Sidebar:** A vertical stack of buttons for navigation: 'ID', 'ID/CC', 'Hx' (History), '1°' (ABCD), 'V/S' (Vitals), 'Exm' (Physical Exam), 'Tx' (Treatment), 'CP' (Care Plan), 'I' (Incident), and 'R' (Review).
- Top Navigation:** Three tabs are visible: 'Systems', 'Area Specific' (which is selected), and 'Extd Systems'.
- Central Area:** A 3D human figure is shown from the back. Several buttons are overlaid on the figure to indicate examination areas:
 - 'Back Neck: Centre' (top right)
 - 'Upper Back: Left' (middle left)
 - 'Upper Back: Right' (middle right)
 - 'Upper Back: Centre' (middle right)
 - 'Cervical Spine' (bottom right)
 - 'Thoracic Spine' (bottom right)
 - 'Lumbar Spine' (bottom right)
 - 'Sacrum Spine' (bottom right)
 - 'Front' (bottom left)
- Right Panel:** A dark blue panel containing a 'Details...' button and two navigation arrows ('<<' and '>>').

Treatment Screen

File	Window	Help	Comments	Filters		0	> 500
ID	Pt 61,		U			0 R	10:48:49
ID / PC	Guidelines	Treatment	Re-assess	Summary			
Hx	Open Airway	Suction	Oxygen	Airway Adjuncts	Manual Ventilation		
History	Mechanical Ventilation	Intubation	Needle Cricothyrotomy	Surgical Cricothyrotomy	Chest Decompression		
1°	Extubation	Chest Tube Insertion	Attach/ Monitor ECG	Shock	Start CPR		
ABCD	Stop CPR	IV/Cannulation	IV Fluid	Drug	Blood Draw		
V/S	Wound Management	Patient Position	Extrication	Splinting	Delivery		
Vital Signs	Other						
Exam	Start	Section	Item	Description	DB		
Physical Exam							
Tx							
Treatment							
CP							
Care Plan							
I							
Incident							
R	Start time	Stop time	Done by	Edit	Delete		
Review	10:48:11		ATP Acc1				

ECS - Web Viewer



Created on: 13/10/2006 17:24:15
 EPRF Number: 1000304
 Finalized: No



EAST OF ENGLAND AMBULANCE SERVICE

Incident Number: 20061016-001
 Patient 1 of 1

DEMOGRAPHICS

Last Name: Smith	First Name: John	Middle Name: William
Date of Birth: 13/10/1979	NHS No.: 10023456	
Address1: 13 Side Street	Address2: Horsforth	City: Leeds
County: West Yorkshire	Post Code: LS12 7YH	
Country: United Kingdom	Home: 0113 4564545	Mobile: 0113 1234567

PATIENT

Smith, John William (Johnny) 27 Years (Actual) Male 12 Stones Ethnicity: W: British
Chief Complaint: Abdominal Pain / Problems;
Secondary Complaint(s): Back-Pain Non-Traumatic;

GP / CLINICIAN

Last Name	First Name	Relationship	Address
Crackers	Jonny	Patient GP	, 45 Gusto Street, Pudsey, Leeds, West Yorkshire, , LS14 Y87 United KingdomTel: 0113 23423423
Jenson	Jenny	Referring Clinician	, 87 Benson Street, Horsforth, Sheffield, West Yorkshire, , LS12 2JK United KingdomTel: 0113 267123622
Nemco	Charlie	Other Health Professionals	, 123 Never Close, Pudsey, Brighouse, West Yorkshire, , LS12 2YU United KingdomTel: 0113 67676663

HISTORY

	ACTUAL	PERTINENT NEGATIVES
Symptoms	General: Chills; RESP: Chest Pain; CVS: Angina; NEURO: Abnormal Gait; Eye/ENT: Cyst on lids; GU / GI: Abdominal Pain; OBS / GYNAE: Abdominal Pain; Musculoskeletal: Joint Pain; Mental Health: Addiction;	
Severity: Visual	0 - Happy no pain;	
Origin of Pain/Symptom	Abdomen: Upper;	
Severity: Numeric	1 / 10	
Radiation/Spread	Abdomen: Middle;	
Quality	Choking;	
Onset	Date/Time: 13/10/2006 17:57:00 Activity: At	

High level sections

- Patient Identification
- History
- Primary survey
- Vital signs
- Examination
- Treatment
- Care plan
- Incident
- Review

SNOMED in the ECS Application

- Implemented across England as part of National Programme for Information Technology
- SNOMED mandated for new applications
- Limited end user pull for SNOMED
 - Expert Reference Group
 - Including GPs used to Read codes & aware of advantages
 - Provided governance role
- Terminology team (Accenture then CSC) asked to SNOMED code
 - Neill Jones
 - Andrew Perry
 - Jeremy Rogers
 - David Robinson

50 years combined terminology experience

Starting point

- Data in Excel spreadsheet
- Up to 10 'levels' navigation to final 'click' for data entry
- Corresponding to buttons/picture selection
- Meaning possibly determined by > 1 level
- 6500 entries in total

Level 1	Level 2	Level 3	Level 4	Level 5
ID	Identification	Personal	Sex	Female
ID	Identification	Personal	Sex	Male
HISTORY	PMH	NEURO	CVA (Stroke)	N/A
HISTORY	PMH	NEURO	Dementia	N/A
Care Plan	Impression	General Systems	Obs / Gynae	Retained placenta
Care Plan	Impression	General Systems	Obs / Gynae	Pre-eclampsia
Physical Exam	Systems	GU/GI	Catheter in situ	N/A
Physical Exam	Systems	GU/GI	Haematemesis confirmed	N/A
Physical Exam	Area Specific	Back	Lumbar Spine	Contusion (look)
Physical Exam	Area Specific	Back	Lumbar Spine	Crepitus (feel)

First steps

- Migrate data into MS Access Database
 - Known issues with Excel & SNOMEDIDs
 - Accept that Excel more commonly used application
 - But need greater functionality for this exercise
- Requested 13 fields in application to store data
 - Max 6 OAV triples/qualifiers to represent post-coordination
 - Given single 1000 character text field
- Decision made to store using SNOMED compositional grammar in 'close to user' form

Lesson 1:
Applications tend not to be
designed around SNOMED (yet)

SNOMED Compositional Grammar

- Modified Backus-Naur Format
- Lightweight syntax
- Easier for humans to read compared with XML
- No industry standard parsers
- Handles pre- & post-coordination
- 194828000|Angina pectoris|
- 125605004|Fracture of bone|:363698007|Finding site|=304679005|Bone structure of knee,|272741003|Laterality|=7771000|Left,|116676008|Associated morphology|=20946005|Fracture, closed|
- SNOMED Clinical Terms® Abstract Logical Models and Representational Forms

Access database

Imports from Excel spreadsheet

SNOMED data – SNOMEDIDs pasted from Clue browser
Preferred terms automatically populated

Level_1	Level_2	Level_3	Level_4	Level_5	Object_SNOM	Object_Term	Attribute_SNC	Attribute_Ti	Value_SNOIMEI	Value_Term_1
Physical	Systems	CNS	Not Assessed	N/A	416237000	Procedure not done	363589002	Associated prc	268970009	Central nervous system examination
Physical	Systems	CNS	Abnormal plantar	N/A	366553001	Plantar reflex finding	363713009	Has interpreta	263654008	Abnormal
Physical	Systems	CNS	Hand tremor	N/A	26079004	Tremor	363698007	Finding site	85562004	Hand structure
Physical	Systems	Eye/ENT	Mouth swelling	N/A	300872008	Swelling of body structure	363698007	Finding site	74262004	Oral cavity structure
Physical	Systems	Eye/ENT	Reduction vision	N/A	7973008	Abnormal vision	363698007	Finding site	8966001	Left eye structure
Physical	Systems	Eye/ENT	Reduction vision	N/A	7973008	Abnormal vision	363698007	Finding site	18944008	Right eye structure
Physical	Systems	Mental Health	Not Assessed	N/A	416237000	Procedure not done	363589002	Associated prc	391281002	Mental health assessment
Physical	Systems	Mental Health	Abnormal appearance	N/A	301305006	Finding of general observation of app	363713009	Has interpreta	263654008	Abnormal
Physical	Systems	Mental Health	Signs of depression	N/A	41769001	Disease suspected	246090004	Associated findi	41006004	Depression
Physical	Systems	Mental Health	Signs of physical	N/A	41769001	Disease suspected	246090004	Associated findi	248061004	Self-harm
Physical	Area Specific	Front	Right Shoulder	Abnormal Distal Neuro	71994000	Problem, abnormal examination	363698007	Finding site	16982005	Shoulder region structure
Physical	Area Specific	Front	Right Shoulder	Abnormal Distal Power	249942005	Distal muscle weakness	363698007	Finding site	303546007	Muscle acting on shoulder joint
Physical	Area Specific	Front	Right Shoulder	Abnormal Distal Sensa	247322000	Abnormal sensation	363698007	Finding site	76552005	Skin structure of shoulder
Physical	Area Specific	Front	Right Shoulder	Abnormal Function	80598009	Joint function disorder	363698007	Finding site	16982005	Shoulder region structure
Physical	Area Specific	Front	Right Shoulder	Abnormal Range of Mo	164532009	O/E - abnormal joint movement	363698007	Finding site	31398001	Joint structure of shoulder region
Physical	Area Specific	Front	Right Shoulder	Abnormal Sensation (f	247322000	Abnormal sensation	363698007	Finding site	76552005	Skin structure of shoulder
Physical	Area Specific	Front	Right Shoulder	Abnormal Stress Tests	251438005	Joint stress test positive	363698007	Finding site	31398001	Joint structure of shoulder region
Physical	Area Specific	Front	Right Shoulder	Abnormality Joint Abo	123946008	Disorder by body site	363698007	Finding site	16982005	Shoulder region structure
Physical	Area Specific	Front	Right Shoulder	Abnormality Joint Belc	123946008	Disorder by body site	363698007	Finding site	16982005	Shoulder region structure
Physical	Area Specific	Front	Right Shoulder	Abrasion (QTY) (look)	399963005	Abrasion	363698007	Finding site	76552005	Skin structure of shoulder
Physical	Area Specific	Front	Right Shoulder	Avulsion (look)	284554003	Avulsion - injury	363698007	Finding site	16982005	Shoulder region structure
Physical	Area Specific	Front	Right Shoulder	Bony tenderness (feel)	278997003	Bone tenderness	363698007	Finding site	272691005	Bone structure of shoulder girdle
Physical	Area Specific	Front	Right Knee	Abnormal Sensation (f	247322000	Abnormal sensation	363698007	Finding site	63464009	Skin structure of knee
Physical	Area Specific	Front	Right Knee	Abnormal Stress Tests	251438005	Joint stress test positive	363698007	Finding site	49076000	Knee joint structure
Physical	Area Specific	Front	Right Knee	Abnormality Joint Abo	123946008	Disorder by body site	363698007	Finding site	72696002	Knee region structure
Physical	Area Specific	Front	Right Knee	Abnormality Joint Belc	123946008	Disorder by body site	363698007	Finding site	72696002	Knee region structure
Physical	Area Specific	Front	Right Knee	Abrasion (QTY) (look)	399963005	Abrasion	363698007	Finding site	63464009	Skin structure of knee
Physical	Area Specific	Front	Right Knee	Avulsion (look)	284554003	Avulsion - injury	363698007	Finding site	72696002	Knee region structure
Physical	Area Specific	Front	Right Digits	Burn(s)...	284196006	Burn of skin	363698007	Finding site	56213003	Skin of finger
Physical	Area Specific	Front	Right Digits	Burn(s)...	284196006	Burn of skin	363698007	Finding site	56213003	Skin of finger
Physical	Area Specific	Front	Right Digits	Burn(s)...	284196006	Burn of skin	363698007	Finding site	56213003	Skin of finger
Physical	Area Specific	Front	Right Digits	Clubbing	30760008	Finger clubbing	272741003	Laterality	24028007	Right
Physical	Area Specific	Front	Right Digits	Coldness (feel)	71200009	Decreased skin temperature	363698007	Finding site	56213003	Skin of finger
Physical	Area Specific	Front	Right Digits	Contusion (look)	125667009	Contusion	363698007	Finding site	7569003	Finger structure
Physical	Area Specific	Front	Left Elbow	Resistance of moveme	298255009	Pain on joint movement	363698007	Finding site	368148009	Left elbow region structure
Physical	Area Specific	Front	Left Elbow	Scar	275322007	Scar	363698007	Finding site	74757004	Skin structure of elbow
Physical	Area Specific	Front	Left Elbow	Soft Tissue Tenderness	301386009	Tenderness of body structure	363698007	Finding site	275161000000108	Structure of soft tissues of left elbow
Physical	Area Specific	Front	Left Elbow	Stab Wound (look)	283445007	Stab wound	363698007	Finding site	368148009	Left elbow region structure
Physical	Area Specific	Front	Left Elbow	stability on Stress test	251439002	Joint stress test negative	363698007	Finding site	16953009	Elbow joint structure
Physical	Area Specific	Front	Left Elbow	Swelling (look)	300872008	Swelling of body structure	363698007	Finding site	368148009	Left elbow region structure
Physical	Area Specific	Front	Left Elbow	Wound (look)	225552003	Wound finding	363698007	Finding site	368148009	Left elbow region structure
Physical	Area Specific	Front	Left Elbow	Other...	123946008	Disorder by body site	363698007	Finding site	368148009	Left elbow region structure
Physical	Area Specific	Front	Left Wrist	Abnormal Distal Neuro	71994000	Problem, abnormal examination	363698007	Finding site	5951000	Structure of left wrist
Physical	Area Specific	Front	Left Wrist	Abnormal Distal Power	249942005	Distal muscle weakness	363698007	Finding site	303739001	Muscle acting on wrist joint
Physical	Area Specific	Front	Left Wrist	Abnormal Distal Sensa	247322000	Abnormal sensation	363698007	Finding site	24785000	Skin structure of wrist
Physical	Area Specific	Front	Anterior Upper F	Gunshot Exit Wound (C	123397009	Injury of anatomical site	363698007	Finding site	182252000	Anterior aspect of upper arm (surface re
Physical	Area Specific	Front	Anterior Upper F	Haematoma	385494008	Haematoma	363698007	Finding site	182252000	Anterior aspect of upper arm (surface re



Access database

Imports from Excel spreadsheet

SNOMED Compositional Grammar Expressions generated from populated fields via query

Level_1	Level_2	Level_3	Level_4	Level_5	SNOMED_Compositional_Pos	SNOMED_Compositional_Neg
Physical Exam	Systems	Respiratory	Breathing Sounds	Left Upper	48348007 Normal breath sounds :363698007 Finding site =239721000000101 Upper lung field, 272741003 Laterality =7771000 Left	373572006 clinical finding absent :246090004 associated finding =48348007 Normal breath sounds :363698007 Finding site =239721000000101 Upper lung field, 272741003 Laterality =7771000 Left
Physical Exam	Systems	Respiratory	Breathing Sounds	Left Upper	65503000 Absent breath sounds :363698007 Finding site =239721000000101 Upper lung field, 272741003 Laterality =7771000 Left	373572006 clinical finding absent :246090004 associated finding =65503000 Absent breath sounds :363698007 Finding site =239721000000101 Upper lung field, 272741003 Laterality =7771000 Left
Physical Exam	Systems	Respiratory	Breathing Sounds	Left Upper	58840004 Decreased breath sounds :363698007 Finding site =239721000000101 Upper lung field, 272741003 Laterality =7771000 Left	373572006 clinical finding absent :246090004 associated finding =58840004 Decreased breath sounds :363698007 Finding site =239721000000101 Upper lung field, 272741003 Laterality =7771000 Left
Physical Exam	Systems	CVS	Bleeding Varicose Veins	N/A	195448005 Varicose veins of the leg with rupture	373572006 clinical finding absent :246090004 associated finding =195448005 Varicose veins of the leg with rupture
Physical Exam	Systems	CVS	Central pulses present	N/A	242921000000109 Central pulses present	373572006 clinical finding absent :246090004 associated finding =242921000000109 Central pulses present
Physical Exam	Systems	CVS	Distended neck veins	N/A	271653008 Jugular venous engorgement	373572006 clinical finding absent :246090004 associated finding =271653008 Jugular venous engorgement
Physical Exam	Systems	CVS	Leg Oedema	N/A	102574007 Oedema of leg	373572006 clinical finding absent :246090004 associated finding =102574007 Oedema of leg
Physical Exam	Systems	Mental Health	Abnormal behaviour	N/A	25786006 Abnormal behaviour	373572006 clinical finding absent :246090004 associated finding =25786006 Abnormal behaviour

SNOMED in MS Access

- Significant advantages over Excel
 - Data manipulation
 - Enforcement of referential integrity
 - Generation of SNOMED Compositional grammar expression
- SNOMEDIDs
 - Known issues with namespace SNOMEDIDs
 - Define SNOMEDIDs as decimal/fixed/zero decimal points
 - Import via query on attached 'text' fields
- QA & legality checking
 - Sanctioned and allowable post-coordination
- Import & export sections to allow team members to work concurrently

Lesson 2:
For a standalone database
package MS Access handles
SNOMED well

Content – overall mappings

Coding status	Number	Percent
Codable (satisfactory map) Significant need for post-coordination	5893	83.7
Codable (sub-optimal map) 64% resolved by request to UKTC	929	13.2
Not codable (out of scope SNOMED) e.g. demographic, composite concepts	164	2.3
Not codable (potentially in scope) 90% resolved by request to UKTC	47	0.7
Removed from application	9	0.1

Acknowledgements:
Ed Cheetham
Ian Green

Lesson 3:
Be on good terms with your
national terminology centre

Post-coordination

- 58% of entries required post-coordinated concept
 - 57% sanctioned/refinement
 - 43% ‘allowable’
- Possibly skewed by nature of the application
 - Anatomical navigation
 - Extensive examination findings section
- Maximum of 3 attributes required
- Multiple representation options
 - Allergies pre & post-coordination
 - Embedded laterality
 - Case by case decision e.g. NHS guidance

Lesson 4:
Without implementing post-coordination SNOMED scope will be limited.

SNOMED issues – modelling & content

- Pain

- Severity
- Origin
- Radiation
- Provoking factors
- Relieving factors
- Quality
- Onset



Not fully modelled – multiple pre-coordinated concepts

- Unintuitive anatomical site

- CSF mouth/ear/nose
- 230744007 'Cerebrospinal fluid leak - Central nervous system space
- 68382005 'Cerebrospinal fluid otorrhoea - Meninges structure

SNOMED issues – concept types

- Some overlaps/gaps on different concept types
- Symptoms – disorders
 - Known difficult area with blurring
 - Code to available concepts
- Problem – disorders
 - Some ‘problem’ concepts but not enough to cover all requirements
 - Code to disorders with agreement ERG
- Morphology – disorders
 - Some missing disorder concepts
 - Requests to UKTC for major gaps
 - Code to less specific concept & use ‘associated morphology’ attribute
- Events - disorders
 - Mechanism of injury
 - Code to available concepts

Lesson 5:
Without a pragmatic approach
SNOMED scope will be limited.

Coding in isolation from the application

- Known issue defining data requirements in isolation from terminology
- Reverse also true e.g.

Level 1	Level 2	Level 3	Level 4	Level 5
Physical exam	Area Specific	Back	Dorsal: Right	Haematoma
Physical exam	Area Specific	Back	Dorsal: Right	Impaled Object

- Back/Dorsal = Dorsum of hand
- **Not** dorsum of thorax

Lesson 6:
SNOMED coding needs to be integrated into the whole development process to work properly

Quality Assurance & Legality checking

- SNOMED coding by humans = inevitable errors
- Multiple representational options
 - Inter- and intra-terminologist variability
- > 50 referential QA rules e.g.
 - Inactive concepts
 - Incomplete OAV triples
 - Unapproved attributes
 - Redundant laterality
- Legality checking
 - Visual basic script by Jeremy Rogers
 - Utilised a metadata table of sanctioned and allowable post-coordination derived from SNOMED documentation
 - SNOMED User Guide/SNOMED Technical Reference Guide

ECS SNOMED data

- Stored in CSC data centre
- Trusts have access for patient based data
- Existing reporting mechanism outside SNOMED
- Strategic reporting application on development roadmap
- Messaging to other applications
 - NPfIT Summary Care Record
 - Work ongoing for next release
 - HL7 V3 standard

Messaging in HL7 V3

- NPfIT includes 'Summary Care Record'
- Centrally hosted – available 24/7
- Later releases of NPfIT applications expected to message to SCR
- Next release of ECS – ongoing work
- NPfIT Message Implementation Manual (MIM)
 - Includes SNOMED subsets defining content to be messaged
- Applied against SNOMED in CSC data centre
- 3 areas considered
 - Allergies & Adverse Reactions ✓
 - Drugs ✓
 - Diagnoses/Findings ? (Not 'formal' diagnoses)

Message section - allergies

Imports from Excel spreadsheet

HL7 CD datatype SNOMED expression generated from populated fields via query

Level_1	Level_2	Level_3	Level_4	HL7
HISTORY	ALLERGIES	FOOD	Seafood	<code codeSystem="2.16.840.1.113883.6.96"code="414285001"displayname="Food allergy"> <qualifier> <name code="246075003"displayName="Causative agent"/> <value code="44027008"displayName="Seafood"/> </qualifier> </code>
HISTORY	ALLERGIES	FOOD	Shellfish	<code codeSystem="2.16.840.1.113883.6.96"code="414285001"displayname="Food allergy"> <qualifier> <name code="246075003"displayName="Causative agent"/> <value code="227146005"displayName="Shellfish - dietary"/> </qualifier> </code>
HISTORY	ALLERGIES	FOOD	Unknown Food	<code codeSystem="2.16.840.1.113883.6.96"code="414285001"displayname="Food allergy"> </code>
HISTORY	ALLERGIES	INSECTS	Bees	<code codeSystem="2.16.840.1.113883.6.96"code="419199007"displayname="Allergy to substance"> <qualifier> <name code="246075003"displayName="Causative agent"/> <value code="288328004"displayName="Bee venom"/> </qualifier> </code>

Summary - overview

- 6500 hard coded entries
- Totally transparent to the end user
- Very resource intensive process
 - Estimated 1 man year effort
 - 4 experienced terminologists
 - ‘Learning by doing’
- Advantages in pre-configured SNOMED expressions
- Particular approach for this application
- Unlikely to be a scalable approach across other applications

Lesson 7:
SNOMED coding is not easy but involves a
lot of fun!

Summary – lessons learned

- Applications tend not to be designed around SNOMED
- MS Access handles SNOMED well
- Collaborate with national terminology centre
- Without post-coordination SNOMED scope will be limited
- Without a pragmatic approach SNOMED scope will be limited
- SNOMED coding needs to be integrated into the whole process
- SNOMED coding is not easy but involves a lot of fun

Any questions?