

Demystify SNOMED CT: Training Considerations

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About me

- Dentist
- Master of Health Informatics
 - Clinical terminologies
 - Projects
- PhD in Computer Science
 - Description Logic
 - Practical applications of ontologies
- Academic

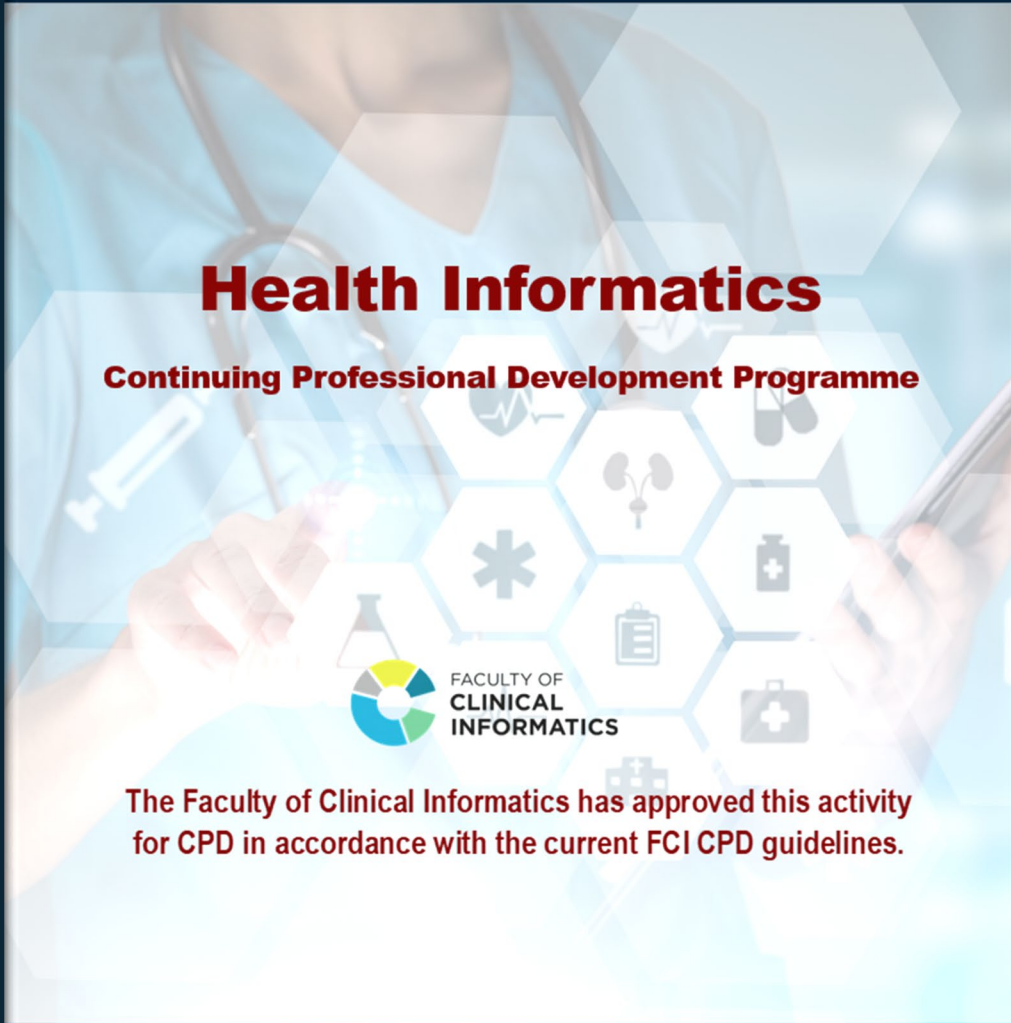



Health Informatics CPD programme

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The programme



Health Informatics
Continuing Professional Development Programme

FACULTY OF CLINICAL INFORMATICS

The Faculty of Clinical Informatics has approved this activity for CPD in accordance with the current FCI CPD guidelines.

go.ncl.ac.uk/health-informatics

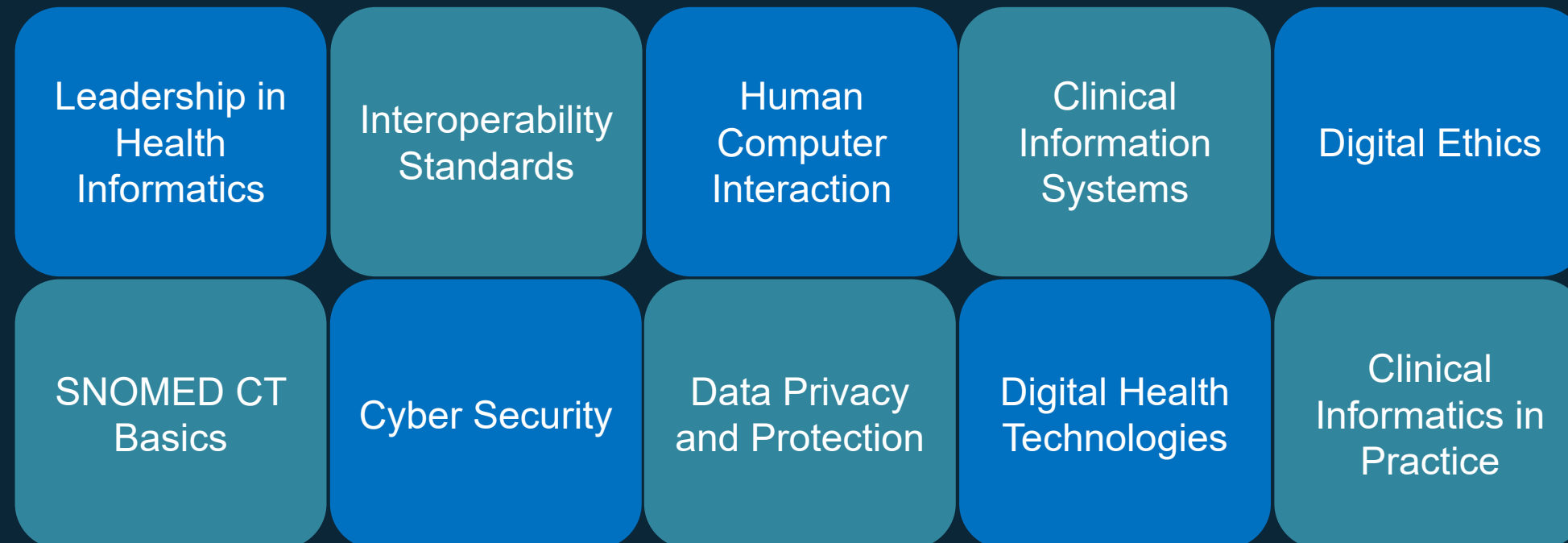
institute of **CODING**

The poster features a background image of a healthcare professional in blue scrubs using a tablet. Overlaid on this is a hexagonal grid of icons representing various medical and informatics concepts: a stethoscope, a heart, a microscope, a pill, a clipboard, a first aid kit, a person, a brain, a gear, and a network. The text is centered and uses a mix of bold and regular fonts.

An **introductory** programme to provide a foundation for beginners in Health Informatics from which they can build additional knowledge in the field.

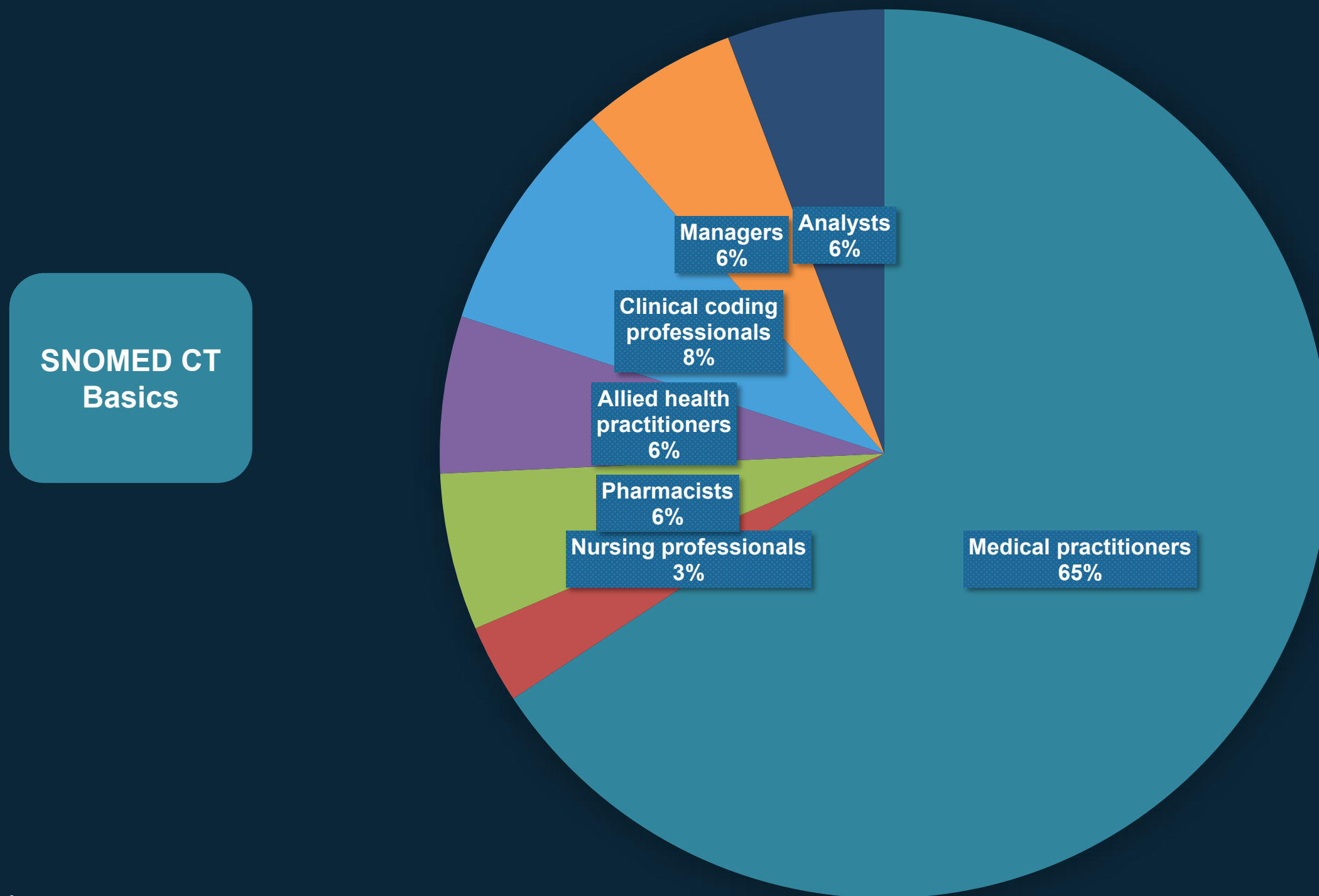
A **collaboration** between Institute of Coding at Newcastle University and Health Education England North East and Cumbria.

The details



- 10 courses x 3 hours each
- Face-to-face delivery:
 - December 2019 to March 2020 (did not really happen that way though!)
- Online hybrid delivery:
 - November 2020 to June 2021
- Small group settings
- Accredited by the UK Faculty of Clinical Informatics

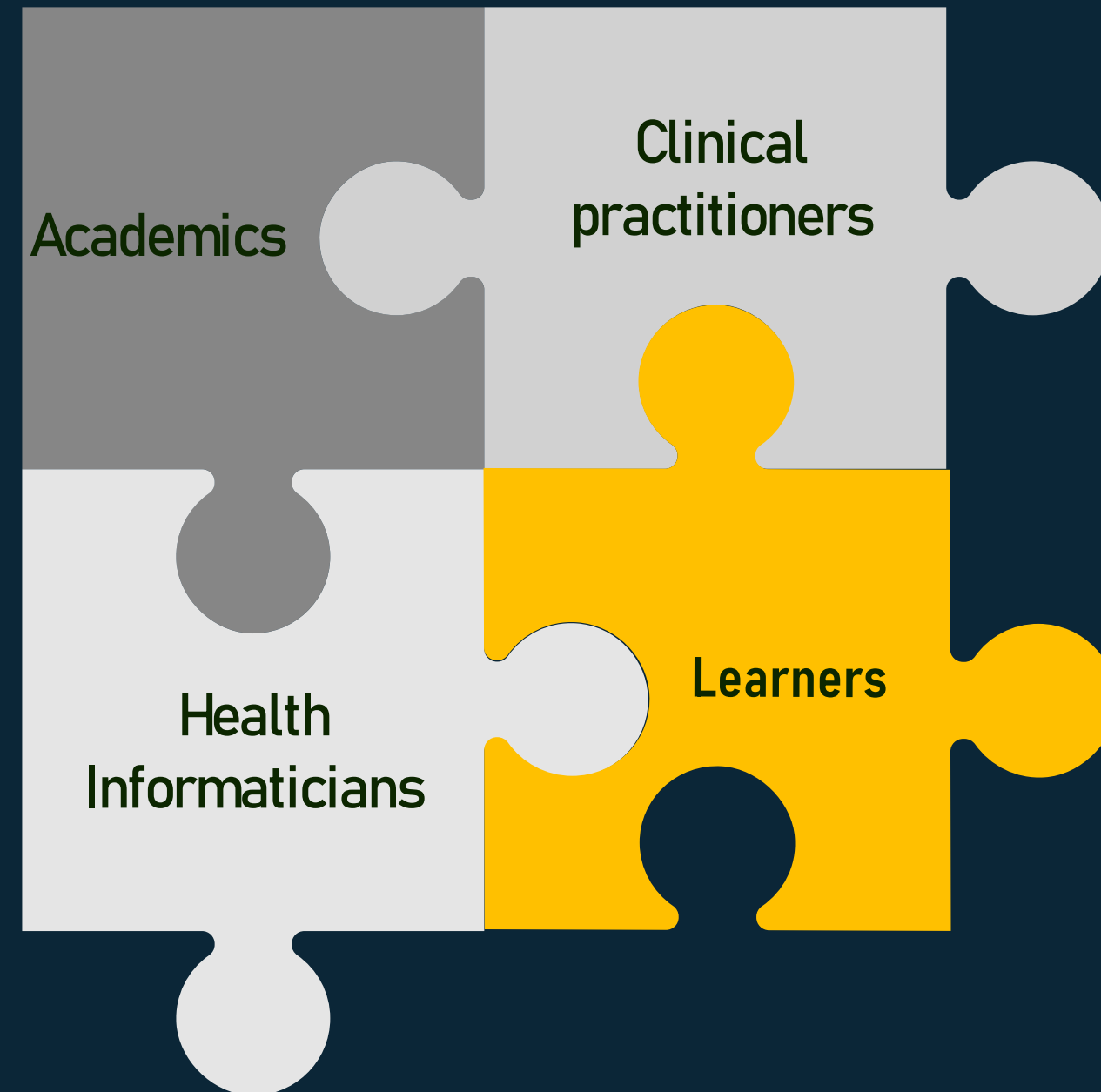
Participant profile



- Working or interested in Health Informatics
- n = 34
- Only SNOMED CT course = 4

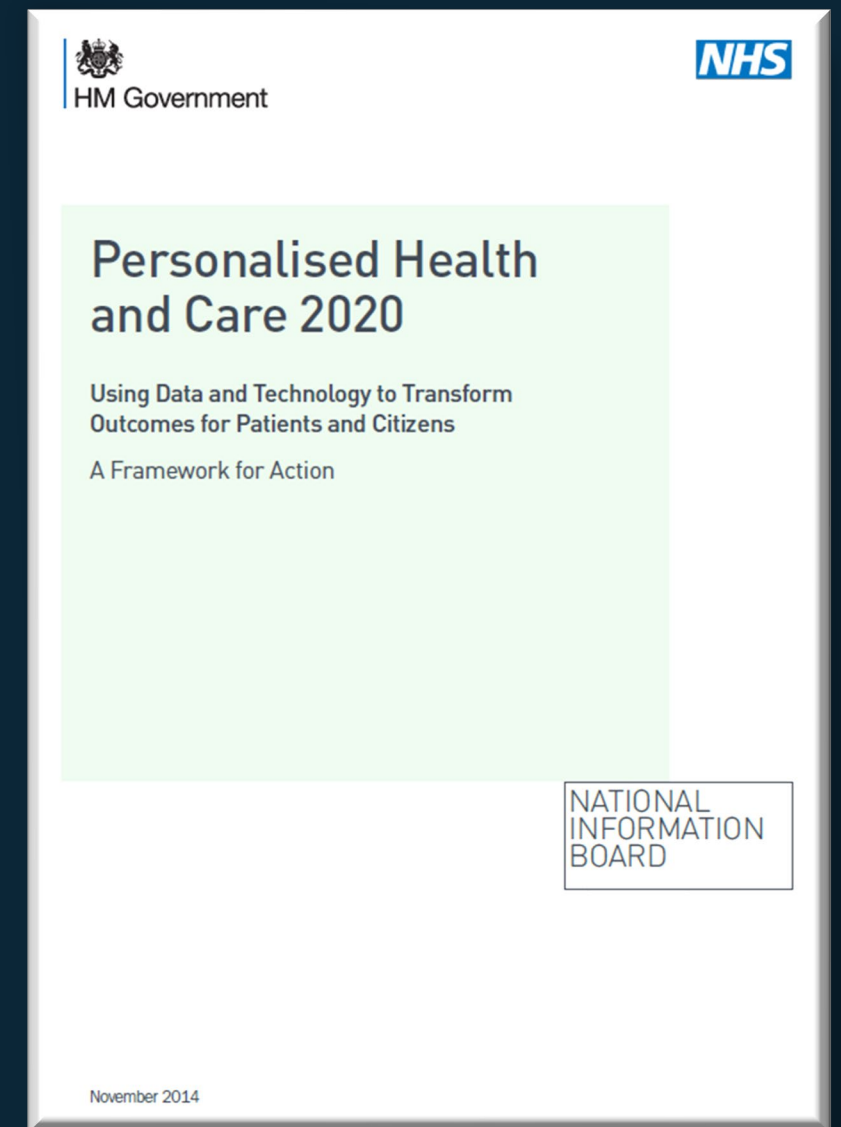
Development and delivery

- Literature reviews
- Core competencies
- Pedagogical principles
- Collaboration



Literature: why SNOMED CT?

- **Why** should clinical practitioners learn about SNOMED CT?
 - Benefits to individual and population health⁶
 - Supporting evidence-based healthcare⁶
 - National Information Standard⁵
 - All NHS healthcare providers in England must use SNOMED CT for capturing clinical terms within electronic patient record systems



Literature: what in SNOMED CT?

Knowledge/Skill – Domain	– Level	
	IT user	BMHI specialist
(1) Biomedical and Health Informatics Core Knowledge and Skills		
1.17 Nomenclatures, vocabularies, terminologies, ontologies and taxonomies in BMHI	+	++
(3) Informatics/Computer Science, Mathematics, Biometry (continued)		
3.1 Basic informatics terminology like data, information, knowledge, hardware, software, computer, networks, information systems, information systems management	+	+++
3.12 Methods for decision support and their application to patient management, acquisition, representation and engineering of medical knowledge; construction and use of clinical pathways and guidelines	+	+++

IMIA recommendations on education in Biomedical and Health Informatics⁴

Flexible Portfolio Training. Royal College of Physicians and NHS Health Education England³

System use and clinician safety

Identify the purposes for which electronic care records are used, and the structuring and standards needed to enable these uses, including coding and classification system

Information and knowledge management

Decision support – finding and recording sources of information digitally

Secondary use of data:

- Nuances of digital data recording, eg use of terminologies and nomenclatures for high-quality data capture
- Accessing and using digitally recorded data for research and audit
- Data analysis

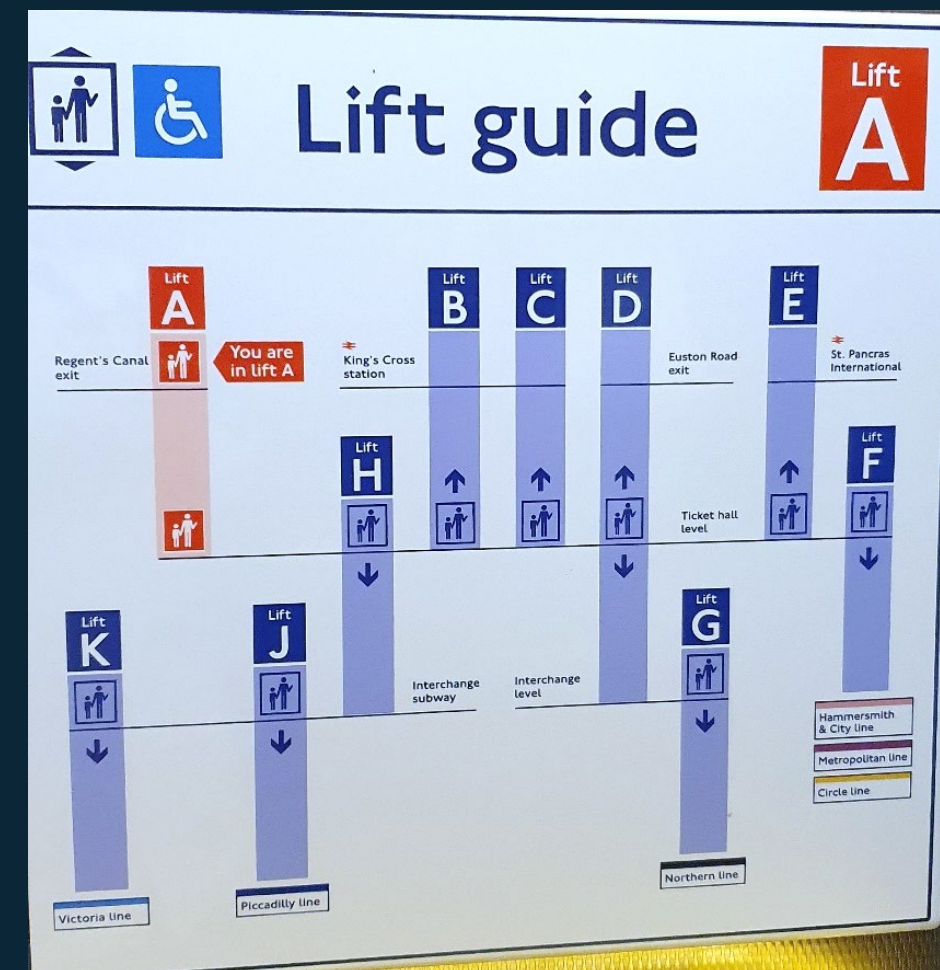
Literature: what in SNOMED CT?

- IMIA⁴
 - The objective of an *informatics-based approach to BMHI* is to focus on the **machine processing of data, information and knowledge** in health care and medicine with a strong emphasis on the need for advanced knowledge and skills of BMHI, of workflow, people and organizational aspects, of mathematics, as well as of theoretical, practical and technical informatics/ computer science, especially **semantic interoperability, ontology-based software engineering** and its relationship with effective and safe data, information and knowledge processing and representation.
- SNOMED CT: Who needs to know what?¹
 - In particular, we recommend that all health informatics professionals should learn **Description Logic**, which **forms the basis** of the way that SNOMED CT concepts are defined and post-coordinated expressions are put together.

Barriers to the adoption of SNOMED CT

SNOMED CT: Who needs to know what?¹

- Inherently complex
- Difficult to find the right code
- Post-coordination adds another layer of complexity
- Documentation long and complex
- Lack of good training and education materials



Example: representing natural language

233604007 |Pneumonia (disorder)|
==== 64572001 |Disease (disorder)| :
 { 116676008 |Associated morphology (attribute)| = 707496003
 |Inflammation and consolidation (morphologic abnormality)| ,
 363698007 |Finding site (attribute)| = 39607008 |Lung structure
 (body structure)| }

Any disease
with associated morphology *of*
inflammation and consolidation
and
with finding site *as* lung structure
is *equivalent to* or a *type of* pneumonia.

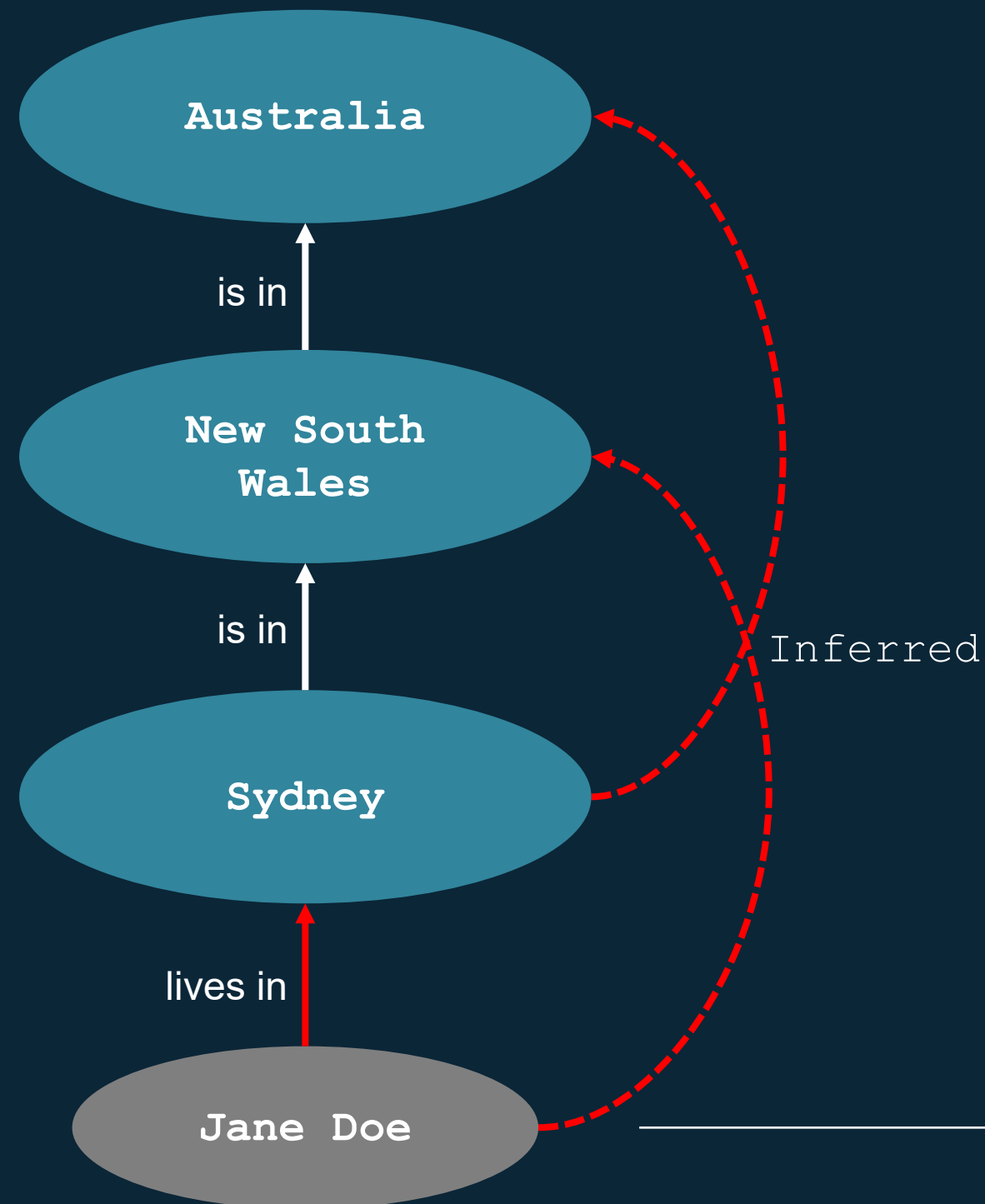
```
EquivalentClasses(  
  :233604007 |Pneumonia (disorder)|  
  ObjectIntersectionOf(  
    :64572001 |Disease (disorder)|  
    ObjectSomeValuesFrom(  
      :609096000 |Role group (attribute)|  
      ObjectIntersectionOf(  
        ObjectSomeValuesFrom(  
          :116676008 |Associated morphology (attribute)|  
          :707496003 |Inflammation and consolidation (morphologic abnormality)|  
        )  
        ObjectSomeValuesFrom(  
          :363698007 |Finding site (attribute)|  
          :39607008 |Lung structure (body structure)|  
        )  
      )  
    )  
  )  
)
```

Pneumonia \equiv Disease \sqcap
(\exists associatedMorphology.InflammationAndConsolidation \sqcap
 \exists findingSite.LungStructure)

Example: logical deduction

Which country is the city of Sydney in?

Which Australian state does Jane Doe live in?



Our knowledge base
– what we know

Jane Doe lives in Sydney.

Factual data

Interoperability and integration (Information technologies and systems)

Recognises that **interoperability is an unresolved problem** and the issues surrounding this (e.g., lack of adherence to informatics standards, different processes surrounding informatics system) impact on the delivery of integrated care

Demonstrates knowledge of the range of technology for transmitting information (e.g., messaging between systems) and clinical standards (e.g., standards for structuring clinical information) for information needed to **support the creation of interoperable systems**

Demonstrates knowledge of the basis, application and limitations of clinical coding systems, terminologies and classifications and understands their **purpose in delivering safer health care**

Knowledge management (Decision making)

Understands how knowledge can be transformed from generation to modelling into a **computable form**

Demonstrates understanding of **models** for effective knowledge acquisition, storage and dissemination, including strengths and limitations

Data structure, standards and linkage (Working with Data and Analytical Methods)

Applies current best health informatics standards for the recording of health data (e.g., classifications, vocabularies) to **increase data quality** and utilisation for improving healthcare and clinical practice and research

UK Faculty of Clinical Informatics core competencies for Clinical Informaticians² – SNOMED CT

Back to the why, what, and the how

The Why

- Implications for data quality, analyses, decision support, interoperability
- Contribution to digital developments
- “How to ask if you don’t know what to ask for?”

The What

- Introduction and history
- Concept and logical models
- Terminologies vs. classifications
- Queries
- Expressions
- Browser

The How

- Interdisciplinary development and delivery
- Learner-centred approach
- Distinguish between technical for understanding and for doing
- Browser as educational tool

What did the learners say?

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What did you find the most useful?

- Better understanding regarding the potential for SNOMED-CT data interpretation
- Will use snomed more effectively
- It was a really clear presentation and then followed by a meaningful demo that made it seem real
- Understanding Ontology and the inferred properties of concepts

I was skeptical that SNOMED was going to be as useful as it was. This course was great with insightful teaching from knowledgeable staff. It is a difficult subject as it's quite different to other elements of informatics but it was great.

Great practical demonstration of its functionality

Knowing about the possibilities and what we must learn to be able to achieve that

demonstration of the browser highlighted areas I had never seen when looking for SNOMED CT terms

The slides describing the SNOMED CT structure and concepts are very effective and provide a good insight to SNOMED CT.

If I'm being completely honest, I was not aware of SNOMED at all. I thought that this was very interesting makes you aware of the browser and some key concepts and can potentially use this information in the future



What would you like to learn more about?

we were beginning to ask a lot about the ways other programmes make SNOMED really clever. A little more of this and getting the most out of SNOMED would be a great follow-on topic

Some more clinical, real world examples of implementation of SNOMED CT especially in secondary care

What to do if the code does not exist
What to do if two codes exist that don't match/coordinate

real-life examples of how questions can exploit the ontology

i think there needs to be basic guidelines how it affects different people. eg the implications for physios, consultants, nurses, coding staff.

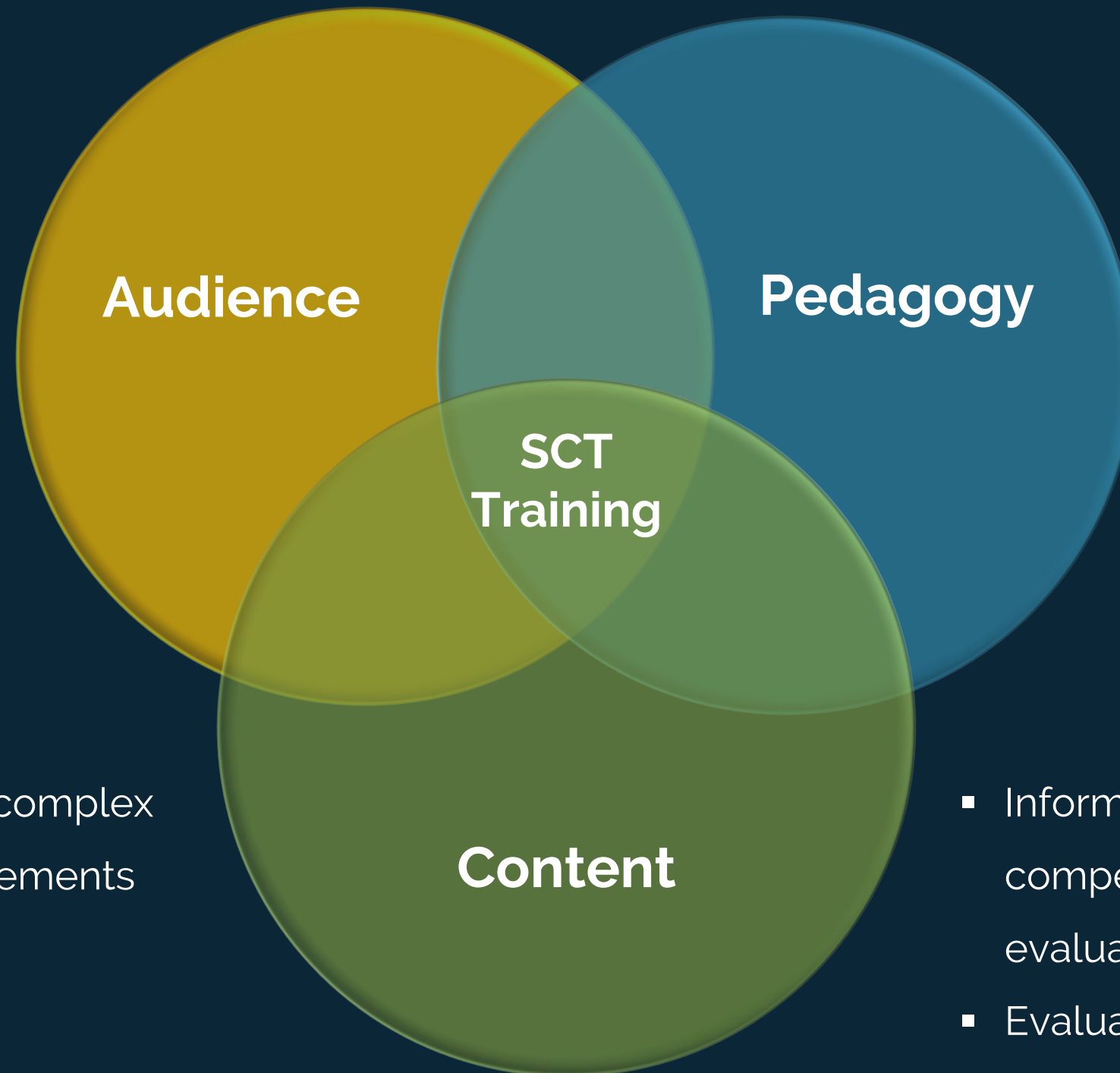
Impact on coding. and relationship between snomed and coders and snomed and medical staff.

Concluding remarks

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Demystify and motivate



- Know your learners
- Users or specialists?

- Adult learning principles
- Facilitation vs. instruction
 - “SNOMED CT is not ‘intuitively obvious’; it needs to be taught”¹
- Format of delivery
- Interdisciplinary development and delivery

- Break down the complex into digestible elements
- Use the browser!

- Inform by literature, competencies, experts, evaluations, learners
- Evaluate and update

Challenges & limitations

- No standardised curriculum
- Infrastructure behind theory – the actual uses of SNOMED CT cannot be realised if the infrastructure is not in place
- Small sample of learners to draw generalised conclusions from
- Format of delivery limitations
 - Flipped learning pre-session study commitments
 - Geographical barriers for face-to-face courses

A long way to go...

- Review content and delivery
- Stakeholder review and feedback
- Health Informatics in undergraduate curriculum
- SNOMED CT use and education survey



References

1. Ed Conley and Tim Benson. 2011. SNOMED CT: who needs to know what. *Eur. J. Biomed. Informatics* 7, 2 (2011), 40–47.
2. Faculty of Clinical Informatics Core Competency Framework for Clinical Informaticians: <https://facultyofclinicalinformatics.org.uk/core-competency-framework>.
3. Flexible Portfolio Training Clinical Informatics Curriculum pathway: <https://www.rcplondon.ac.uk/file/12047/download>.
4. John Mantas, Elske Ammenwerth, George Demiris, Arie Hasman, Reinhold Haux, William Hersh, Evelyn Hovenga, K C Lun, Heimar Marin, and Fernando Martin-Sanchez. 2011. Recommendations of the International Medical Informatics Association (IMIA) on education in biomedical and health informatics-first revision. *Eur. J. Biomed. Informatics* 7, 2 (2011).Flexible Portfolio Training.
5. NHS Digital SNOMED CT Information Standard: <https://digital.nhs.uk/data-and-information/information-standards/information-standards-and-data-collections-including-extractions/publications-and-notifications/standards-and-collections/scci0034-snomed-ct>.
6. SNOMED International 5-Step briefing: <https://www.snomed.org/snomed-ct/five-step-briefing>.

Thank You! Questions?



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