



## SNOMED CT

An Introduction/Debra Konicek, RN, MSN, BC

March 23, 2011

[www.cap.org](http://www.cap.org)

## Agenda

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- **SNOMED CT: Introduction**
- Benefits of SNOMED CT: Interoperability
- What is SNOMED CT?
- SNOMED CT Terminology Structure
  - Concepts
  - Descriptions
  - Hierarchies
  - Relationships
- SNOMED CT and Other Terminologies
- SNOMED CT Distribution
- CAP STS Overview and Services

## SNOMED CT

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# *Systematized Nomenclature of Medicine Clinical Terms*

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## IHTSDO & SNOMED CT

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- In 2007, CAP transferred SNOMED CT to the International Health Terminology Standards Development Organization (IHTSDO)
- IHTSDO responsible for editorial governance and international distribution
- IHTSDO Member Countries

Australia  
Canada  
Cyprus  
Denmark  
Estonia

Lithuania  
New Zealand  
Singapore  
Slovak Republic  
Slovenia

Spain  
Sweden  
The Netherlands  
United Kingdom  
United States

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## SNOMED CT: Rich Content, Logical Structure

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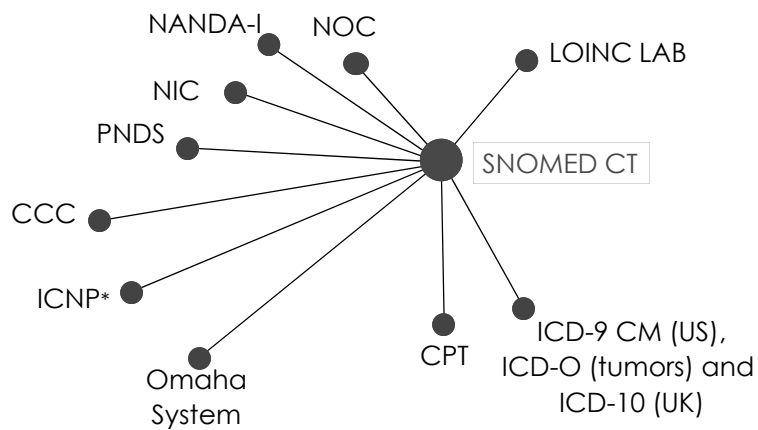
- Comprehensive clinical terminology
  - Over 311,000 concepts
  - Created by physicians, nurses, and other clinicians
- Makes clinical data easier to...
  - Capture
  - Retrieve
  - Exchange
  - Understand

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## Some Standardized Terminology Mappings to SNOMED CT

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\* In Process

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## Benefits of Interoperability

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- Facilitates interoperability between national and international healthcare systems
- Allows links to knowledgebases
  - The United States Health Information Knowledgebase
- Facilitates clinical research
- Provides a mechanism for automated mapping to other clinical vocabularies and code sets
  - ICD, CPT, NANDA-I, PNDIS, etc

## Interoperability

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- Semantic interoperability requires health information to be represented by “specific” vocabularies and code sets that can be interpreted by EHR technology
  - Collected at the point of care in user friendly clinical terms
  - Converted and presented in a readable format

## Interoperability Improves Patient Care

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- Complete, accurate, and searchable health information, available at point of care
- Enables data sharing among providers
- Coordination and personalization of care
- Facilitates quality monitoring of provider specific outcomes
- Facilitates quality reporting and analytics
- Reductions in adverse events

## SNOMED CT Facilitates Clinical Research

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- Standard data is captured once and reused
  - Tracking patient safety for recently approved drugs
  - Testing efficacy of new procedures
  - Identifying falls in elderly hospitalized patients receiving opioid analgesics

## Provides a Mechanism for Automated Mapping

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- SNOMED CT allows very fine grained capture of data
- Many other code sets (i.e., ICD, CPT) use broader categories
  - Important clinical detail is lost

## Allows Links to Knowledgebase

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- What is a knowledgebase?
  - External source of knowledge or information
- Components include:
  - KB provides the foundation for decision support rules
  - KB provides a way to synthesize health knowledge
  - Machine readable rules
  - Human readable material

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## SNOMED CT in an EHR Application

ConceptId	DescriptionId	Term
20354001	34227016	Open fracture of lower end of humerus
208302004	318823010	Open fracture of ulna, coronoid
54819005	91112014	Closed fracture of shaft of radius and ulna
269083002	402859019	Closed Colles' fracture
66246007	110021014	Open fracture of shaft of radius

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## Structured Data Entry Forms

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## SNOMED CT

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- A comprehensive clinical terminology covering: nursing and medical diagnoses, signs and symptoms, functional status, interventions, procedures, outcomes, etc.
- Allows for a consistent way of indexing, storing, retrieving and aggregating clinical data across specialties and sites of care
- Helps to structure and computerize the healthcare record, reducing the variability in the way data is captured, encoded and used for clinical care of patients and research

## “Ontology” and Concept Orientation

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- Ontology: A set of meanings connected by relationships
  - A single concept can have multiple names or synonyms
  - For example:
    - Ligation of artery
    - Arterial ligation
  - A single name can refer to many concepts
    - Fundus of uterus
    - Fundus of eye

## Concept Permanence

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- A concept never goes away, its code is never reused
- A concept/code needs to support legacy systems

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## Concept

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- A distinct unit of meaning
  - Something we care enough about to have a name for and to talk about
  - Not a narrative or a full sentence
    - *Usually a noun or verb phrase*

“Hct≤35 + ≥35% O2/Assist vent or ↑HR,↑RR”  
this is a narrative, not a concept

## A Concept is a Container

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- ConceptID 90539001
- Descriptions:
  - Ventricular aneurysm (disorder)
  - Ventricular aneurysm
  - Ventricular cardiac aneurysm
- Relationships:
  - IS-A → Aneurysm of heart
  - IS-A → Disorder of cardiac ventricle
  - Associated morphology: Aneurysm
  - Finding site: Cardiac ventricle structure

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## SNOMED CT Description Types

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- Fully Specified Name (FSN)
  - “Aortic aneurysm (disorder)”
- Preferred Term/display name
  - “Aortic aneurysm ”
- Synonyms
  - “AA - Aortic aneurysm”
  - “Aneurysm of aorta”

## FSN vs. Preferred Term

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- **FSN:** Total resection of urinary bladder (procedure)
- **Preferred term:** Complete cystectomy

## Description Types CliniClue Browser

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Concept Status: Current

### Descriptions

- ▣ aortic aneurysm (disorder)
- ▣ aortic aneurysm
- ▣ AA - Aortic aneurysm
- ▣ aneurysm of aorta

Definition: Fully defined by ...

### is a

- ▣ aneurysm of artery of trunk
- ▣ disorder of aorta

### Group

- ▣ associated morphology
  - ▣ aneurysm
- ▣ finding site
  - ▣ aortic structure

### Qualifiers

- ▣ severity
  - ▣ severities
- ▣ episodicity
  - ▣ episodicities
- ▣ clinical course
  - ▣ courses

### Codes

- ▣ Original SnomedId : D3-83300
- ▣ Read Code (Ctv3Id) : G71..

(F) Fully Specified Name

(P) Preferred Name

(S) Synonyms

[http://www.nlm.nih.gov/research/umls/Snomed/snomed\\_browsers.html](http://www.nlm.nih.gov/research/umls/Snomed/snomed_browsers.html)

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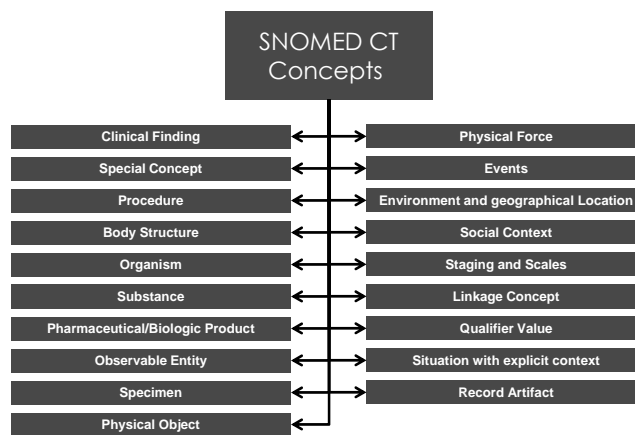
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## 19 Top Level Hierarchies

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## Most Populated Hierarchies

Clinical Finding

Procedure

Body Structure

Organism

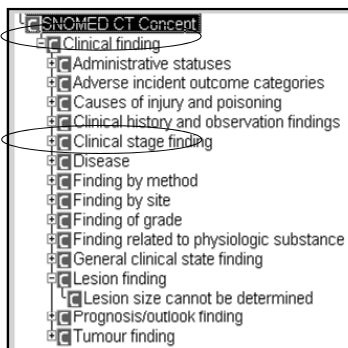
Substance

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## Clinical Findings



- Capillary pulse (finding)
- Lipids abnormal (finding)
- Aortic murmur (finding)
- Cirrhosis of liver (disorder)
- Venous embolism (disorder)
- Decreased blood volume (finding)
- Cigarette smoker (finding)
- Acute abdomen (disorder)

*Result of a clinical observation, assessment, or judgment*

*Both normal and abnormal clinical states*

*Sub-hierarchy of "Disease": states that are necessarily abnormal*

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## Procedures

- ↳ SNOMED CT Concept
  - ↳ Procedure
  - ↳ Administrative procedure
  - ↳ Community health procedure
  - ↳ Environmental care procedure
  - ↳ General treatment
  - ↳ Laboratory procedure
  - ↳ Procedure by approach
  - ↳ Procedure by device
  - ↳ Procedure by intent
  - ↳ Procedure by method
  - ↳ Procedure by priority
  - ↳ Procedure by site
  - ↳ Procedure related to anesthesia and sedation
  - ↳ Procedure with a clinical finding focus
  - ↳ Procedure with a procedure focus
  - ↳ Provider-specific procedure
  - ↳ Regimes and therapies

- Admission review (procedure)
- CT of ankle (procedure)
- Insertion of insulin pump (procedure)
- Blood cell count, automated (procedure)
- Asthma education (procedure)
- Prenatal education (procedure)
- Surgical biopsy of joint (procedure)
- Referral to urology service (procedure)

*Activities performed in the provision of health care*

*Includes administrative, invasive, diagnostic, imaging, referrals, and education procedures*

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## Observable Entity

- ↳ SNOMED CT Concept
  - ↳ Observable entity
  - ↳ Body product observable
  - ↳ Clinical history/examination observable
  - ↳ Device observable
  - ↳ Drug therapy observable
  - ↳ Functions
  - ↳ General clinical state
  - ↳ Imaging observable
  - ↳ Interpretation of findings
  - ↳ Laboratory biosafety level
  - ↳ Lethal dose
  - ↳ Monitoring features
  - ↳ Population statistic
  - ↳ Radiation therapy observable
  - ↳ Rate of administration of intravenous fluid
  - ↳ Sample observable
  - ↳ Social / personal history observable
  - ↳ Substance observable
  - ↳ Temporal observable
  - ↳ Tumor observable
    - ↳ Additional pathologic finding in tumor specimen
    - ↳ Breslow depth staging for melanoma
    - ↳ Clark's melanoma level
    - ↳ Degree of pigmentation of tumor
    - ↳ Dukes stage

- Platelet volume (observable entity)
- Pulmonary valve flow (observable entity)
- Central venous pressure (observable entity)
- Total blood volume (observable entity)
- Handedness (observable entity)
- Blood pressure (observable entity)
- Moistness of skin (observable entity)

*Something that can be measured or observed*

*Example of use: to code headers on a template*

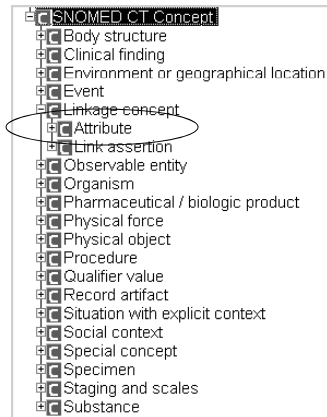
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## Linkage Concept/Attribute

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- Finding site (attribute)
- Associated morphology (attribute)
- Laterality (attribute)
- Method (attribute)
- Procedure site (attribute)

*"Attribute" is sub-hierarchy of Linkage concept*

*Used to construct relationships between two SNOMED CT concept*

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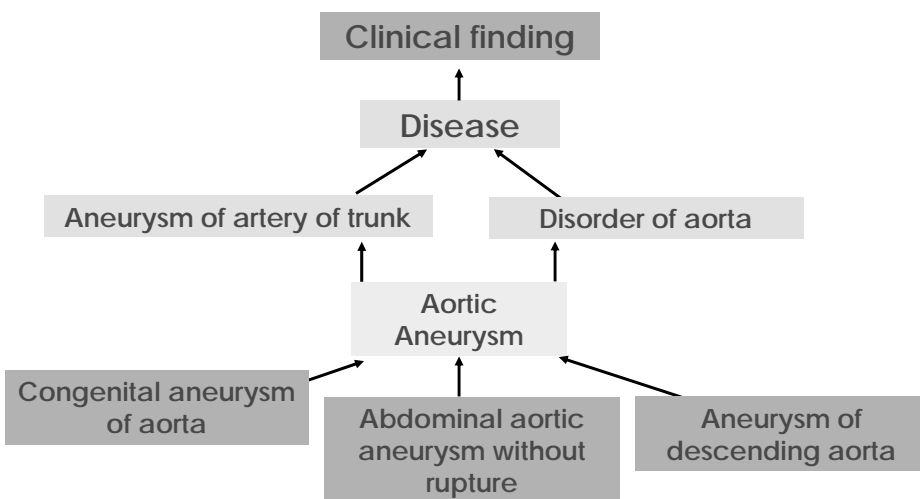
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## SNOMED CT Defining Relationships

- Serum total cholesterol measurement 412808005:
    - **Is a:** Total cholesterol measurement ← Hierarchy relationship
    - **Component:** Total cholesterol
    - **Method:** Measurement-action
- Defining attribute relationship

## “Is-a”



## Attribute Relationships

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- Aortic aneurysm(67362008 )
  - Finding site: Aortic structure
  - Assoc. morphology: Aneurysm
- Finding site:
  - Specifies the body site affected by a condition
  - Relates “Clinical finding” and “Body structure”
- Associated morphology:
  - Specifies morphologic change seen at tissue or cellular level
  - Relates “Clinical finding” and “Morphologically abnormal structure”

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## “Is-a”

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Situation with explicit context  
(situation)

Finding with explicit context (situation)

Family history of disorder (situation)

Family history of acute  
medical disorder (situation)

Family history of  
transient ischemic  
attack (situation)

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## Attribute Relationships

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- Family history of transient ischemic attack (160363004)
  - Subject relationship context: Person in the family
  - Assoc. finding: Transient cerebral ischemia
- Subject relationship context:
  - Specifies the subject of the Clinical finding or Procedure being recorded, in relation to the subject of the record
  - Relates “Clinical finding” and “Procedure” to descendants of “person” which Is\_A Social Context

## Attribute Relationships Continued

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- Associated finding:
  - Specifies the “Clinical finding” whose context is being modified
  - Relates “the Situation with explicit context” hierarchy to their related Clinical finding

“Is-a”

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## Classification (ICD) and Terminology (SNOMED CT)

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- ICD-9-CM: Used to classify or condense an entire patient encounter with as few as one or two assigned codes
- SNOMED CT: Enables a complete description of the entire clinical episode, represented by multiple codes, giving clinicians and others a full understanding of the patient encounter

## ICD 9 CM and SNOMED CT

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### *SNOMED CT allows very fine grained capture of data*

- Disturbance of skin sensation 782.0
  - Anesthesia of skin
  - Burning or prickling sensation
  - Hyperesthesia
  - Hypoesthesia
  - Numbness
  - Paresthesia
  - Tingling
- Skin sensation disturbance 80910005
  - Anesthesia of skin 271805006
  - Sensation of burning of skin 102604002
  - Prickling sensation 30961001
  - Hyperesthesia 14151009
  - Hypesthesia 397974008
  - Numbness of skin 102603008
  - Paresthesia of skin 102602003
  - Tingling of skin 274676007

## Representing "Heart Attack"

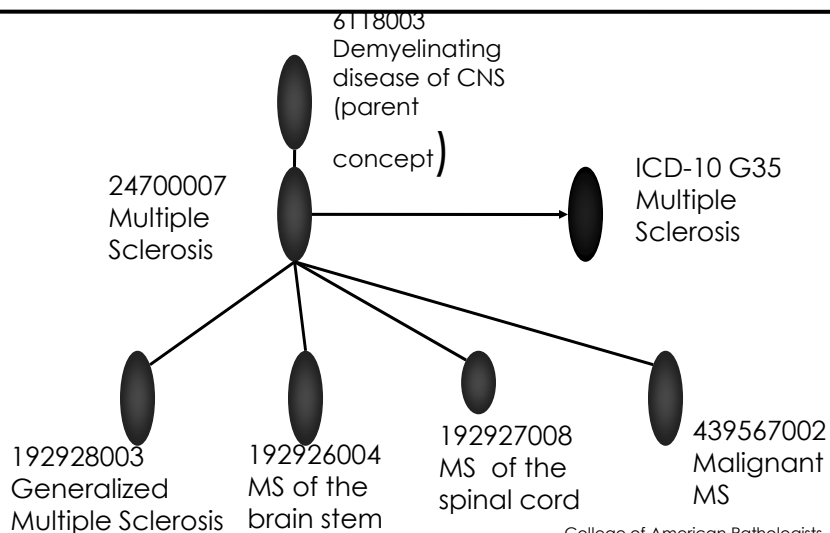
• Myocardial infarction	Myocardial infarct
• MI-Myocardial infarction	Heart attack
• Infarction of heart	Cardiac infarction

- ICD-9-CM code 410 "Acute myocardial infarction"
- Capturing identical clinical expressions with one concept

SNOMED CT code 22298006 with above synonyms (1 concept) multiple subtypes specific to site and severity of injury

- o standardizes information storage
- o aides information usage and retrieval
- o allows for flexibility/variation in clinician representation

## SNOMED Concepts Mapped to one ICD-10-CM Code



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## Distribution of SNOMED CT

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- SNOMED CT releases twice a year at the end of January and at the end of July.
- SNOMED CT is Available from IHTSDO via your countries National Release Center
  - For example, in the United Kingdom, the national release center is the National Health Service (NHS). In the United States, the national release center is the National Library of Medicine (NLM). The SNOMED CT tables are available free for use in the US from the NLM.

National Library of Medicine website at [www.nlm.nih.gov](http://www.nlm.nih.gov).

Table Name	Number of Tables
Core Tables <ul style="list-style-type: none"> <li>• Concepts</li> <li>• Descriptions</li> <li>• Relationships</li> </ul>	3
Component History Table	1
Subset	2
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## Professional Services

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### *“Helping Organizations Achieve Semantic Interoperability”*

**EMR/HIT Strategy and Semantic Interoperability**

**Education and Licensing**

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**The Recognized Terminology Experts**

SNOMED CT and all Major Classification & Coding Systems

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- Clinical and technical strategy and implementation consulting
- Mapping, content development
- Data management services
- Standard education
- Customized education
- Licensed content products

Licensed Content Product Development including SNOMED CT subsets and derivative, structured and encoded checklists and templates

## CAP-STS Education Offerings

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- Self-Directed Learning Presentations
  - SNOMED CT: An Introduction ("Basics")
  - SNOMED CT Concept model
  - Distribution format
  - Intro to Mapping
  - Intro to Nursing Content
  - Intro to Terminology and Classifications

## CAP-STS Education Offerings Continued

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- Eight Instructor-led Webinar Presentations:
  - SNOMED CT: An Introduction ("Basics")
  - SNOMED CT Concept Model
  - Distribution Format
  - Context Model for SNOMED CT Expressions
  - SNOMED CT Coding Clinical Data: Terminology and Information Model Interactions
  - Intro to Mapping
  - Intro to Nursing Content
  - SNOMED CT CliniClue Browser Training
- Live 2-day Classes
  - Customized courses held at your organization

## Questions?

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