EHRs, Interoperability and Quality Reporting

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Encore CE!

NENIC INDEPENDENT STUDY

On May 3, 2013

this lecture was recorded, with speaker permission, on

at

NENIC's Annual Symposium

Trends in Clinical Informatics: A Nursing Perspective

NENIC INDEPENDENT STUDY

- There is an absence of conflict of interest for planners, presenters, faculty, authors and content reviewers for this program.

- There has been no commercial support or sponsorship received for this program.

NENIC INDEPENDENT STUDY

- To successfully complete this module you will need to listen to the presentation, complete the evaluation and then your CE certificate will be sent to you by e-mail.
- If you have any questions, concerns or need additional information, contact NENIC's Program Planning Chair (program@nenic.org) . All feedback will be addressed in a timely manner.

NENIC INDEPENDENT STUDY

- At the end of this independent study module, you will be able to define :
  - One national initiative related to quality reporting from HER's as directed by meaningful use criteria.
  - One relationship between informatics standards, care documentation, quality reporting and evidenced based nursing practice.
  - The components of the knowledge Model for Nursing Informatics.

INTRODUCING

Judith J. Warren, PhD, RN, BC, FAAN, FACMI

- Christine A. Hartley Centennial Professor, (Retired)
- University of Kansas School of Nursing

EHRs, Interoperability and Quality Reporting

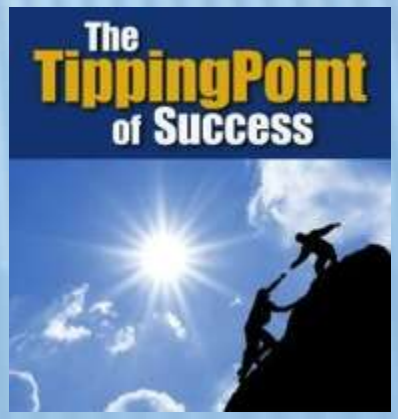
WHAT DOES 'IT' MEAN FOR NURSING?

"If nursing data is organized in a standard way, it can also be shared and compared across regional or national databases to identify trends, report outcomes, and research new opportunities to improve nursing practice."

- TIGER Initiative

THE TIPPING POINT: ENSURING NURSING'S ROLE IN HEALTH IT

- Result of some nurses talking about the future of meaningful use at a conference in July 2010
- Tipping Point invitational meeting in August 2010, funded by University of Colorado College of Nursing and Thomson Reuters
- Tipping Point 2 and 3 sponsored by ANA
- Engaged in strategic planning
  - Where do we need to be
  - Who do we know who is there
  - Who can we place there



A MEANINGFUL ROLE FOR NURSING

- Nursing documentation can be a tool to transform practice and outcomes
- Clinical data needs to be in a discrete format for electronic data exchange
- Need to transition from expensive retrospective chart reviews to quality reporting as a byproduct of nursing practice
- Secondary use of data is a by-product of patient care documentation

A REPLICABLE PROCESS TO CREATE INTEROPERABILITY

1. Evaluate the Evidence
2. Leverage Clinical Expertise
3. Develop Optimum Clinical Data Sets
4. Harmonize the Data
5. Map to Reference Terminologies
6. Formalize the Model in UML
7. Link to HL7 with a CDA
8. Validate the Model

Chow & Beene, 2011

A REPLICABLE PROCESS TO CREATE INTEROPERABILITY

1. Evaluate the Evidence
2. Leverage Clinical Expertise
3. Develop Optimum Data Sets
   a. Clinical data
   b. *Quality Metrics*
4. Harmonize the Data
5. Map to Reference Terminologies
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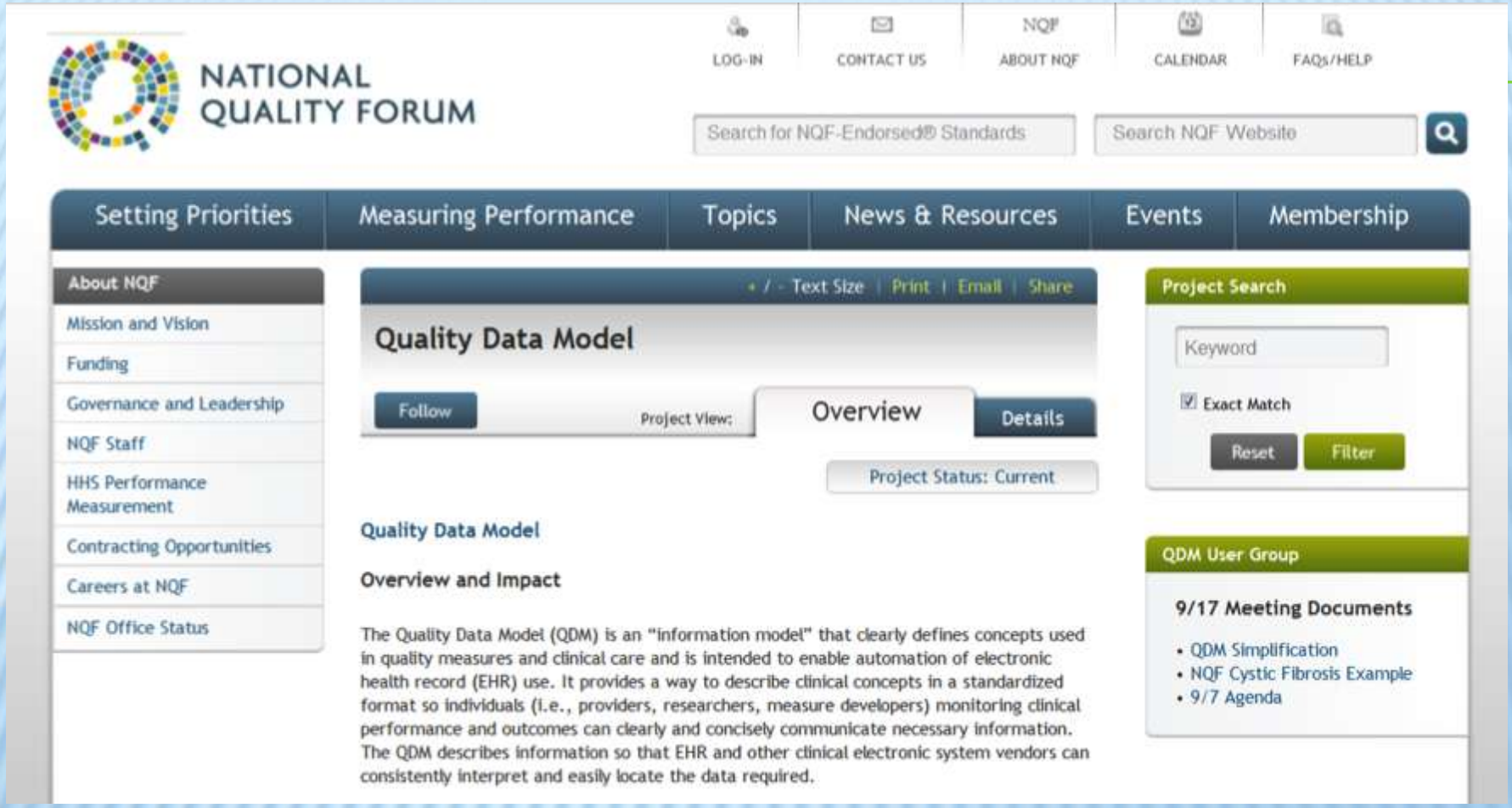
Warren adaption of Chow & Beene, 2011

STEP 1: EVALUATE THE BASE OF EVIDENCE

- Literature reviews
  - Conducted by NDNQI and their Pressure Ulcer Panel of Experts
- National Quality Forum (NQF)
  - Review requirements of the Data Quality Model
  - Review requirements of the eMeasures specifications
- Strategies for automatically generating these reports from data that is documented during the course of care delivery within the EHR



HTTP://WWW.QUALITYFORUM.ORG/QUALITYDATAMODEL.ASPX

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CMS Home > Medicare > Quality Measures > Electronic Specifications

Quality Measures
- Overview
- Electronic Specifications
- EHR Incentive Program Appeals
- Multi-Stakeholder Group Input on Quality Measures

Electronic Specifications

What are Electronic Specifications?

In order to report clinical quality measures (CQMs) from an electronic health record (EHR), electronic specifications must be developed that include the data elements, logic and definitions for that measure in a format that can be captured or stored in the EHR so that the data can be sent or shared electronically with other entities in a structured, standardized format, and unaltered.

EHR Incentive Program Electronic Specifications

Introduction to Electronic Specifications

These electronic specifications are derived from certified EHRs. As part of the criteria for satisfying meaningful use, CQM results (numerators, denominators, and exclusions) must be reported to CMS. Specific details regarding the reporting of the specifications for EPs and eligible hospitals/CAHs are described below.

Each electronic specification contains four main components:

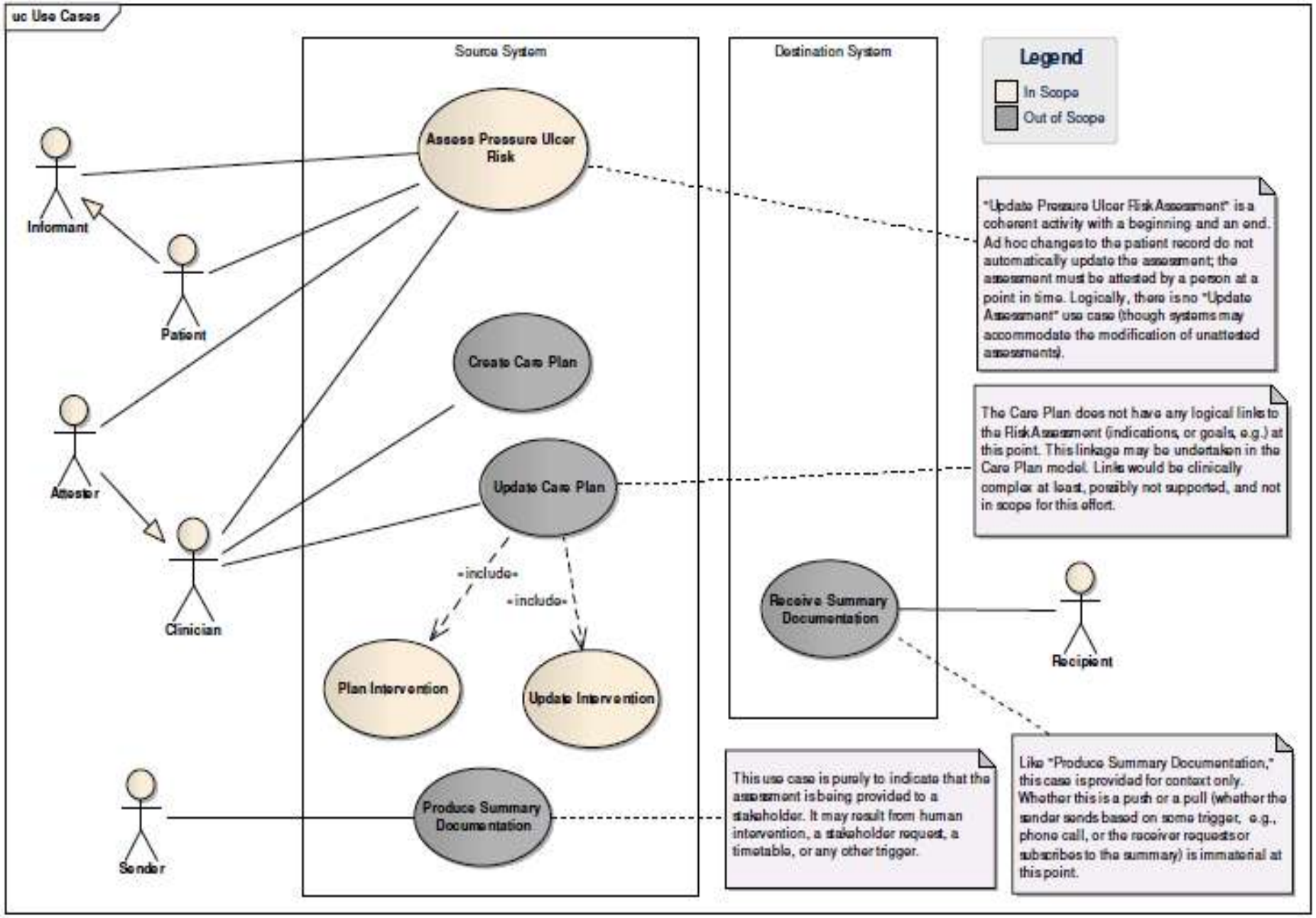
1. Measure Overview/Description - This contains the measure title, description, number, measurement period, measure steward, and other relevant information to the measure.
2. Measure Logic - This contains the population criteria and measure logic for the numerator, denominator and exclusion categories. The measure logic contains the algorithm used to calculate performance.
3. Measure Code Lists - This contains all of the codes pertaining to the measure.
4. QDS Elements - This lists and describes each Quality Data Set (QDS) data element associated with the measure. The QDS is a model of information that contains the standard element, the quality data element, and the data flow attributes. It is a way to describe clinical concepts in a standardized format so individuals (i.e., providers, researchers, measure developers) monitoring clinical performance and outcomes can clearly and concisely communicate necessary information. The QDS model also describes information in a manner that allows EHR and other clinical electronic system vendors to unambiguously interpret the data and clearly locate the data required.

HTTPS://WWW.CMS.GOV/QUALITYMEASURES/03_ELECTRONICSPECIFICATIONS.ASP

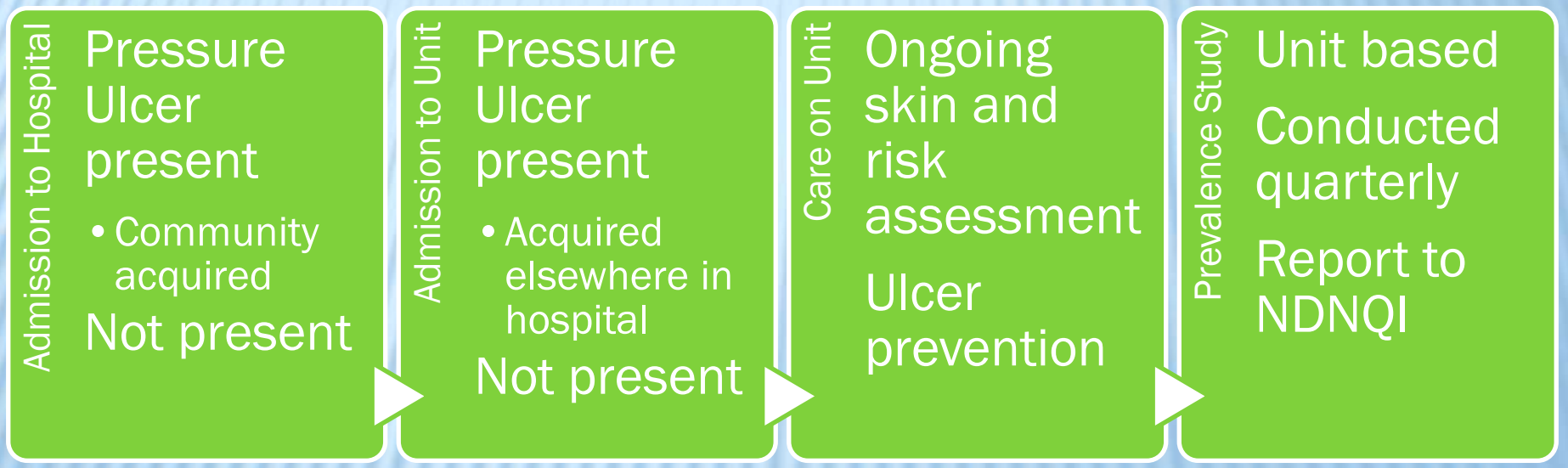
STEP 2: LEVERAGE CLINICAL EXPERTS

- NDNQI Panel of Experts
  - Chaired by Sandra Bergquist-Beringer
  - Members: Expertise supplied by
    - National Pressure Ulcer Advisory Panel (NPUAP) and Wound, Ostomy and Continence Nurses (WOCN)
    - Nurse Researchers specializing in Wound and Skin Care
- Requirements developed with use of APNs, use cases, terminology specialists, quality measures, and tools
  - Workflow diagrams, MindMaps, and UML
- Use Cases developed (clinical scenarios) for numerous collections of indicator information

Use Cases - *(Use Case diagram)*



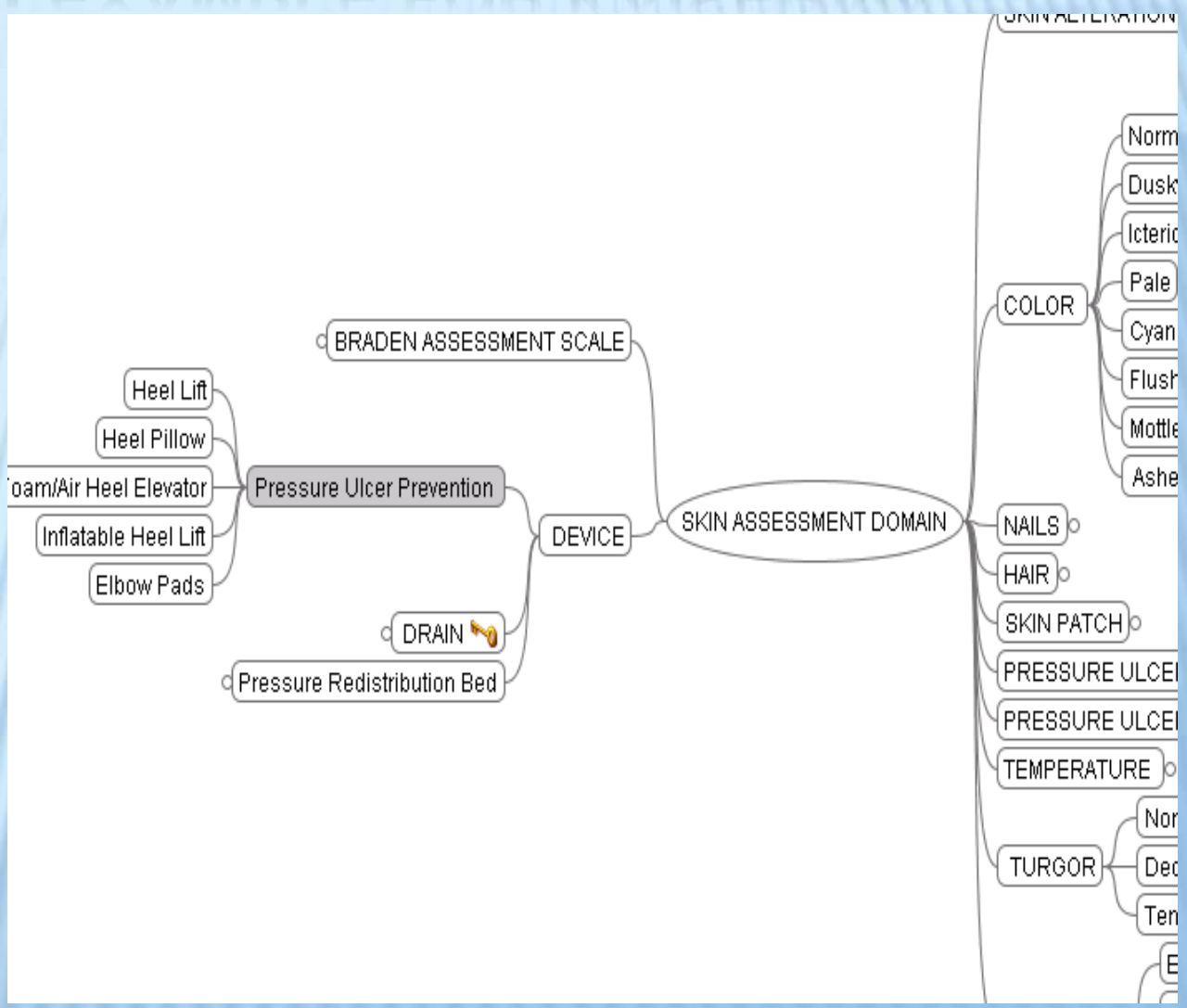
PRESSURE ULCER INDICATOR WORKFLOW



STEP 3: DEVELOP OPTIMAL CLINICAL DATA SETS: EXAMPLE FOR KAISER/VA

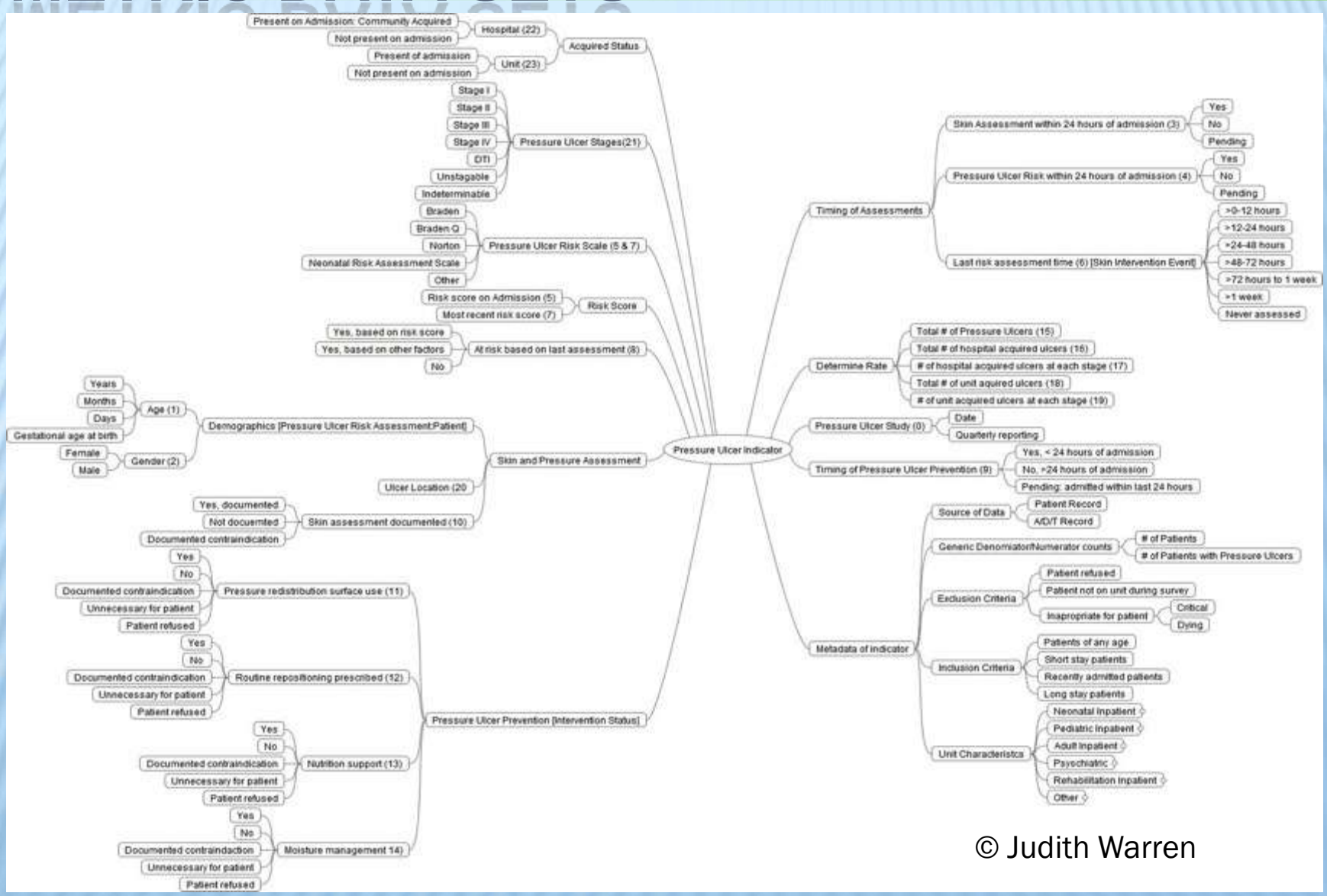
Subject matter experts reviewed spreadsheets and created mind maps to ensure content is comprehensive

Then:
Determined the optimal data set per use case based on both evidence based practice and context of scenario

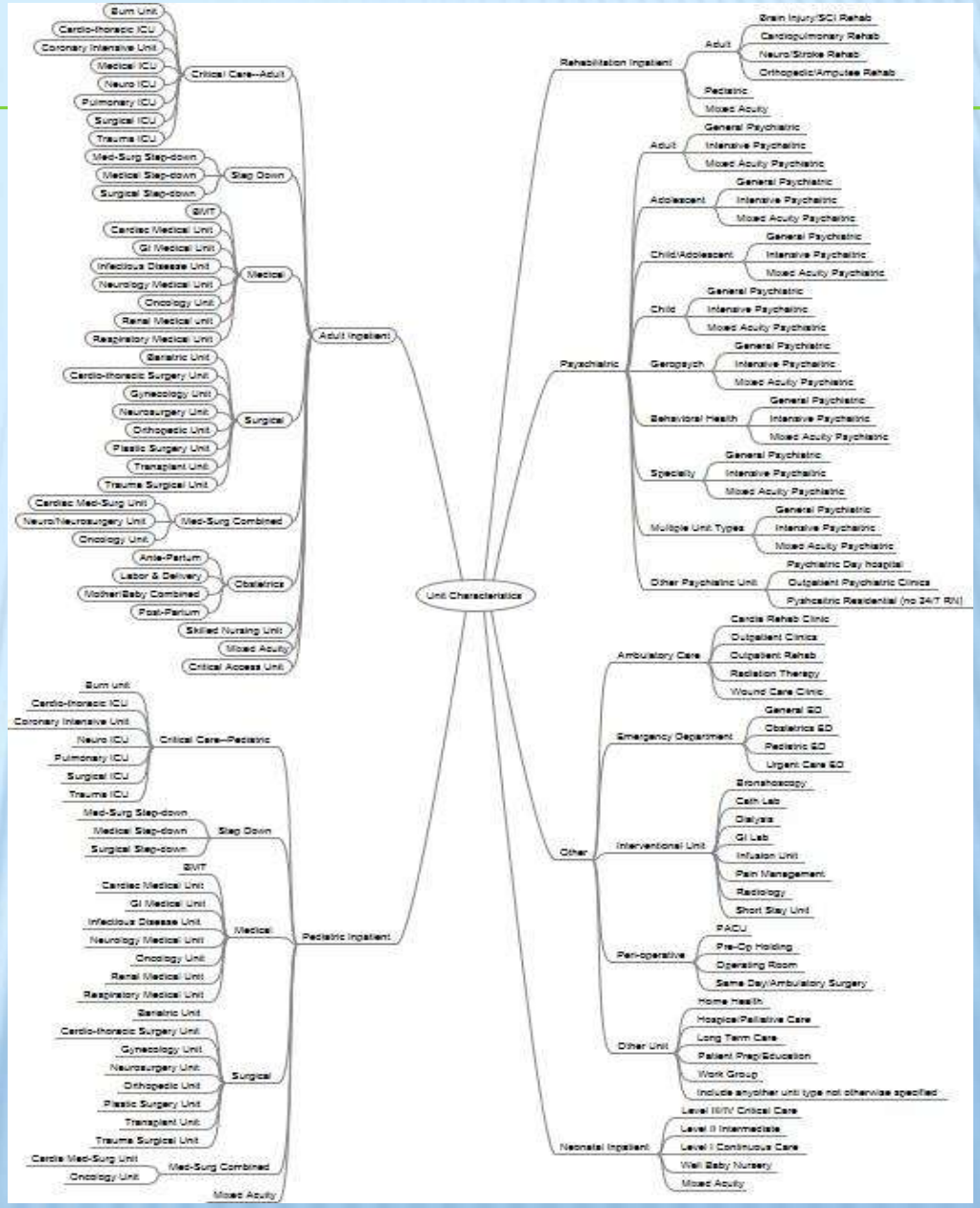


Chow & Beene, 2011

STEP 3: DEVELOP OPTIMAL QUALITY METRIC DATA SETS



Data Set Model for Nursing Units



STEP 4: HARMONIZE THE DATA EXAMPLE FROM KAISER/VA

VA Nursing Intervention: Manage Moisture		KP Nursing Intervention: Incontinence / Moisture Mgt
Maintain clean and dry skin		GAP
Apply condom catheter		Urinary containment device in place
Apply fecal collector (especially if skin breakdown)		Fecal containment device in place
Apply protective barrier ointment		Applied moisture barrier ointment / cream Applied skin barrier film / wipe Applied skin barrier film / wipe
Offer bedpan at scheduled intervals if patient is bed-bound		GAP
Offer urinal at scheduled intervals if patient is bed-bound		Prompted voiding
Schedule toileting		Prompted voiding
Instruct patient/caregiver to request assistance as needed		GAP
GAP		Absorbent underpad in place

Chow & Beene, 2011

STEP 4: HARMONIZE THE DATA

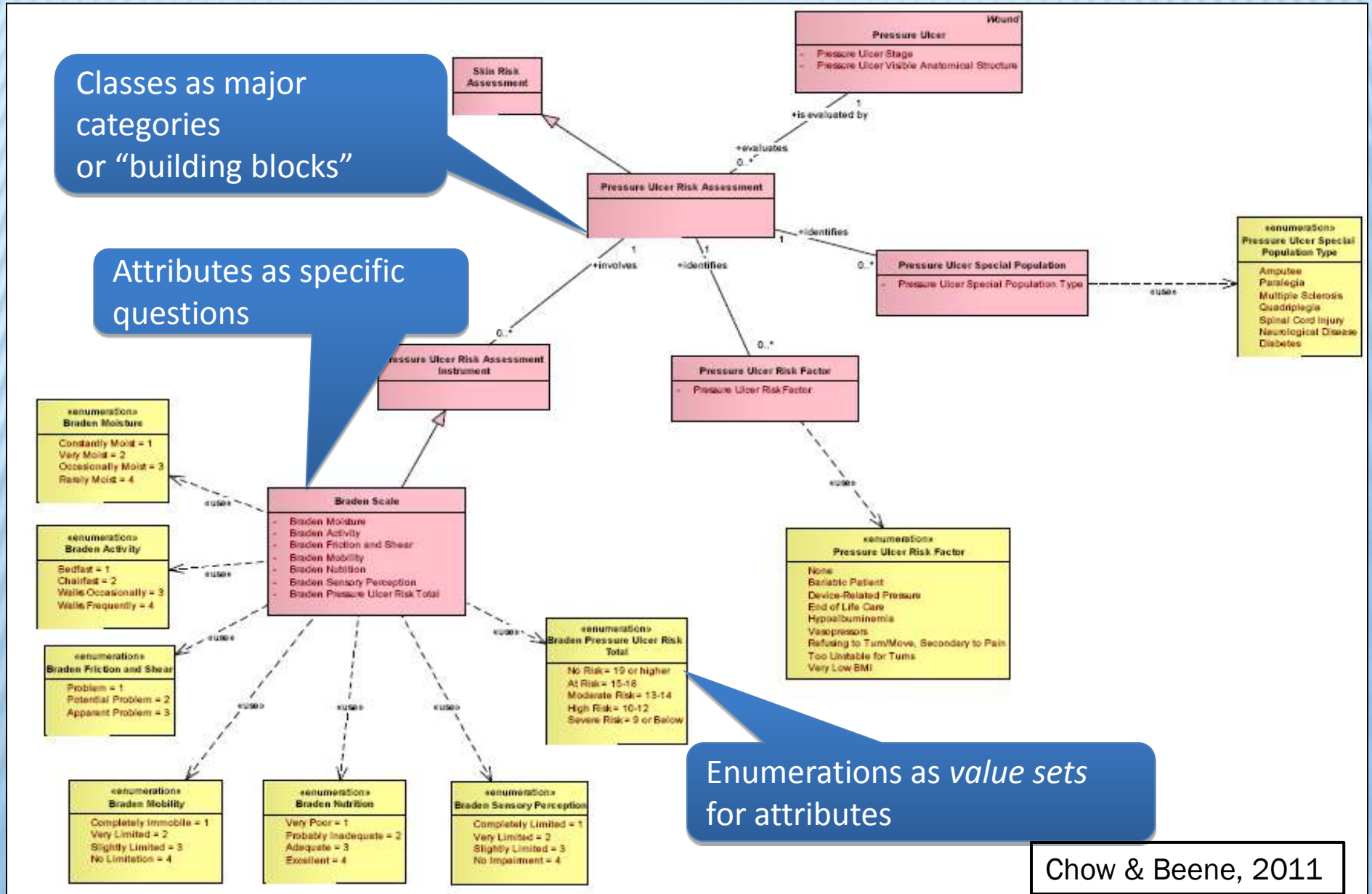
NDNQI Pressure Ulcer Indicator	HL7 Pressure Ulcer Domain Model
Skin Assessment	Skin Color
	(many more)
Risk Assessment	Scale used
	(many more)
Prevention Interventions	Nutrition management
	(many more)

STEP 5: MAP TO REFERENCE TERMINOLOGIES

NDNQI element	SNOMED CT Concept	Code
Pressure ulcer stage	pressure ulcer stage (observable entity)	420592002
Pressure ulcer stage I	pressure ulcer stage 1 (disorder)	421076008
Pressure ulcer stage II	pressure ulcer stage 2 (disorder)	420324007
Pressure ulcer stage III	pressure ulcer stage 3 (disorder)	421927004
Pressure ulcer stage IV	pressure ulcer stage 4 (disorder)	420597008
Pressure ulcer unstagable	nonstageable pressure ulcer (disorder)	421594008
Pressure ulcer indeterminable	pressure ulcer not visible (disorder)	421434007
Deep tissue injury		Gap

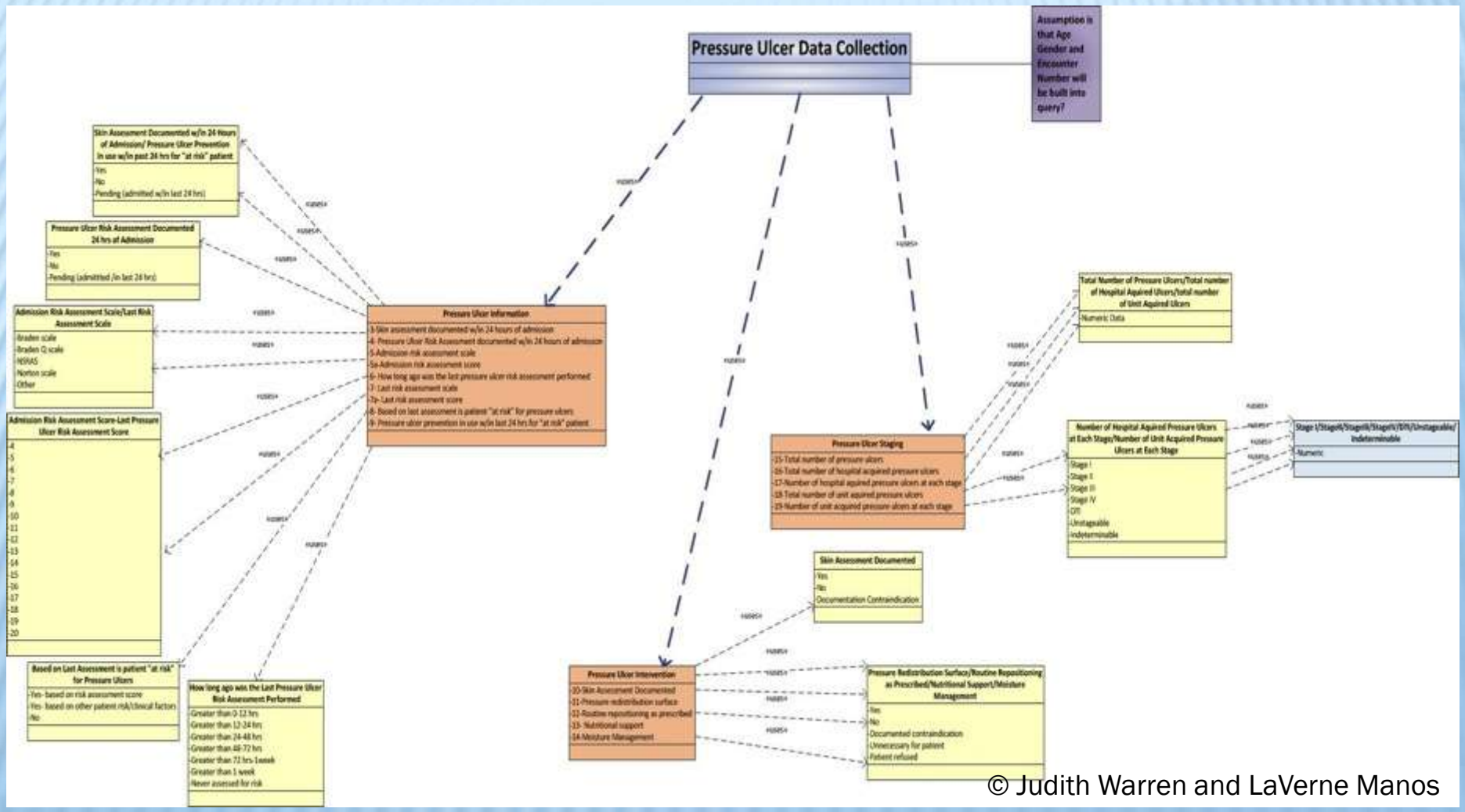
NDNQI element	SNOMED CT Concepts	Code	Comment
community acquired pressure ulcer			gap
community acquired pressure ulcer present	pressure sore (disorder); community acquired (qualifier value)	399912005; 277057000	requires post-coodination
community acquired pressure ulcer absent	pressure sore (disorder); community acquired (qualifier value)	399912005; 277057001	requires post-coodination
hospital acquired pressure ulcer			gap
hospital acquired pressure ulcer present	hospital acquired pressure ulcer (disorder)	446261004	
hospital acquired pressure ulcer absent	hospital acquired pressure ulcer (disorder)	446261005	
unit acquired pressure ulcer			gap
unit acquired pressure ulcer present			gap
unit acquired pressure ulcer absent			gap

STEP 6: FORMALIZE THE MODEL IN UML



Chow & Beene, 2011

NDNQI DRAFT DATA MODEL, V 1.0



Has not been validated outside of NDNQI; contains unabstracted elements

STEP 7: LINK CONCEPT MODELS TO HL7

HL7 Quality Standards
CDA –based
(Structured Documents)

```
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<entry typeCode="DRIV">
    <!-- Inpatient encounter -->
    <act classCode="DOCSECT" moodCode="EVN.CRT">
        <id root="5a2c903c-bd77-4444-ad9d-452383fbabcd" />
        <code code="46240-8" codeSystem="2.16.840.1.113883.6.1" displayName="Encounters" />
        <sourceOf typeCode="COMP">
            <encounter classCode="ENC" moodCode="EVN.CRT">
                <code code="1.3.6.1.4.1.33895.1.3.0.36" codeSystem="2.16.840.1.114443" codeSystemName="H
            </encounter>
        </sourceOf>
    </act>
</entry>
<entry typeCode="DRIV">
    <!-- Principal Diagnosis of Ischemic stroke -->
    <act classCode="DOCSECT" moodCode="EVN.CRT">
        <id root="5a2c903c-bd77-4bd1-ad9d-452383fbabcd" />
        <code code="11535-2" codeSystem="2.16.840.1.113883.6.1"
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                    </observation>
                </sourceOf>
            </act>
        </sourceOf>
    </act>
</entry>
<entry typeCode="DRIV">
    <!-- Atrial Fibrillation/Flutter (Problem List) -->
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        <id root="aebb2a61-73da-11de-8a39-0800200c9a66" />
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        <sourceOf typeCode="COMP">
            <act classCode="ACT" moodCode="EVN.CRT">
                <sourceOf typeCode="SUBJ">
                    <observation classCode="OBS" moodCode="EVN.CRT">
                        <value xsi:type="CD" code="1.3.6.1.4.1.33895.1.3.0.7" codeSystem="2.16.840.1.114
                    </observation>
                </sourceOf>
            </act>
```

XML code

Quality Measure Report

Patient	Nancy Nuclear		
Date of birth	February 1, 1958	**Sex**	Female
Contact info	2222 Home Street Ann Arbor, MI 99999 Telecom information not available	**Patient IDs**	987654321 2.16.840.1.113883.19.5
Document Id	f2d5f971-d67a-4456-8833-213f01331ca0		
Document Created:	October 5, 2009		
Author	Quality Manager, RN, Good Health Clinic		
Informant	Good Health Clinic		
Legal authenticator	Quality Manager, RN of Good Health Clinic signed at May 13, 2008		
Document maintained by	Good Health Clinic		

CDA Document
(a structured form-human readable)

Table of Contents

- Measure Set: STROKE, V1.0

Measure Set: STROKE, V1.0

- The Joint commission stroke measure set is a set of 8 measures assessing specific elements of the the care and treatment provided to stroke patients that have been shown to affect outcomes.

Measure Section

- STK-3 Anticoagulation Therapy for Atrial Fibrillation/Flutter V1.0: Ischemic stroke patients with atrial fibrillation/flutter who are prescribed anticoagulation therapy at hospital discharge.
- STK-8 Stroke Education V1.0: Ischemic or hemorrhagic stroke patients or their caregivers who were given educational materials during the hospital stay addressing all of the following: activation of emergency medical system, need for follow-up after discharge, medications prescribed at discharge, risk factors for stroke, and warning signs and symptoms of stroke

Reporting Parameters

Reporting period: 01 October 2009 - 31 March 2010

Patient Data Section

Problem List section

- Atrial Fibrillation

Discharge diagnosis section

- Primary discharge diagnosis: Ischemic stroke

Discharge medications section

- Warfarin 2 MG Oral Tablet 2 every 24 hours prescribed

Encounters

- Admit date:3 - October - 2009
- Discharge date:5 - October - 2009

Procedures and Interventions

- Education Provided: Activation of emergency medical system
- Education Provided: Medications prescribed at discharge
- Education Provided: Risk factors for stroke
- Education Provided: Warning signs and symptoms of stroke

Chow & Beene, 2011

STEP 8: VALIDATE THE MODEL

- Utilize professional organization expertise (e.g., NPUAP, WOCN) and NQF to review information model
- Validate use cases against information model
- Compare information model to current EHR systems
- Address reference terminology gaps with standards development organizations (IHTSDO and LOINC)
- Publish information model for public consumption, including terminology mappings
  - National Library of Medicine UMLS
- Publish process to encourage others to participate in nursing information model development

ISSUES

- Terminology overlaps and gaps—terminology models
  - SNOMED CT does not identify all pressure ulcer sites
    - Will need to submit request for inclusion
  - There is overlap on what is covered in SNOMED CT and LOINC
    - How do we determine which terminology to use where
- Queries are needed
  - Temporal patterns
  - Calculating denominators

NEXT STEPS

- Steps 6 and 7: Harmonize the information model and terminology bindings with the Skin Assessment and Care domain models
  - Collaborate with
    - NQF/Joint Commission/NDNQI
    - HL7
    - IHTSDO
    - LOINC
- Lobby for inclusion in MU Stage Three Criteria
- Other NDNQI Indicators?
  - Tipping Point recommends Falls Prevention as next domain

COMPLEXITY OF THE EHR: MODELING MANAGES COMPLEXITY AND LET'S US LINK TO THE LEARNING HEATH SYSTEM

INTEROPERABILITY DEFINITION

The ability of two or more Health Information Technology systems or elements to exchange information and to use the information that has been exchanged.

HIMSS Dictionary, 2nd Edition.

WHY DO WE MODEL?

- Models give us a template that guides us in constructing a system.
- If you want to make a building you first make a blueprint of the building to make, in the same way you should make a model of the system you want to make.
- Models help us visualize a system at different levels of abstraction, this makes it easier to manage complexity and to understand the system.
- Provides the framework for interoperability

In context of health policy and regulations.

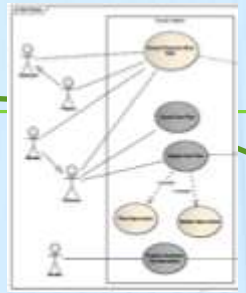
Conduct research

Develop evidence based guidelines

Use Case

HL7 Domain Analysis Model for Pressure Ulcer Prevention

Evidence Based Guidelines



Query retrieved

NQF Quality Data Model

Query for data

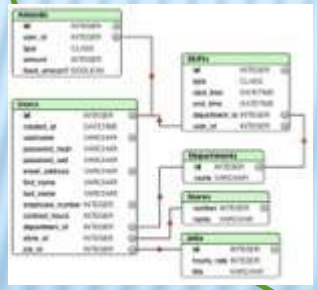
```
select p.name_full_formatted from
clinical_event ce, person p
plan ce where ce.event_title_text = "Skin
Color" and ce.result_val = "Cyanotic“
join p where p.person_id = ce.person_id
order by ce.active_status_dt_tm,
p.name_full_formatted
go
```

Nursing Knowledge for Practice ©

Concept	SNOMED CT Code
Skin Color	364533002
cyanotic	119419001
flushed	248213001
jaundiced	18165001

Mapping to Standard Terminology

Database structure that holds information



Tie terminology to value set

Build data element

Design and build user interface

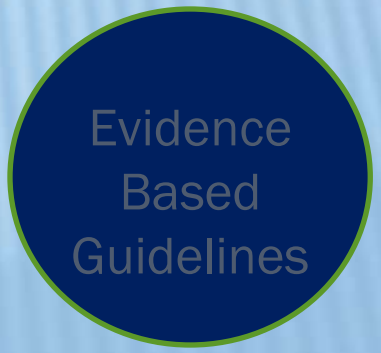
Developed by Judith Warren,
jjwarren@live.com
Susan Matney,
samatney@mmm.com

KNOWLEDGE

- Conduct research

- Engage domain experts

- Develop evidence based guidelines



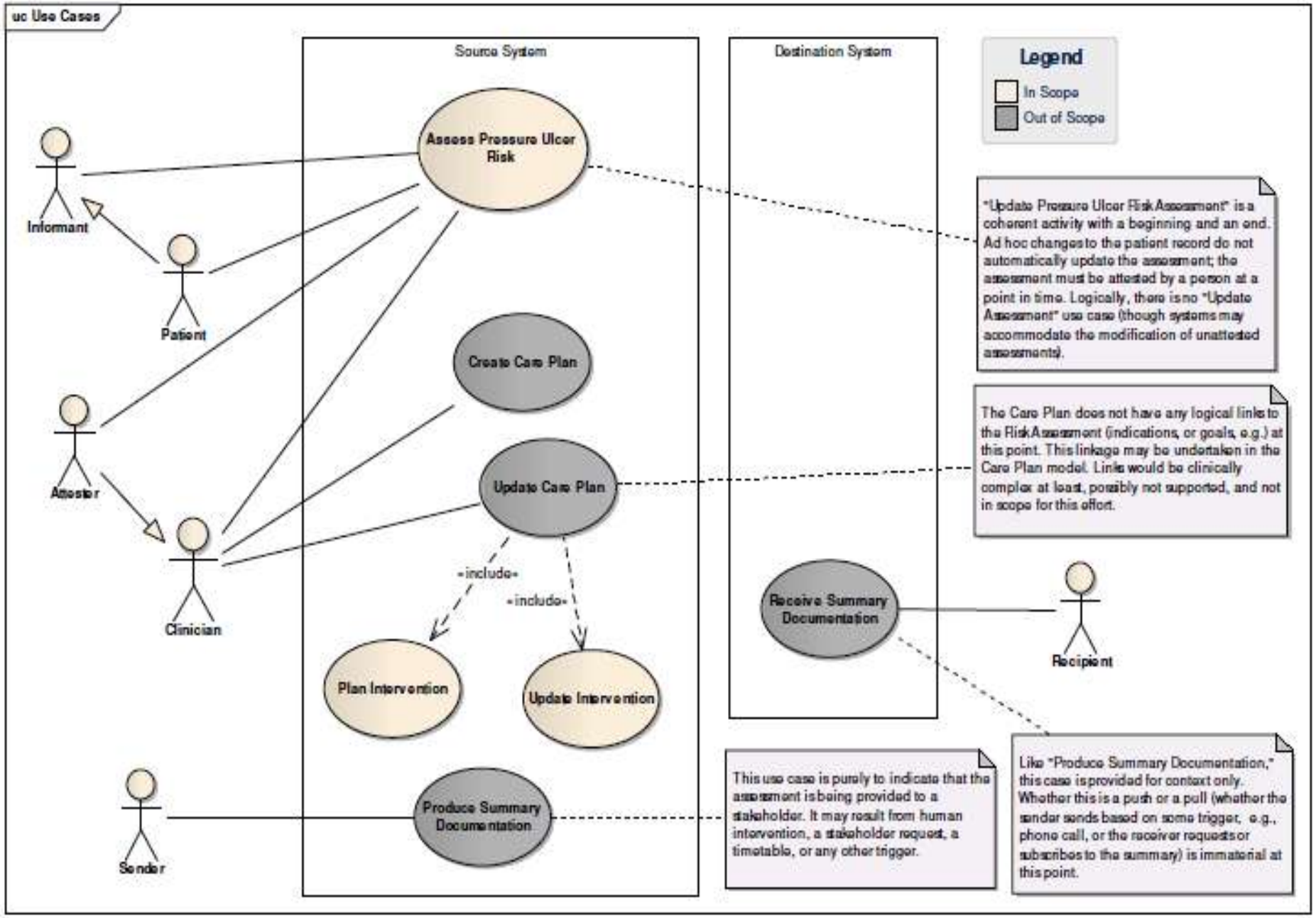
RESEARCH

- Subject matter experts were asked to provide source materials for use in informing the DAM.
- Source materials include existing models, data dictionaries, works in progress, email threads, and other references.
- The source material is analyzed to discover behavioral or structural requirements.
- One-on-one dialog between the DAM analyst and the submitter of source material help to improve understanding and implications for the DAM.

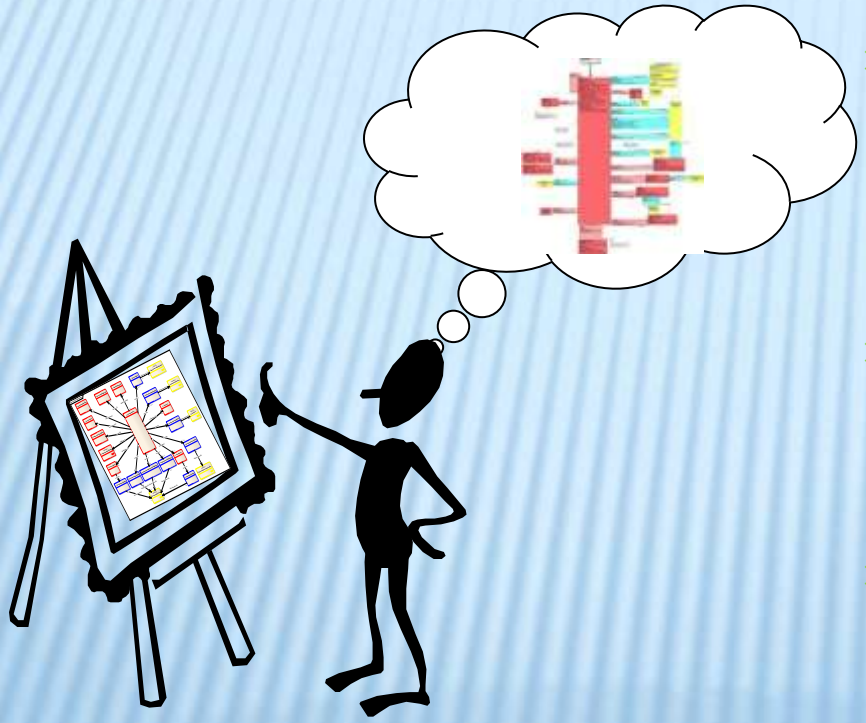
EVIDENCE-BASED PRACTICE AS KNOWLEDGE MANAGEMENT (KM)

- Strategies of KM used in designing EHR functionality
  - Searching the literature and regulations for best practices and quality metrics
  - Documentation of selected information and knowledge
- Deconstructing evidence and quality metrics
  - Documentation strategies designed
  - Clinical decision support implemented

Use Cases - *(Use Case diagram)*



MODEL



- Insights gained from research are used to adjust or confirm the DAM.
- Functional scope is reflected in a Use Case diagram.
- Activity control and information flows are reflected in Activity diagrams.
- Information requirements are reflected in Class diagrams.
- Questions and open issues related to modeling are noted for use in model review.

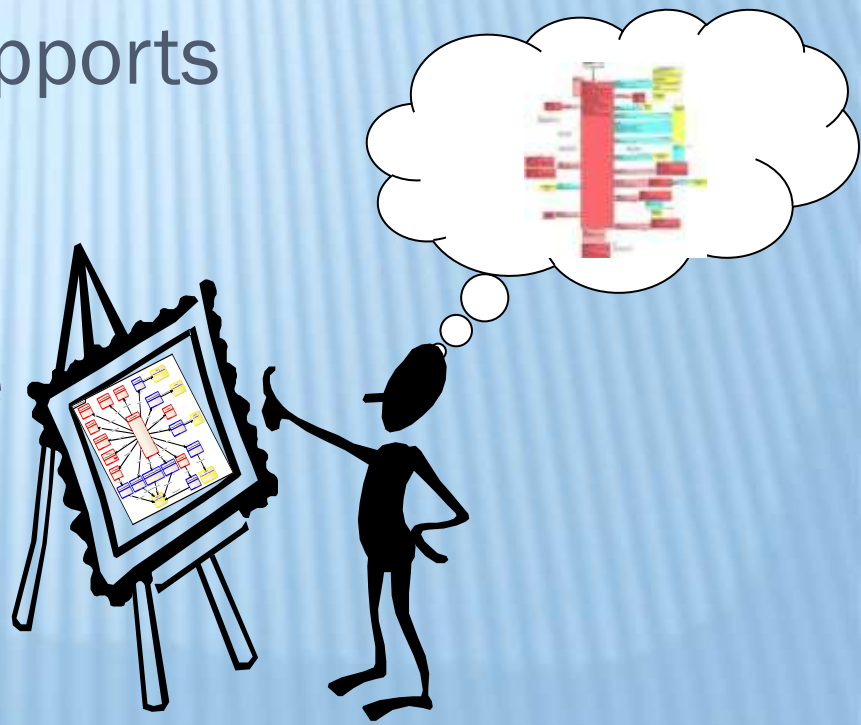
REVISE

- The peer review comments create an improved understanding of requirements.
- Comments also reveal difficulty in understanding the model.
- The model is revised to reflect the improved understanding or to make the model content more comprehensible.
- The revised model is then used during analysis of additional input.

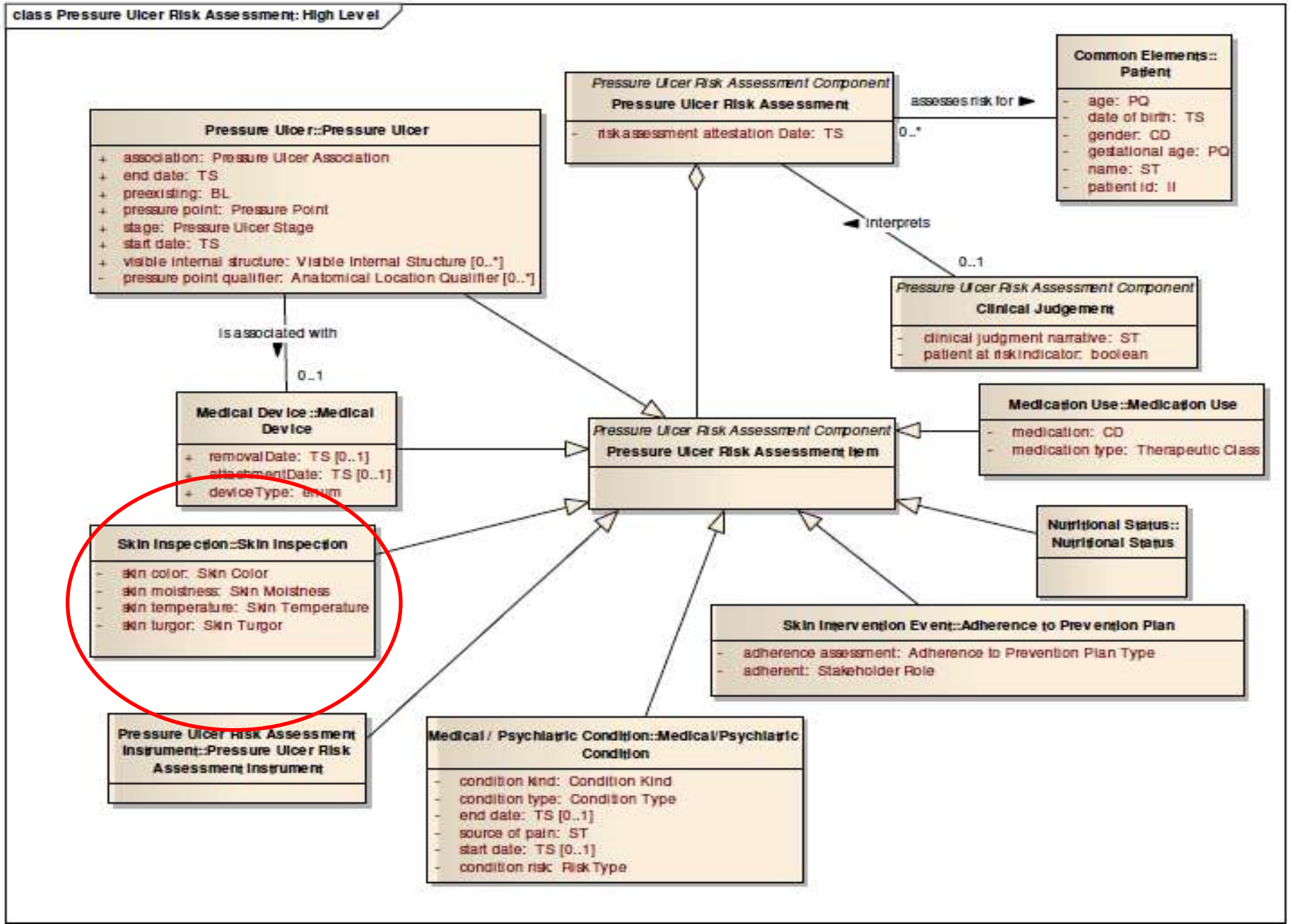
CLINICAL DOMAIN MODELING

- Looks like a lot of work, BUT…..

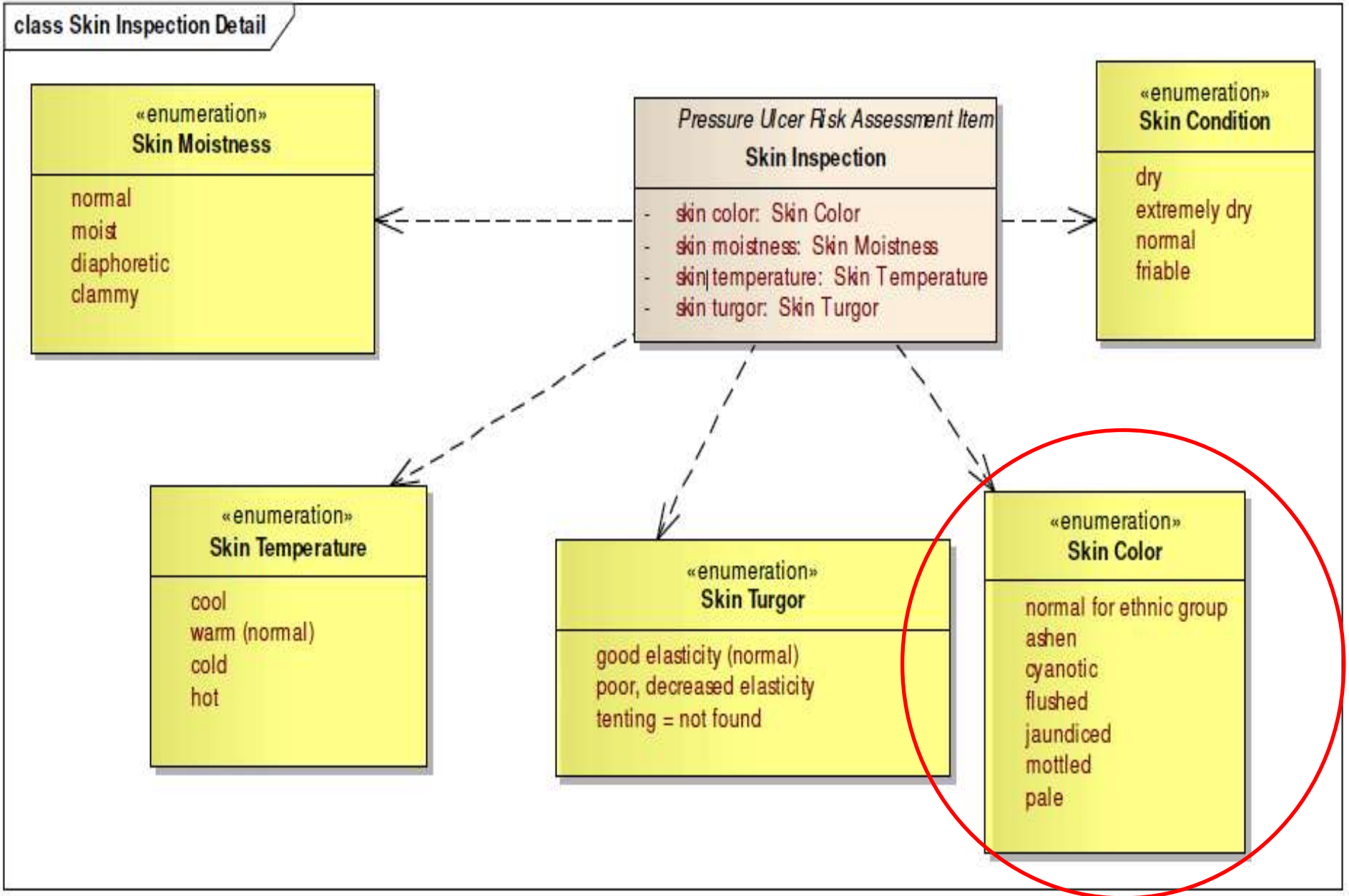
- If done well, modeling supports
  - Data mining strategies
  - Semantic interoperability
  - Transformation of practice
  - Creation of Wisdom



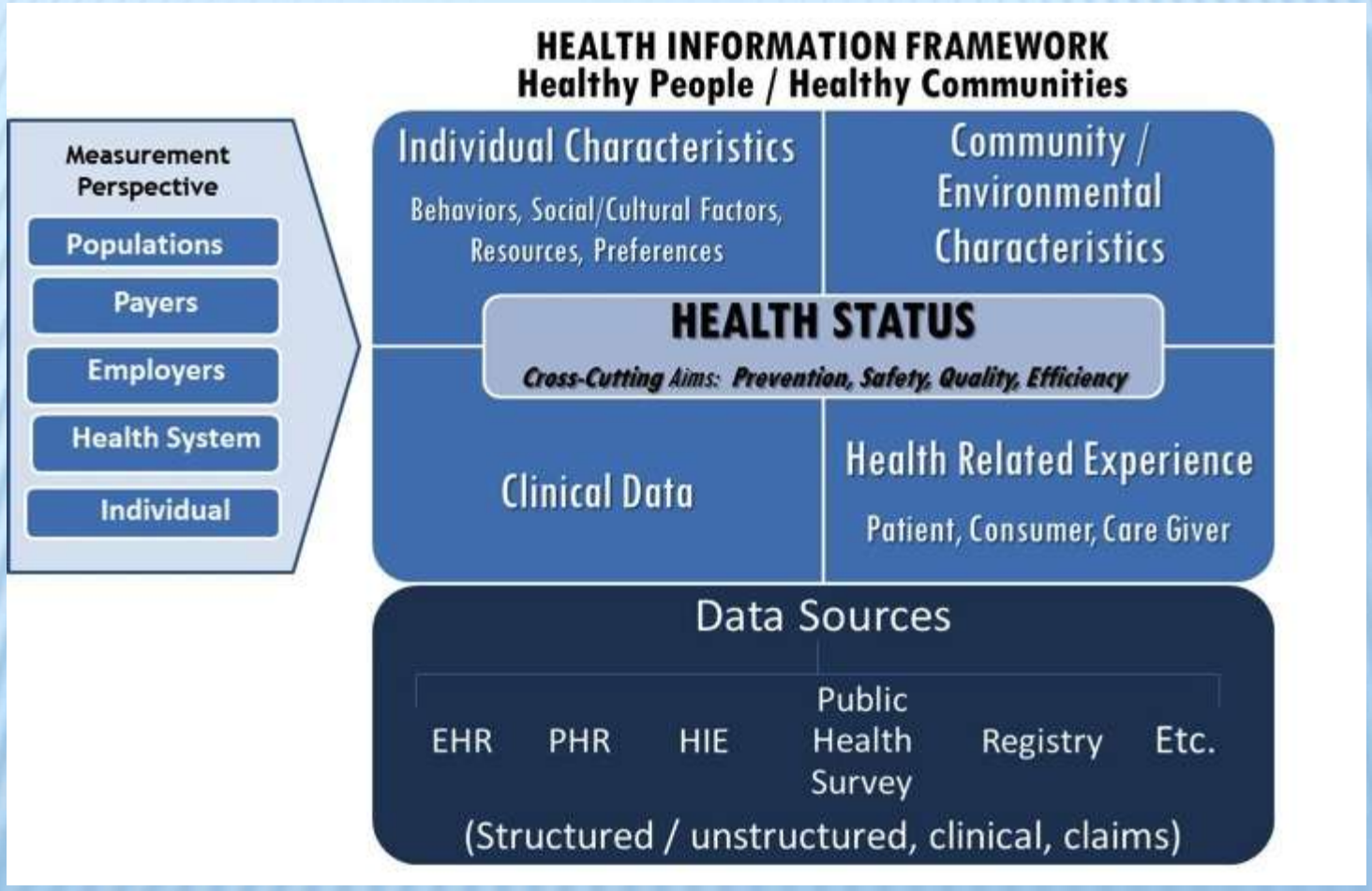
Pressure Ulcer Risk Assessment: High Level - *(Logical diagram)*



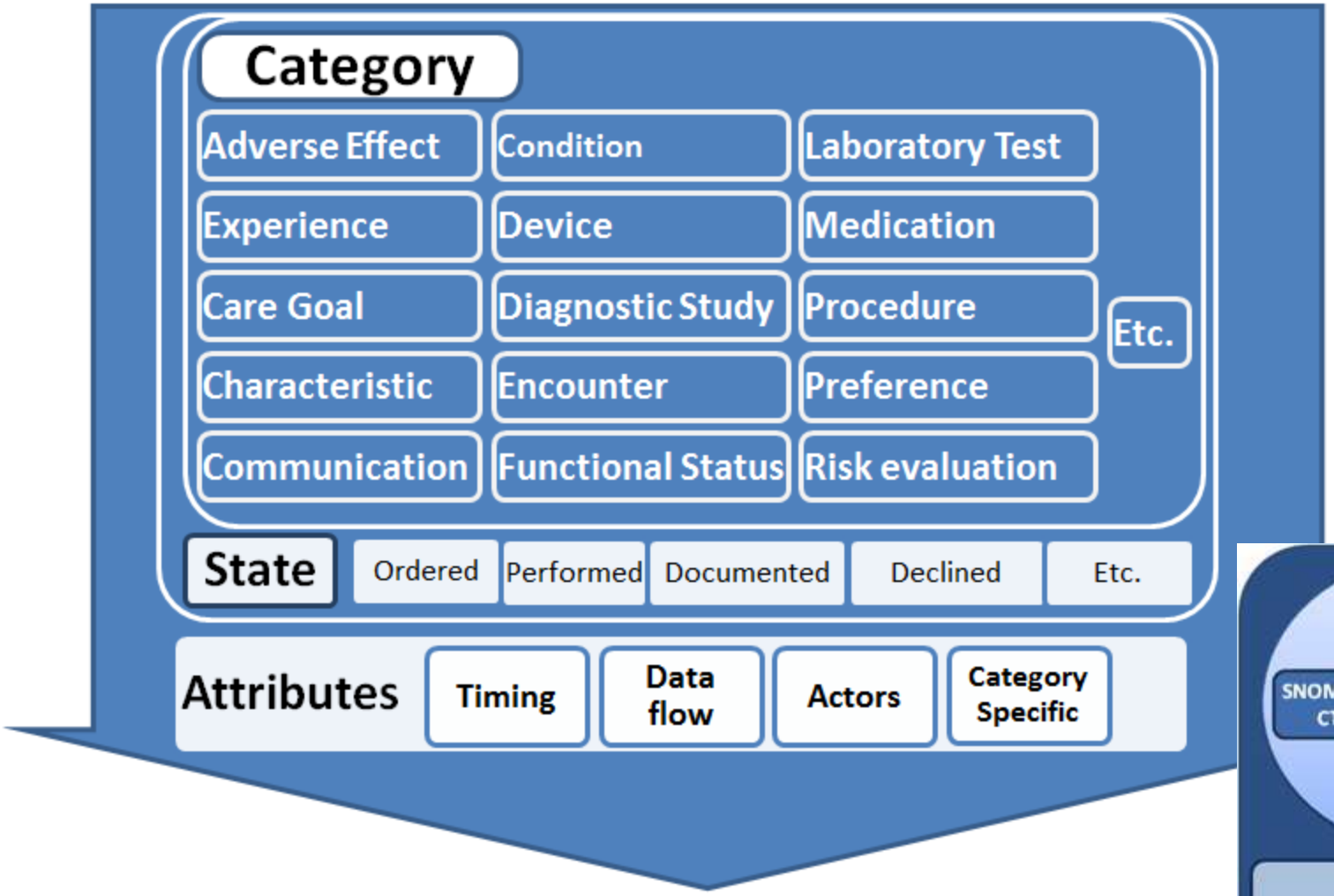
Skin Inspection Detail - *(Logical diagram)*



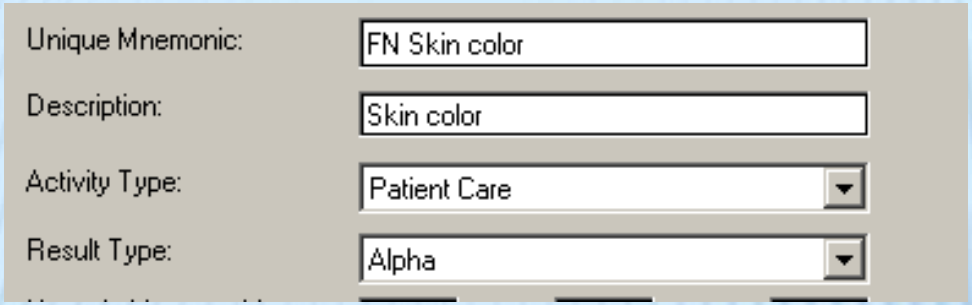
NQF'S HEALTH INFORMATION FRAMEWORK



Quality Data Model Information Structure



BUILD THE QUESTION AND RESPONSE VALUES



Numeric Details | **Alpha Details**

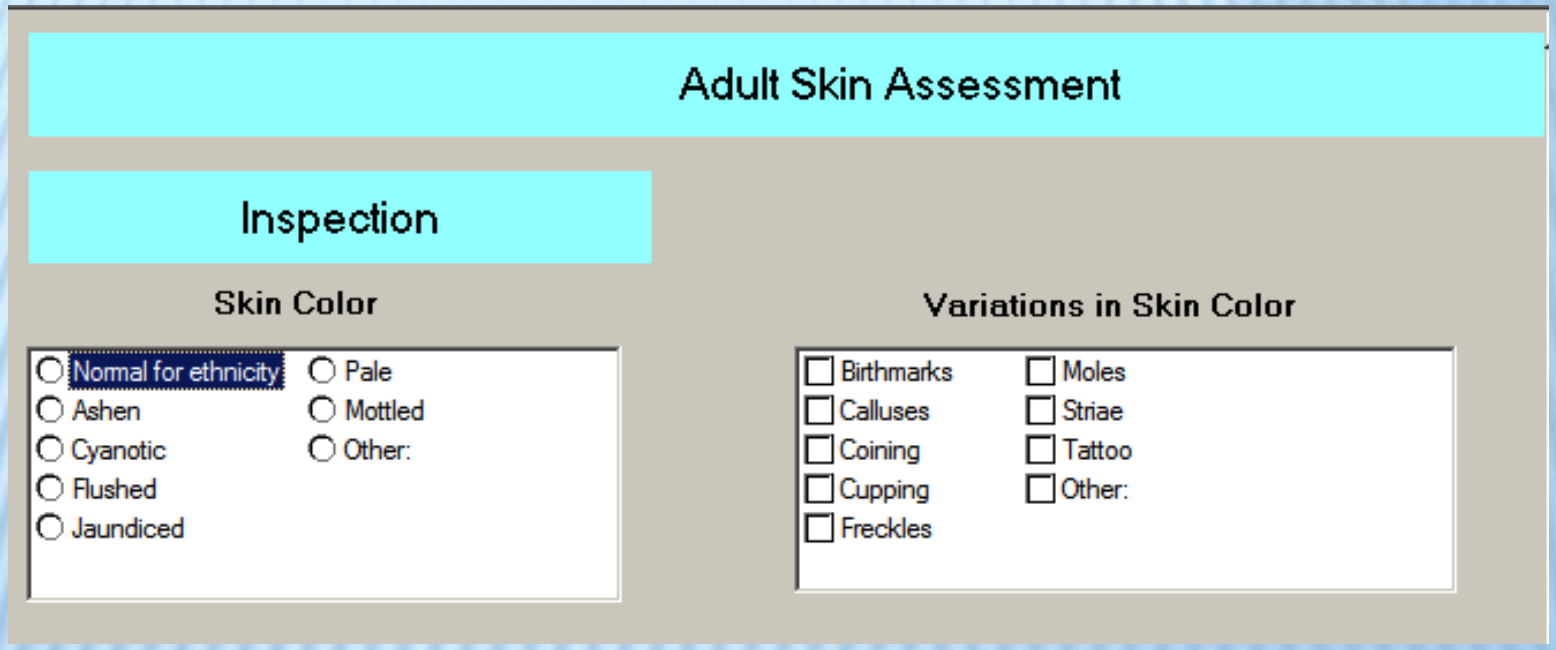
Current Reference Range: **0 Years - 0 Years**

	Description	Sequence	Result	Concept CKI
1	Normal for ethnicity	1	0	297952003
2	Ashen	2	0	445394005
3	Cyanotic	3	0	119419001
4	Flushed	5	0	248213001
5	Jaundiced	6	0	18165001
6	Pale	7	0	267029006
7	Mottled	8	0	406128001

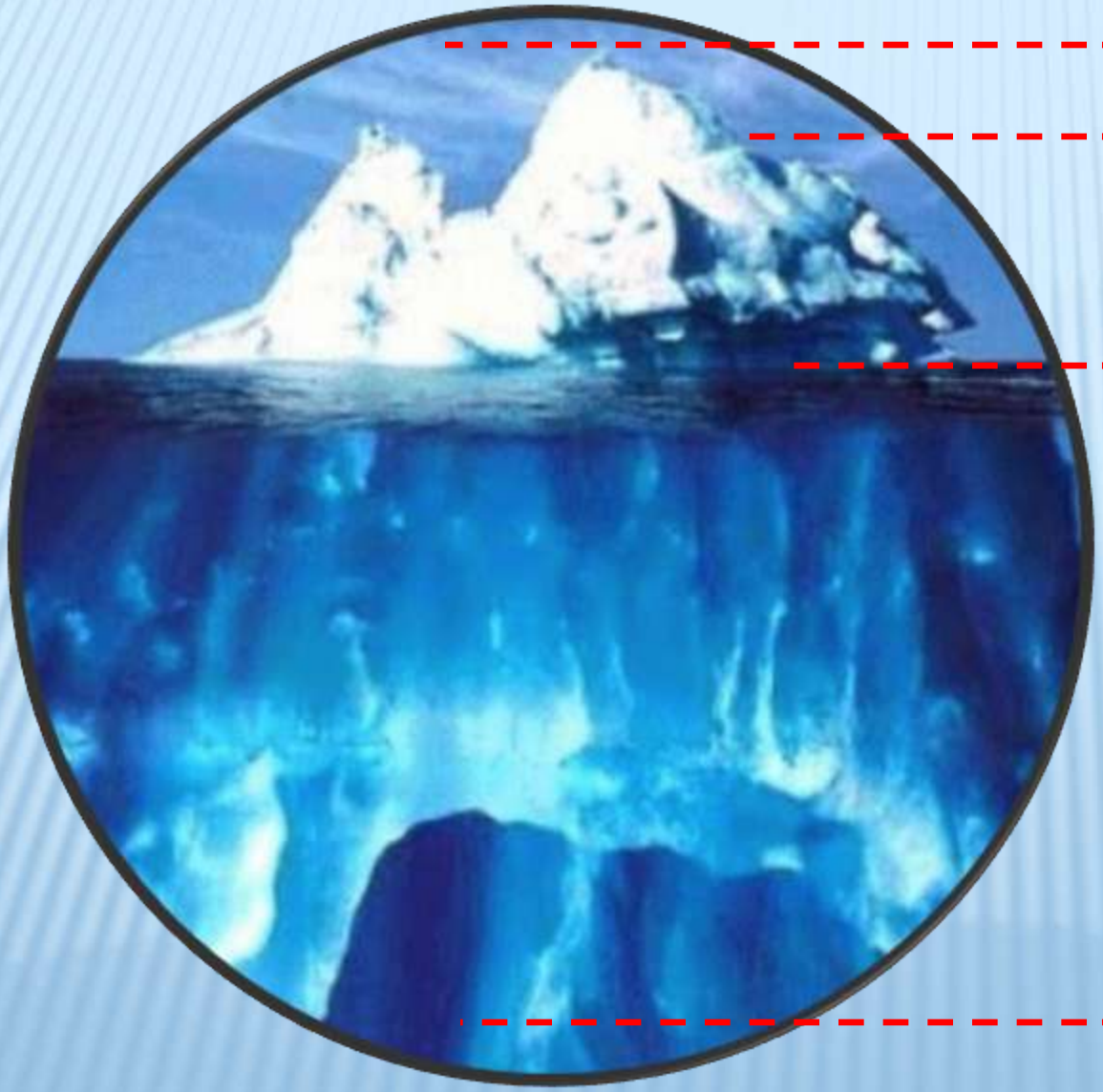
CLASS: SKIN COLOR

Attribute	Notes	Constraints and tags
skin color Skin Color	A holistic evaluation of the color of the patient's skin adjusted for ethnicity, used as an indicator of systemic problems	Vocabulary: { LOINC: Color (39107-8) } Vocabulary: { SNOMED CT: color of skin (observable entity) (364533002) }

DESIGN THE FORM



The Usability Iceberg

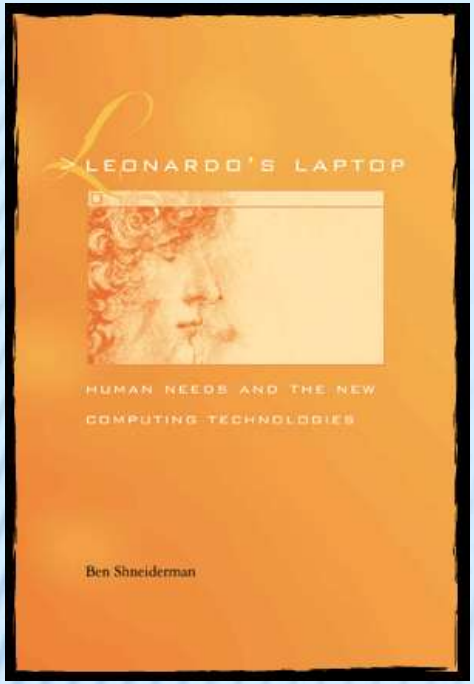


10% Look
(visuals, layout, colors, etc.)

30% Feel
(menus, buttons, controls, etc.)

60% User Task Goals
(workflow, navigation, objects and relationships, etc.)

Adapted from “Common User Access Guide to User Interface Design”, copyright 1991 IBM


LEONARDO'S LAPTOP
HUMAN NEEDS AND THE NEW
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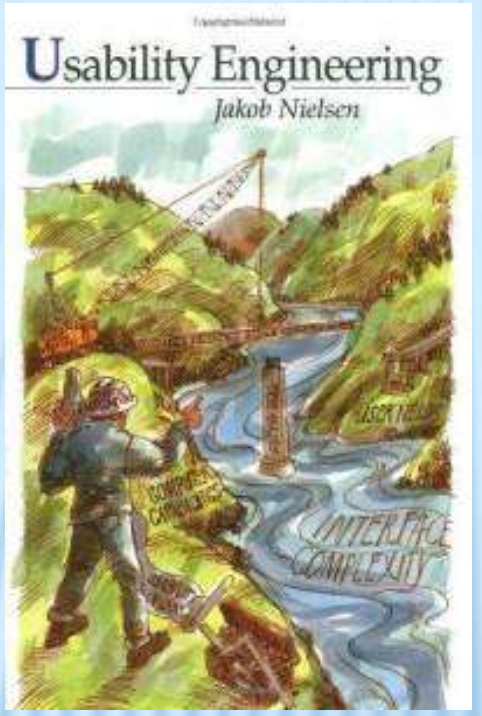
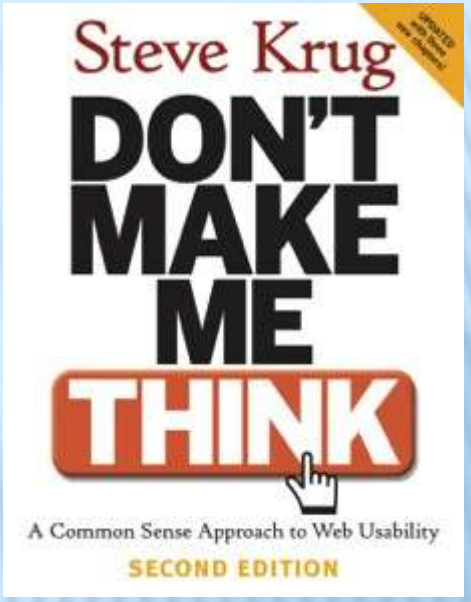
Ben Shneiderman


Usability Engineering
Jakob Nielsen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A Common Sense Approach to Web Usability
SECOND EDITION


DESIGNING THE USER INTERFACE
Strategies for Effective Human-Computer Interaction / 5th Edition
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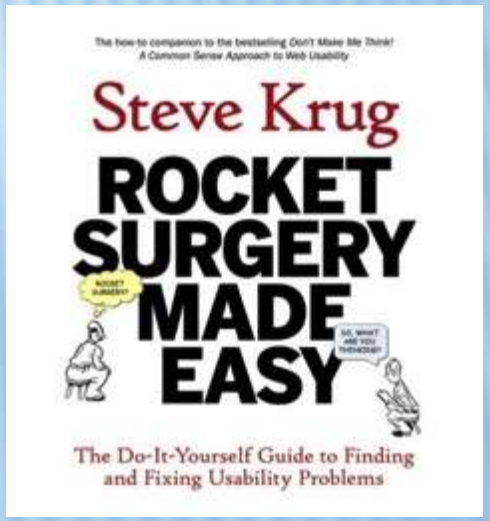
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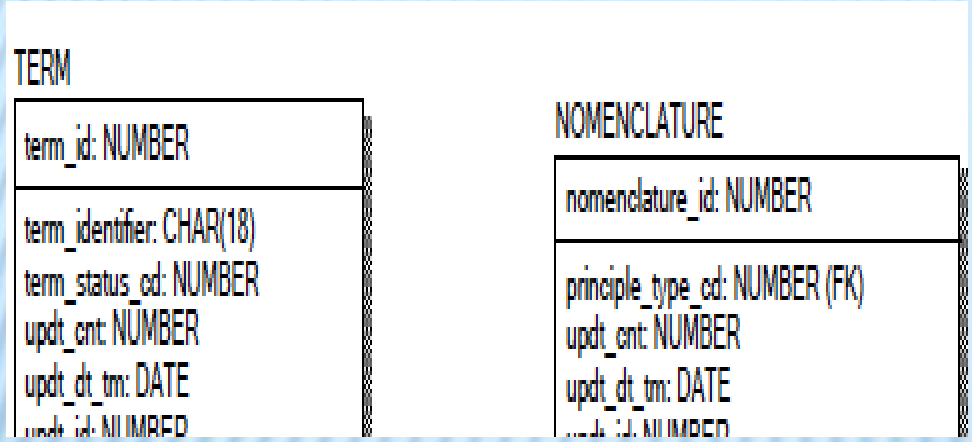
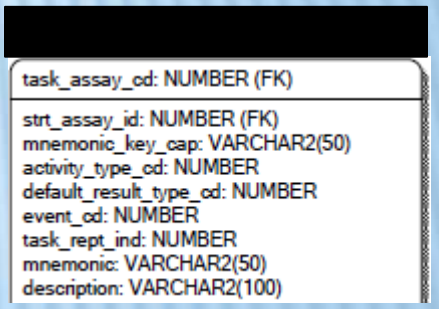
ROCKET SURGERY MADE EASY
The Do-It-Yourself Guide to Finding and Fixing Usability Problems

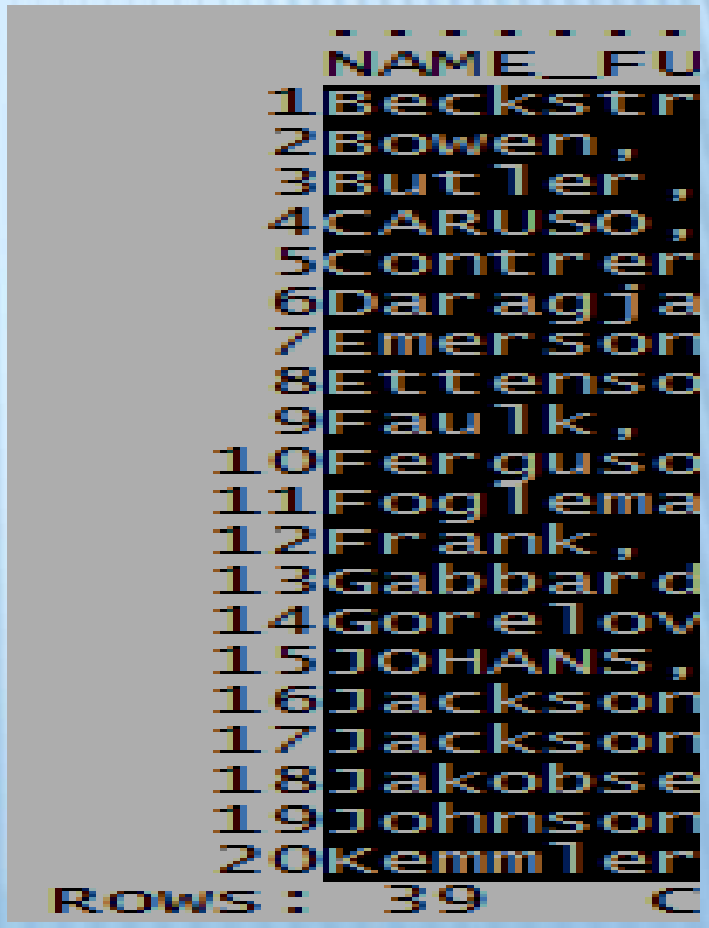
TOOLS TIE VALUES TO TABLES: DATA CAN BE STORED AND QUERIED





QUERY FOR REPORTS

- select p.name_full_formatted from clinical_event, person p
- plan where ce.event_title_text = "Skin Color" and result_val = "Cyanotic“
- join p where p.person_id = person_id
- order by active_status_dt_tm, p.name_full_formatted
- go



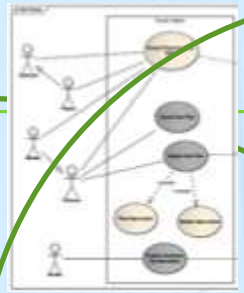
Nursing Knowledge for Practice

Conduct research

Develop evidence based guidelines

Evidence Based Guidelines

Use Case



HL7 Domain Analysis Model for Pressure Ulcer Prevention

NQF Quality Data Model

Mapping to Standard Terminology

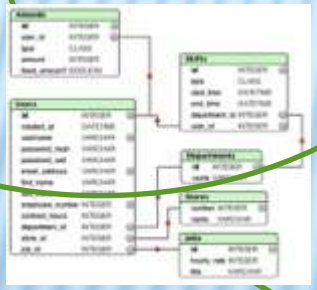
Concept	SNOMED CT Code
Skin Color	364533002
cyanotic	119419001
flushed	248213001
jaundiced	18165001

Query retrieved

Query for data

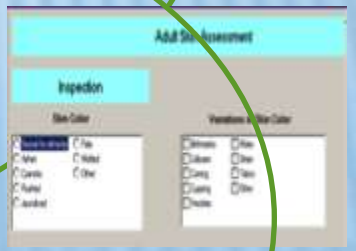
```
select p.name_full_formatted from
clinical_event ce, person p
plan ce where ce.event_title_text = "Skin
Color" and ce.result_val = "Cyanotic“
join p where p.person_id = ce.person_id
order by ce.active_status_dt_tm,
p.name_full_formatted
go
```

Relational database structure that holds information



Tie terminology to value set

Build data element



Design and build user interface

Developed by Judith Warren,
jjwarren@live.com
Susan Matney,
samatney@mmm.com

A METHOD BEGINS WITH A SINGLE STEP

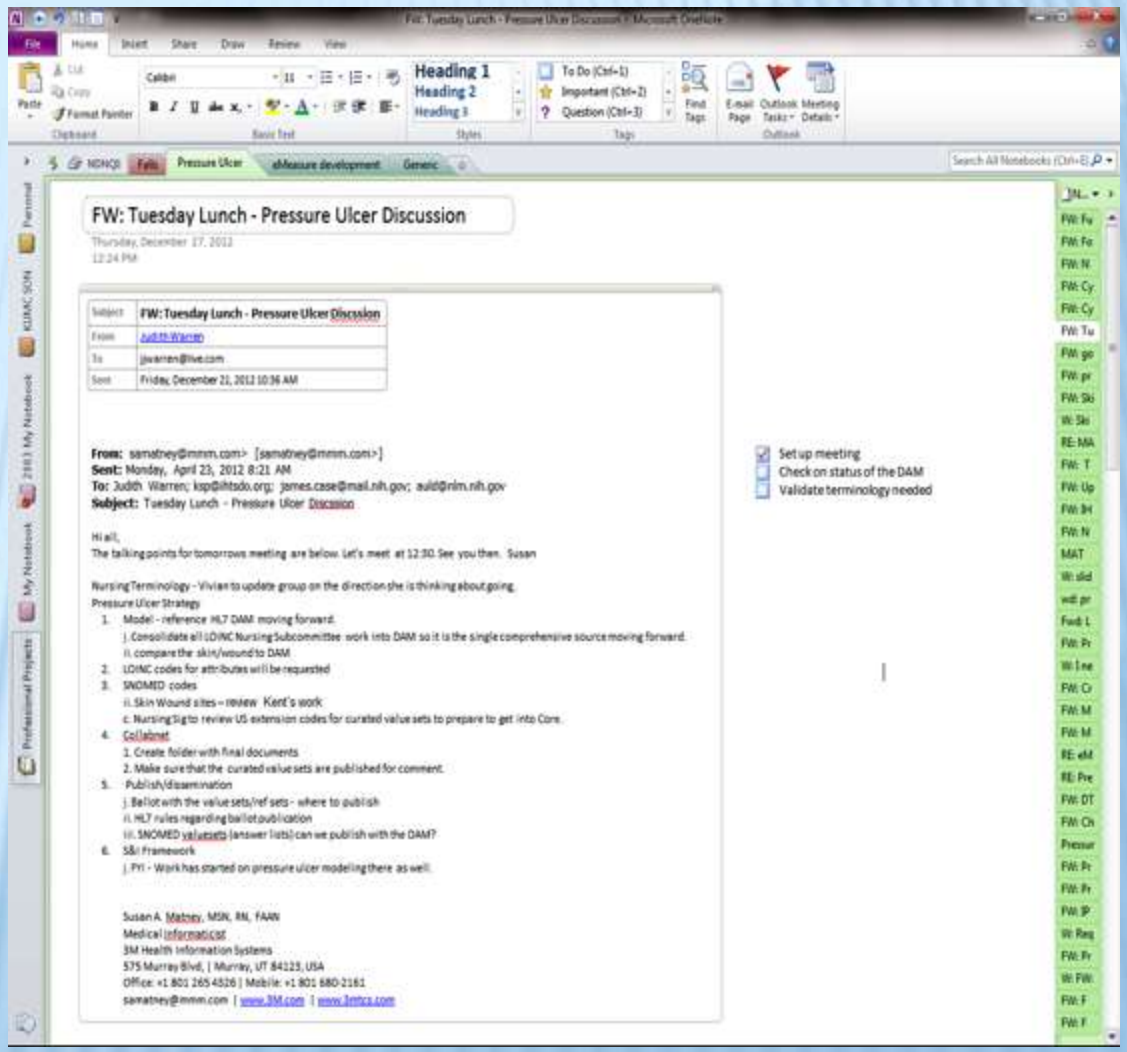
- Takes a team
- Team members can join along the path
- The path is iterative
- The path leads to the Emerald City
  - aka Semantic Interoperability

Modeling WITH MIND MAPS

- Download FreeMind
  - Free mind mapping software
  - http://freemind.sourceforge.net/wiki/index.php/Main_Page

TRACKING AND ORGANIZING TOOLS

- Microsoft Outlook or other email program
- Microsoft OneNote
  - File emails
  - To do list



Judith J. Warren, PhD, RN, BC, FAAN, FACMI
Warren Associates, LLC
NDNQI Consultant

jjwarren@live.com

CE EVALUATION AND CERTIFICATE

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https://nenic.memberclicks.net/index.php?option=com_mc&view=mc&mcid=form_154107