

# HINZ 2006


## Integrating the Electronic Health Record with Public Health Needs - What's the Big Deal?

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# NZ Informatics





## Tour Guide

- Review of Public Health
  - Definition
  - Goals
  - FHA alphabet soup (letter noodles)
  - Clinical information system touch points
- Interoperability
  - Requirements overview
  - Dirty details
- Case Studies
  - Valiant efforts
  - Vanquished value
- Opportunities
  - Kiwi knowledge application in informatics



## Public Health – What do we Mean?

The science and practice of protecting and improving the health of a community, as by preventive medicine, health education, control of communicable diseases, application of sanitary measures, and monitoring of environmental hazards.

- Focus is on populations rather than individuals



## Public Health Functions

- Prevents epidemics and the spread of disease
- Protects against environmental hazards
- Prevents injuries
- Promotes and encourages healthy behaviors
- Responds to disasters and assists communities in recovery
- Assures the quality and accessibility of health services



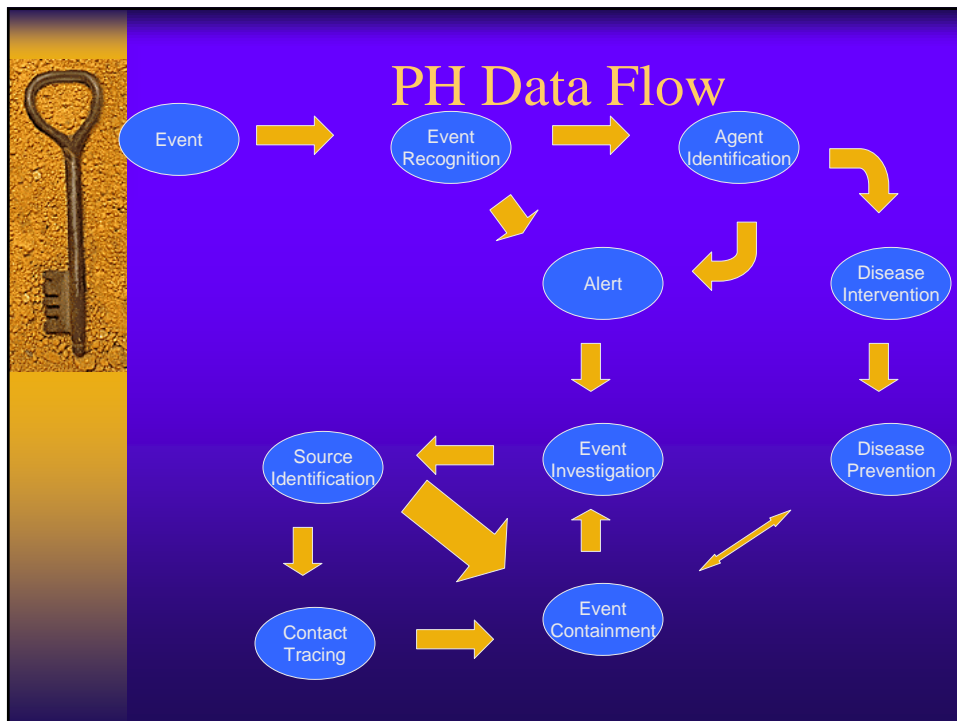
## Public Health in the US Federal Agencies


- Centers for Disease Control and Prevention
- Department of Defense
- Veterans Administration
- National Cancer Institute
- Food and Drug Administration
- Environmental Protection Agency
- Department of Homeland Security



## Public Health Initiatives

- PHIN, BioSense - CDC
- NBIS, BioWatch – Homeland Security
- caBIG - NCI
- SPL New Drug Submissions - FDA
- Joint Initiative Fund (JIF) - DOD/VA
- InfoWay - Canada Public Health Surveillance Projects







Event  
Recognition

## Surveillance Components

- Starts with surveillance
- Examples:
  - Increase in blood culture requests
    - derived from lab data feeds
  - Pedialyte pharmacy sales rise
  - Respiratory illness visits to GP
  - Increase in Ask-A –Nurse call volume for flu-like illness
  - Clinical Adverse Event Report






## Interoperability Savings

**EXHIBIT 3**  
**Net Value Of Health Care Information Exchange And Interoperability (HIEI)**


	Implementation, cumulative years 1–10 (\$ billions)	Steady state, annual starting year 11 (\$ billions)
<b>Level 2</b>		
Benefit	141	21.6
Cost	0.0	0.0
Net value	141	21.6
<b>Level 3</b>		
Benefit	286	44.0
Cost	320	20.2
Net value	-34.2	23.9
<b>Level 4</b>		
Benefit	613	94.3
Cost	276	16.5
Net value	337	77.8

The Value Of Health Care Information Exchange  
And Interoperability *Health Affairs January 2005*  
Jan Walker, Eric Pan, Douglas Johnston, Julia Adler-Milstein, David  
W. Bates, and Blackford Middleton



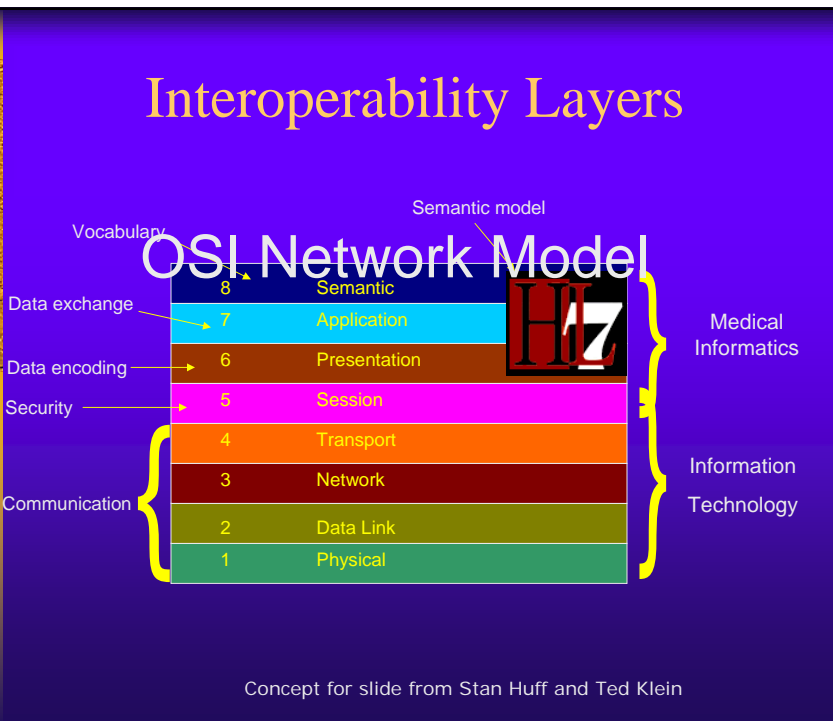
## Interoperability Requirements

- Appropriate connectivity
  - Message must be routed appropriately across an enterprise
  - Firewalls must be negotiable
- Common terminology
  - Unambiguous coding
  - Shared across institutions
- Equivalent Data Types
  - Allows vocabulary expression and carries terminology metadata
- Syntactical consistency
  - Provides contextual meaning
  - Must be readable from one application to another




## Interoperability Layers

OSI Network Model




Layer	Layer Name	Category
8	Semantic	Medical Informatics
7	Application	
6	Presentation	
5	Session	
4	Transport	Information Technology
3	Network	
2	Data Link	
1	Physical	

Concept for slide from Stan Huff and Ted Klein



## Interoperability Terminology Components

- Code systems
- Vocabulary Domain definition
- Value set machinery
- Distribution
- Syntactical binding
- Data capture and regeneration
- UI presentation




## Interoperability – The Details

- No single medical terminology covers the healthcare domain
- Some terminologies have no “simple” end user representation (Potassium SerPI-mCnc)
- Government and private groups may use different terminologies within the same domain
- Terminologies have a life cycle
- Maintenance is everyone’s problem




## Interoperability – More Details

- Standard services are needed across the enterprise to serve up terminology
- Local edits to a terminology may need to be reconciled across organizations
- Update schedules become critical to exchange semantics
- Terminology licensing issues may affect information trading partners



## Data Types

- Examples: Integer; Float; String; Boolean; HL7 Data Types CD, CE, CV, CS, CR
- Constrain the values for a data element
- Provide concept level semantics
- Do not have state or commutable properties (are immutable)
- Should reflect the structure required by the terminology as well as the use case



## Syntactical Representation

- Provides the context of use for the vocabulary elements
- Should be information model driven
- Should be consistent across message types
  - All structured document schemas should bind vocabulary in a consistent manner
- All structural elements should be coded for processing
- Primitive data types should be consistent across SDO's




## Political Interoperability Issues

- SDO's need more consumer representation across the board
- Within HL7 rules may need to change to allow better oversight of terminology binding to specifications
- Government agencies need better inter and intra agency coordination




## Data Discrimination

- Cold
- August is a ~~45893009~~ **45893009** in NZ.
- She met his gaze with ~~28584006~~ **28584006** stare.
- Julia is in bed with a ~~82072006~~ **82072006**.



## Data Aggregation

Term	Description ID	Concept ID
myocardial infarction	37436014	22298006
cardiac infarction	37442013	22298006
heart attack	37443015	22298006
myocardial infarct	1784873012	22298006
MI - Myocardial infarction	1784872019	22298006
infarction of heart	37441018	22298006




## Case Studies – Pitfalls Explored

- FDA – SPL coding initiative
  - Schema? You mean that actually has to match the vocabulary used?
- CDC – PHIN VADS
  - You weren't actually going to use that terminology at runtime were you?
- NCI – caBIG Adverse Event System (CARES)
  - #^&\*%^%\$%& OR
  - “But I thought everybody speaks monkey!”




## FDA SPL Initiative

“Electronically formatted content of labeling will be used to support health information management technologies such as electronic prescribing; the electronic health record (EHR), which will provide health care providers, patients, and other authorized users access to patient information in electronic format; and the DailyMed, a new way to distribute up-to-date and comprehensive medication information in a computerized format for use in health care information systems”



## FDA SPL Components

- HL7 Structured Product Label Specification
- LOINC document sections
- UCUM units of measure
- RxNORM and NDF-RT for clinical drug
- SNOMED Clinical problem coding




## HL7 CE Data Type

Name	Type	Description
code	ST	The plain code symbol defined by the code system.
codeSystem	UID	Specifies the code system that defines the code.
codeSystemName	ST	The common name of the coding system.
codeSystemVersion	ST	Version descriptor defined specifically for the given code system.
displayName	ST	A name or title for the code.
originalText	ED	The text or phrase used as the basis for the coding.
translation	SET<CD>	A set of other concept descriptors that translate this concept descriptor into other code systems.


## HL7 CD Data Type

Name	Type	Description
code	ST	The plain code symbol defined by the code system.
codeSystem	UID	Specifies the code system that defines the code.
codeSystemName	ST	The common name of the coding system.
codeSystemVersion	ST	Version descriptor defined specifically for the given code system.
displayName	ST	A name or title for the code.
originalText	ED	The text or phrase used as the basis for the coding.
translation	SET<CD>	A set of other concept descriptors that translate this concept descriptor into other code systems.
qualifier	List<CR>	Specifies additional codes that increase the specificity of the primary code.



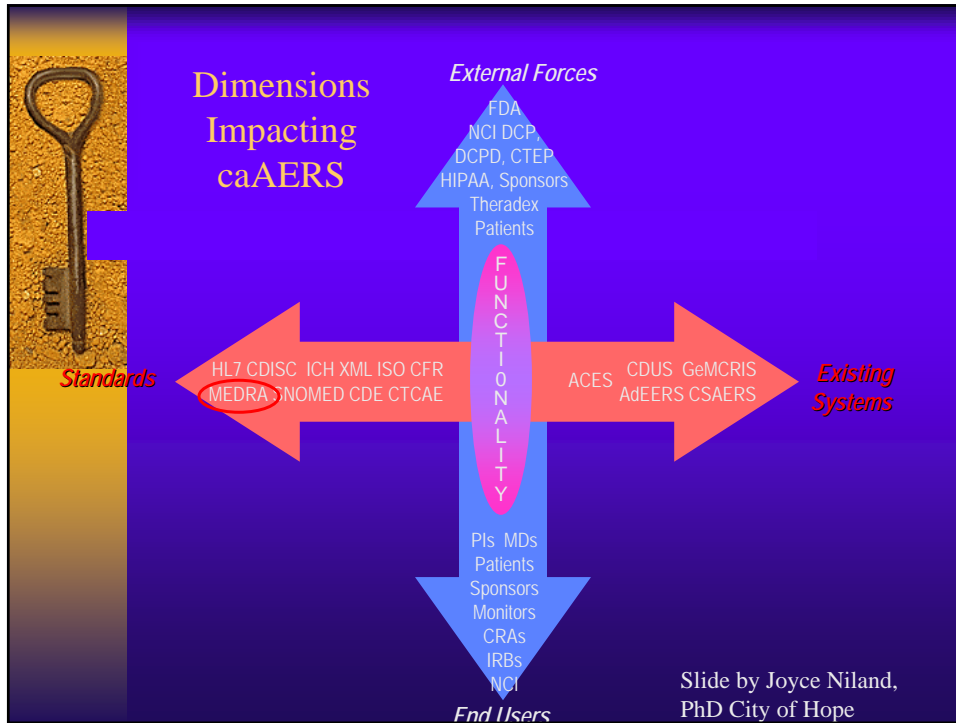


```
<highlight>  
<text> moderate to severe pain</text>  
<subject>  
  <substanceAdministration>  
    <reason typeCode="TREAT">  
      <indicationObservationCriterion>  
        <code code="128170" codeSystem="2.16.840.1.113883.3.26.1.1" displayName="Problem"/>  
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          <name code="246112005" displayName="severity"/>  
          <value code="371824009" displayName="moderate to severe"/>  
        </qualifier>  
      </value>  
    </indicationObservationCriterion>  
  </reason>  
</substanceAdministration>  
</subject>  
</highlight>
```




## NCI caBIG

- caERS – meant to integrate data from clinical trial systems, LIMS, hospital and clinical systems and patient reports for capturing adverse events
- Reports to FDA using MedDRA - the Medical Dictionary for Regulatory Activities - emphasis on ease of use for data entry, retrieval, analysis, and display, as well as a suitable balance between sensitivity and specificity within the regulatory environment.




- ## The caERS Problem
- Clinical systems don't use MedDRA
  - MedDRA is expensive (>70K per license)
  - Mixes semantic types in a single coded value
  - Clinical systems in the US are moving to LOINC and SNOMED
  - MedDRA is proprietary, so no mappings available to SNOMED or LOINC hence a "tower of Babel"
  - Left with an error prone human intensive integration task



## CDC PHIN VADS


- The CDC terminology services
- Meant to serve internal and external public health application requirements for vocabulary services in support of messaging
- The source of truth for PHIN certification
- Arranged by code systems, vocabulary domains, vocabulary views and value sets
- Composed of multiple source terminologies including CDC application specific code systems



## Key PHIN VADS Issues


The current CDC solution has proven to be inadequate and has failed to produce a complete solution. The following slides outline three primary areas of concern:

- Content
- Access
- Distribution




## PHIN VADS Content Issues

- Inconsistent Meta-data across value sets
- Out of date vocabularies and code sets
- No filtering applied to value sets
- Value sets are non-hierarchical
- The OID not available for use in an HL7 message
- Duplicate codes (1127 in the NBS lab value set alone) making it impossible for anyone to know which to use




## PHIN VADS Access Issues

- Web access only and can't be referenced
- Must view each value set by drilling down through 2-3 html pages then display the value set and cannot simply get back to the root
- No published, standardized API for external systems to interface with
- Limited published system documentation and formal recommendations for how to use PHIN VADS



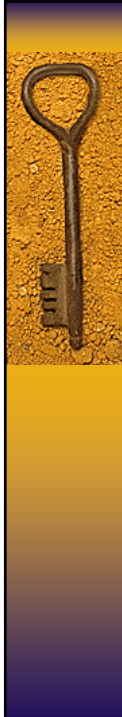
## PHIN VADS Distribution Issues

- Cannot download value sets larger than 2000 elements
- Cannot download all value sets as a collection
- No support for localization
- Limited infrastructure to support wide spread adoption and consistent use of PHIN VADS, the core component of PHIN interoperability



## Opportunities ABOUND

- There is a need for a low cost clinical system for point of care data capture with a public health API
- Small components of an SOA for vocabulary and messaging standards application services are necessary for RHIO success
- Lightweight HIPPA compliance services are needed (HIPPA Log, patient data use consents, de-identification engines, research data set construction and centralized repositories)
- Post-coordination solutions will be necessary to gain widespread support for clinical information capture



## Summary

- Public health is at a crossroads of the electronic age – exciting times
- Silos of public health and clinical care are the norm. Change control processes are as important as the technology.
- Interoperability requires a master plan across both realms. So the Devil is in the details AND the big picture!
- Interoperability is a complex, vocabulary driven requirement, as yet unsatisfied. We have met the enemy and it is us !
- The solution is in this room in the fruits of your labor!



## Thank You !

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