Why?

“To help people live the healthiest lives possible.”
Core Assumptions

‘The complexity of modern medicine exceeds the inherent limitations of the unaided human mind.’

~ David M. Eddy, MD, Ph.D.

‘... man is not perfectible. There are limits to man’s capabilities as an information processor that assure the occurrence of random errors in his activities.’

~ Clement J. McDonald, MD
• We need to
  • Provide better care
    • By sharingExecutable clinical decision support modules
  • Decrease cost
  • Make clinicians and patients happier
  • Provide accurate computable data as the foundation of a learning health system
SMART on FHIR®© – Open Platform Architecture

SOA Orchestration

mHealth

OAuth

FHIR® REST API

FHIR Profiles from CIMI Models (using standard terminology)

Heterogeneous Systems

Commercial EHR

Home Grown System

VISTA

Others...

http://smartplatforms.org/smart-on-fhir/
The Clinical Information Modeling Initiative (CIMI) is an HL7 Work Group that is producing detailed clinical information models to enable interoperability of health care information systems.

CIMI was initiated during a “Fresh Look” session at an HL7 meeting in 2011.

CIMI models are free for use for all purposes.

See http://www.opencimi.org/ for more details.
CIMI Mission

Improve the interoperability of healthcare systems through shared implementable clinical information models.
CIMI creates “computable logical models.”

- The models are algorithmically processable
- Models show the structural relationship of the model elements (containment)
- Models are expressed in a formal computable format
- Coded elements have explicit binding to allowed coded values (attributes and values)
- Models are independent of any specific programming language, implementation technology, or type of database
- The models must support explicit, unambiguous query statements against data instances

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CIMI Goals

- Create a shared repository of detailed clinical information models
- Repository is open to everyone and models are licensed free for use at no cost
- Where the models:
  - Are expressed in an approved formalism
  - Archetype Definition Language (ADL)
  - Archetype Modeling Language (AML)
  - Are based on a core reference model, including a set of base data types
  - Have formal bindings to standard coded terminologies
Logical Model Development Lifecycle

Standards Infusion

Core Reference Model

SNOMED CT
LOINC
RxNorm

CEMs
DCMs
CDEs
CDA Templates
openEHR Archetypes
ISO EN 13606 Archetypes
FHIM Models
FHIR Resources

Model Review

Repository of Shared Models in an approved Formalism

Initial Loading of Repository

Model Dissemination

Translators

HL7 FHIR
LOINC or SNOMED Observable
CDISC
HL7 CDA
X12
NCPDP
HL7 V2
SNOMED CT
How are the models used?

The models are used during software development, which makes the process much faster and more efficient, and it insures that the references to data in the software adhere to the agreed standards.
The Interoperable App Development Process

- **Domain Analysis**
- **Create Logical Models (CIMI)**
- **Approve Models**
- **Model Repository**
- **Create Physical Artifacts (FHIR Profiles)**
- **Artifact Repository (FHIR Profiles)**

**Project Needs**
- Pediatric Growth Chart
- Neonatal Bilirubin
- Comm Acq Pneumonia
- OPA Data Collection
- MQIP
- ACC registries

**Terminology Server (SOLOR)**

**Conformance Testing**

**Create Software (Apps, Services, CDS)**

**HSPC**

**HSPC+**
Where are the models used?

• We want to create ubiquitous sharing of standardized data across the breadth of medicine for:
  • Direct patient care
  • Research and learning
  • Public health
  • Clinical trials
  • Data from devices
  • Post market surveillance
  • Quality and disease specific registries
  • Billing and health administration
  • Any where that we share health related data and information .....
Questions?
The largest FHIR educational event in the world
June 19 – 21, 2018 in Boston, MA
www.fhirdevdays.com/boston
IsoSemantic Models – Example of Problem

*(from Dr. Linda Bird)*

**e.g. “Suspected Lung Cancer”**
Data Comes in Different Shapes and Colors

- Finding – Suspected Lung Cancer
- Finding – Suspected Cancer
  - Location – Lung
- Finding – Cancer
  - Location – Lung
  - Certainty – Suspected

(Let’s say this is the preferred shape)
Data Standardized in the Service

Application

Application and User

Data in preferred shape and color

Shape and color translation

Shape and color of data in the local database
Partial Interoperability

- Application
- Application and User
- Standard Terms (Non-standard Structure)
- Term Translators
- Local databases, CDA, HL7 V.2, etc.
Preferred Strategy – Full Interoperability

Application

Application and User

Standard Structure AND Standard Terms (As defined by CIMI Models)

Term and Structure Translators

Local databases, CDA, HL7 V.2, etc.

Requirements

Application

Application and User

Standard Structure AND Standard Terms (As defined by CIMI Models)

Term and Structure Translators

Local databases, CDA, HL7 V.2, etc.
Reasons to do it on the server side

• Person writing the translation is most likely to understand the meaning of the data in their own database.

• The person writing the translation only has to understand their own data and the preferred model.
  – They can optimize query execution for their own system

• The query for the data is simpler. If the application has to write a query that will work for all shapes, the query will be inefficient to process by every system.
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Dr. Homer Warner
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- Z h#kdyh#slfnhg#kh#rz #kdqj lqj #ixlw
- Wkhuh#l#d#qhhg#wr#kdyh#8/333. #ghflvlrq#vxssruw#uxdhv#ru#p rgxdhv
- Wkhuh#l#qr#sdwk#iurp #483#wr#jhw#wr#8/333#xqdnv#z h#ixqgdp hwiao| #fkdqjh#kh#hfrv| vwhp
Wkh#Ixwxuh#Hfrv|vwhp

- Vwdqgdugv#lUh#ghilqhg#kdw#hqdedh#5wuxo|5iqwhurs#hudedh#v|vwhp v#vlqj#vwdqgdugv#dvhg#vhylfhv

- Rqg#dqg#qhz #IKU#yhqgruv=
  - Vxssruw#vwdqgdugv#dvhg#vhylfhv#KO:#IKIU^a,
  - Vxssruw#VP DUW^a #ssdfdwrqv

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- Shrs dh#ex | #kh#dssv#kh | qhhg

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- Sdwlhqvw#uhfhlyh#ehwhu#duh#dw#d#rz hu#frv#ehfdxvh#arz hu#frvw#klj khu#txdow | dssv#duh#dyldode#lv#gulyhq|e | #p dunhw#rufhv
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+hp skdvlv#dgghg,
Wkh#Erpw#ri#p hglfdq#vriwz duh

- Ehfhnuu#Khdawk#W# FIR #Uyylhz
- Sduwhquv#KhdawkF duh=# 415 # lqrlq
- Lqwhup rxqwdllq#P hglfdq#Hquwhu# 883 # lqrlq
DFR v#dqg#Uhj lvwlhv

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HKU 4
HKU 5
HKU 6
Wkh#vwduw#ri#d#Ohduqlqj#
Khda;kfduh#V|vwhp #lv#
dffxudwh/#frp sxwdedh/#gdwd1
P ruh#Uhdvreq

- Djkdh#vriwz duh#ghyhar sp hqw
  - Z lgho#ghwulexwhg
  - G luhfwhg#gdb|#e |#urqw#bq#fdqll dqv
  - Lqfuhdvhg#xvde lbw|#ri#vriwz duh/#fudwlylw/#lqqrydwlrq

- Lqfuhdvhg#fkrlh#lq#vriwz duh
  - Wkrxvdqgv#ri#lqghshqghqw#ghyharshuv
  - Fhqwdoo#sdqghg#frqrp |#v#uhh#p duhwh
  - Wklqn#bdss#wrhu#ru#khdokfduh#ru#ru#lqqrdwlrqv#dh#xehu