The Office of the National Coordinator for Health Information Technology

Quality Improvement Standards Harmonization and the Clinical Quality Framework

Using Cross-Initiative Coordination to Reach the Future State

March 18, 2015

HealthIT.gov

Objectives

- Preview 2015 measure update standards/testing improvements
- Understand need for CDS/eCQM harmonization
- Learn about the planned pathway for CDS/eCQM standards harmonization:
  - Intermediate goals
  - Long term outcomes

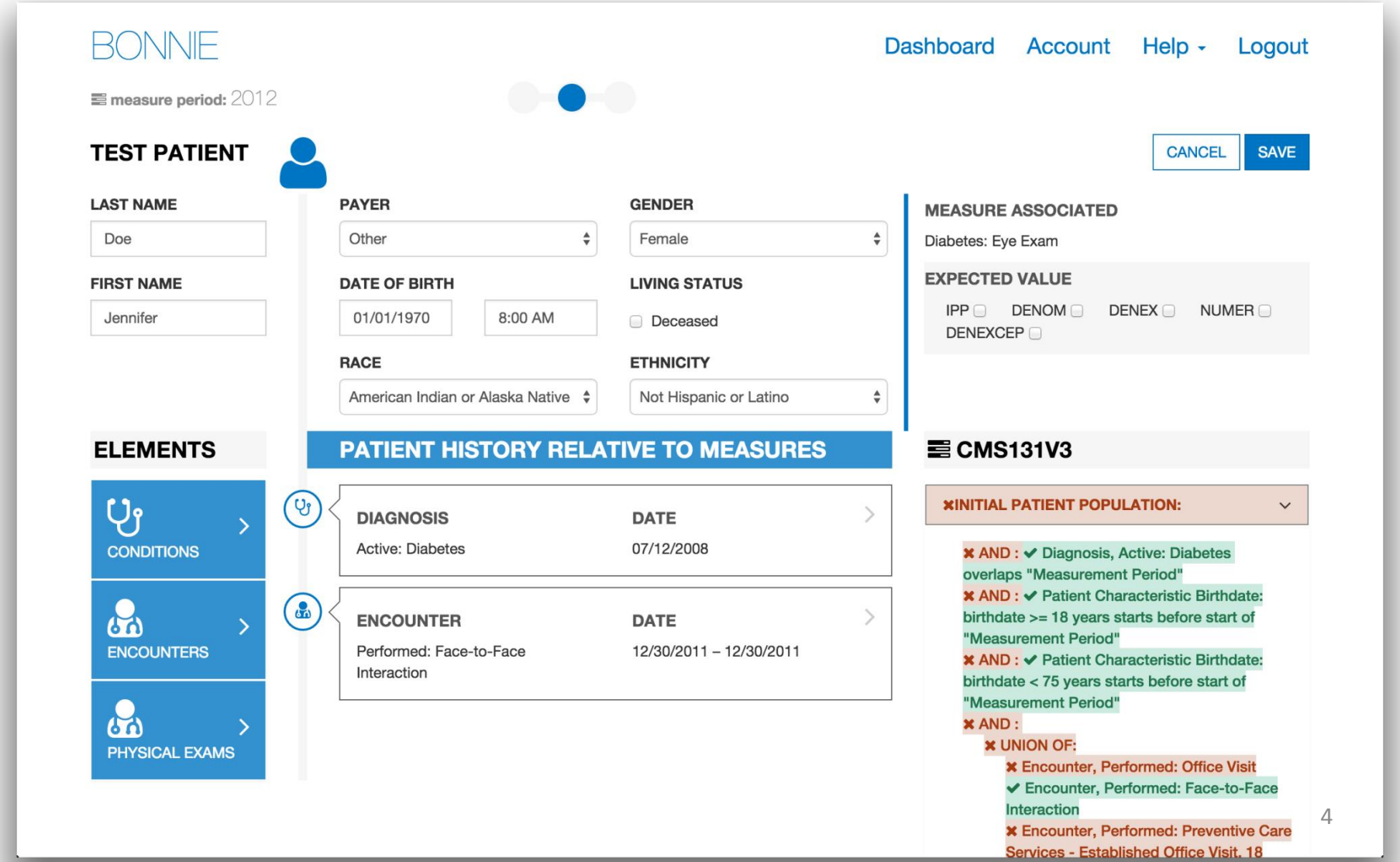
The Clinical Quality Framework:

CURRENT STANDARDS/MEASURE UPDATE

2015 eCQM Annual Update

- All 93 eCQMs to be published in HQMF R2.1
- Current Measure Authoring Tool release packages include HQMF R2.1 file validation
- Value sets updated to include latest 2014/2015 code systems
- Corrections to incorporate feedback from users and changes to other standards
- All measures pre-tested using BONNIE testing tool which creates QRDA libraries

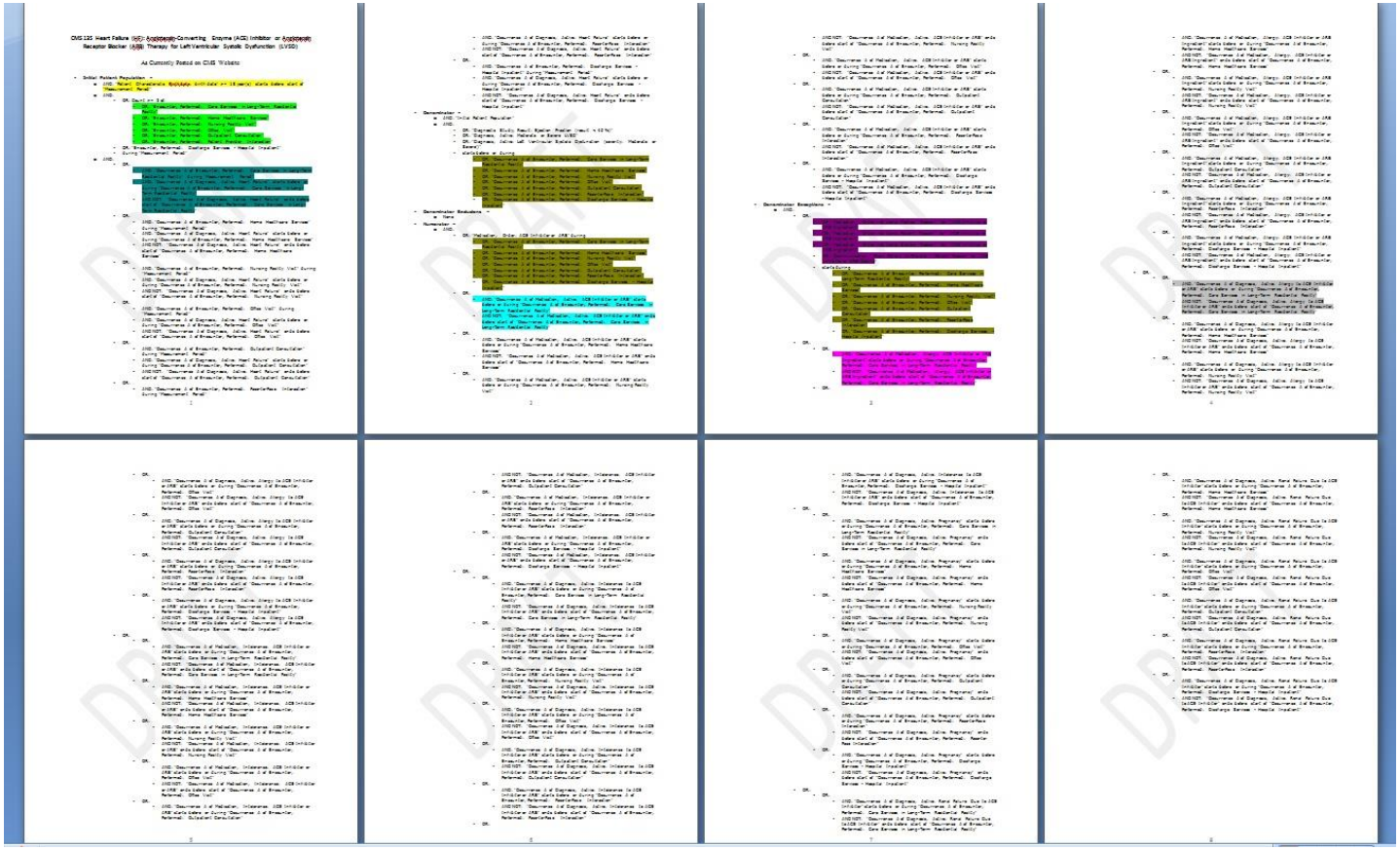
BONNIE: Test-Driven Development



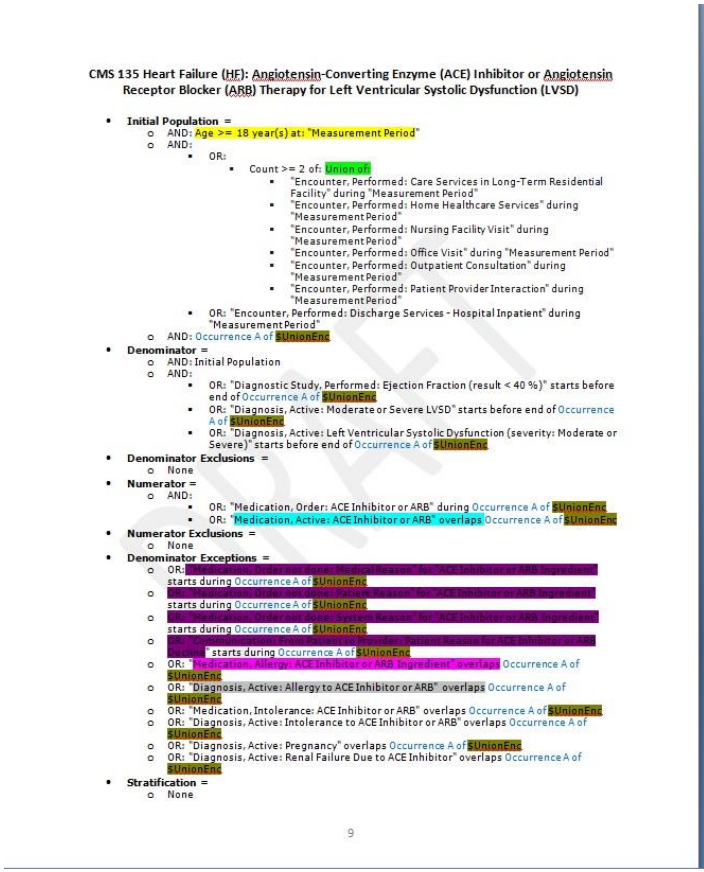
Motivation for HQMF R2.1

- HQMF R2.1 much more tractable than HQMF R1
  - Easier to parse
  - Simpler execution model
- Intent to enable automated machine importing:
  - Less effort than manual measure implementation
  - Less chance of error than manual implementation
  - Faster turnaround for measure updates
  - Fix bugs in library code (e.g., temporal operators) once
  - Once you can import one measure you can rapidly add others

2014 Measure Logic for CMS135



Proposed 2015 Measure Logic for CMS135



CMS 135 Heart Failure (HF): Angiotensin-Converting Enzyme (ACE) Inhibitor or Angiotensin Receptor Blocker (ARB) Therapy for Left Ventricular Systolic Dysfunction (LVSD)

- **Initial Population** =
  - AND: Age >= 18 year(s) at: "Measurement Period"
  - AND:
    - OR:
      - Count >= 2 of: Union of:
        - "Encounter, Performed: Care Services in Long-Term Residential Facility" during "Measurement Period"
        - "Encounter, Performed: Home Healthcare Services" during "Measurement Period"
        - "Encounter, Performed: Nursing Facility Visit" during "Measurement Period"
        - "Encounter, Performed: Office Visit" during "Measurement Period"
        - "Encounter, Performed: Outpatient Consultation" during "Measurement Period"
        - "Encounter, Performed: Patient Provider Interaction" during "Measurement Period"
      - OR: "Encounter, Performed: Discharge Services - Hospital Inpatient" during "Measurement Period"
  - AND: Occurrence A of $UnionEnc
- **Denominator** =
  - AND: Initial Population
  - AND:
    - OR: "Diagnostic Study, Performed: Ejection Fraction (result < 40 %)" starts before end of Occurrence A of $UnionEnc
    - OR: "Diagnosis, Active: Moderate or Severe LVSD" starts before end of Occurrence A of $UnionEnc
    - OR: "Diagnosis, Active: Left Ventricular Systolic Dysfunction (severity: Moderate or Severe)" starts before end of Occurrence A of $UnionEnc
- **Denominator Exclusions** =
  - None
- **Numerator** =
  - AND:
    - OR: "Medication, Order: ACE Inhibitor or ARB" during Occurrence A of $UnionEnc
    - OR: "Medication, Active: ACE Inhibitor or ARB" overlaps Occurrence A of $UnionEnc
- **Numerator Exclusions** =
  - None
- **Denominator Exceptions** =
  - OR: "Medication, Order not done: Medical Reason" for "ACE Inhibitor or ARB Ingredient" starts during Occurrence A of $UnionEnc
  - OR: "Medication, Order not done: Patient Reason" for "ACE Inhibitor or ARB Ingredient" starts during Occurrence A of $UnionEnc
  - OR: "Medication, Order not done: System Reason" for "ACE Inhibitor or ARB Ingredient" starts during Occurrence A of $UnionEnc
  - OR: "Intervention, Order: patient is provider- patient Reason for ACE Inhibitor or ARB Ingredient" starts during Occurrence A of $UnionEnc
  - OR: "Medication, Allergy: ACE Inhibitor or ARB Ingredient" overlaps Occurrence A of $UnionEnc
  - OR: "Diagnosis, Active: Allergy to ACE Inhibitor or ARB" overlaps Occurrence A of $UnionEnc
  - OR: "Medication, Intolerance: ACE Inhibitor or ARB" overlaps Occurrence A of $UnionEnc
  - OR: "Diagnosis, Active: Intolerance to ACE Inhibitor or ARB" overlaps Occurrence A of $UnionEnc
  - OR: "Diagnosis, Active: Pregnancy" overlaps Occurrence A of $UnionEnc
  - OR: "Diagnosis, Active: Renal Failure Due to ACE Inhibitor" overlaps Occurrence A of $UnionEnc
- **Stratification** =
  - None

9

Data Criteria (QDM Variables)

- **$LTRFEnc** =
  - "Encounter, Performed: Care Services in Long-Term Residential Facility" satisfies all
    - during "Measurement Period"
    - overlaps "Diagnosis, Active: Heart Failure"
- **$HHSEnc** =
  - "Encounter, Performed: Home Healthcare Services" satisfies all
    - during "Measurement Period"
    - overlaps "Diagnosis, Active: Heart Failure"
- **$NFVEnc** =
  - "Encounter, Performed: Nursing Facility Visit" satisfies all
    - during "Measurement Period"
    - overlaps "Diagnosis, Active: Heart Failure"
- **$OVEnc** =
  - "Encounter, Performed: Office Visit" satisfies all
    - during "Measurement Period"
    - overlaps "Diagnosis, Active: Heart Failure"
- **$OCEnc** =
  - "Encounter, Performed: Outpatient Consultation" satisfies all
    - during "Measurement Period"
    - overlaps "Diagnosis, Active: Heart Failure"
- **$F2FEnc** =
  - "Encounter, Performed: Face-to-Face Interaction" satisfies all
    - during "Measurement Period"
    - overlaps "Diagnosis, Active: Heart Failure"
- **$InptDcSvcEnc** =
  - "Encounter, Performed: Discharge Services - Hospital Inpatient" satisfies all
    - during "Measurement Period"
    - overlaps "Diagnosis, Active: Heart Failure"
- **$UnionEnc** =
  - Union of:
    - $LTRFEnc
    - $HHSEnc
    - $NFVEnc
    - $OVEnc
    - $OCEnc
    - $F2FEnc
    - $InptDcSvcEnc

10

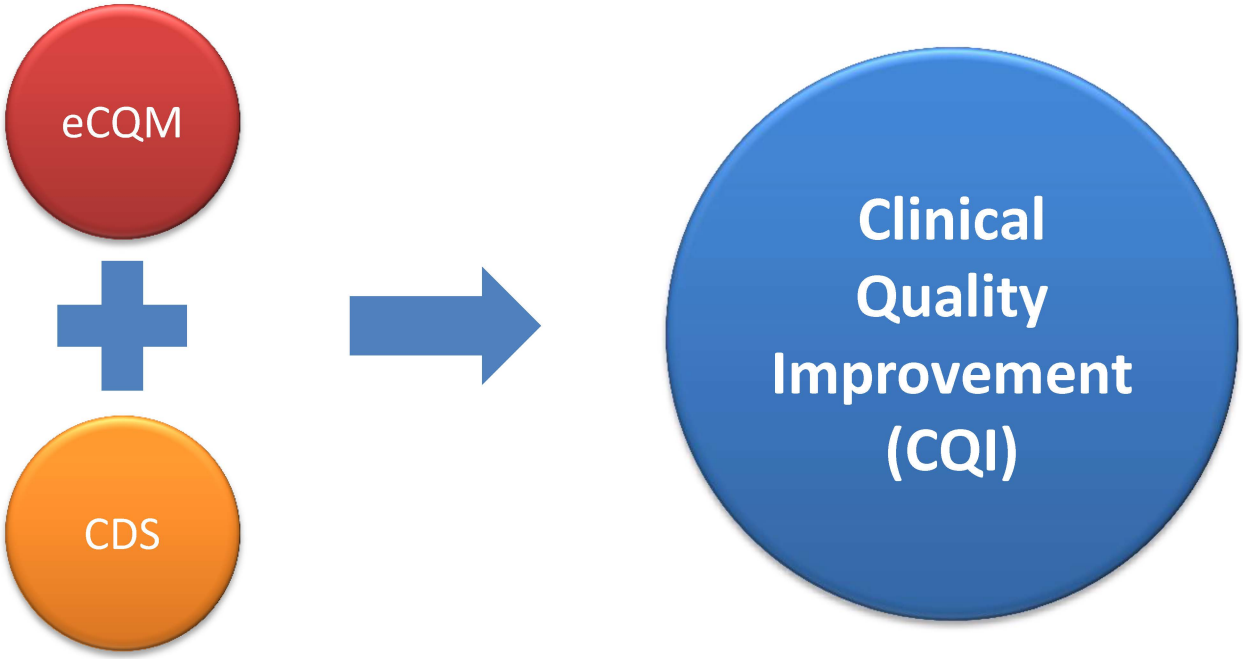
MATHEMATICA Policy Research

The Clinical Quality Framework:

ADDRESSING QI STANDARDS MISMATCH

Why Harmonize Now?

- Clinical Decision Support (CDS) and electronic Clinical Quality Measurement (eCQM) are closely related, share many common requirements, and both support improving health care quality
  - CDS recommends actions and eCQM measures impact/ care quality outcomes
  - Shared need to define patient cohorts
  - Shared need for standard ways to reference patient data



The Challenge

- **The standards used for the electronic representation of CDS and eCQM were not developed in consideration of each other**, and use different approaches to patient data and computable expression logic.

	Patient Data	Computable Expression Logic
Clinical Decision Support	• **Virtual Medical Record** (for both physical and logical models)	• **CDS Knowledge Artifact Implementation Guide**
Electronic Clinical Quality Measurement (eCQM)	• **Quality Reporting Data Architecture** (for physical model) • **Quality Data Model** (for logical model)	• **Health Quality Measure Format** (for physical model) • **Quality Data Model** (for logical model)

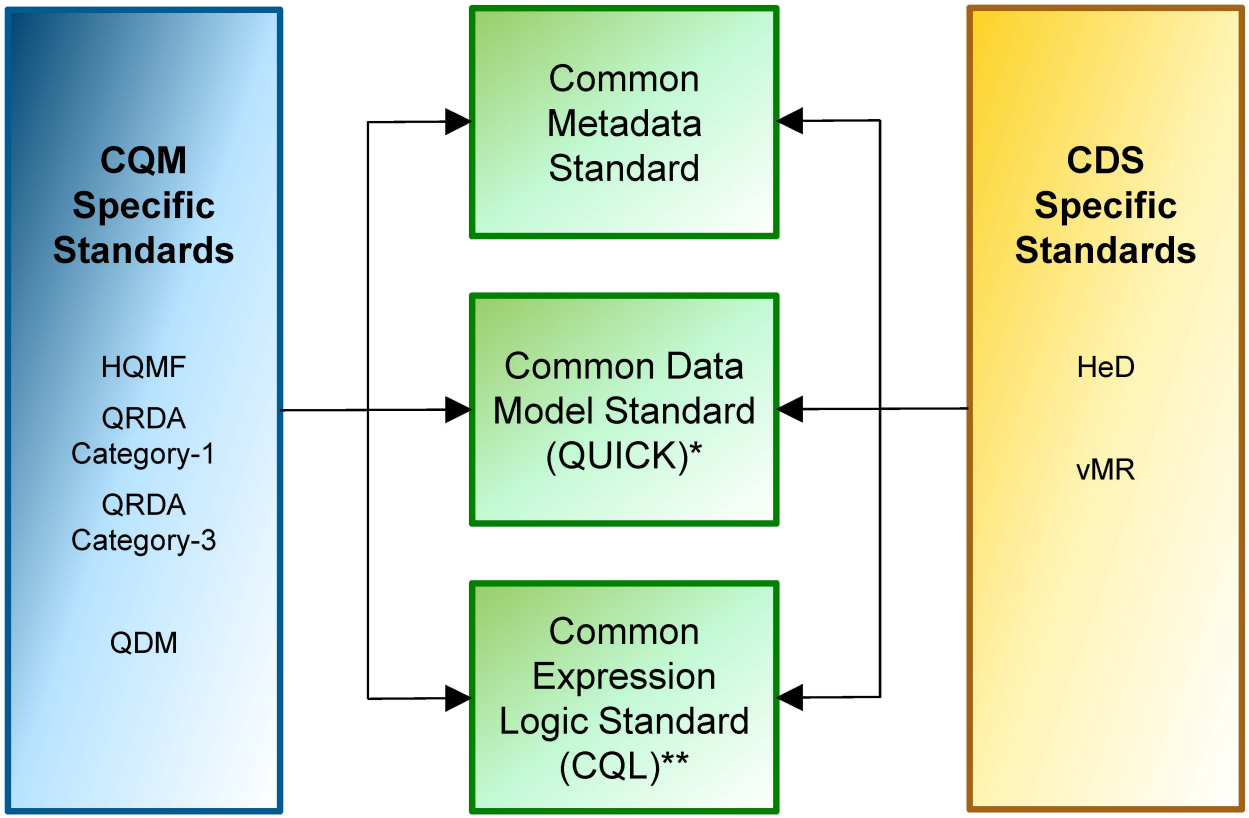
- Adhering to different standards places an additional implementation burden on vendors and providers with homegrown systems to build product-specific decision support to support quality measures.
- **It is currently difficult to share logic between eCQMs and CDS rules**.

The Clinical Quality Framework:

CURRENT HARMONIZED QI STANDARDS

Goal: Shared Standards

Clinical Quality Measurement and Clinical Decision Support



** Quality Improvement and Clinical Knowledge*
*** Clinical Quality Language*

Clinical Quality Metadata Conceptual Model:
Informational ballot published Feb 2015

- Metadata is data about data. It is used to classify an information artifact to enable that artifact to be retrieved, used, or quantified.
- Prior to this approach, the Clinical Quality Improvement domain included several information models with a total of 18 different HL7 standards with metadata requirements.
- The Clinical Quality Metadata Conceptual Model brings together the requirements for many CQI standards/models and harmonizes them into a single conceptual model.

Common use cases for Clinical Quality Metadata Conceptual Model:

- **Health eDecisions (HeD)**
- **Decision Support Services (DSS)**
- **Health Quality Measures Format (HQMF)**
- **Virtual Medical Record (vMR)**
- **Quality Reporting Data Architecture (QRDA)**
- **Templates**
- **Clinical Document Architecture (CDA)**
- **Order Sets**

Clinical Quality Language:
DSTU balloted Jan 2015 (awaiting publication)

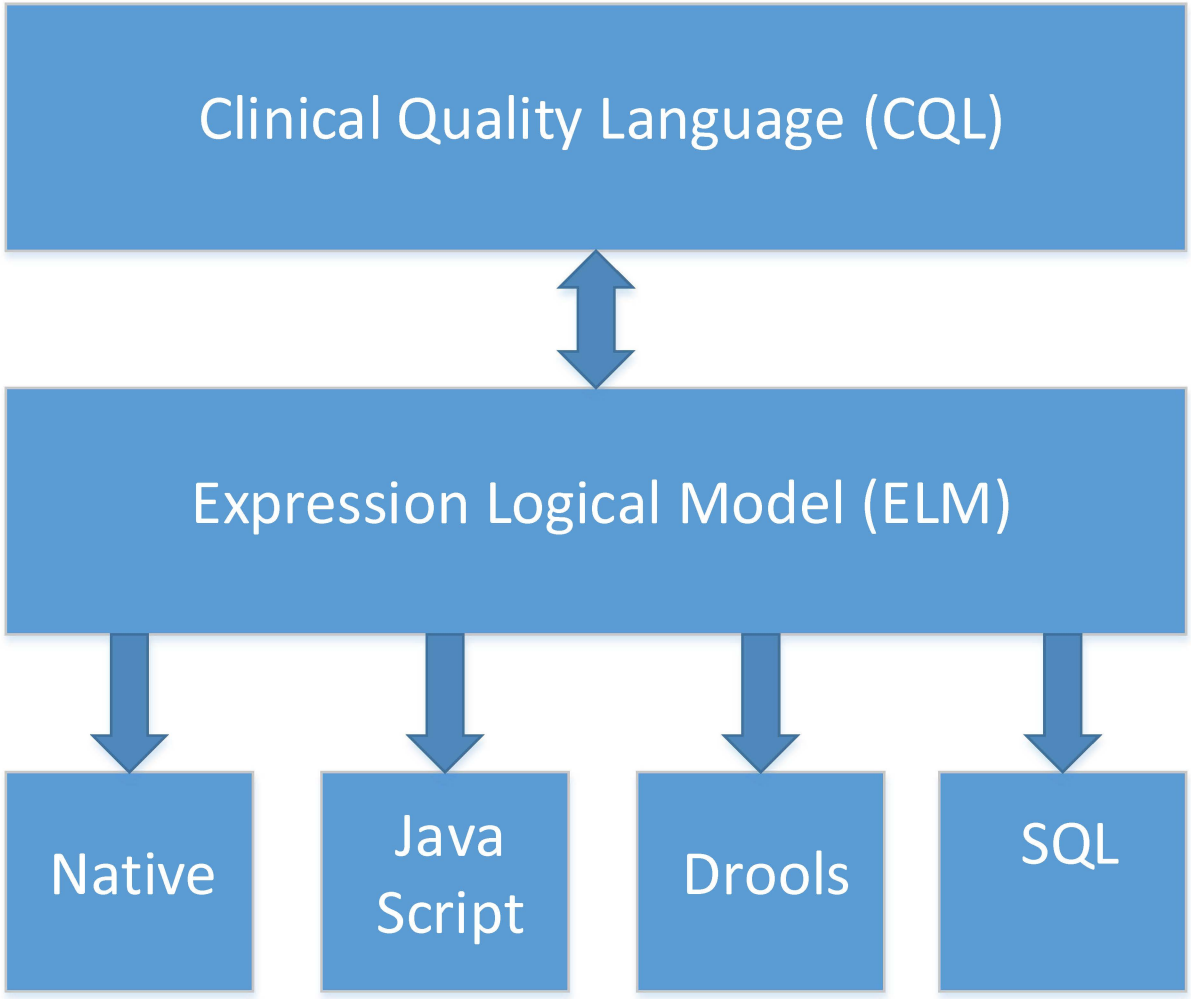
- Builds on functional requirements defined in:
  - Harmonization of Health Quality Artifact Reasoning and Expression Logic
- Leverages
  - Computability achieved by HeD
  - Measure Author understanding (QDM Heritage)
- Focus of the high-level syntax is on authoring
  - While providing a clear/automatic path to computable logic

Chlamydia Screening, CQM

```
using QLIM

context PATIENT // TODO: Look at turning this into a parameter with a 'with' statement

parameter MeasurementPeriod default interval[Date(2013, 1, 1), Date(2014, 1, 1))

concept "Other Female Reproductive Conditions" = ValueSet("2.16.840.1.113883.3.464.1003.111.12.1006")
...

let InDemographic =
    AgeAt(start of MeasurementPeriod) >= 16
        and AgeAt(start of MeasurementPeriod) < 24
        and Gender = "female"

let SexuallyActive =
    exists ([Condition: "Other Female Reproductive Conditions"] where effectiveTime overlaps before MeasurementPeriod)
        or exists ([Condition: "Genital Herpes"] where effectiveTime overlaps before MeasurementPeriod)
        or exists ([Condition: "Genococcal Infections and Venereal Diseases"] where effectiveTime overlaps before MeasurementPeriod)
        or exists ([Condition: "Inflammatory Diseases of Female Reproductive Organs"] where effectiveTime overlaps before MeasurementPeriod)
        or exists ([Condition: "Chlamydia"] where effectiveTime overlaps before MeasurementPeriod)
        or exists ([Condition: "HIV"] where effectiveTime overlaps before MeasurementPeriod)
        or exists ([Condition: "Syphilis"] where effectiveTime overlaps before MeasurementPeriod)
        or exists ([Condition: "Complications of Pregnancy, Childbirth and the Puerperium"] where effectiveTime overlaps before MeasurementPeriod)
        or exists ([ObservationResult: "Pregnancy"] where effectiveTime during MeasurementPeriod)
        or exists ([ObservationResult: "Pap"] where effectiveTime during MeasurementPeriod)
        or exists ([ObservationResult: "Lab Tests During Pregnancy"] where effectiveTime during MeasurementPeriod)
        or exists ([ObservationResult: "Lab Tests for Sexually Transmitted Infections"] where observedAtTime during MeasurementPeriod)

let InInitialPopulation =
    InDemographic and SexuallyActive

let InDenominator =
    InInitialPopulation

let InNumerator =
    InDenominator
        and exists ([ObservationResult: "Chlamydia Screening"] where effectiveTime during MeasurementPeriod)
```

Chlamydia Screening, CDS

```
using QLIM

context PATIENT

concept "Other Female Reproductive Conditions" = ValueSet("2.16.840.1.113883.3.464.1003.111.12.1006")
...

let InDemographic =
    Age() >= 16 and Age() < 24 and Gender = "female"

let SexuallyActive =
    exists ([Condition: "Other Female Reproductive Conditions"])
    or exists ([Condition: "Genital Herpes"])
    or exists ([Condition: "Genococcal Infections and Venereal Diseases"])
    or exists ([Condition: "Inflammatory Diseases of Female Reproductive Organs"])
    or exists ([Condition: "Chlamydia"])
    or exists ([Condition: "HIV"])
    or exists ([Condition: "Syphilis"])
    or exists ([Condition: "Complications of Pregnancy, Childbirth and the Puerperium"])
    or exists ([ObservationResult: "Pregnancy Test"])
    or exists ([ObservationResult: "Pap Test"])
    or exists ([ObservationResult: "Lab Tests During Pregnancy"])
    or exists ([ObservationResult: "Lab Tests for Sexually Transmitted Infections"])

let NoScreening =
    not exists ([ObservationResult: "Chlamydia Screening"] where effectiveTime during interval[today - 1 years, now])
    and not exists ([Procedure, Planned: "Chlamydia Screening"] where effectiveTime >= now)
    and not exists ([ObservationResult: "Reason for not performing Chlamydia Screening"])

let NeedScreening = InDemographic and SexuallyActive and NoScreening
```



Authors use CQL to produce libraries containing human-readable yet precise logic.

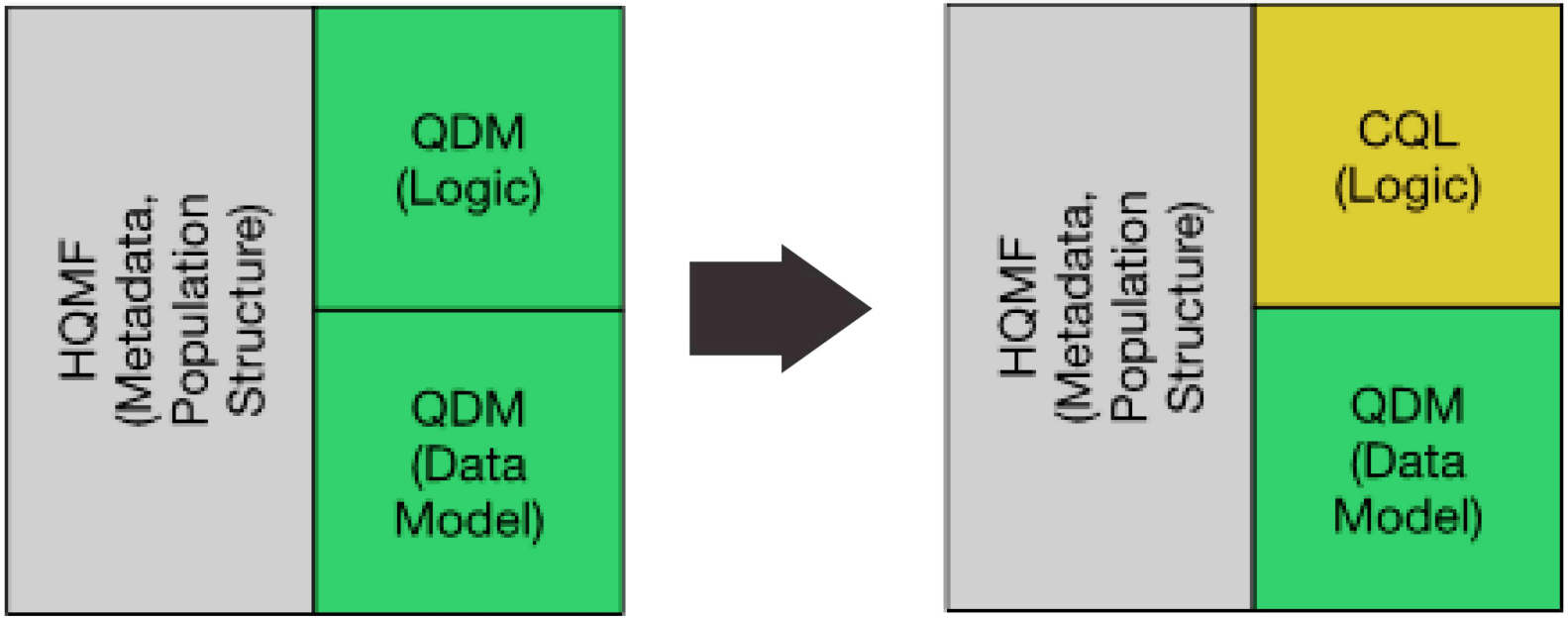
ELM XML documents contain machine-friendly rendering of the CQL logic. This is the intended mechanism for distribution of libraries.

Implementation environments will either directly execute the ELM, or perform translation from ELM to their target environment language.

The Clinical Quality Framework:

FUTURE HARMONIZED QI STANDARDS

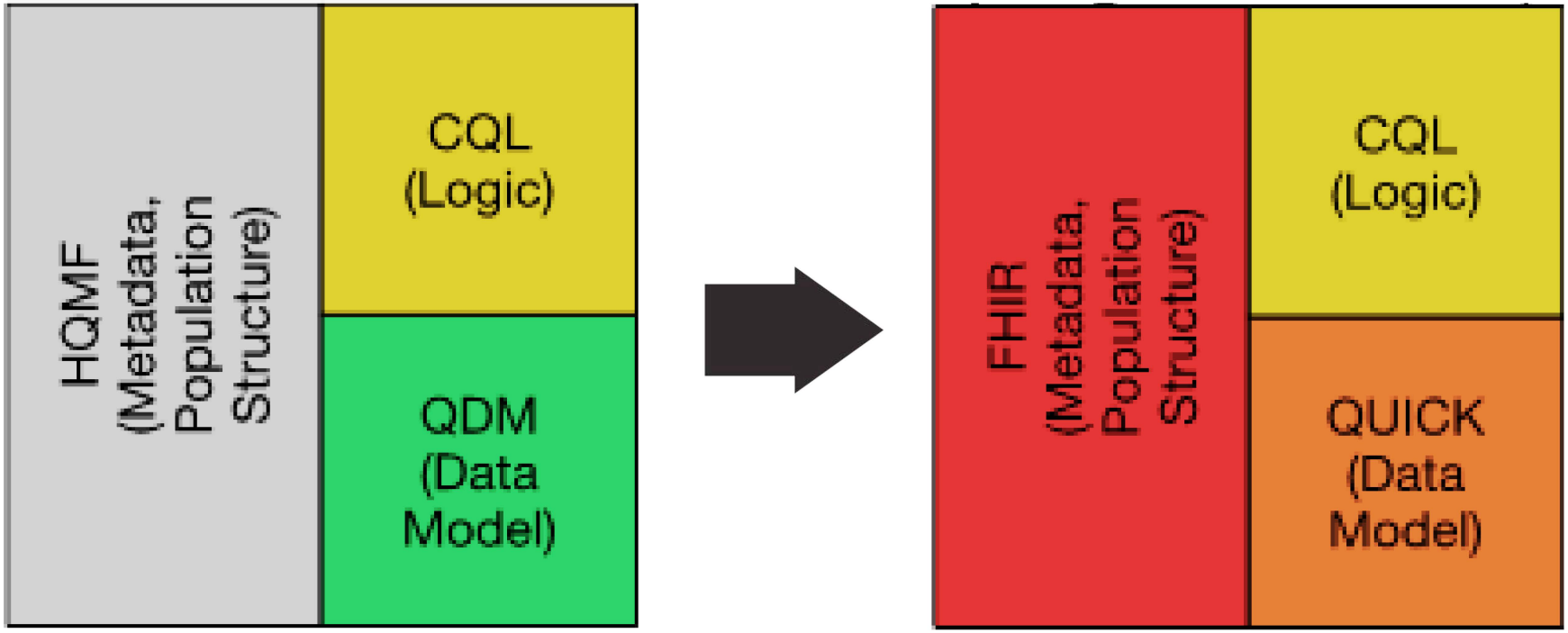
Proposed 2015 Standards Evolution



Intermediate Approach: CQL-based HQMF Implementation Guide

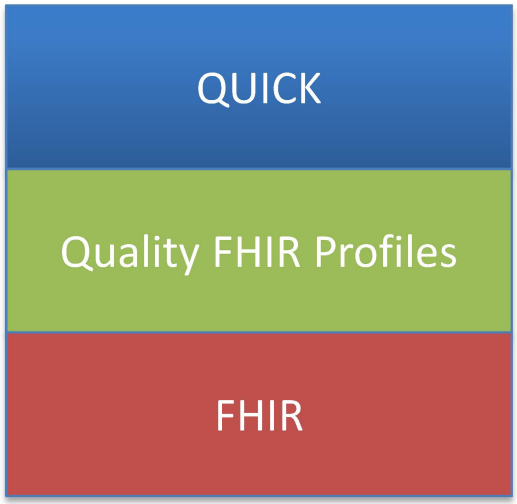
- Ballot in submission for May 2015
- Pros
  - Continued use of the QDM allows unchanged use of QRDA for measure reporting
  - Only expression language changes, easier on measure producers and consumers
  - Work on FHIR-based measure reporting standard can be delayed until FHIR is more stable
- Cons
  - Creates inertia against QUICK introduction
  - QDM will require ongoing maintenance
  - Delays fully integrated eCQM+CDS

Proposed Post-2015 Standard



QUICK and Quality FHIR Profiles

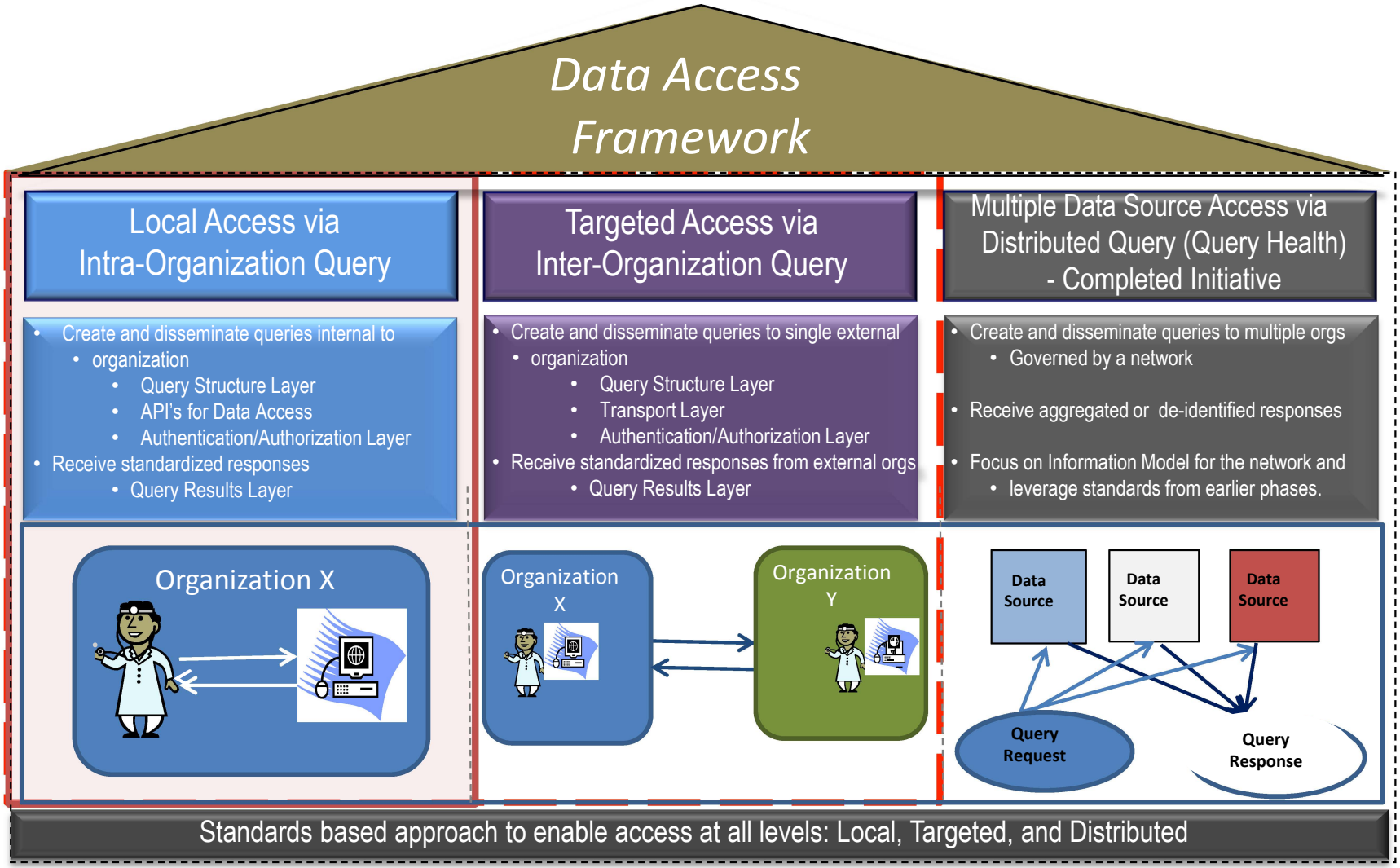
- QDM→ QUICK ← VMR
- QUICK: UML-based logical model– initial plan to map to FHIR
- Resolved to auto-generate QUICK from Quality FHIR profiles rather than hand-craft
- QUICK and Quality FHIR Profiles to be balloted for DSTU in 2015



Joint FHIR Profiles for Quality

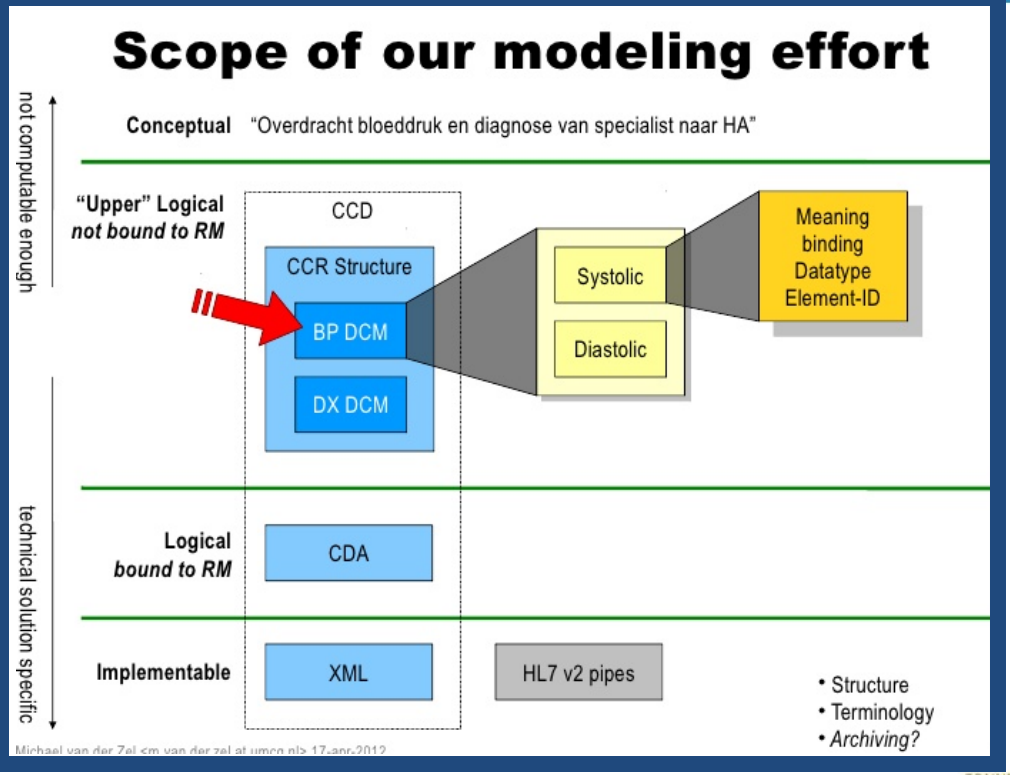
- An S&I coordination effort led to realization of an opportunity for common FHIR profiles across CQF and DAF
- Discussion with the CIMI-HSPC team revealed further interest in coordination
- Current approach: QI Core = common FHIR content for all three use cases with modifications/further constraints

Data Access Framework: Query Standard for Information Exchange



Note: An organization can be a hospital that is part of larger organization and can also include HIEs, RIOs, other types of organizations etc.

CIMI: Clinical Information Modeling Initiative
HSPC: Health Services Platform Consortium



HARRIS ORACLE TELUS IBM

Dignity Health.

Cleveland Clinic

CONNECTING GTA

TRINITY HEALTH Livonia, Michigan

Advocate Health Care

Federal Aviation Administration

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Presence Health™ Today counts.

NHIN Nationwide Health Information Network

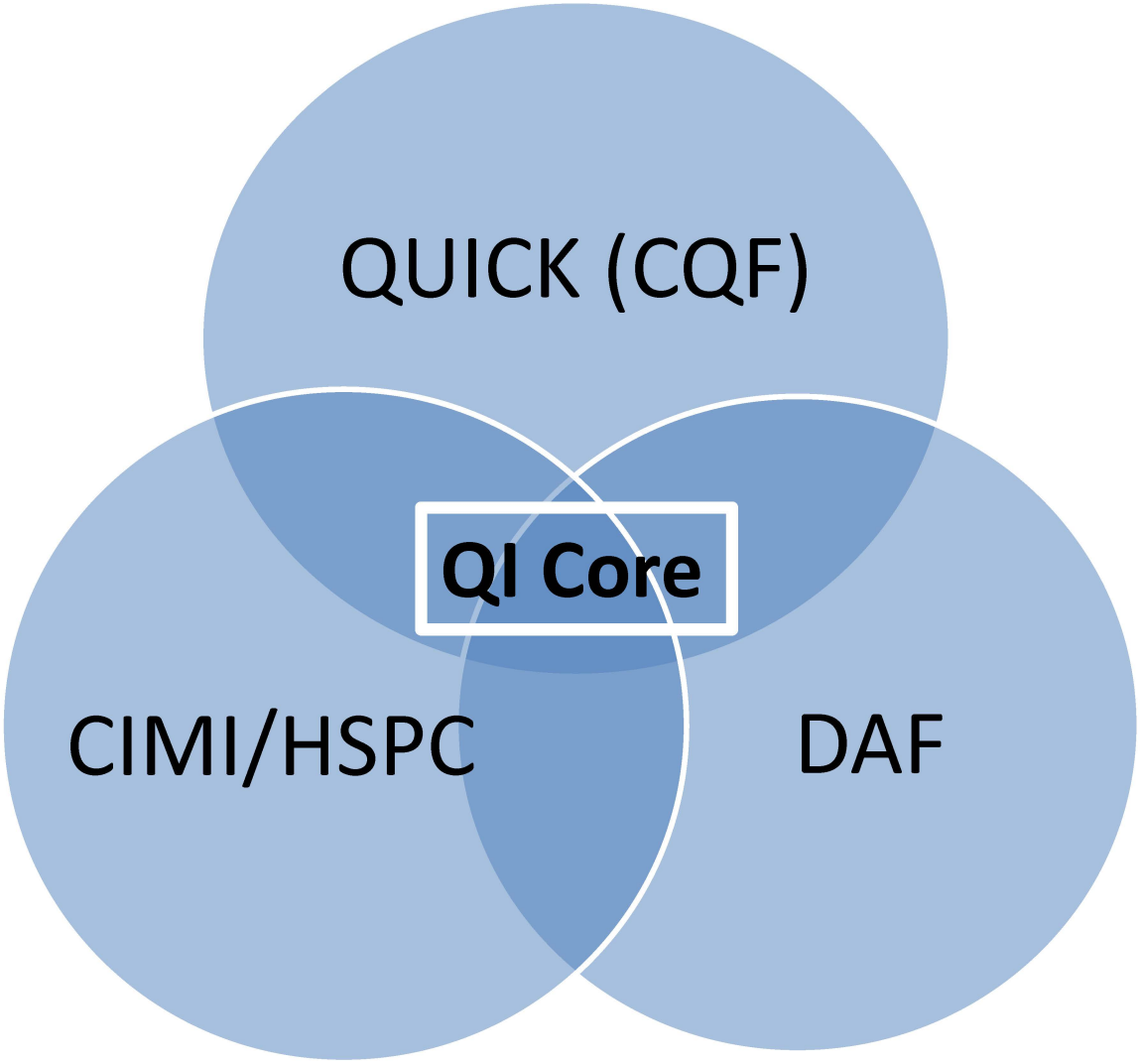
Department of Veterans Affairs

U.S. Department of Defense Military Health System Health.mil

Florida Health Information Exchange

HSPC

Joint FHIR Profiles for Quality



Questions?

http://wiki.siframework.org/Clinical+Quality+Framework+Initiative

- Initiative Coordination and Support: Ken Kawamoto, Marc Hadley, Sarah Ryan, Bridget Blake
- Community Contributors: various private and public sector contributors. E.g., McKesson, Epic, Motive Medical Intelligence, Evinance, Wolters Kluwer Health, Zynx Health, National Decision Support Company, HLN Consulting, American College of Radiology, American College of Cardiology, HHS, CDC, universities and healthcare systems, and many others

HL7 sponsors: Clinical Quality Information Workgroup, Clinical Decision Support Workgroup, FHIR Workgroup

Work supported by Tacoma: a CMS-ONC sponsored activity

- ONC and CMS: Steve Posnack, Kate Goodrich, Julia Skapik (julia.skapik@hhs.gov), Minet Javellana, Laverne Perlie, Pavla Frazier

BACKGROUND/ ADDITIONAL CONTENT

Quality Improvement Pathway : Ideal State

QDM – Summary of 2015 Changes

- **Some of the changes to QDM include:**
  - **Ability to perform variable assignments**
  - **Ability to add inline comments**
  - **Introduction of new operators - *Age At , Satisfies any / Satisfies all, Overlaps***
  - **Eight new temporal operators for including concurrency**
  - **Approx 20 Datatypes/Attributes clarified / removed due to ambiguity.**
  - **Addition of General relationships.**
- Total of 32 QDM changes since January 1, 2014
- The current QDM specification can be found at:
  - http://www.healthit.gov/quality-data-model

Quality Measurement (eCQM) Standards

- Measure Definition Standards
  - Quality Data Model (QDM)
  - Health Quality Measure Format (HQMF)
- Measure Reporting Standards
  - Quality Reporting Document Architecture (QRDA)
  - Category I for patient level data
  - Category III for aggregate data

Clinical Decision Support (CDS) Standards

- HL7 standards from Health eDecisions (HeD)
  - Virtual Medical Record (vMR) data model
  - CDS Knowledge Artifact Specification (KAS)
    - Rules, order sets, documentation templates
  - Decision Support Service (DSS) Spec and IG
- Aligned with other relevant standards
  - vMR: CCD, CCDA, QRDA, Infobutton
  - KAS: Order Set DSTU, GELLO, Arden, CDS Consortium
  - DSS: Infobutton, IHE Request for Clinical Guidance, REST

Standards Status: March 2015

- HQMF R2.1 published in Aug 2014
  - CQF-based HQMF IG comment-only ballot in Jan 2015
- HeD KA R1.2 published in July 2014

- CQL
  - Requirements balloted in Jan 2014
  - Comment-only ballot in Sept 2014, DSTU* ballot in Jan 2015
- QUICK
  - Requirements (QIDAM) balloted in Jan and May 2014
  - Comment-only ballot in Sept 2014, DSTU ballot for May 2015
- Quality FHIR Profiles
  - Comment-only ballot in Jan 2015, DSTU ballot for May 2015

* Draft Standard for Trial Use

Anatomy of a CQL Library

- using statements
  - Define the data model(s) in use by the library
- include statements
  - Define other libraries referenced by the library
- context definition
  - Define the overall context for the library (e.g. PATIENT or ENCOUNTER)
  - system-understood
  - in terms of the model
- parameter definitions
  - Define available “inputs”
- concept definitions
  - Define user-friendly labels for value sets within the library
- let statements
  - Define the expressions that are available within the library
  - Can be used by the containing artifact or other referencing libraries

CMS 135 using CQL/QDM

```
library CMS135_QDM version '1'

using QDM

valueset "Care Services in Long-Term Residential Facility": '...'
valueset "Heart Failure": '...'
...

context Patient

parameter "Measurement Period"
  default interval[@2014-01-01T00:00:00.0, @2015-01-01T

define "Long-Term Residential Facility Encounters":
  ["Encounter, Performed": "Care Services in Long-Term Residential Facility"] E
    with ["Diagnosis, Active": "Heart Failure"] D
      such that D."period" overlaps before E."period"
    where E."period" during "Measurement Period"

define "Relevant Encounters":
  "Long-Term Residential Facility Encounters"
    union ...
    union ...
```

Valueset definitions allow local names to be used within the artifact

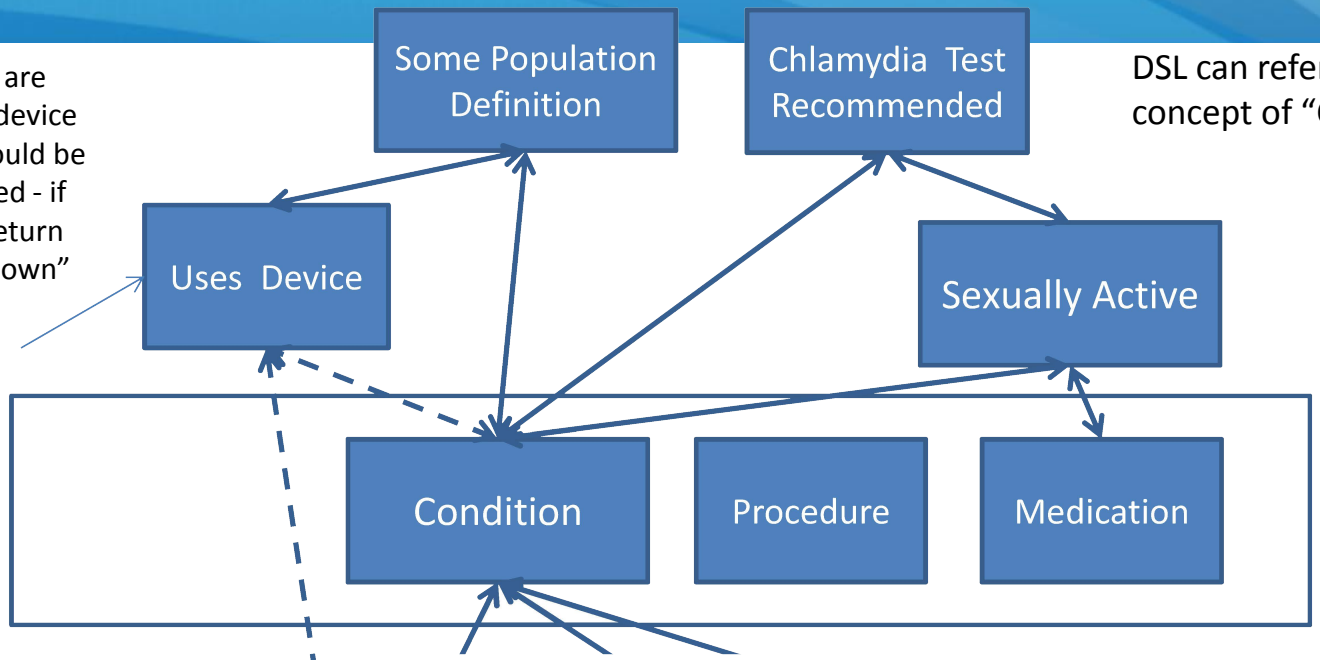
Identifiers can include spaces and punctuation to make logic more readable

Filtering is explicit in criteria, rather than implicit in the model

Each define is a set, rather than a criteria definition, so “occurrencing” is not required

Underlying Language and Data Source are both variable

BLUE = available concepts



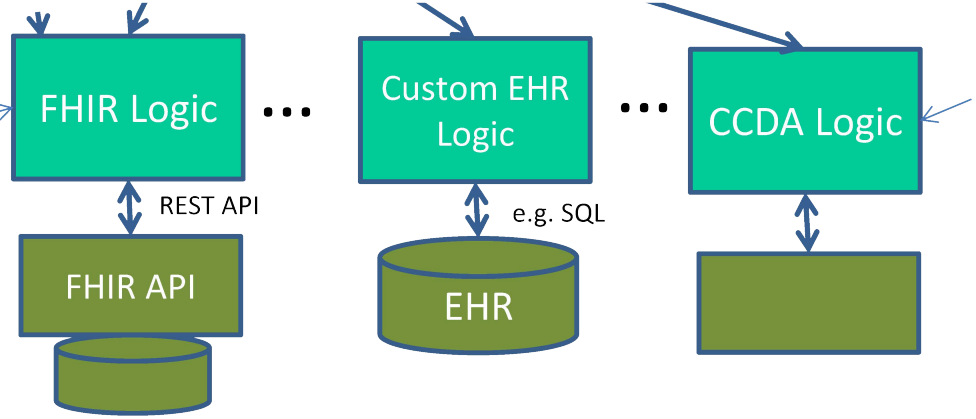
There are ways device use could be inferred - if not, return "unknown"

DSL can reference high-level concept of "ChlamydiaTest"

In the same way that lower-level concepts can be referenced

Including the concepts explicitly defined in the "logical model"

e.g. Condition.evaluate (DataSource, Occurrence, Filter)

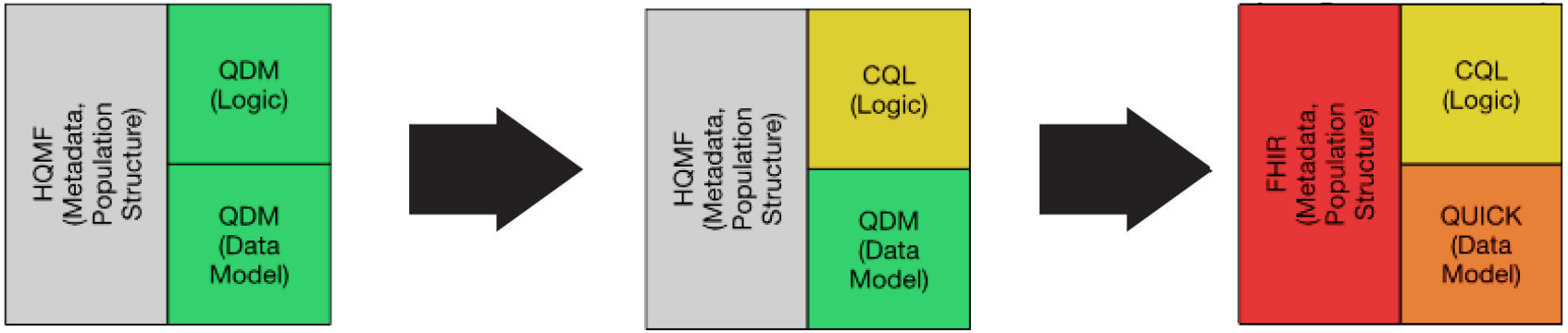


We implement at least this e.g. as Java library

As well as Data Format Specific concepts that implement a common "data provider" interface in terms of the logical model

Back end data stores

Step-wise Movement to Future Standards



Moving to Future Standards

- QUICK data model will be generated automatically directly from the complete FHIR profiles for Quality
- Goal is to facilitate a transition between existing standards and future standards through modularity
- Ongoing pilots will demonstrate implementation feasibility and lead to further standards refinement