

Health Level Seven International (HL7) Fast Healthcare Interoperability Resources (FHIR®)

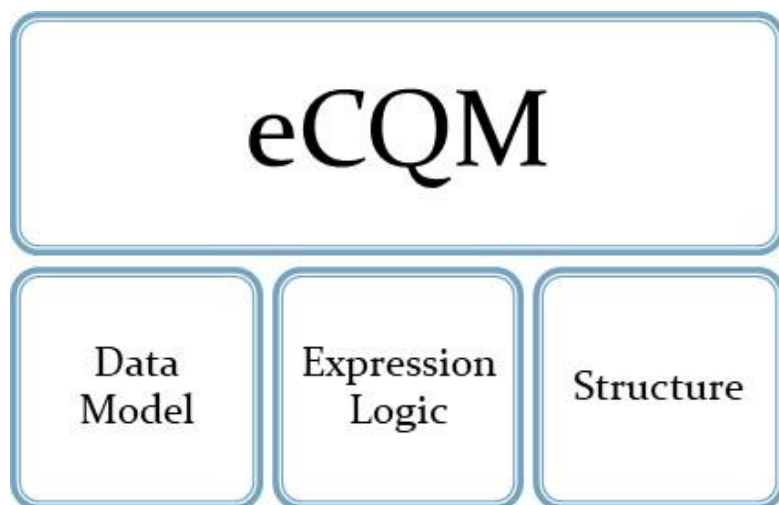
**HL7 FHIR® 101-
Using Clinical Quality Language (CQL) and
FHIR® for eQMs
September 26, 2019
Rob Samples, ESAC Inc.**



Agenda

- » Components of an electronic clinical quality measure (eCQM)
- » Introduction and walkthrough FHIR® specification
- » Use of Profiles
- » Quality Data Model (QDM) and Quality Improvement Core (QI-Core) mappings
- » Introduction to Quality Improvement Clinical Knowledge (QUICK)
- » FHIR® measure conversion
- » Tools to help with conversion
- » Using the FHIR® eCQM Repository
- » Conversion examples

Parts of an eCQM



Data Model: What data to look for in the patient's medical record

Expression Logic: How to calculate the result, evaluate the right care was provided

Structure: Metadata, numerator, denominator, exclusions, exceptions

What Is FHIR®?

- » Fast Healthcare Interoperability Resources (<http://hl7.org/FHIR>)
- » FHIR® is a next-generation standards framework created by HL7
- » Provides an interoperable platform for healthcare
 - Defines a common way to structure health data known as Resources
 - Enables automated data exchange through Application Programming Interfaces (APIs)
- » FHIR® uses latest technologies to be developer friendly

FHIR® - A Brief History

FHIR® DSTU 2*

- Balloted in early 2015
- Initial version of FHIR® focused on core data set and exchange using APIs
- Focus of the Argonaut project and ONC Common Clinical Data Set

FHIR® STU 3

- Released in 2017
- First version to contain Clinical Reasoning module
- Basis for initial eCQM conversion and Data Exchange for Quality Measures (DEQM) and Quality Measure Implementation Guides

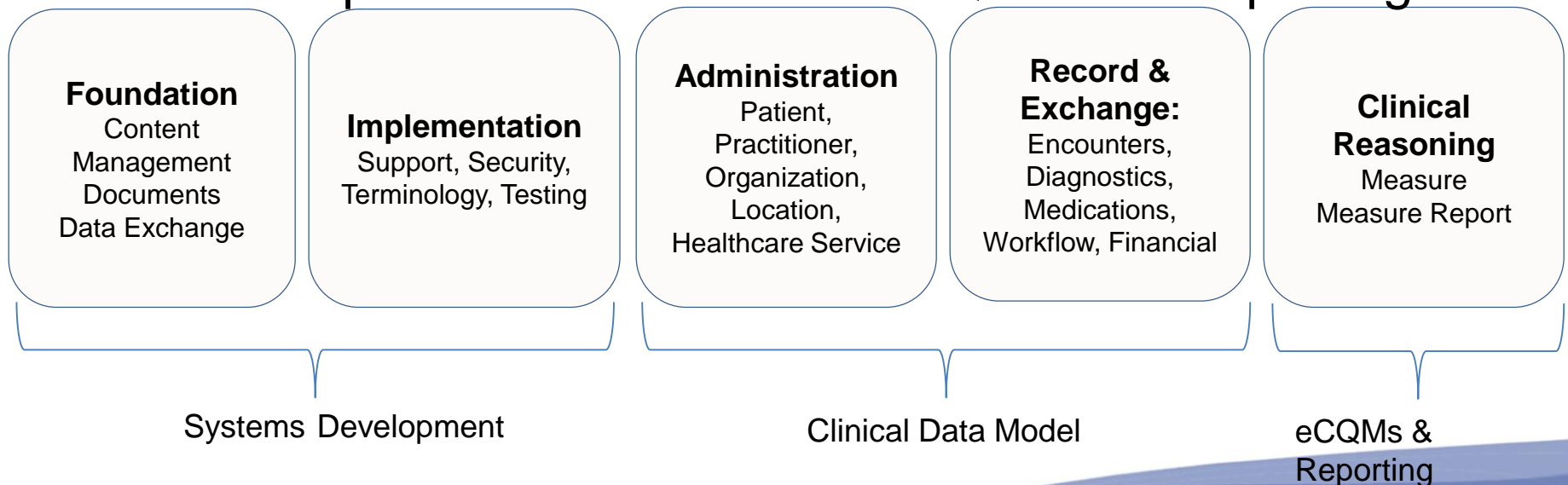
FHIR® R4

- Published 12/2018
- First version to contain Normative resources
- Target implementation for many EHR Vendors
- Current version used for converting test eCQMs

*Note HL7 no longer uses Draft for naming conventions

How is FHIR® used?

- FHIR® is organized into five levels for easy navigation
- Levels I and II give implementers a basis for exchanging data
- Levels III and IV are used to represent data in eCQMs
- Level V provides structure for eCQMs and Reporting



Walkthrough of FHIR®

- » <http://hl7.org/FHIR>
- » Basic navigation of the specification
- » Build vs. production sites
- » FHIR® Maturity Model
- » Review a basic Resource - Encounter

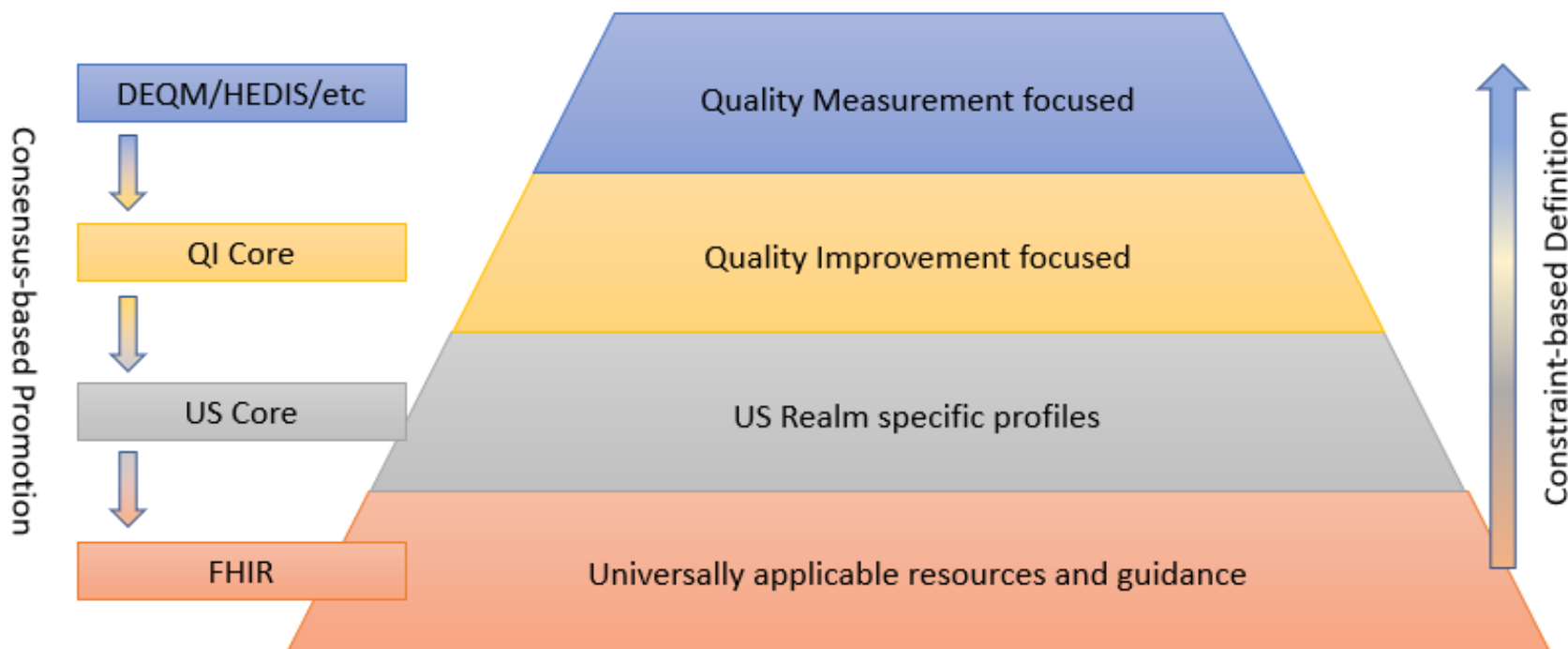
Resources vs. Profiles

- » **Resources** are the basic building block of the FHIR® specification
 - Defines how data are to be structured and exchanged
 - Intended to be generic to fit a wide range of use cases
- » **Profiles** are Resources that have been changed for a specific use case
 - Profiles are published in an implementation guide
 - Conformance ensures both sender and receiver agree on the structure of data
- » Implementation guides for quality measurement
 - QI-Core/QUICK**- The data model for eCQMs
 - FHIR® Quality Measure**- Structure of an eCQM
 - Data Exchange for Quality Measures (DEQM)**- How quality data are to be exchanged

What is Profiling?

- » Adapts the FHIR® standard for specific uses
- » Can both restrict and extend APIs, Resources, Terminology
- » Required elements and Must Support
- » Specify a value set
- » Extensions and Statuses

HL7 FHIR® Standards for Quality



HEDIS – National Committee for Quality Assurance’s (NCQA’s) Healthcare Effectiveness Data and Information Set

Using QI-Core

- » September 2019 ballot updates QI-Core to FHIR® R4
 - <http://hl7.org/fhir/us/qicore/2019sep/>
- » Bi-directional mapping of QDM and QI-Core
 - QI-Core to QDM
 - QDM to QI-Core
- » QUICK- A conceptual view of QI-Core for authoring included in the [QI-Core Implementation Guide](#)

FHIR® Clinical Reasoning

- » FHIR® Measure Resource
 - eCQM metadata and structure
 - FHIR® Quality Measure Implementation Guide
 - <http://hl7.org/FHIR/us/cqfmeasures/2019May/index.html>
- » FHIR® Measure Report
 - Supports Individual, List, and Summary
 - DEQM Implementation Guide
 - <http://hl7.org/FHIR/us/davinci-deqm/2019May/STU3/>
- » **Implementation Guides are currently based on FHIR® STU 3**
 - Updates for R4 planned for Feb 2020 ballot cycle

Converting eCQMs to FHIR®

- » CMS began converting QDM-based eCQMs to use FHIR® in spring of 2019
- » Developed a prioritized list based on program needs
 - Initial conversions used FHIR® STU 3
 - In July of 2019, began using FHIR® R4
- » Intent of conversion is to
 - Identify gaps in emerging standards
 - Perform initial testing of FHIR® eCQMs
 - Training for measure developers

Tools to support eCQM Conversion

» Atom Text Editor

- <https://atom.io/>
- Provides a basic editor for authoring measures
- Language-CQL package shows CQL highlighting and FHIR® data model validation

» Measure Repository

- For work-in-progress eCQMs and example expressions

<http://build.FHIR.org/ig/cqframework/draft-measures/examples.html>

Example- ED Encounter

QDM

```
29 define "Initial Population" :↵↵↵
30   » "Inpatient Encounter" Encounter↵↵↵
31   » » with ["Encounter, Performed" : "Emergency Department Visit"] ED↵↵↵
32   » » ...such that ED.relevantPeriod ends 1 hour or less before start of Encounter.relevantPeriod↵↵↵
```

FHIR®

```
26 define "Initial Population" :↵↵↵
27   .."Inpatient Encounter" Encounter↵↵↵
28   ...with ["Encounter" : "Emergency Department Visit"] ED↵↵↵
29   .....such that ED.status = 'finished'↵↵↵
30   .....and ED.period ends 1 hour or less before start of Encounter.period↵↵↵
```


Example- Lab Test Performed

QDM

```
48  define "Pap Test with Results":↵
49  » ["Laboratory Test, Performed": "Pap Test"] PapTest↵
50  » » where PapTest.result is not null↵
51  ↵
52  define "Pap Test Within 3 Years":↵
53  » "Pap Test with Results" PapTest↵
54  » » where PapTest.relevantPeriod 3 years or less before end of "Measurement Period"↵
```

FHIR®

```
58  define "Pap Test with Results":↵
59  » [Observation: "Pap Test"] PapTest↵
60  » » where PapTest.value is not null↵
61  » » » and PapTest.status in { 'final', 'amended', 'corrected', 'preliminary' }↵
62  ↵
63  define "Pap Test Within 3 Years":↵
64  » "Pap Test with Results" PapTest↵
65  » » where PapTest.effective 3 years or less before end of "Measurement Period"↵
```

Example- Procedure Performed

QDM

```
40 define "Flexible Sigmoidoscopy Performed":↵
41   » ["Procedure, Performed": "Flexible Sigmoidoscopy"] FlexibleSigmoidoscopy↵
42   » » where FlexibleSigmoidoscopy.relevantPeriod ends 5 years or less on or before end of "Measurement Period"↵
43   ↵
44 define "CT Colonography Performed":↵
45   » ["Procedure, Performed": "CT Colonography"] Colonography↵
46   » » where Colonography.relevantPeriod ends 5 years or less on or before end of "Measurement Period"↵
```

FHIR®

```
49 define "Flexible Sigmoidoscopy Performed":↵
50   » [Procedure: "Flexible Sigmoidoscopy"] FlexibleSigmoidoscopy↵
51   » » where FlexibleSigmoidoscopy.status = 'completed'↵
52   » » » and FlexibleSigmoidoscopy.performed ends 5 years or less on or before end of "Measurement Period"↵
53   ↵
54 define "CT Colonography Performed":↵
55   » [Procedure: "CT Colonography"] Colonography↵
56   » » where Colonography.status = 'completed'↵
57   » » » and Colonography.performed ends 5 years or less on or before end of "Measurement Period"↵
```

Resources

- » More Examples: <http://build.FHIR.org/ig/cqframework/draft-measures/examples.html>

- » FHIR® R4 Standards and Implementation Guides
 - <http://hl7.org/fhir/> (Current Version)
 - <http://build.fhir.org/> (Current build- will change)
 - <http://hl7.org/fhir/us/core/> (US Core R4 version)
 - Data Exchange for Quality Measures (Feb 2020)
 - Quality Measures Implementation Guide (Feb 2020)

- » FHIR STU 3 Standards and Implementation Guides
 - <http://hl7.org/fhir/STU3/>
 - <http://hl7.org/fhir/us/davinci-deqm/2019May/STU3/>
 - <http://hl7.org/fhir/us/cqfmeasures/2019May/>

More Resources

- » CQL-to-Expression Logical Model (ELM) Translator
 - https://github.com/cqframework/clinical_quality_language/blob/master/Src/java/cql-to-elm/OVERVIEW.md
- » Java Script (JS) CQL Execution Engine
 - <https://github.com/cqframework/cql-execution>
- » Java CQL Execution
 - https://github.com/dbcgc/cql_engine
- » Clinical Quality Framework (CQF) Ruler
 - <https://github.com/DBCG/cqf-ruler>

Thank You!

- » Implementers should continue to use specifications and resources posted to: <https://ecqi.healthit.gov/>
- » Comments or questions can be directed to: fhir-esac@esacinc.com