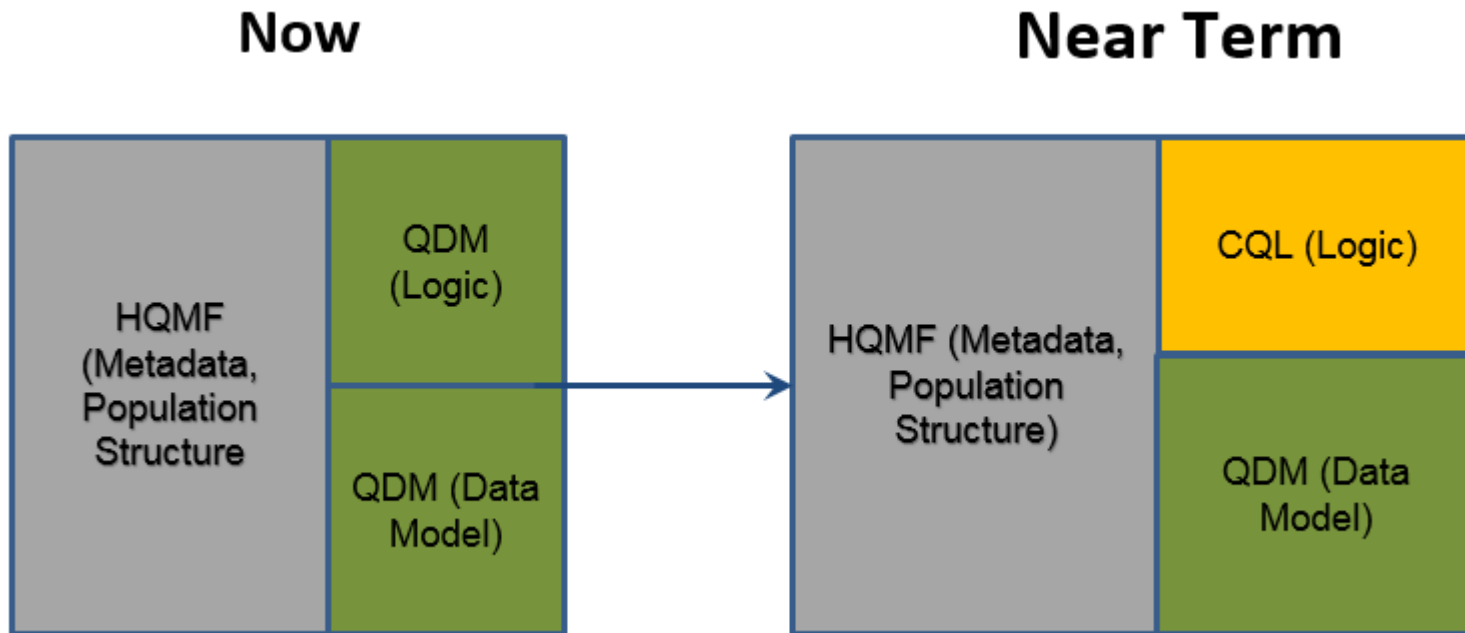# Benefits of Clinical Quality Language (CQL)

Explanation of Benefits of CQL for Measure Developers and Vendors

Acronyms

- CQL - Clinical Quality Language

- HQMF - Health Quality Measure Format

- QDM - Quality Data Model

- FHIR - Fast Healthcare Interoperability Resources

- CDS - Clinical Decision Support

- ELM - Expression Logical Model

- SQL - Structured Query Language

- eCQM – electronic clinical quality measures

Evolving eCQM Standards

Now

Near Term

```
HQMF (Metadata, Population Structure)   QDM (Logic)
                                        QDM (Data Model)
```

→

```
HQMF (Metadata, Population Structure)   CQL (Logic)
                                        QDM (Data Model)
```

Definitions:

HQMF – Health Quality Measure Format

CQL – Clinical Quality Language

QDM – Quality Data Model

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Benefits of CQL

- Improved expressivity
- More precise/unambiguous
- Can share logic between measures
- Can also share logic with decision support
- Can be used with multiple information data models (e.g., QDM, FHIR)
- Simplifies calculation engine implementation

Benefits of CQL over QDM for eCQM development

- QDM logic limits a measure developer's ability to express the type of comparisons needed to truly evaluate outcomes of care
  - QDM can not request patient results that indicate outcomes and compare if there is improvement over time
    - e.g., Request the change (delta) in depression scale (PHQ-9) results over time for a single patient, or for each patient in a cohort
- CQL's mathematical expression logic allows this type of comparison over time

Benefits of CQL over QDM for eCQM development

- QDM logic is unable to express a mathematical expression to derive a desired result
  - QDM can not provide mathematical calculations based on discrete findings
    - e.g., LDL = Total cholesterol minus HDL + (Triglycerides/5))
  - Therefore the respective measure in QDM had to limit results to accept only specific LDL results
- CQL's mathematical expression logic allows the derivation of desired results

Benefits of CQL over QDM for eCQM development

- QDM logic is unable to easily identify components of an assessment, examination, or test procedure. For example:

Example 1	Delivery Room Assessment form – request (a) intent to exclusively breast feed the infant, (b) the infant's gestational age at birth
Example 2	Identify a single ophthalmological exam containing measurements such as (a) cup to disc ratio, and (b) hemorrhages
Example 3	Assure the systolic and diastolic blood pressure results are from the same blood pressure reading

- CQL easily allows the selection of components.

Benefits of CQL over QDM for eCQM development

- Cumulative Medication Duration – a derived element cannot be expressed with QDM logic

  - *Dispensing*: Calculated from the number of doses dispensed divided by the number of doses per day – and then add all dispensing events to come up with the total number of days covered by multiple dispensing events over a defined time period

  - *Administering*: Calculated from the number of administration events from the beginning of the first to the end of the last over the defined period of time

- CQL can express the calculation in a computable format

Benefits of CQL over QDM for eCQM development

- QDM logic required implicit logic definition to indicate that a day represents a 24-hour period at the specificity of the last hour.
- CQL allows:
  - The measure developer to specify the exact time relationship needed (e.g., at the specificity of seconds or minutes where indicated, and hour, if so indicated elsewhere)
  - Clearer definition of data element start and stop times that were often vague or ambiguous in QDM logic

Benefits of CQL over QDM for eCQM development

- QDM logic only works with the QDM data model
- CQL allows for model flexibility
  - Will continue to work with the QDM data model
    - Allows existing measure development with QDM
  - Can also work with other data models like FHIR
    - Provides extensibility for emerging standards
  - Also works for Clinical Decision Support (CDS)

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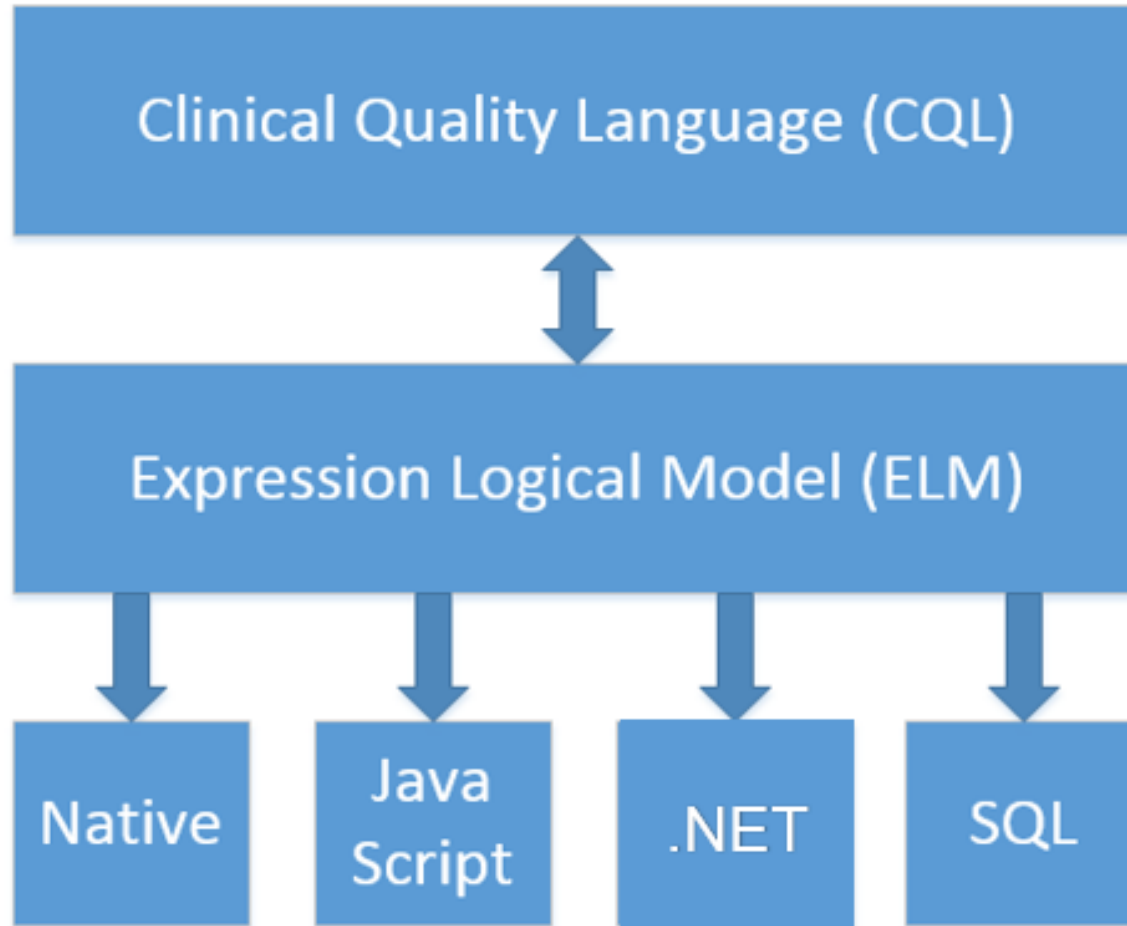
Authors use CQL to produce libraries containing human-readable yet precise logic.

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

Quality measure calculation systems will either directly evaluate the ELM or translate it into other formats such as JavaScript, .NET or SQL

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Benefits of the CQL to ELM translation

- The ELM file carries sufficient semantics to enable execution independent of the CQL that produced it

- A "canonical" representation in terms of more primitive operations: focused on supporting implementation use cases such as evaluation and translation

- Makes the implementation of an evaluation engine easier

  - Allows for a generic evaluation engine that does not need to be updated with new measures

Benefits of ELM

- ELM is the machine-readable representation of CQL designed for sharing and implementation applications

- CQL-to-ELM translation tooling is provided, so implementations do not need to do parsing, syntactic, or semantic validation

- Simplifies implementation of an evaluation engine

Benefits of the CQL to ELM translation : Simple Retrieve

- Pharyngitis Diagnoses - CQL

```
["Diagnosis": "Acute Pharyngitis"]
```

- ELM Retrieve

```
<operand xsi:type="Retrieve"
    dataType="qdm:Diagnosis"
    templateId="Diagnosis"
    codeProperty="code">
  <codes name="Acute Pharyngitis" xsi:type="ValueSetRef"/>
</operand>
```

- Provides the semantics necessary to easily retrieve the correct data from the EHR

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