

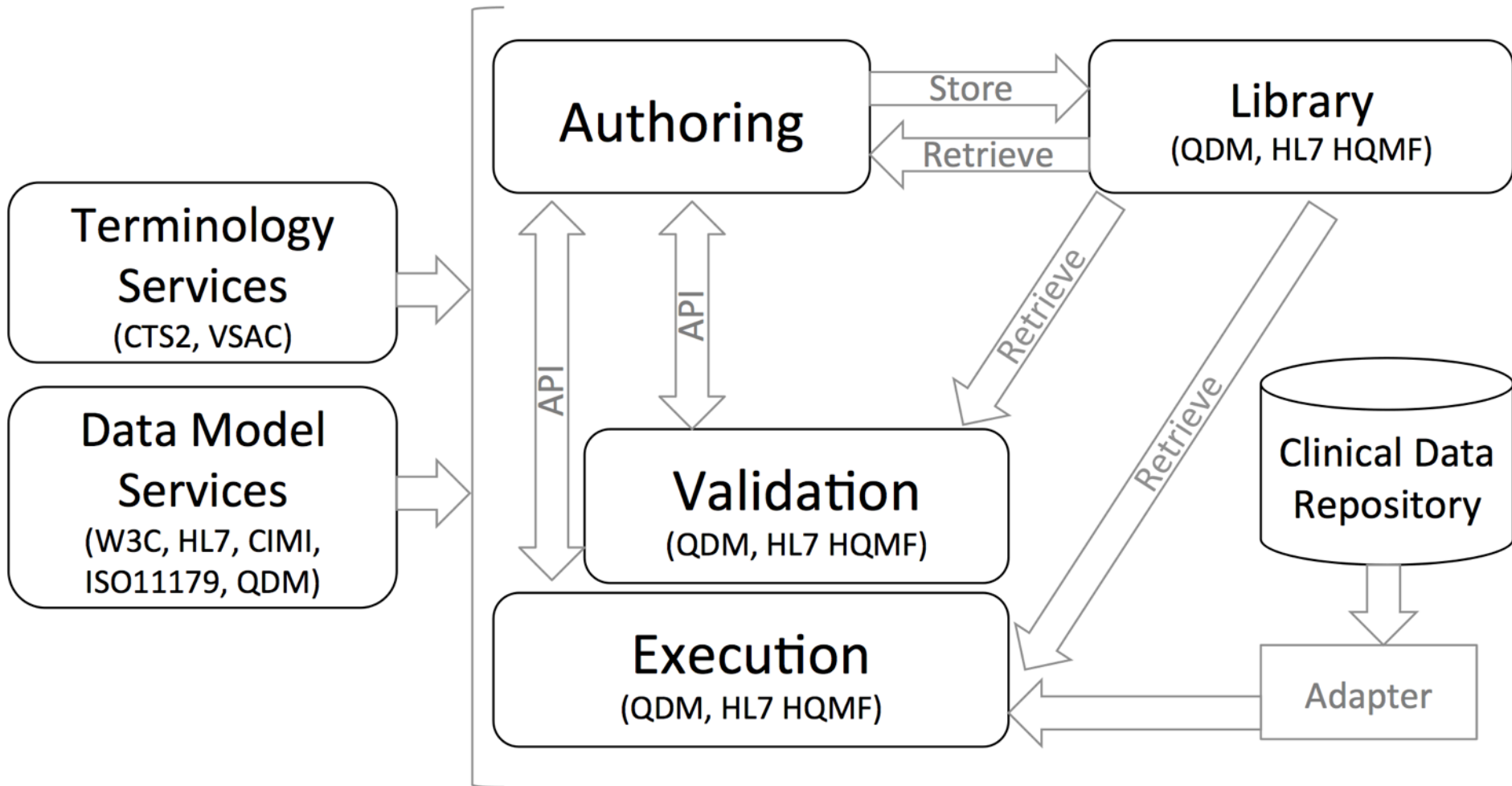
PhEMA

Phenotype Execution and Modeling Architecture (PhEMA)

<http://projectphema.org>

May 15, 2015

PhEMA



PhEMA

- Library – storage, discovery, reuse
- Authoring – UI; standards in & out
- Clinical Data Repository – standard interface, flexible schema
- Execution – run definition against CDR
- Validation – verify against simulated patients
- Data Model Services – data & logic representation
- Terminology Services – vocabularies & value sets

Components in i2b2

	i2b2 Cell / Component	PhEMA Implementation
Library	CRC / Workplace	PhEMA Library PheKB*
Authoring	Webclient Workbench	Authoring Tool
Clinical Data Repository	CRC	I2b2* Local Data Warehouses*
Execution	CRC	KNIME I2b2*
Validation		Bonnie
Data Model Services	Ontology	Data Element Repository
Terminology Services	Ontology	CTS2 instances

* Proposed implementation, not yet completed

Proposal #1 – QDM Cell

- How do we convert QDM-based logic to an i2b2 execution?
- Proposed solution:
 - Develop a cell that converts QDM-based logic (from Library cell) to a set of i2b2 queries
 - Interact with CRC to execute individual definitions
 - Utilize a multi-step process, managed by the cell, for each micro-execution
 - Manage translation of QDM types into i2b2 structures (mapping/configuration step)

Common Data Model (QDM, FHIR and CDM)

Phenotype
Algorithm
Library

Phenotype Authoring Tool

Guoqian test

QDM Data Elements

- Care Experience
- Care Goal
- Communication
- Condition/Diagnosis/Problem
- Diagnosis, Active
- Diagnosis, Family History
- Diagnosis, Inactive
- Diagnosis, Resolved
- Device
- Drug
- Event
- Family History
- Intervention
- Laboratory Test
- Medication
- Physical Exam

Value Sets

Terminologies / Codes

Logical Operators

Temporal Operators

Existing Phenotypes

Fetch Data Elements

To meet criteria using this diagnosis, the diagnosis indicated by the Condition/Diagnosis/Problem QDM category and its corresponding value set should reflect occurrence of an active diagnosis. Keep in mind that when this category is used with string relationships, the criteria is looking for an active diagnosis for the time frame indicated by the string relationship.

Diagnosis, Active

Encounter, Performance

Start Before Start Of

Phenotype Authoring

Web Client

Project: I2b2 Demo User: I2b2 User Find Patients | Analysis Tools | Message Log | Help | Change Password | Logout

Analysis Tool

Query Name:

Temporal Constraint: Treat all groups independently

Group 1	Group 2	Group 3
Occurs = Or	Occurs = Or	Occurs = Or
Exclude	Exclude	Exclude

drop a term on here

Run Query Clear Print Query 0 Groups New Groups

Query Status

- CDM Metadata
- CDM Diagnosis
- Demographics
- Datatype
- Family History
- Inactive
- Resolved
- Severities
- Start Datetime
- Stop Datetime
- Diagnoses
- Diagnoses (ICD 10)
- Expression Profile Data
- Laboratory Tests
- Medications
- Procedures
- Reports
- Visit Details

Phenotype Execution

QDM and FHIR
Enhancement

PhEMA Data Element Repository
(QDM, FHIR)

I2b2
Data Repository

Navigate Terms

Find Terms



Navigate Terms

Find Terms

- Hypertensive disease
 - Ischemic heart disease
 - Admit Diagnosis
 - Principal Diagnosis
 - qdmDatatype
 - qdmSeverity
 - Secondary Diagnosis
 - Acute myocardial infarction**
 - Admit Diagnosis
 - Principal Diagnosis
 - qdmDatatype
 - Active
 - Family History
 - Inactive
 - Resolved
 - qdmSeverity
 - Mild
 - Moderate
 - Severe
 - Secondary Diagnosis
 - Acute myocardial infarction, of
 - Acute myocardial infarction, of
 - Acute myocardial infarction, of
 - Acute myocardial infarction, of
 - Acute myocardial infarction, of
 - Acute myocardial infarction, of
 - Acute myocardial infarction, of
 - Acute myocardial infarction, of
 - Acute myocardial infarction, su
 - Acute myocardial infarction, tru
 - Acute myocardial infarction, un
 - Angina pectoris
 - Old myocardial infarction
 - Other acute and subacute forms of ischemic heart disease
 - Other forms of chronic ischemic heart disease
 - Other forms of heart disease
 - Venous and lymphatic disease
 - Conditions in the perinatal period

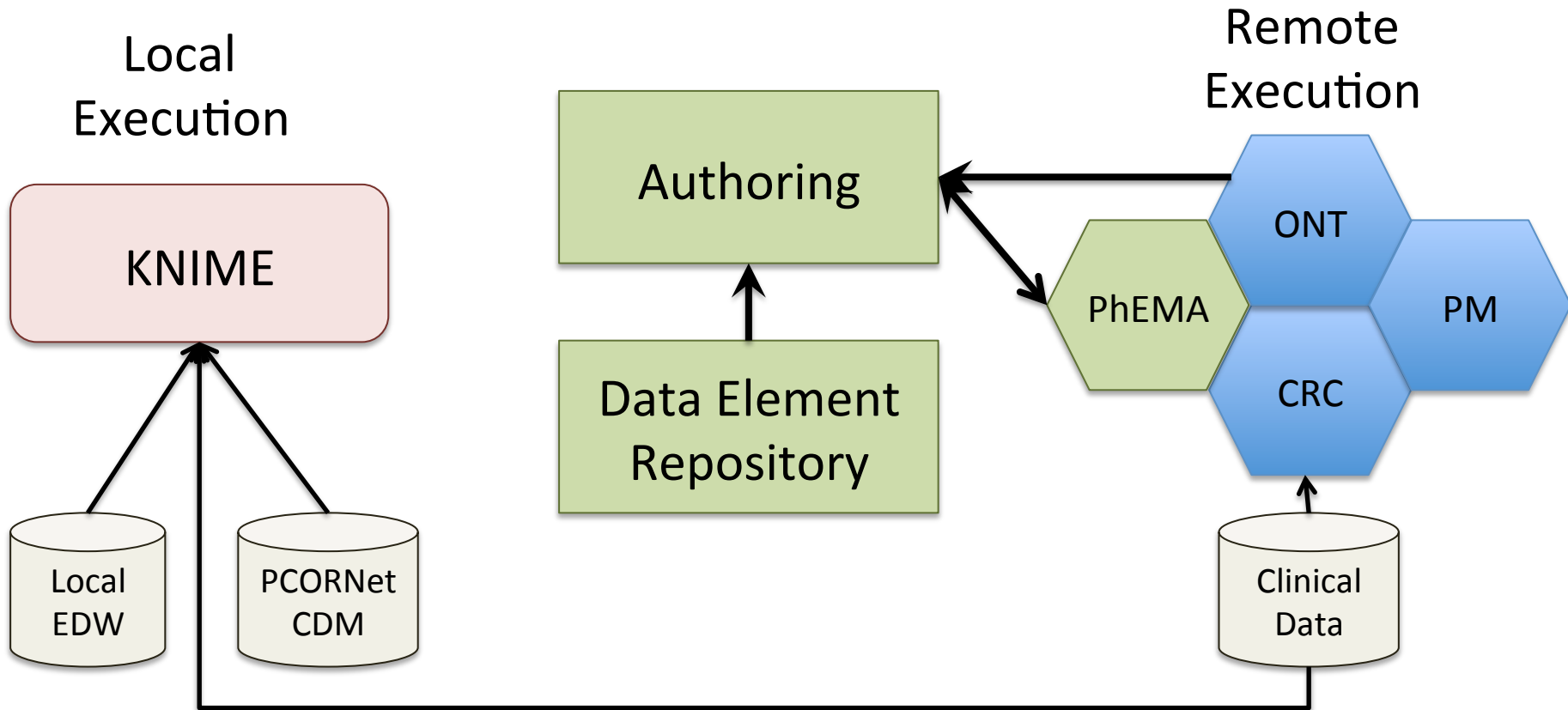
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i2b2 PhEMA Ontology

- qdmDatatype
- qdmSeverity
- Secondary Diagnosis
- Acute myocardial infarction**
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Proposal #2 – Authoring Tool

- <http://projectphema.org:8081>
- Can the PhEMA Authoring Tool be extended for use in i2b2?
- Proposed solution:
 - DER wrapper around Ontology cell for structure
 - May need to dynamically respond to metadata blobs
 - DER wrapper for allowed operations
 - CTS2 wrapper around Ontology cell for terms
 - Creation of i2b2 query format

Proposal #3 – PheKB Integration

- How do we connect i2b2 instances to validated, curated instances of definitions?
- Proposed solution:
 - Develop a Library cell that connects to an external repository
 - Webclient plug-in to access and load (import?) definitions
 - Requires ability to execute QDM-based logic representations & use value sets

Considerations

- Ability to propose non-breaking changes to i2b2 hive
 - Most work will try to isolate hive cells and work in new cells
- Overlap with other i2b2 initiatives
 - Other groups doing work in these areas?
 - Fit with i2b2 roadmap?