Phenotype Execution and Modeling Architecture (PhEMA)

http://projectphema.org

May 15, 2015
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

<table>
<thead>
<tr>
<th>Library</th>
<th>i2b2 Cell / Component</th>
<th>PhEMA Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authoring</td>
<td>Webclient Workbench</td>
<td>Authoring Tool</td>
</tr>
<tr>
<td>Clinical Data Repository</td>
<td>CRC</td>
<td>I2b2* Local Data Warehouses*</td>
</tr>
<tr>
<td>Execution</td>
<td>CRC</td>
<td>KNIME I2b2*</td>
</tr>
<tr>
<td>Validation</td>
<td></td>
<td>Bonnie</td>
</tr>
<tr>
<td>Data Model Services</td>
<td>Ontology</td>
<td>Data Element Repository</td>
</tr>
<tr>
<td>Terminology Services</td>
<td>Ontology</td>
<td>CTS2 instances</td>
</tr>
</tbody>
</table>

* 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)

PhEMA Data Element Repository
(QDM, FHIR)

I2b2 Data Repository

https://github.com/esacinc/query-health
i2b2 PhEMA Ontology
Local Execution

KNIME

Local EDW
PCORNet CDM

Data Element Repository

Authoring

Clinical Data

Remote Execution

ONT
PhEMA
CRC
PM

Clinical Data
Proposal #2 – Authoring Tool

- [http://projectphema.org:8081](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?