CEM Refset Impl

This document describes, from a high-level, how the CEM Refsets are used to implement a CEM information model. They closely align with the refset tabs listed in the “CEM\_dbp\_refSetMapping.xlsx” spreadsheet. It is available on GitHub in the <https://github.com/Apelon-VA/ISAAC/tree/master/resources> folder.

# CEM Refset Concepts

Before importing a CEM model into an OTF database, several Refset concepts must be created. Once created, the concepts are represented by constants in the CEMMetadataBinding class, in the [ISAAC/import-export](https://github.com/Apelon-VA/ISAAC/tree/master/import-export) project. The following concepts correspond to the tabs in the “CEM\_dbp\_refSetMapping.xlsx” spreadsheet:

* CEM\_TYPE\_REFSET
* CEM\_KEY\_REFSET
* CEM\_DATA\_REFSET
* CEM\_COMPOSITION\_REFSET
* CEM\_CONSTRAINTS\_REFSET
* CEM\_CONSTRAINTS\_PATH\_REFSET
* CEM\_CONSTRAINTS\_VALUE\_REFSET

(The remaining concepts in the CEMMetadataBinding class are used as values of various concept extension Refset members.)

# CEM Model XML

Currently, the CEM model imported into ISAAC is represented by the “DiastolicBloodPressureMeas-ceml.xml” file (available in the [ISAAC/import-export](https://github.com/Apelon-VA/ISAAC/tree/master/import-export) project):

<ceml>

<cetype name="DiastolicBloodPressureMeas">

<key code="DiastolicBloodPressure\_KEY\_ECID"/>

<data type="pq"/>

<qual card="0-1" name="methodDevice" type="MethodDevice"/>

<qual card="0-1" name="bodyLocationPrecoord" type="BodyLocationPrecoord"/>

<qual card="0-1" name="bodyPosition" type="BodyPosition"/>

<qual card="0-1" name="abnormalFlag" type="AbnormalFlag"/>

<qual card="0-1" name="deltaFlag" type="DeltaFlag"/>

<qual card="0-1" name="referenceRangeNar" type="ReferenceRangeNar"/>

<qual card="0-M" name="relativeTemporalContext" type="RelativeTemporalContext"/>

<mod card="0-1" name="subject" type="Subject"/>

<att card="0-1" name="observed" type="Observed"/>

<att card="0-1" name="reportedReceived" type="ReportedReceived"/>

<att card="0-1" name="verified" type="Verified"/>

<constraint path="qual.abnormalFlag.data.cwe.domain" value="AbnormalFlagNumericNom\_DOMAIN\_ECID"/>

<constraint path="qual.deltaFlag.data.cwe.domain" value="DeltaFlagNumericNom\_DOMAIN\_ECID"/>

<constraint path="qual.methodDevice.data.cwe.domain" value="BloodPressureMeasurementDevice\_DOMAIN\_ECID"/>

<constraint path="data.pq.unit.domain" value="PressureUnits\_DOMAIN\_ECID"/>

<constraint path="data.pq.normal" value="MilliMetersOfMercury\_ECID"/>

</cetype>

</ceml>

# Top-Level CEM Implementation

This CEM model is implemented by attaching various Refset members (as annotations) directly to the **Blood pressure taking (procedure)** concept (UUID 215fd598-e21d-3e27-a0a2-8e23b1b36dfc). The structure of these annotations is illustrated below:

**Blood pressure taking (procedure)**

┠ Single CEM\_TYPE\_REFSET member

* String extension value "DiastolicBloodPressureMeas"

┠ Single CEM\_KEY\_REFSET member

* String extension value "DiastolicBloodPressure\_KEY\_ECID"

┠ Single CEM\_DATA\_REFSET member

* Concept extension value CEMMetadataBinding.CEM\_PQ

┠ Multiple CEM\_COMPOSITION\_REFSET members

┗ Multiple CEM\_CONSTRAINT\_REFSET members

# CEM Composition Refset Members

The multiple CEM\_COMPOSITION\_REFSET annotations above correspond to the **qual**, **mod**, and **att** components of the CEM model. They are directly attached to the **Blood pressure taking (procedure)** concept as members of the CEM\_COMPOSITION\_REFSET, with Concept-String extension values.

Constraints on the **qual**, **mod**, and **att** components are attached to the Refset members themselves, as members of the CEM\_CONSTRAINT\_REFSET. The “path” and “value” fields of the constraint are in turn modeled as members of the CEM\_CONSTRAINTS\_PATH\_REFSET and CEM\_CONSTRAINTS\_VALUE\_REFSET, and attached directly to the constraint annotation.

An example can help illustrate. Consider this **qual** component:

<qual card="0-1" name="methodDevice" type="MethodDevice"/>

It would be modeled as follows:

**Blood pressure taking (procedure)**

┗ CEM\_COMPOSITION\_REFSET member

* Concept extension value CEMMetadataBinding.CEM\_QUAL
* String extension value “MethodDevice”

┗ CEM\_CONSTRAINTS\_REFSET member

┠ CEM\_CONSTRAINTS\_PATH\_REFSET member

* + - String extension value “card”

┗ CEM\_CONSTRAINTS\_VALUE\_REFSET member

* + - String extension value “0-1”

# CEM Constraint Refset Members

The multiple CEM\_CONSTRAINT\_REFSET annotations above correspond to the **constraint** component of the CEM model. The structure is very similar to that described previously, with “path” and “value” modeled as members of the CEM\_CONSTRAINTS\_PATH\_REFSET and CEM\_CONSTRAINTS\_VALUE\_REFSET. The only difference is that they are attached directly to the **Blood pressure taking (procedure)** concept.

Again, an example can help illustrate. Consider this **constraint** component:

<constraint path="qual.methodDevice.data.cwe.domain" value="BloodPressureMeasurementDevice\_DOMAIN\_ECID"/>

It would be modeled as follows:

**Blood pressure taking (procedure)**

┗ CEM\_CONSTRAINTS\_REFSET member

┠ CEM\_CONSTRAINTS\_PATH\_REFSET member

* String extension value “qual.methodDevice.data.cwe.domain”

┗ CEM\_CONSTRAINTS\_VALUE\_REFSET member

* String extension value “BloodPressureMeasurementDevice\_DOMAIN\_ECID”