Healthcare Concept Maps combined with a FHIR® accelerator

Dr. John Svibely, MD
Chief Medical Informatics Officer (CMIO), jsvibely@Trisotech.com

Denis Gagne
Chief Executive Officer (CEO), dgagne@Trisotech.com
Abstract

- BPM+ models are based on open standards that can be used to visually depict the structure and behavior of healthcare workflows and decisions.
- If these workflow and decision models are to completely model healthcare clinical guidelines, then they also need to orchestrate logical data structures of medical concepts and data in the electronic health record.

In this session we will:
- introduce two knowledge entity models of the most common medical conditions and observations
- bind them to logical data structures based on FHIR, referred to the FHIR accelerator
- demonstrate them in action.
A modern Healthcare integration toolkit should support all kinds of integrations:
HEALTHCARE INTEROPERABILITY ACCELERATED

Trisotech BPM+ Healthcare Journey

Phase 1: Prove Viability
- Create BPM+ Health Executable Platform Independent Models (PIM)
- Create FHIR® Wrapper to obtain FHIR® enabled BPM+ services
- Generate CDS Hook end points on the fly

Phase 2: Disambiguation
- Create Concept Models for the most commonly used Conditions and Observations
- Semantically disambiguated terms using coding
- Create a FHIR® Accelerator to accelerate FHIR® wrapper creation

Phase 3:
- Generate FHIR® enabled endpoints on the fly from BPM+ Health models using Concept Models and FHIR® Accelerator

** What we are presenting today **
PHASE 1 LESSONS LEARNED

Modeling in the Small vs Modeling in the Large

**The Artist**

When modeling in the Small, a BPM+ Health modeler may have a lot of liberty to creatively craft a few models. These models can be created for a specific organization, for a specific purpose, within a specific environment, using the specific vernacular of the organization and binded to the specific information infrastructure.

**The Engineer**

When modeling in the Large, a BPM+ Health modeler should apply separation of concerns, model with re-use in mind, use standardized concepts and data structures, ensure portability to various potential environments and information infrastructures.
We need to move from an Art Form to an Engineering Discipline

**PHASE 1 LESSONS LEARNED**

- BPM+ Health Models: 1003
- BPM+ Health Services: 667
- Categories: 138
- Labeled Shapes: 8891
- Unique Data Types: 1254
MOVING FROM NARRATIVE TO MODELS

Modeling Best Practices

Narrative

Computational Independent Model (CIM)

Platform Independent Model (PIM)

Platform Specific Model (PSM)
Modeling Best Practices

**SEPARATION OF CONCERNS**

- Narrative
- Computational Independent Model (CIM)
- Platform Independent Model (PIM)
- Platform Specific Model (PSM)

**Text**

**Behavior specification**

**Executable logic**

**Target Integrated**
MOVING FROM NARRATIVE TO BPM+ HEALTH MODELS ON FHIR

Modeling Best Practices

** Text

** Behavior specification

** Executable logic

** Target Integrated

Narrative

Computational Independent Model (CIM)

Platform Independent Model (PIM)

Platform Specific Model (PSM)

DMN

BPMN

CMMN

FHIR® enabled BPMN, CMMN, DMN Services

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MIND THE GAP

Modeling Best Practices

** Text

** Behavior specification

** Executable logic

** Target Integrated

Narrative

Computational Independent Model (CIM)

Platform Independent Model (PIM)

Platform Specific Model (PSM)

** Gaps to be filled

FHIR® enabled BPMN, CMMN, DMN Services

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USE SUBJECT MATTER EXPERTS TO BRIDGE THE GAPS

Modeling Best Practices

** Text
** Behavior specification
** Executable logic
** Target Integrated

1. **Narrative**
2. **Computational Independent Model (CIM)**
3. **Platform Independent Model (PIM)**
4. **Platform Specific Model (PSM)**

**FHIR® enabled BPMN, CMMN, DMN Services**

SME
WHAT NEEDS TO BE DONE

Modeling Best Practices

** Text
** Behavior specification
** Executable logic
** Target Integrated

Narrative

- Computational Independent Model (CIM)

- Platform Independent Model (PIM)

- Platform Specific Model (PSM)

Capture Narrative into Models

Add data types and logical expressions

Add bindings to specific data source (Create FHIR wrapper)

FHIR® enabled BPMN, CMMN, DMN Services

SME
Skills Required for Creating Automatable BPM+ Health Modelers

- Capture Narrative into BPM+ Models
  - Barrier to entry
  - BPM+ Field Guide
  - DMN, BPMN and CMMN Method and Style Training

- Add Data Types and Logical Expressions to BPM+ Models
  - A basic understanding of data structure (Item Definitions)
  - A good understanding of Decision Table and the FEEL expression language

- Add Bindings to Specific Data Source (Create a FHIR® Wrapper)
  - A good understanding of Healthcare coding for disambiguation
  - A good understanding of FHIR® resources
Hypothesis 1

Healthcare Concepts (Conditions and Observations) used in BPM+ Health Models follow the Pareto Principle

The Pareto principle states that for many outcomes, roughly 80% of consequences come from 20% of the causes (the “vital few”).
Based on review of 667 BPM+ Heath Clinical Services:
The 50 most frequently used observations represent 70% of FHIR requests (out of 1400).

https://CDS.Trisotech.com
Example from Observation Concept Model

**Serum BNP in pg per mL**

**Type:** Number

- concentration of brain natriuretic peptide in the serum

```
Serum BNP in pg per mL is a Cardiac Tests
```

**Alternatives**

- brain natriuretic peptide
Concept Models including Disambiguated Logical Structures (Types)
CURB65

- Creatinine kinase levels in mmol/L
- Sputum virus in nasopharyngeal swab
- Site of care
- Number of breaths taken per minute
- Severity of the symptoms
- Hypotension
- Apical heart rate in mm Hg
- Blood pressure in mm Hg
- Age in years

References
Hypothesis 2

It is possible to create a simple Drag and Drop tool from the FHIR® Resources Schemas
DRAG AND DROP FHIR RESOURCES

FHIR® Accelerator
DRAG AND DROP FHIR RESOURCES

FHIR® Accelerator
**CLOSING THE SKILLS GAP**

Modeling Best Practices

**Narrative**
- Capture Narrative into Models

**Computational Independent Model (CIM)**
- Add data types and logical expressions

**Platform Independent Model (PIM)**
- Add bindings to specific data source (Create FHIR® wrapper)

**Platform Specific Model (PSM)**
- FHIR enabled BPMN, CMMN, DMN Services

**SME**
- Concept Models of most Common Terms

**Concept Models including Disambiguated Logical Structures (Types)**

**Platform Specific Binding FHIR Accelerator**

**FHIR®**

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CLOSING THE SKILLS GAP

- Add Data Types and Logical Expressions to BPM+ Models
- Add Bindings to Specific Data Source

Healthcare Concept Maps combined with a FHIR® accelerator
Any questions?

THANKS!