



Presentation for HHS DAWG

FHA Information Modeling (IM) Project and the Federal Health Information Model (FHIM)

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Agenda

- IM Project/ FHIM Context
- Overview of FHIM and Associated Terminology Models/ Value Sets
- Overview of Implementation Modeling Tools
- How the Models/Tools Support the S&I Framework
- Summary

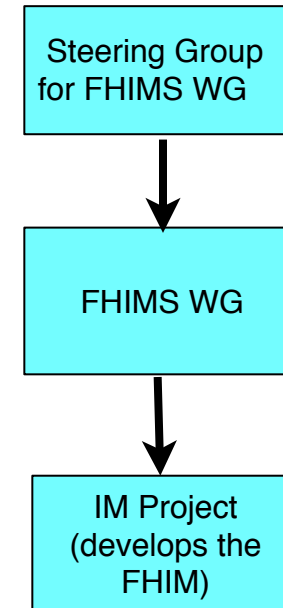


➡ IM Project and FHIM Context

Staffed by LC Members (guides FHIMS WG by setting priorities and developing/approving strategy)

Staffed by FHA Program Manager and potentially other support resources (manages FHIMS WG and supports FHIMS Steering Group and all projects)

Staffed by Federal partner resources (2-3 project leads and at least one contact/participant from each Federal partner)





➔ IM Project and FHIM Steering Group and Modeling Participants

- Steering Group Members:

- DoD [Nancy Orvis]
- SSA [Justine Piereman]
- CDC [Nikolay Lipskiy]
- VHA [Tim Cromwell]
- NCI [George Komatsoulis]
- CMS [Theresa Lissauer]

- Information Modeling Project comprised of volunteers from:

DoD/MHS	CDC
VA / VHA	SSA
HHS	SAMHSA
CMS	IHS
FDA	NCI
NLM	FHA

***All are encouraged to invite
Subject Matter Experts (SMEs)
from their respective organizations
to provide insight and input on
models, standards, and definitions.***



FHIM and Associated Terminology Models

Goal and Principles

- **Goal**

- Produce a logical, health information model that supports semantic interoperability and that is built by harmonizing information from the individual Federal partners and standards organizations

- **Principles**

- The model will be expressed in standard Unified Modeling Language (UML) notation (it may also be expressed in other notations)
- The model will be designed to meet all Federal partner semantic interoperability needs for the exchange of information with other organizations
- The model will support existing national health standards
- The model will be in the public domain, freely available and easy to access
- The model will be specified as a logical model consisting of a set of domain models
- The model will not specify behaviors (operations) and, at least initially, will not specify OCL constraints or rules
- The model will be made available as an XML export



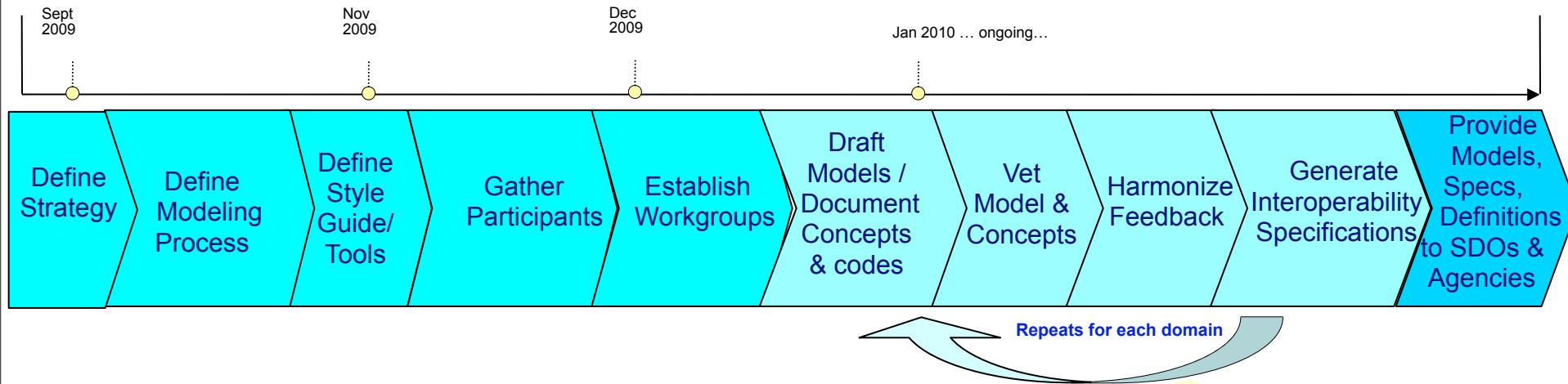


➤ FHIM and Associated Terminology Models Approach

- Initial baseline model created by drawing on existing UML models from VHA, NCI and FDA
- HL7 Reference Information Model (RIM) used as a reference model for the FHIM
- Developed using a standard process and style guide
 - Lead FHIM modeler ensures consistency, integration and harmonization across domain models
 - Health information divided into domains (e.g., Person, Laboratory, Medications/Pharmacy, etc.) - each domain has a modeling team
 - Modeling team consists of lead modeler, SMEs, Federal partner liaisons, others
 - Model each domain starting with existing information from baseline model
 - Incorporate and harmonize information from Federal partners
 - Incorporate and harmonize information from standards organizations
- The FHIM is versioned and stored in a GForge repository as it is developed
- The FHIM is distributed for review/feedback by Federal partners



FHIM and Associated Terminology Models Process



- Create a baseline model from existing VA, NCI and FDA models
- Use the HL7 RIM as a reference model
- Harmonize information across the FHA Federal Partners/Agencies
- Harmonize with information defined by health SDOs and HITSP
- Identify concepts and terminologies in need of harmonization
- Fully document coded data attributes and their value sets
- Vet model, terminologies/value sets and definitions with FHA Federal Partners/Agencies and harmonize final comments
- Use model driven architecture approach to produce interoperability specifications
- Integrate model approach and content into existing SDO development processes
- Interoperability specifications available for FHA Partners/Agencies to leverage



➤ FHIM and Associated Terminology Models Traceability

- FHIM links to terminology models/value sets by storing a unique value set ID
- Terminology models maintain all other terminology information (a terminology model/value set links to the FHIM by storing the ID of the data attribute in the FHIM that it supports)
- FHIM maintains traceability to use cases and the HL7 EHR-S Functional Model
- FHIM incorporates information from Computational Independent Models (CIMs)
- FHIM is a Platform Independent Model (PIM)





➤ FHIM and Associated Terminology Models Priorities

- Modeling priorities for the FHIM are set by a Steering Group of six Federal partners (CMS, DoD, VA, SSA, CDC, and NCI)
- FHIM priorities include full support for information domains specified by Clinical Care Document (CCD) and Meaningful Use
- Eleven Federal partners are participating directly in the Information Modeling (IM) Project (VA, DoD, FDA, CDC, NCI, HHS, CMS, IHS, SSA, SAMHSA and NLM)
- All other Federal partners have the opportunity to participate through model reviews/feedback



➤ FHIM and Associated Terminology Models

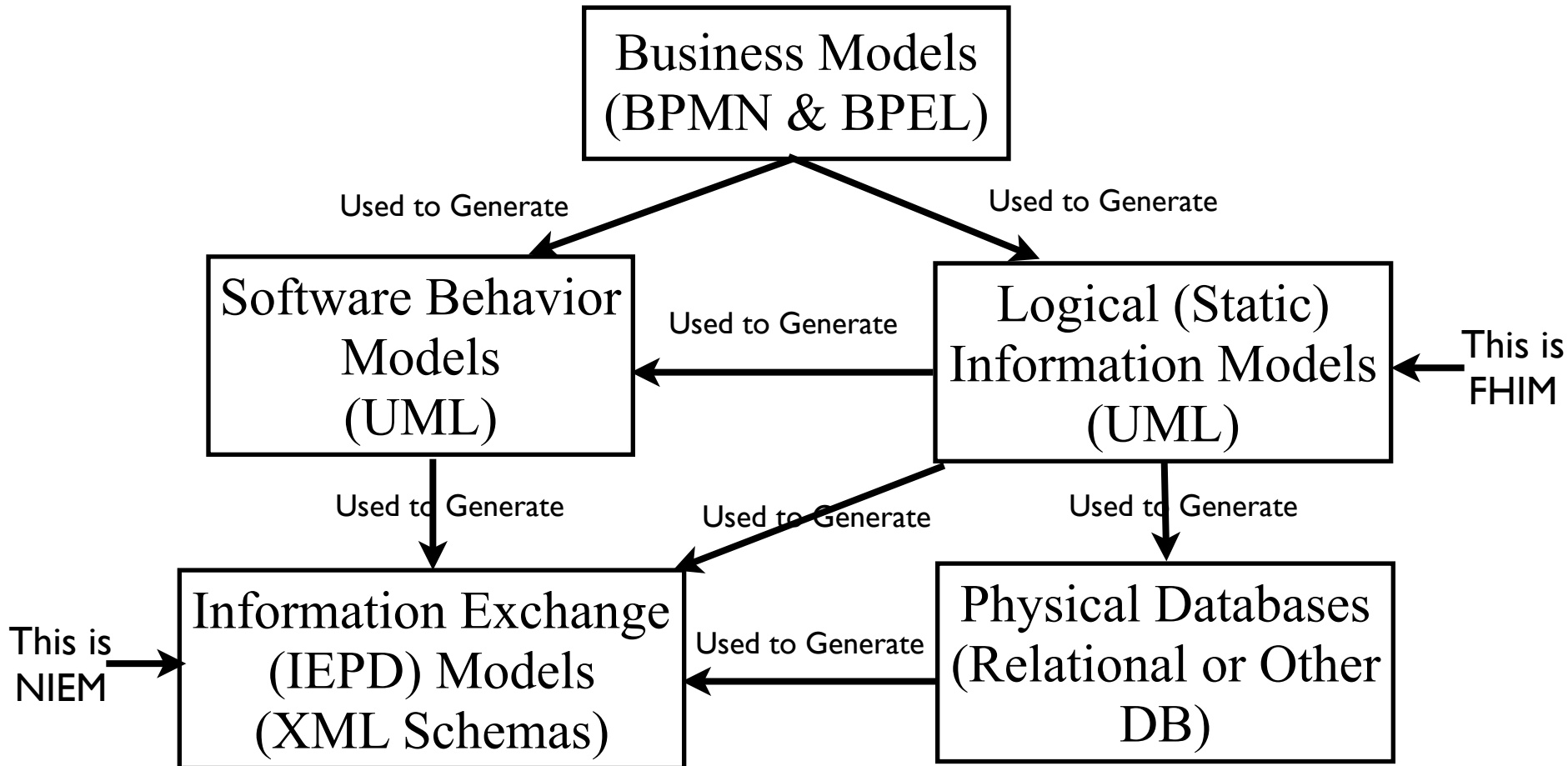
Current Status of Information Domain Modeling

- **Domains Already Modeled**
 - Person
 - Security and Privacy
 - Eligibility, Enrollment, Coordination of Benefits
 - Behavioral Health Assessments
- **Currently Being Modeled**
 - Lab
 - Medications/Pharmacy (including immunizations)
 - Problem
- **Domains Scheduled to Be Modeled**
 - Orders (General)
 - Allergies
 - Vital Signs
 - Encounters



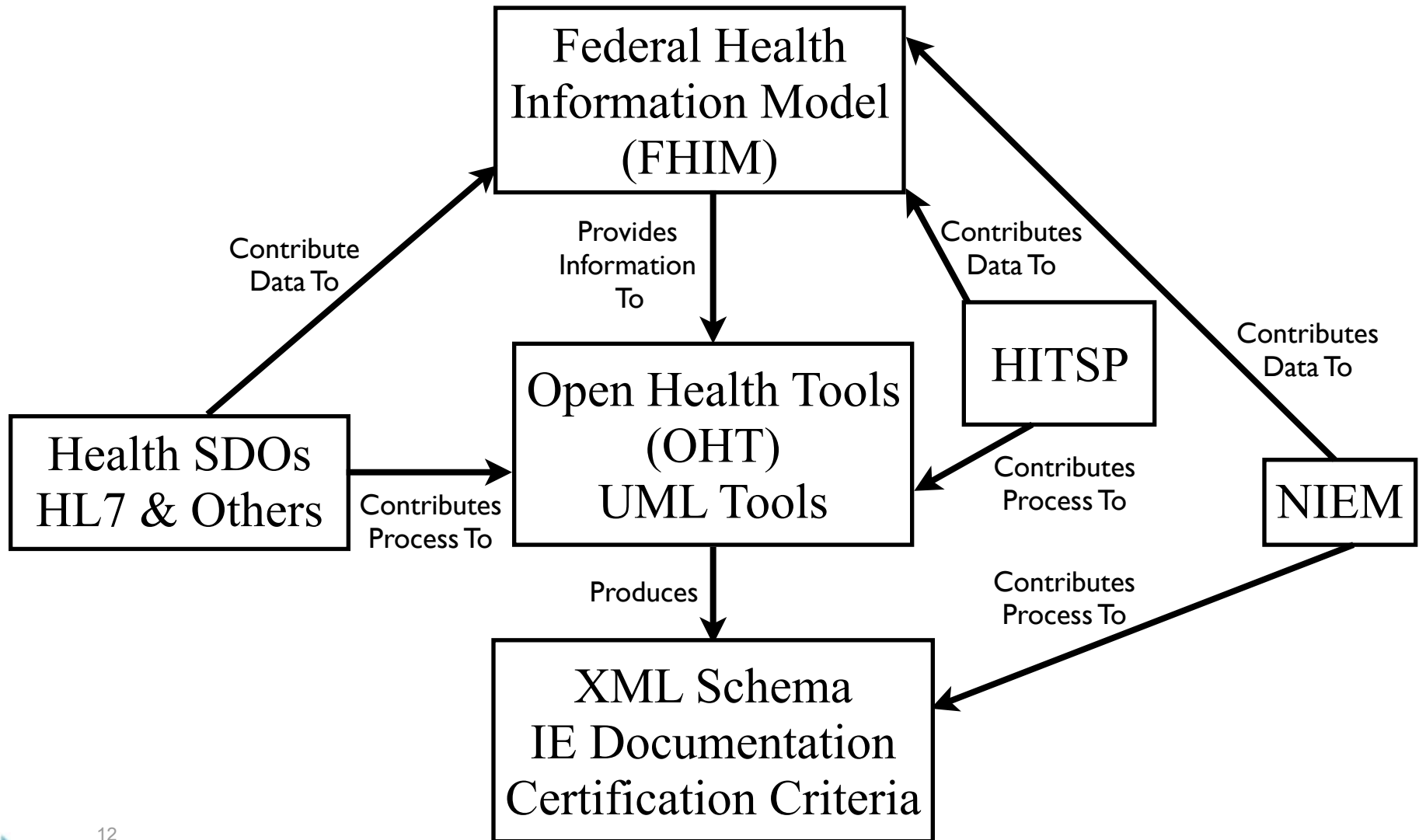


➔ Model Driven Architecture (MDA) View Describing Relationship Between FHIM and NIEM





Model Driven Architecture (MDA) View Integration of FHIM, NIEM, HITSP and Health SDOs





➤ FHIM and Associated Terminology Models Benefits

- The models retain use case context
- The models are integrated
(2-way links between Information ↔ Terminology models)
- The modeling process harmonizes content (information and terminology) across organizations
- The models support efficient standards development
- The models are being integrated with the MDHT to support a model-driven approach to development of information exchange interoperability specifications
- The models can be leveraged by organizations for internal use in systems and database development
- The models are developed using standard UML



Overview of Model-Driven Health Tools

- Open source project within Open Health Tools (OHT)
- Based on Eclipse Platform - template driven and extensible
- First tooling release in Jan 2011 targeting full-lifecycle support for CDA
 - UML design of implementation guides
 - Publishing ballot specs and developer docs
 - Generating validation and Java runtime support
- Prototype started using non-CDA base models (e.g. FHIM, NIEM core, NCPDP) in MDHT tooling and generating XSD implementation, in addition to Java
- Can generate multiple implementation (PSM) models
- Three user roles of MDHT apply to CDA and other base models





Publishing and Validation

- **Publishing Implementation Guides, Normalized Format**
 - The UML models created with template definitions are automatically transformed to DITA XML (OASIS standard), which is then published to PDF and HTML formats.
 - Developer documentation includes the complete aggregate list of all inherited elements and conformance rules. Thus, a developer does not need to "follow the breadcrumbs" of template conformance references. This issue is #1 complaint by developers using HITSP and IHE specifications.
- **Validating XML Instances**
 - Conformance rules modeled in UML are transformed to Object Constraint Language (OCL) expressions that are executed by the Java runtime.
 - Enables rapid iterative development of specification and conformance test suite.



FHIM Model
Driven Prototype
Approach



FHIM Model
(PIM)

1

Harmonized

**NIEM Health
Domain**

Lab Domain
Integration
Use Case

Uses

2

Constrains

Uses

**Lab Domain
Exchange (PIM)**

**Platform
Independent**

MDHT

4

Transform

5

**CDA Exchange
PSM (UML)**

**NIEM Exchange
PSM (UML)**

8

Generate

6

Transform

**CDA
Implementation
Guide
Document**

**CDA Exchange
Implementation
(Java)**

Transform

7

**NIEM Exchange PSM
Implementation
(XSDs)**

Generate

9

**NIEM IEPD
Document**

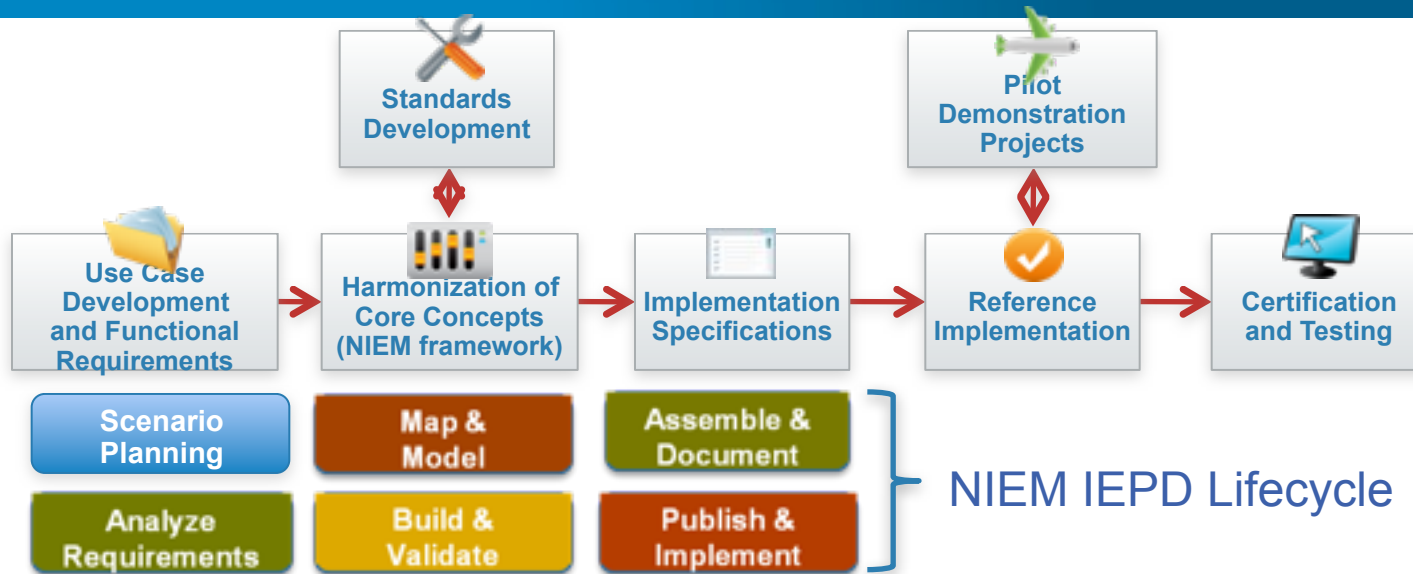
**Platform
Specific**



CDA Models and Reference Implementations

- MDHT team is currently working on UML models and Java implementations of the following CDA-based document types:
 - HL7 Continuity of Care Document (CCD)
 - IHE Patient Care Coordination (PCC) Profiles
 - HITSP C83 and C32 Patient Summary
 - HL7 Public Health Case Report (PHCR)
 - IHE Lab Report Document
 - HITSP C74 Personal Health Monitoring Report
 - HL7 Health Story specifications (CDA Common Data Types)
- Early prototype of NIEM implementation

S&I Framework

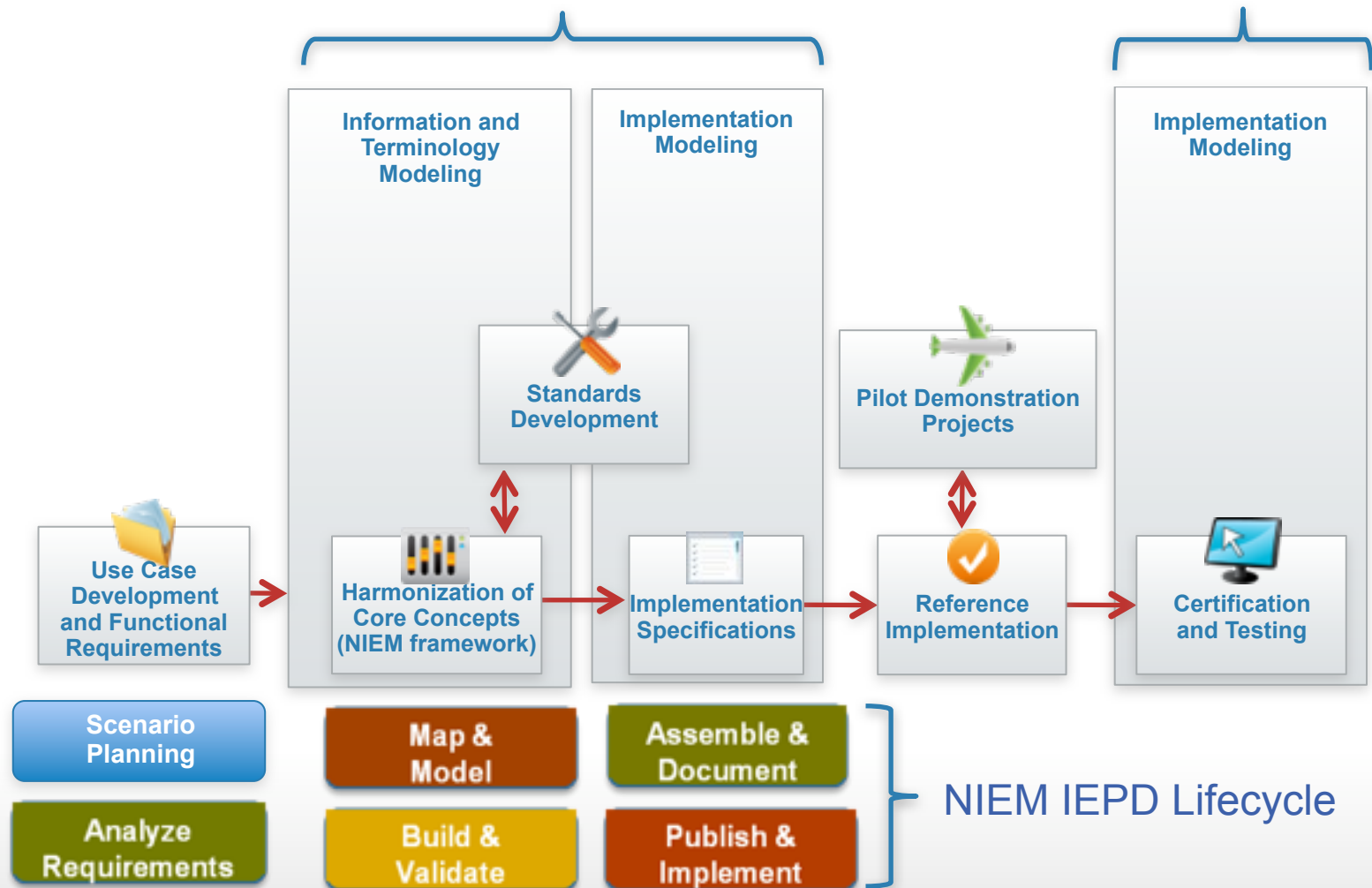


- Create a NIEM Health standards harmonization process and governance framework
- Establish roadmap for existing NHIN standards, MU harmonization, and non-MU health information exchange specifications
- Establishes a repeatable, iterative process for developing widely reusable, computable implementation specifications
- Establishing the tooling and repositories needed
- Establishing the practices and guidelines for modeling
- Enables semantic traceability so that useable code can be traced back to original requirements and definitions
- Promotes transparency and collaboration from broad range of health stakeholders

Mapping of IM Project Models and Tools to S&I Framework



IM Project Models and Tools





➤ How the Models/Tools of the IM Project Support the S&I Framework

- Direct engagement of the Federal partner community
- Support for Federal partner priorities such as VLER and MU
- Direct support of Federal partner use cases
- Adoptable by all organizations - models and tools are freely available
- Traceability to the use cases and functional requirements supported
- Provides semantic and syntactic modeling constructs to support the definition of information
- Harmonizes standards across the Federal partners and standards organizations



➡ How the Models/Tools of the IM Project Support the S&I Framework

- Able to integrate with and support the NIEM process
- Supports the 3 OMG/MDA model abstractions - CIM, PIM, PSM
 - FHIM content derived from CIMs
 - FHIM model is a PIM
 - PSM produced by MDHT
- MDHT tools can produce multiple technology bindings (PSMs) for the same set of logical specifications
- MDHT tools can generate certification/testing artifacts



➤ IM Project Summary

The IM Project:

- Produces freely available, harmonized information and terminology models
- That are integrated with open source model-driven health tools
- That can support multiple implementation platforms (PSMs), including NIEM
- And that can support the goals and requirements of the S&I Framework