THE ONC STANDARDS AND INTEROPERABILITY FRAMEWORK

A Model-Centric Approach to Specifications

Presented by Kevin Puscas
Architect (Contractor - Nitor Group)
Nationwide Health Information Network

Outline

- What is the NHIN *(just to get us all on the same page)*
  - Architecture of the NHIN
  - Current NHIN Specifications
- The ONC S&I Framework *(what is it, why is it, how does it work)*
  - Activities and Processes
  - National Information Exchange Model
- Model-Centric Specifications *(using models to do what???)*
  - *The Approach*
  - *Example*

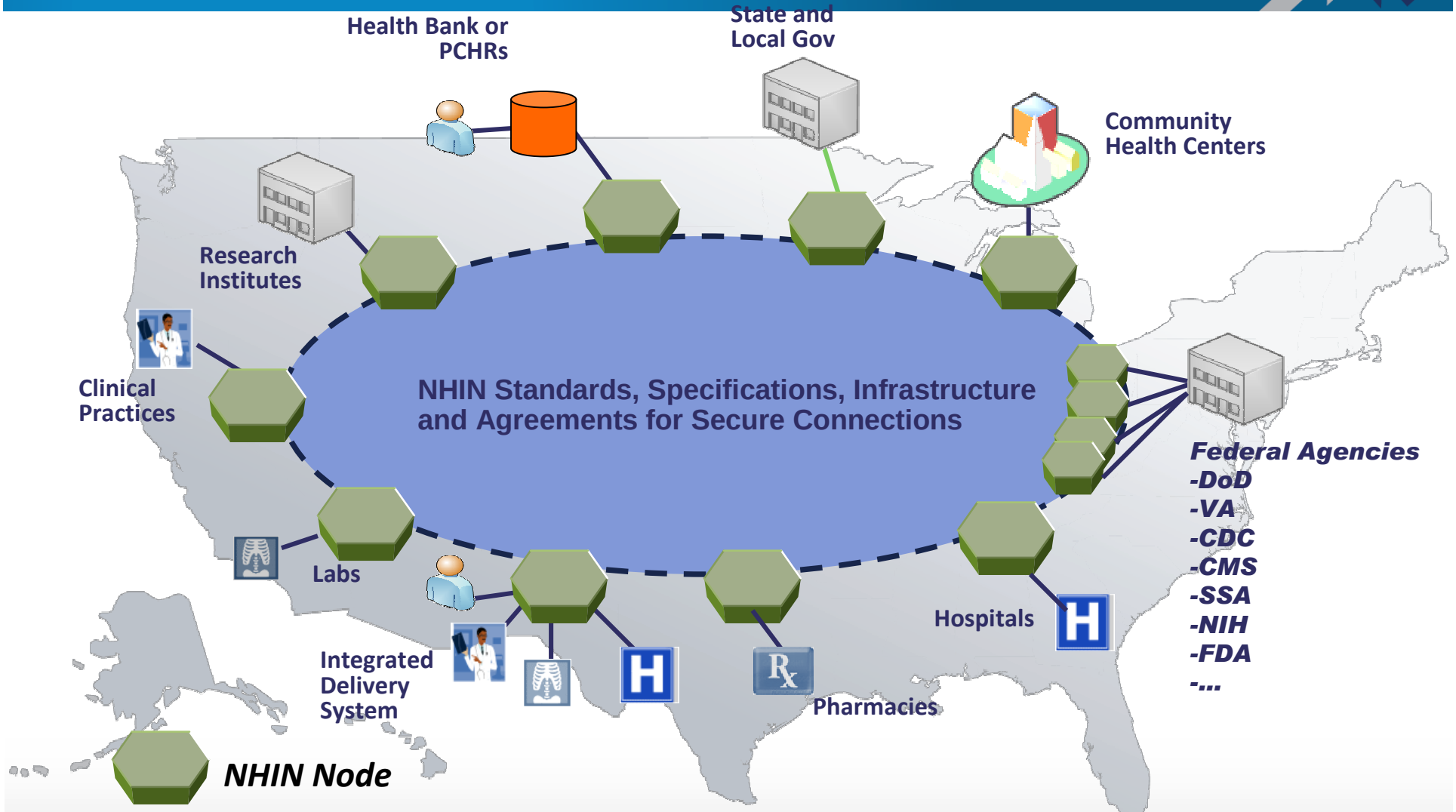
NHIN
Nationwide Health Information Network

What is the NHIN?

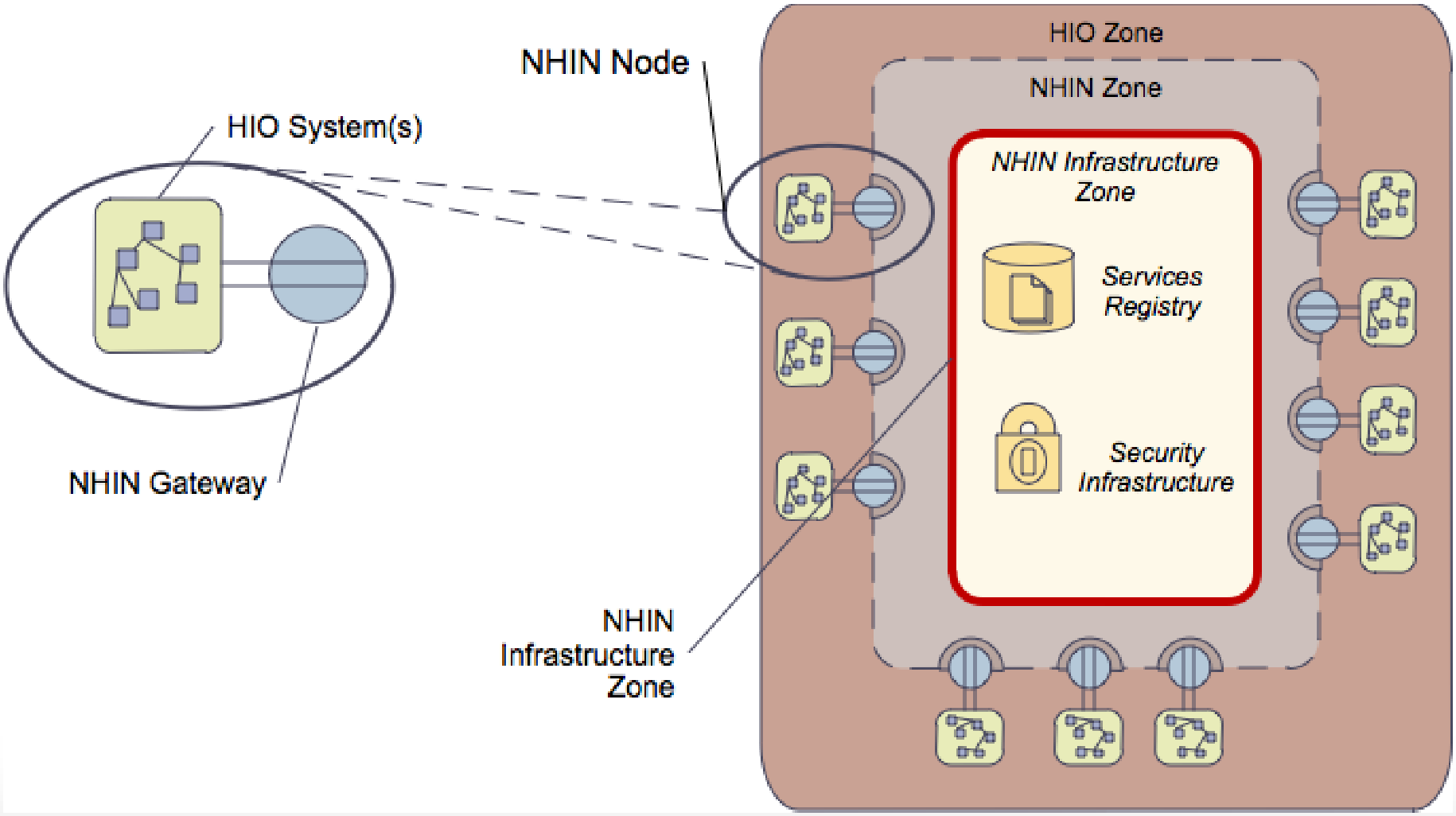
A set of **policies**, **standards** and **services** that enable the Internet to be used for secure and meaningful exchange of health information to improve health and health care.

NHIN Nationwide Health Information Network

NHIN – Federated SOA View



NHIN Exchange – Architecture Components



Current NHIN Specification Development Process

- Prescribes the technical and security requirements necessary to support information exchange among NHIN Nodes
- Specifications are developed through a collaborative, multi-stakeholder process facilitated by the Specifications Factory
- Specifications are a harmonization of existing specifications produced by different SDOs (ex IHE, HITSP, HL7, OASIS, …)
- Efforts are guided by the NHIN governance structure, which includes oversight by the NHIN Technical Committee and input from the NHIN Coordinating Committee
- Provide a multi-layered services stack from infrastructure through to reusable cores services and up to business process orchestrations

NHIN
Nationwide Health Information Network

Current NHIN Specifications

Transaction Profiles

Utilize exchange patterns for specific transactions

- CMS CARE *Doc Submission*
- CDC GIPSE *HIEM*
- MITA *Eligibility Verification*
- CMS PQRI *Doc Submission*

Discovery and Information Exchange Services

Rely on foundations to enable exchange patterns

Discovery		Pull		Push	Pub/Sub
Patient Discovery	Services Registry	Query & Retrieve Docs	Eligibility Verification	Doc Submission	HIEM

Messaging, Security, & Privacy Foundations

Enable private, secure, and interoperable communication of health information

- Messaging Platform
- Authorization Framework

Operational Infrastructure

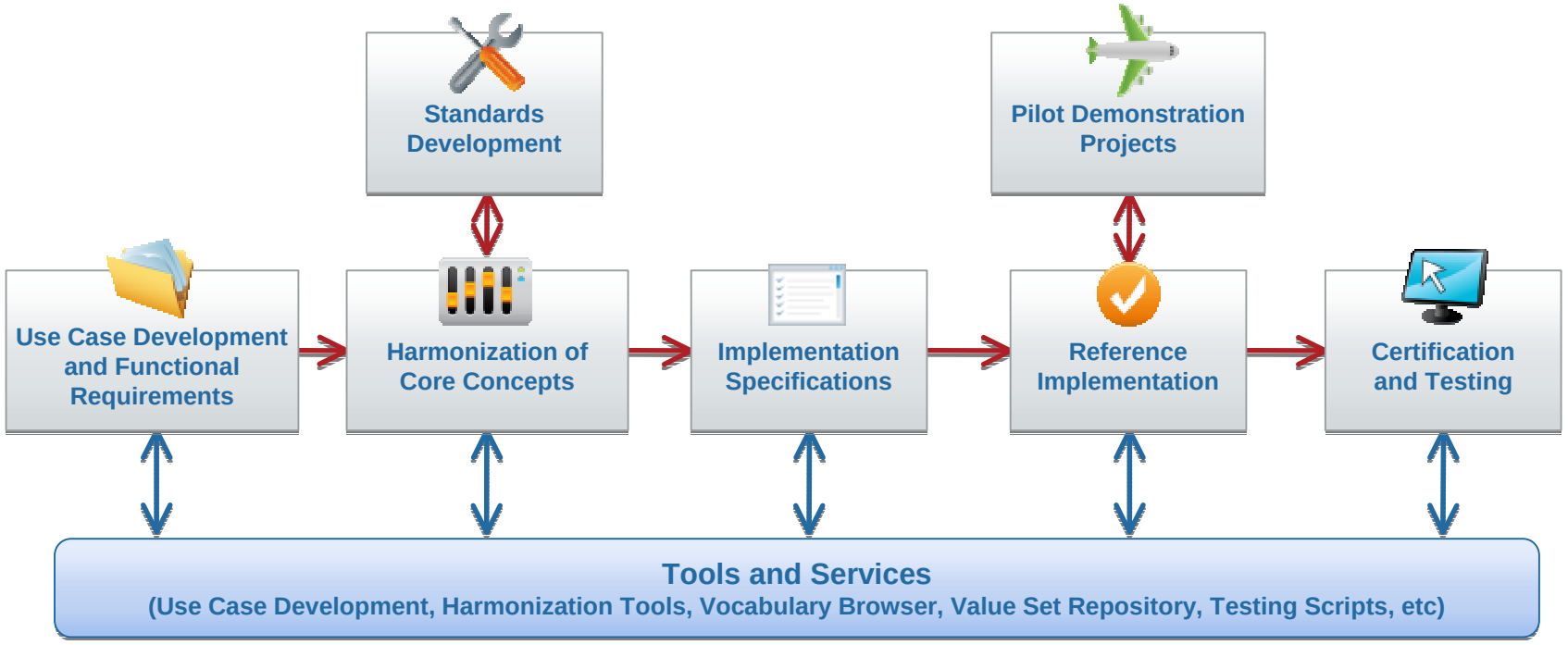
Runtime systems that support the NHIN Exchange

- Security Infrastructure (managed PKI)
- Web Services Registry

---- Designates Pilot Use

NHIN Nationwide Health Information Network

ONC Standards and Interoperability Framework



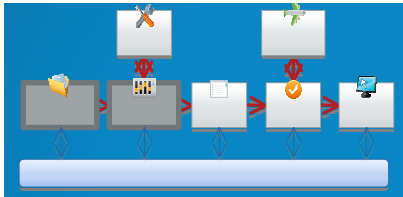
Why do we need an interoperability framework?

“Whitepapers are not Specifications”

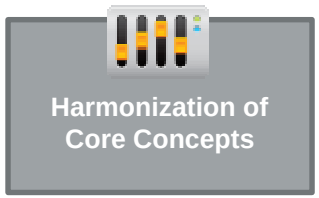
David Linthicum ,OMG SOA Healthcare Conference 2010

Why do we need an interoperability framework?

- Move toward more “computational” implementation specifications (IS)
  - Scalable processes
  - Ability to develop tools to increase the efficiency of IS development and maintenance
  - The importance of developing IS that are explicit and subject to less interpretation
- Link use cases and standards from inception to certification
  - Keep the certification processes tightly linked to the standards and IS processes
  - Support tool development for certification testing
  - Develop the testing for compliance at the same time as developing the standards
- Integrate multiple SDOs with different expertise across the process
  - Transport packages
  - Vocabulary
  - Value sets
  - Security
- Provide repeatable mechanisms for harmonization and integration of existing standards across SDOs



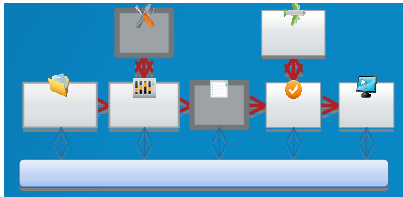
S&I Activities
Use Cases and *Harmonization*



- **Engages a wide community in defining use cases to be driven through the process**
- **Focus on solving a real problem**
  - Determines scope
  - Able to “test” if the use case solves the problem
  - Prevents “analysis paralysis”
  - Does not model in the abstract
  - Open, transparent process
- **Output Business Scenarios should describe**
  - Services
  - Standards
  - Business rules, trust, policies
- **Output can be captured as**
  - Use Cases and Activity Diagrams
  - Collaborations
  - BPMN
  - Etc…

- **Use-case driven (bottom up) with top down coordination**
- **Multiple use cases might have overlapping standards, services or policies**
  - E-prescribing and adverse event reporting
  - Clinical care summary and quality reporting
  - Laboratory data exchange and clinical decision support
- **Need to have a strong harmonization framework that spans different standards organizations**

NHIN Nationwide Health Information Network

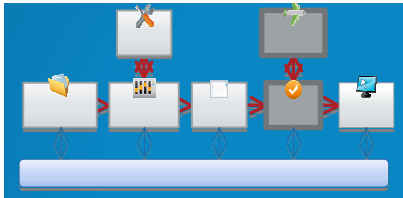


S&I Activities
Standards Development and *Implementation Specs*

- As part of the use case development and harmonization process gaps in standards may arise
- Gaps may exist in
  - Data package
  - Value Sets
  - Services
- Work with SDOs (NLM, HL7, IHE etc) to fill in gaps
- Allows the standards work to proceed in parallel with development of the implementation specifications

- Using a model-centric approach to provide sufficient details to support implementation
- Implementation Specification is an explicit description of the
  - Standards
  - Services
  - Policies
- Specifications are packaged together to support use cases and business scenarios
- Create guidelines for development of reference implementation

NHIN
Nationwide Health Information Network



S&I Activities
Reference Implementation and *Pilots*

Reference Implementation

- Executable implementations of specifications
- Can be used by others to help guide their own implementation or find problems with specifications
- Encourages feedback to ONC

Pilot Demonstration Projects

- Reference implementations in use by stakeholders
- Confirms use case is being supported
- ONC helps provide coordination of pilot demonstrations

NHIN Nationwide Health Information Network

S&I Activities
Certification and Testing and *Tools and Services*

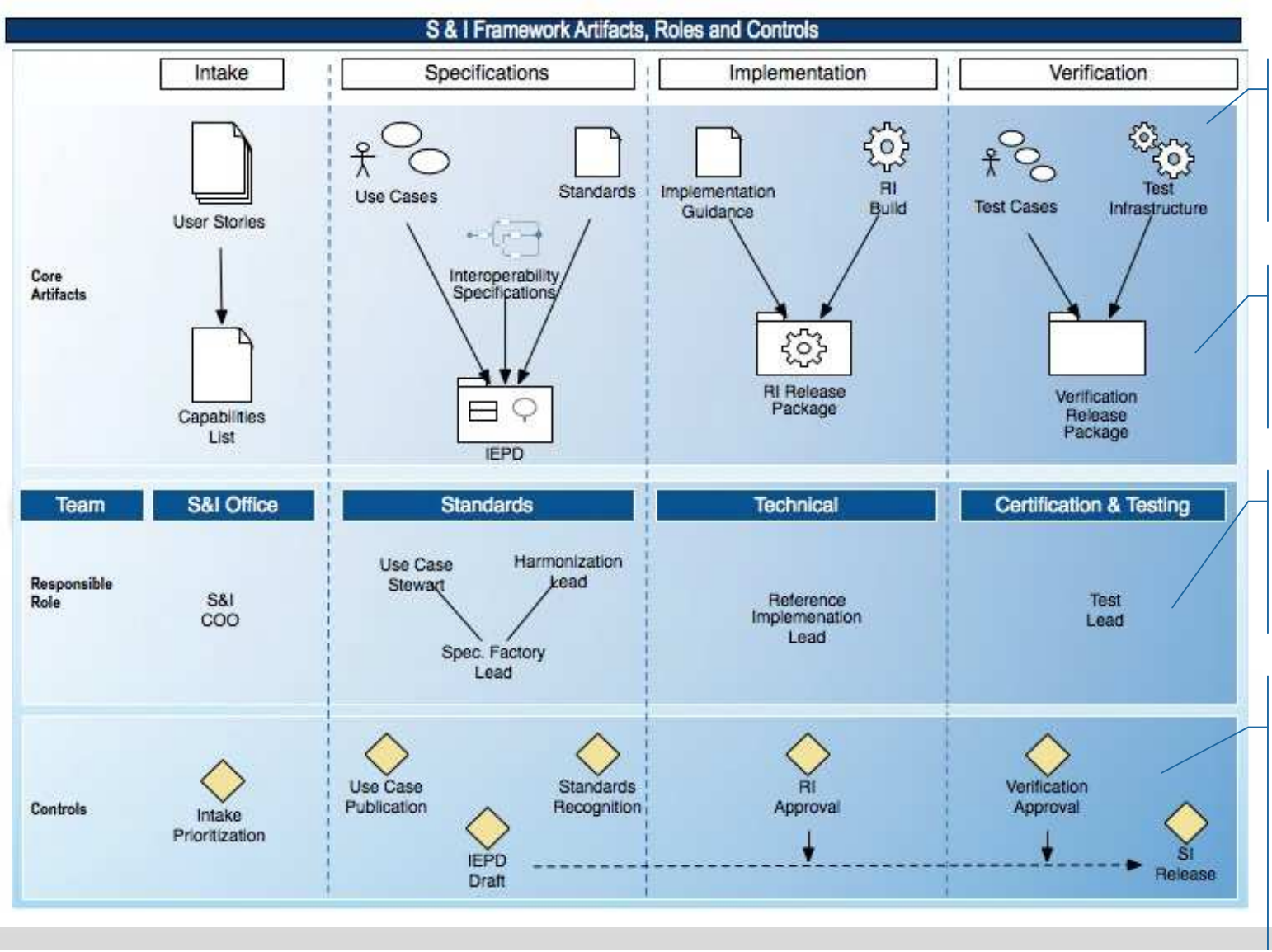
Certification and Testing

- Provides mechanisms and infrastructure for testing specification implementations
- Includes conformance testing for individual specifications as well as interoperability testing for business scenarios
- Tools and Tests can be used as part of ONC Certification

Tools and Services
(Use Case Development, Harmonization Tools, Vocabulary Browser, Value Set Repository, Testing Scripts, etc)

- Tools and Repositories used to support the other S&I activities
- Example
  - IEPD and model repositories
  - Vocabulary sets
  - Modeling tools and guidelines
  - Collaboration tools
- Will leverage existing tools and repositories whenever possible
- Many of the repositories and collaboration tools to be publically available

S&I Governance (Artifacts, Roles and Controls)



Core artifacts are versioned and controlled

Artifacts are "packaged" and released

Each artifacts has a responsible role

Artifacts and releases have prioritization and approval points, or "controls"

National Information Exchange Model Overview

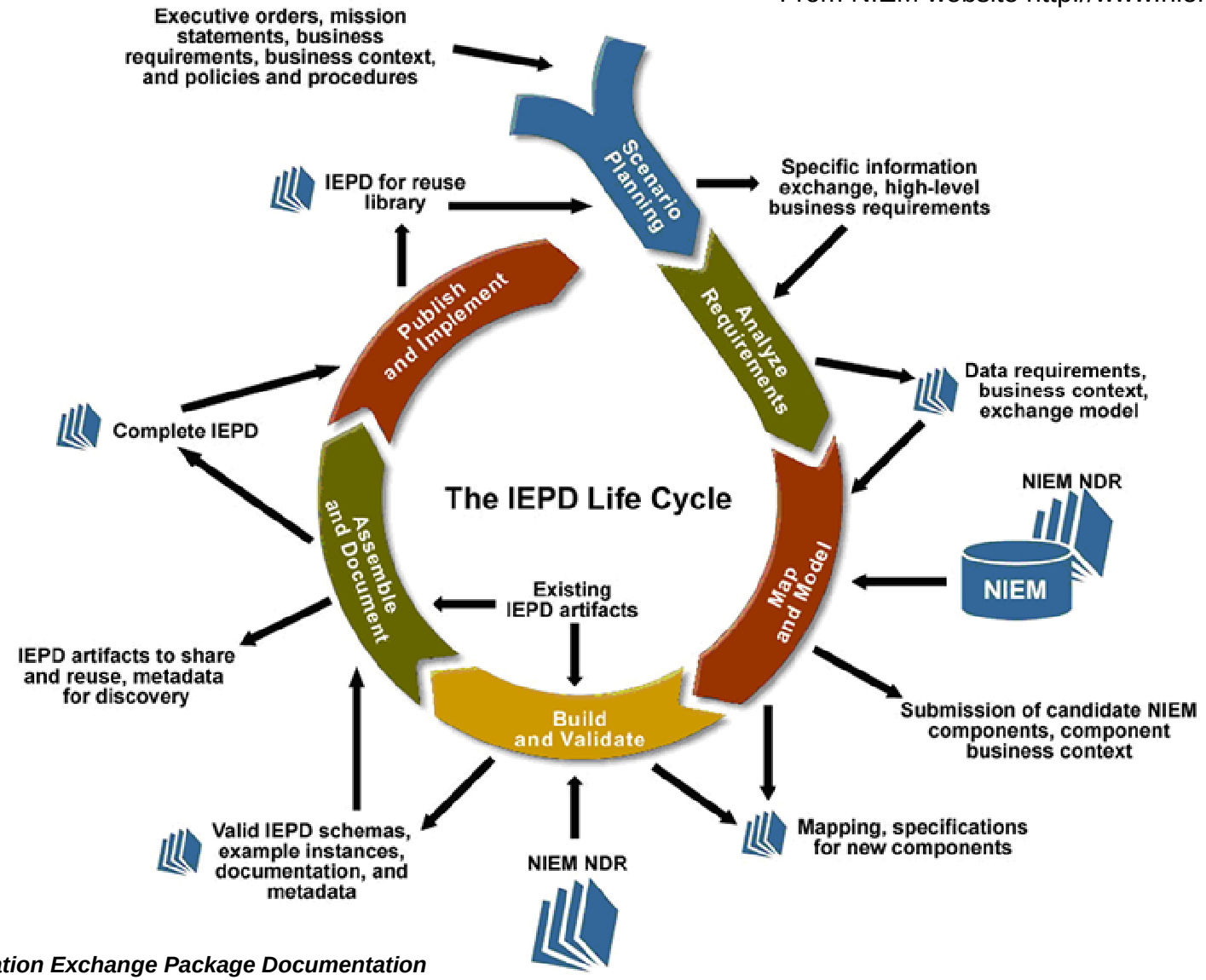
- The National Information Exchange Model (NIEM) is a Federal, State, Local and Tribal interagency initiative providing a foundation for seamless information exchange.
- NIEM is a framework to:
  - Bring stakeholders and Communities of Interest together to identify information sharing requirements in day-to-day operational and emergency situations;
  - Develop standards, a common lexicon and an on-line repository of information exchange package documents to support information sharing;
  - Provide technical tools to support development, discovery, dissemination and re-use of exchange documents
  - Provide training, technical assistance and implementation support services for enterprise-wide information exchange.
- ONC Office of Standards and Interoperability plans build a Health Information Exchange Model (HIEM) that is harmonized with NIEM
- HIEM to leverage NIEM conventions and NIEM components where possible

From NIEM website http://www.niem.gov/index.php

NHIN Nationwide Health Information Network

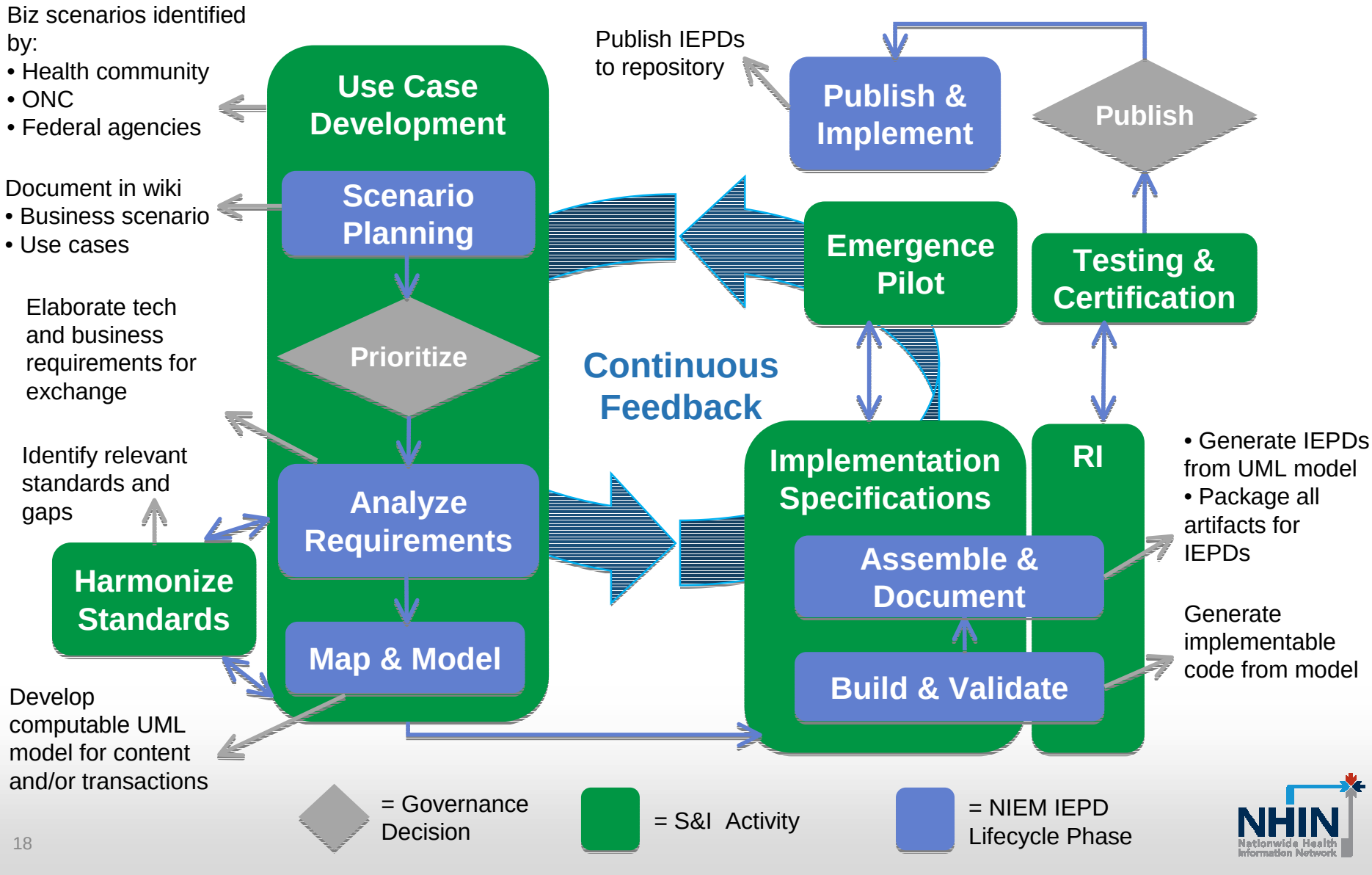
NIEM Process

From NIEM website http://www.niem.gov/index.php

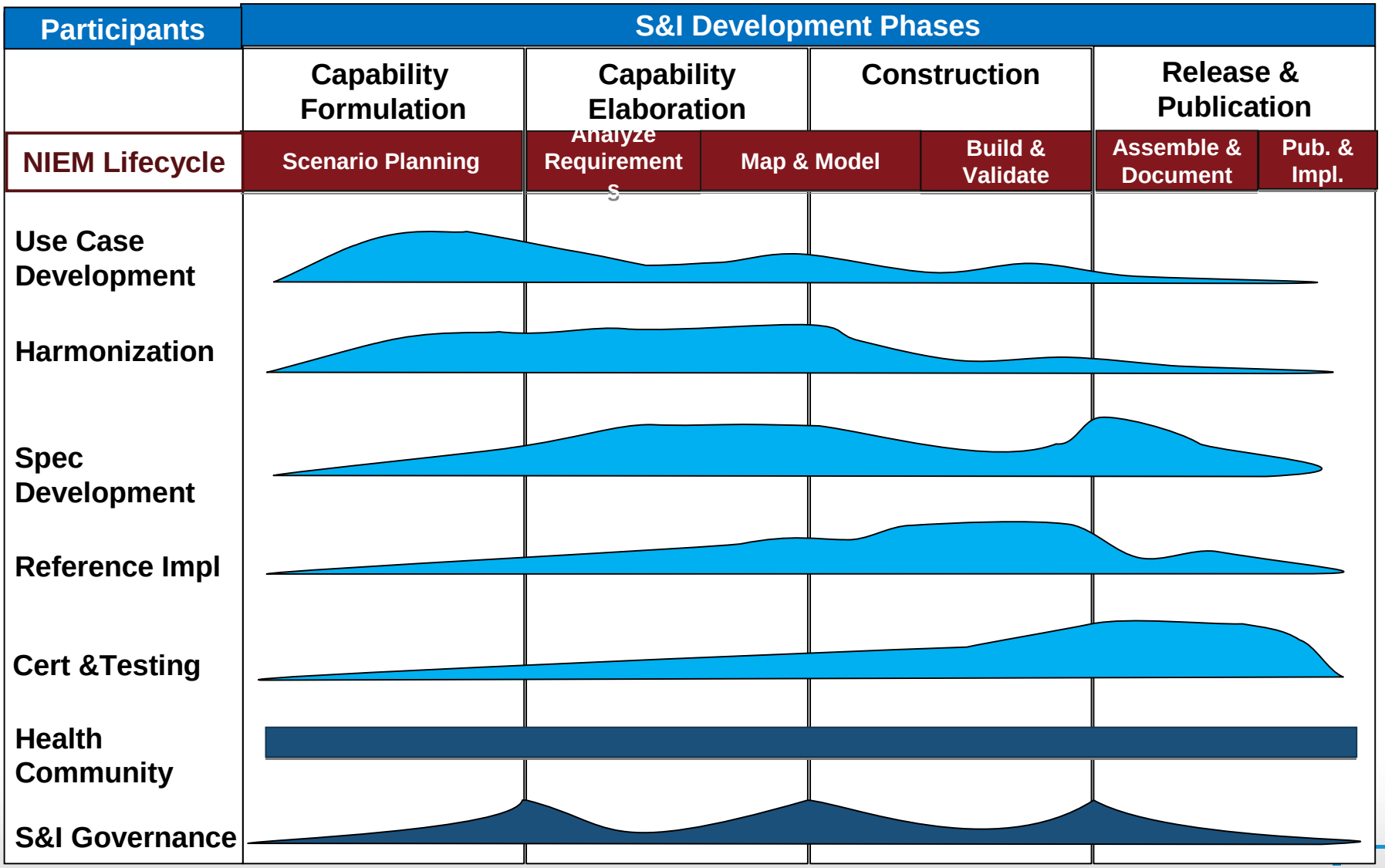


IEPD: Information Exchange Package Documentation

S&I NIEM Process Harmonized

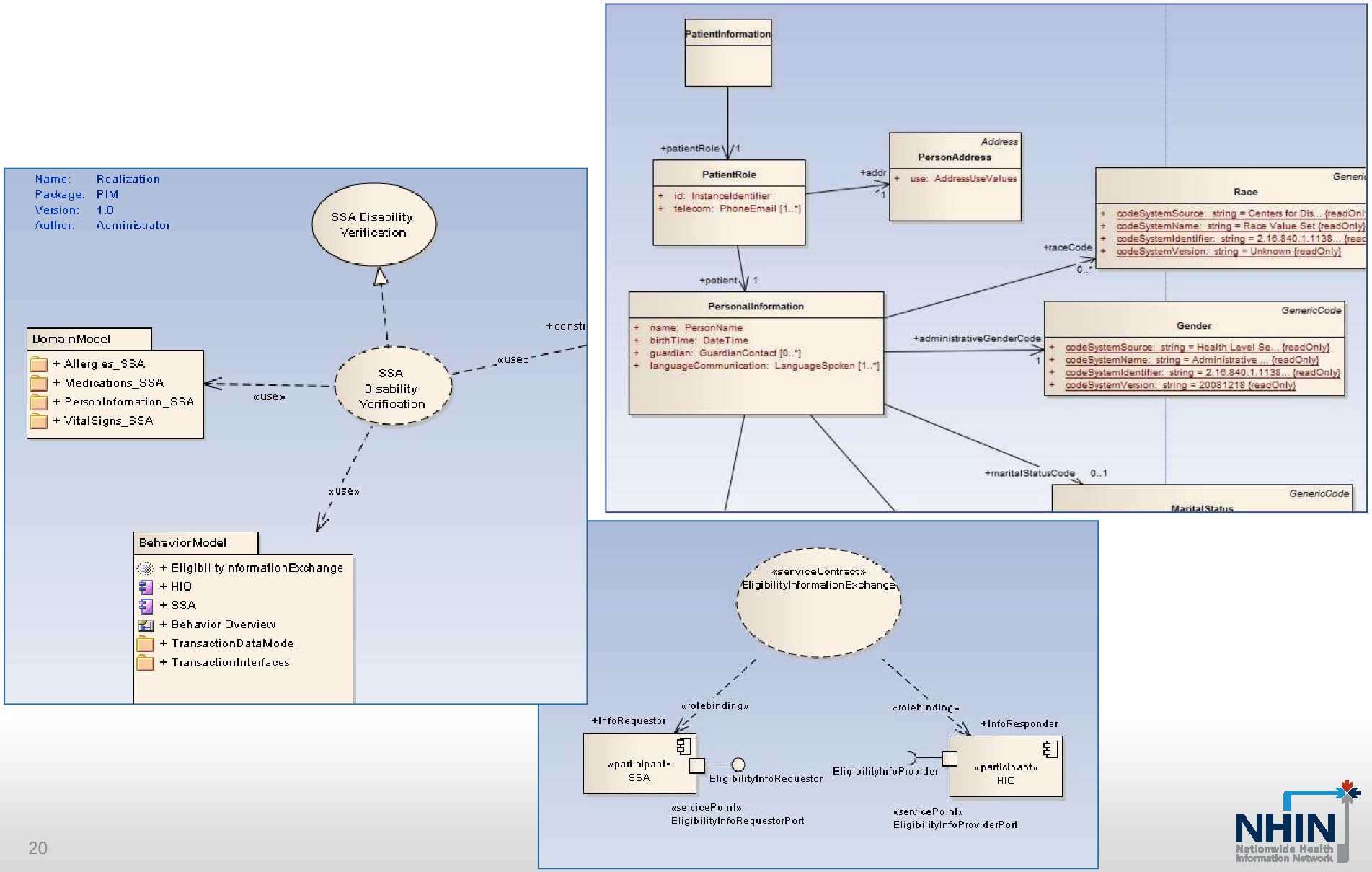


S&I NIEM Process Harmonized



NHIN
Nationwide Health Information Network

Model Centric Specifications



Model Centric Specification Development

- The S&I Framework uses models to capture the information required to specify exchanges between parties on the NHIN. This supports the 2 primary goals of the S&I Framework
  - To aid in the creation of specifications that are less ambiguous than specs traditionally done using word processing tools.
  - To support the creation of specifications by other groups
- Models refers largely to the visual representation of exchange syntax, semantics, dependencies and rules.
- By using models the S&I Framework intends to:
  - Establish a repeatable pattern for evolution and traceability from requirements to implementation of specifications
  - Provides for the implementation of specifications using multiple possible technologies
  - Support the composability and reuse among specifications
  - Support the creation of specifications by groups outside ONC by providing guidelines, patterns, repositories and tools

NHIN
Nationwide Health Information Network

Developing the Model Centric Approach

- Identify Specific Requirements
- Define a Solution Strawman
- Use an existing NHIN business scenario as a proof of concept

Requirements for a Model Centric Approach

- The modeling approach used by the S&I Framework ***must***
  - Provide traceability from Use Case and Requirements through to one or more implementations
  - Provide semantic and syntactic modeling constructs to support defining the information and behavior that are part of exchanges
  - Support the need to harmonize with existing standards defined at different levels of abstraction
  - Be adoptable by different organizations
  - Be able to integrate into NIEM process

NHIN
Nationwide Health Information Network

Solution Strawman

- Three main components
  - Adopt the OMG Model Driven Architecture (MDA) based modeling concepts
  - Select a set of tools/technologies/practices that are easily adoptable
  - Utilize the model-centric paths through the NIEM processes and related artifacts

S&I Model Centric Proof of Concept

Used SSA Disability Determination business scenario as a starting point

- Goals
  - Refine NIEM process to develop S&I implementation specifications based on the SSA Disability Determination business scenario
  - Develop IEPD artifacts using NIEM process
    - Computable UML model for content and transactions based on MDA
    - IEPD for content and transactions
  - Identify tools/technologies/practices needed for S&I Framework process and gaps in existing tools

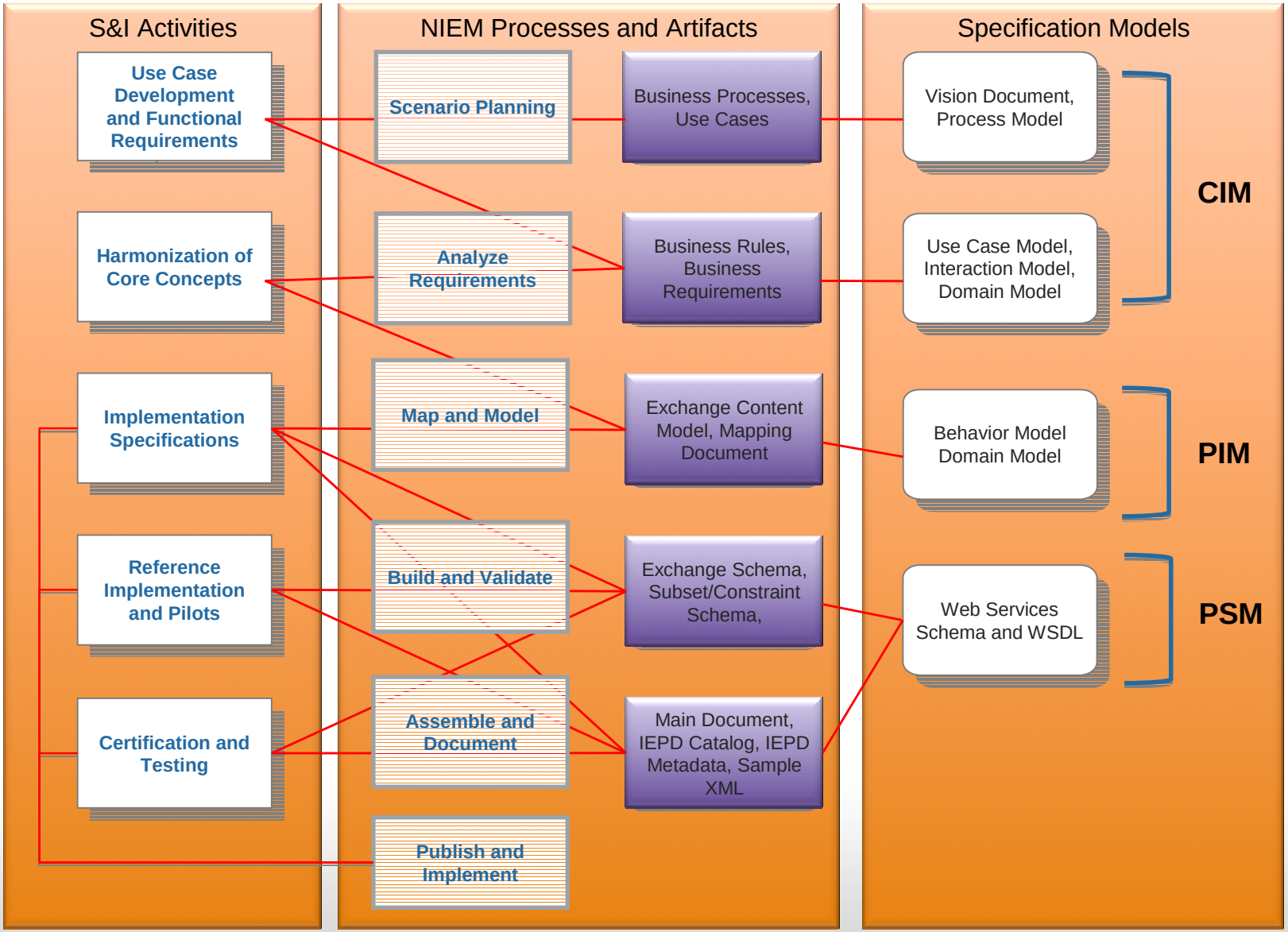
Model-Centric Solution - MDA

- Base S&I Framework modeling on the 3 OMG/MDA model abstractions.
  - Computational Independent Model (CIM)
  - Platform Independent Model (PIM)
  - Platform Specific Model (PSM)
- Define a mechanism to show traceability from Use Cases and Functional Requirements through to technical bindings defined in a PSM.
- Define a flexible modeling foundation by which different types of specifications can be defined.
- Provides ability for multiple technology bindings for the same set of logical specifications (multiple PSMs)

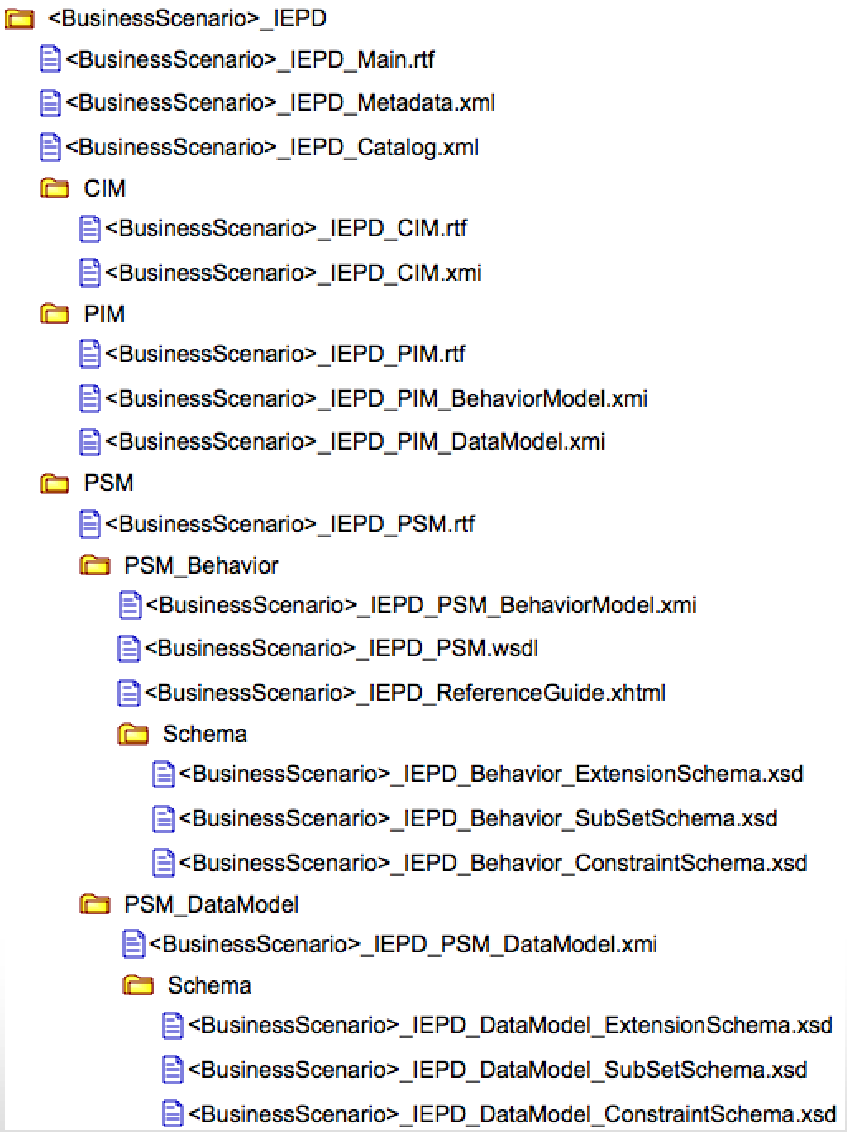
Model-Centric Solution – Tools/Technologies/Practices

- Use the OMG Unified Modeling Language v2.x
  - *Is an industry standard general modeling language*
  - *Provides mechanisms for customization of modeling constructs via profiles*.
- Utilize OMG XML Model Interchange (X format
  - *Provides flexibility for non-gr of models (ex searching, transforming, re*
  - *Vendor neutral UML modeling tools*
  - *Allows for shari n with NIEM tooling*
- Adopt/Adapt an /modeling standard for defining specifica
  - *Examined HL7 S IF) and OMG Service Oriented Arch*
  - *SoaML or som appears to be the best fit.*

Model Centric Solution - NIEM



Proposed Structure for S&I IEPD



Notes

»3 Levels of Modeling Abstractions

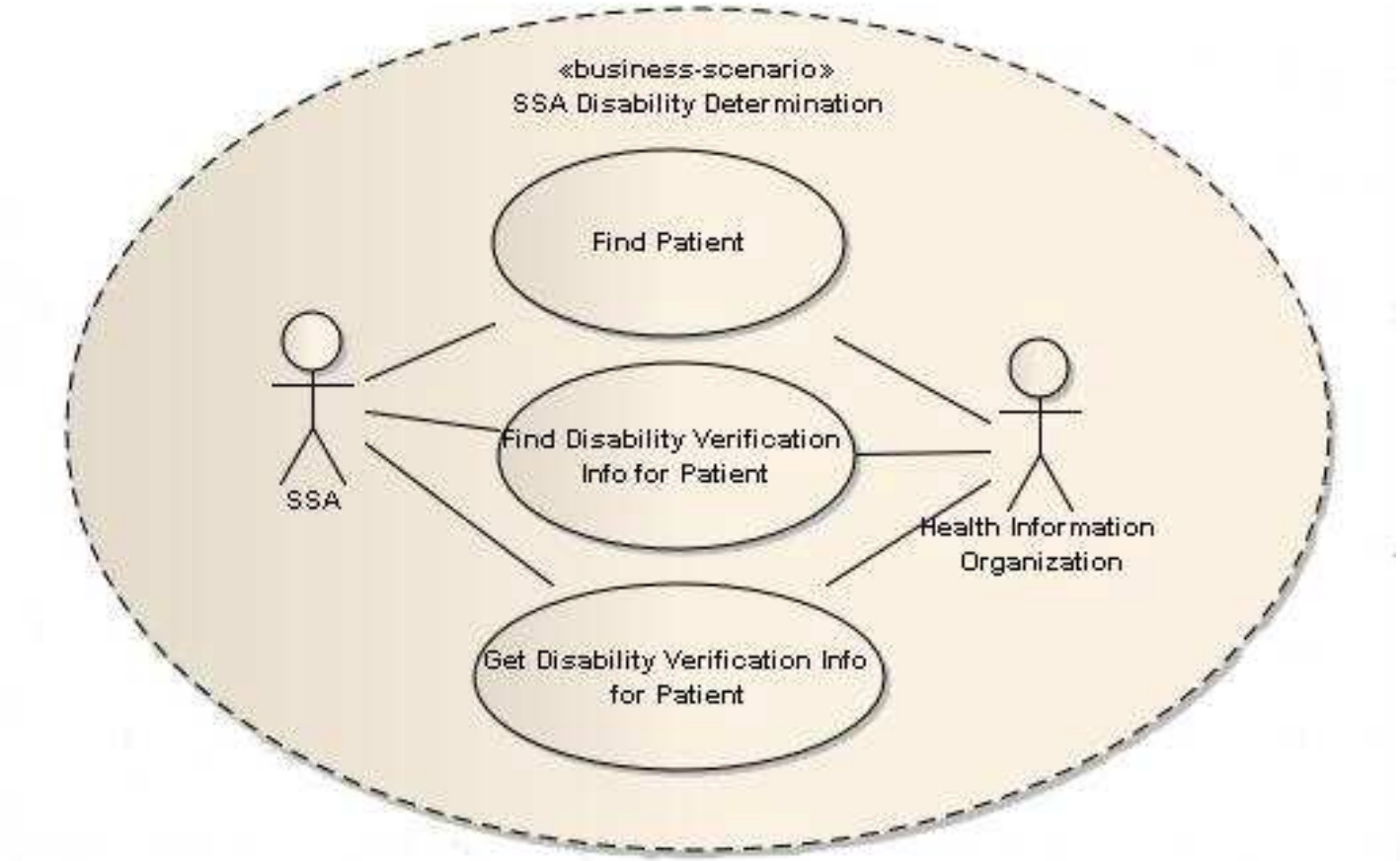
- » Computational Independent Model (CIM)
- » Platform Independent Model (PIM)
- » Platform Specific Model (PSM)

»Overall IEPD package contains artifacts from each specification level (CIM, PIM, PSC) each covering behaviors, rules, and content

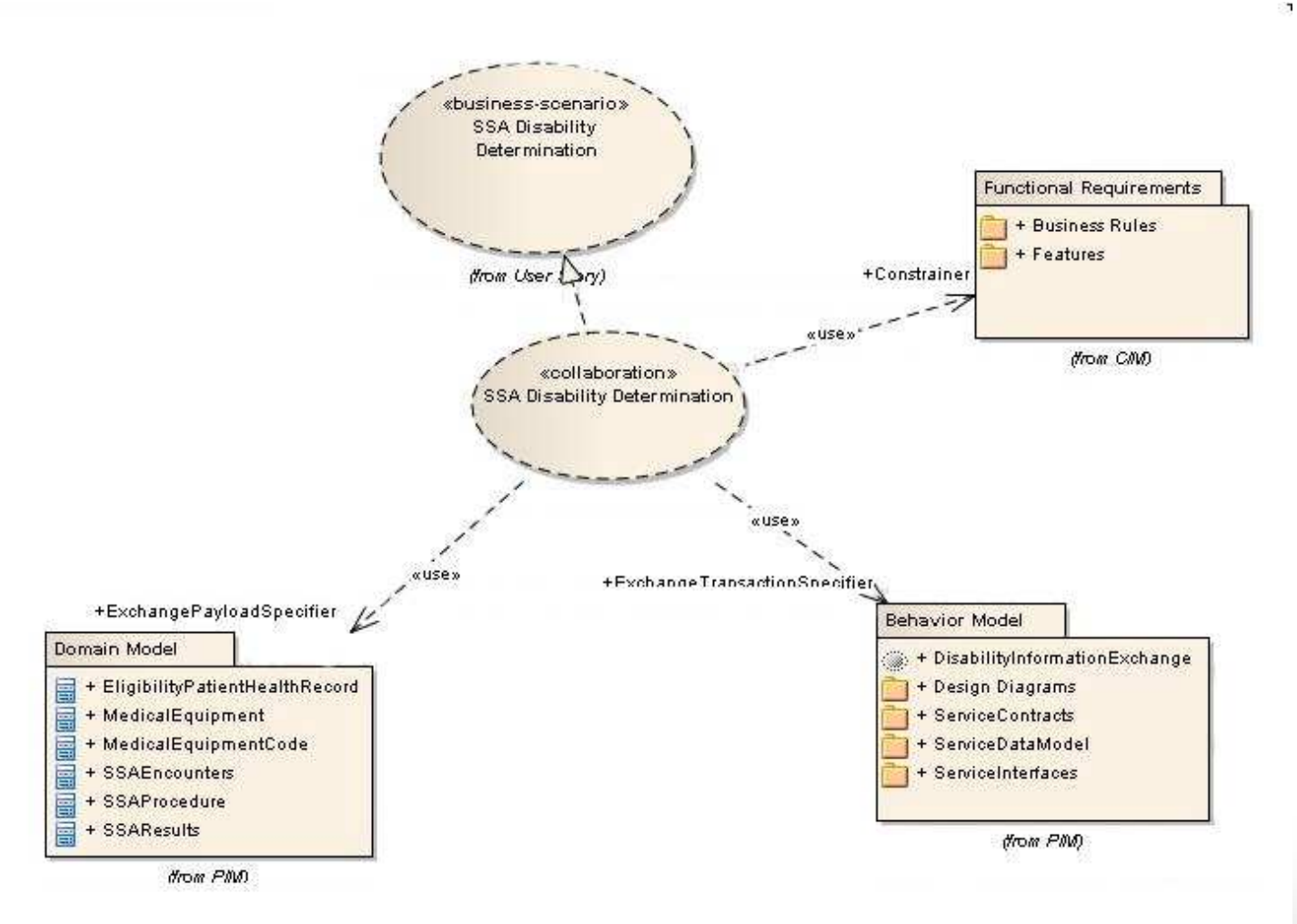
»The S&I IEPD is intended to provide a complete set of specification information for any implementers starting from any abstraction level

NHIN Nationwide Health Information Network

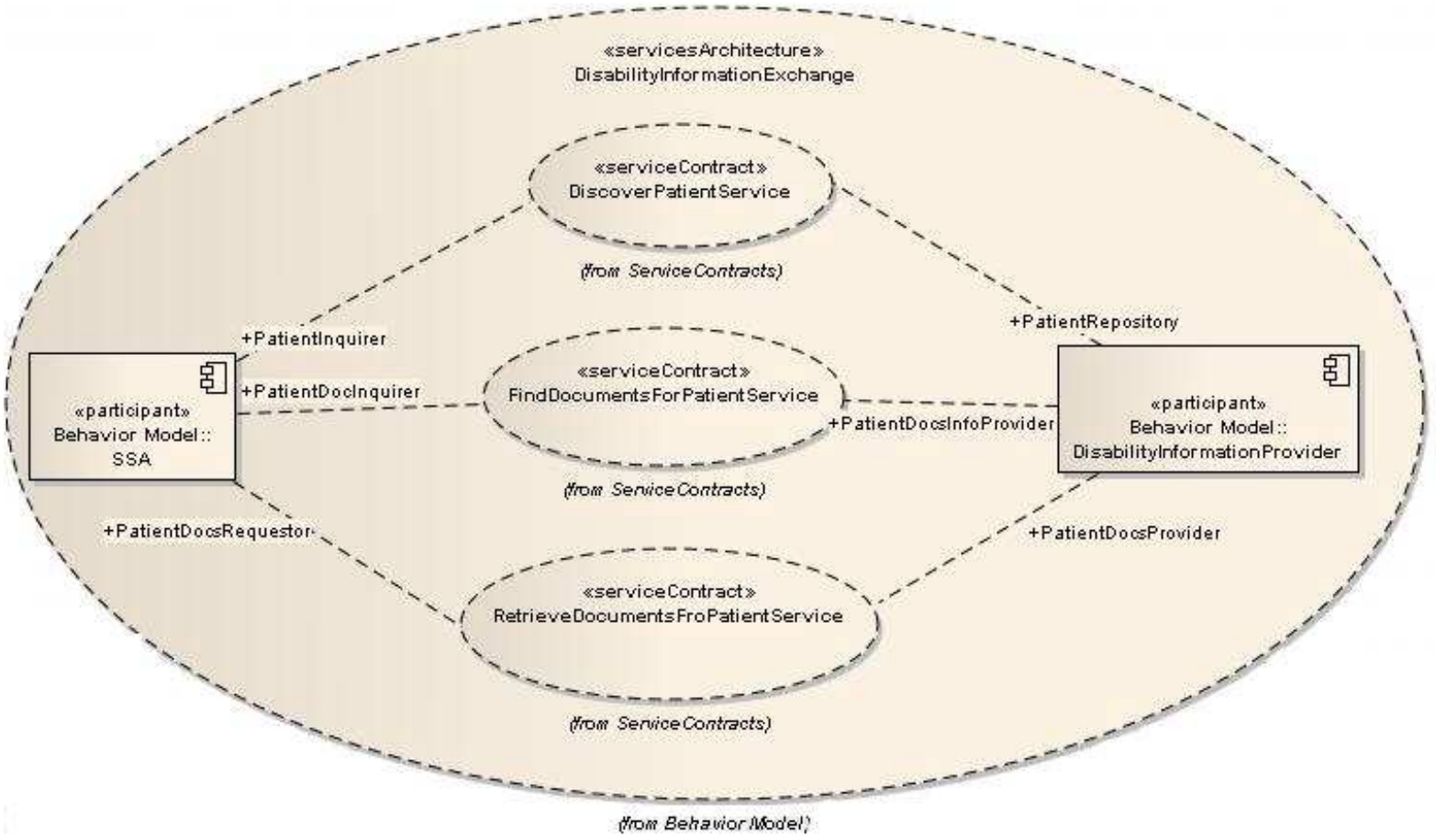
Sample Model – CIM Business Scenario



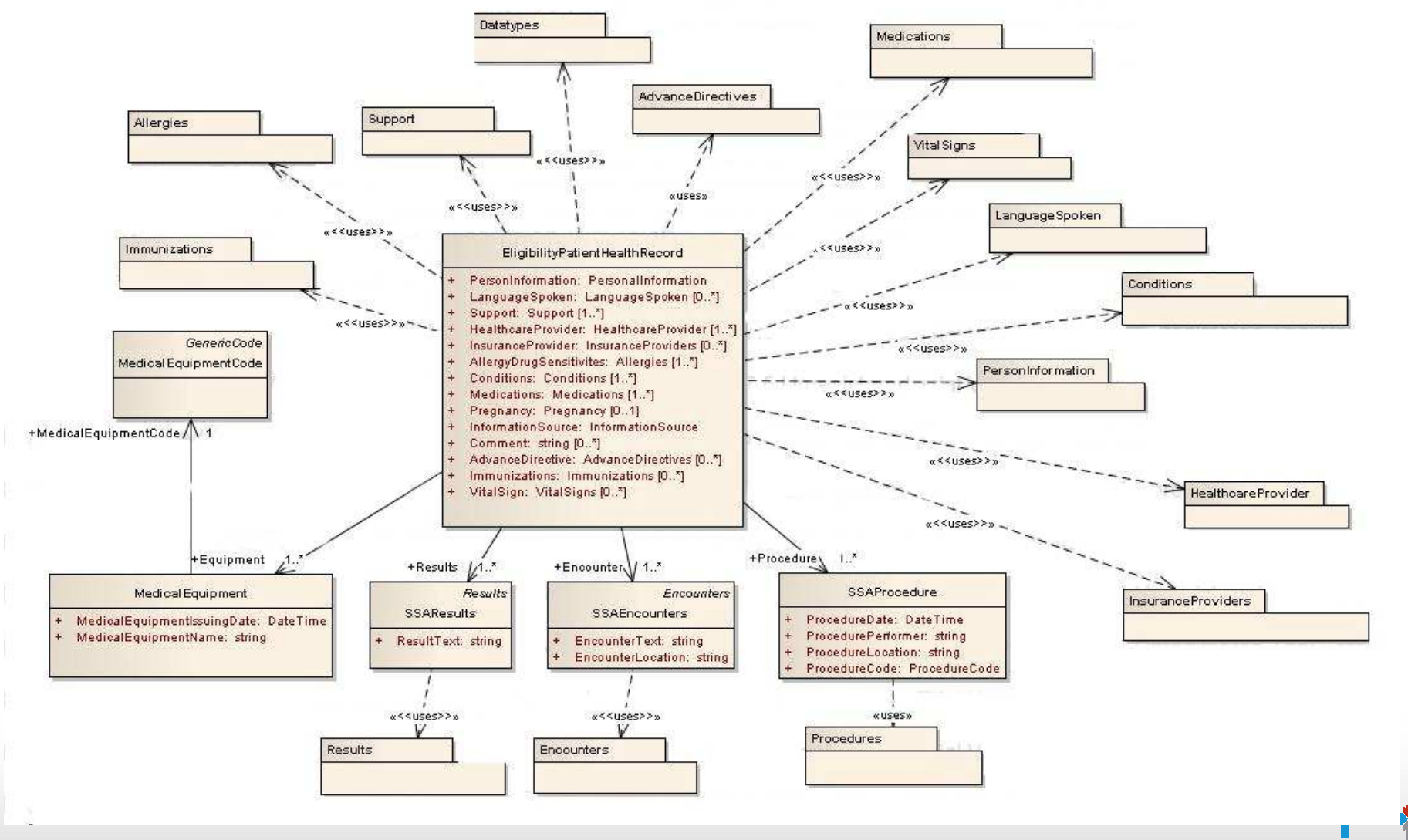
Sample Model – PIM Realization



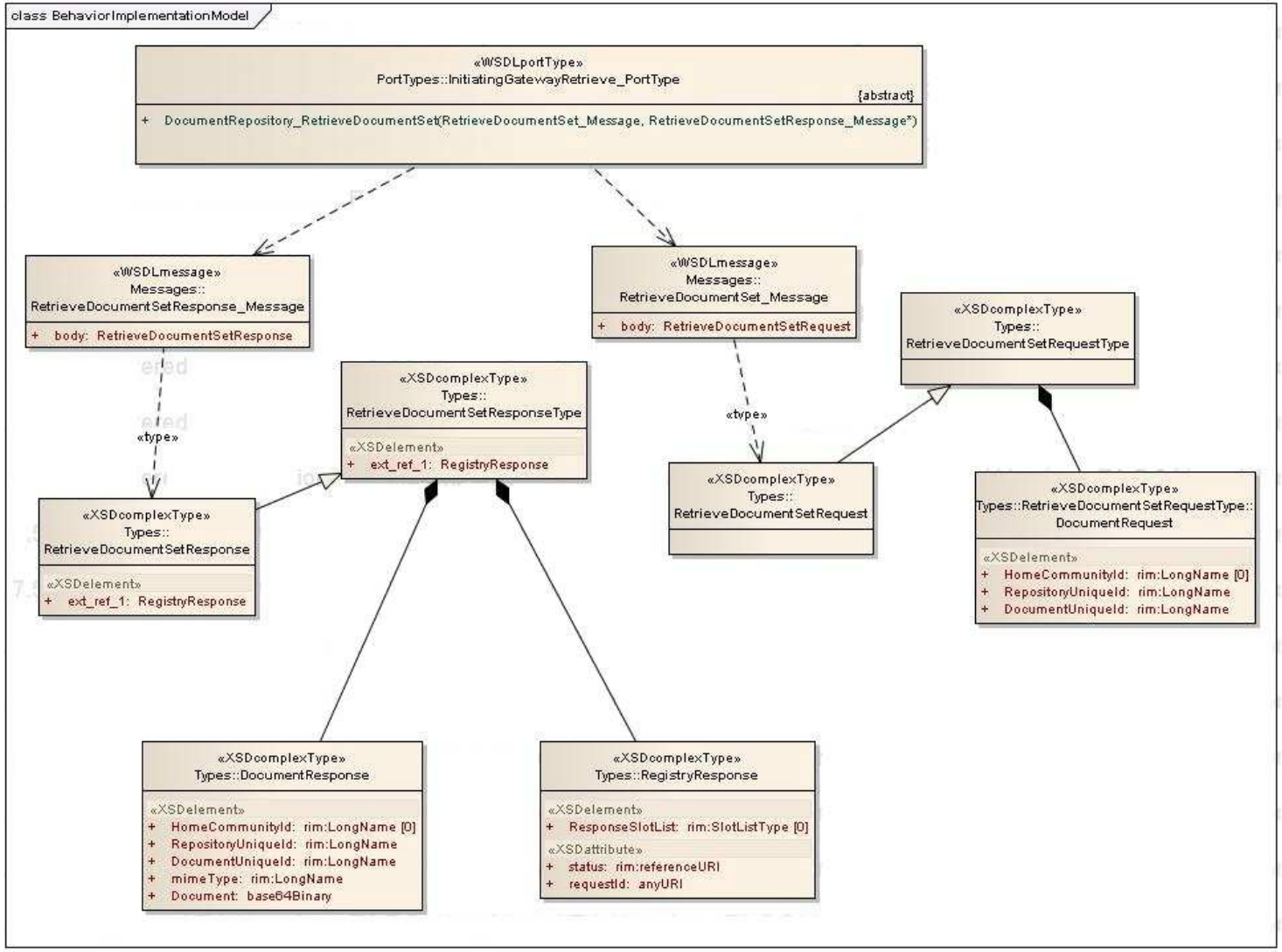
Sample Model – PIM Service Architecture



Sample Model – PIM Domain Model



Sample Model – PSM WSDL Interface



Where are We Now and What's Next

- SSA Prototype effort confirms the concepts of using models to define NHIN specifications
- However questions remain
  - Finding the right Too-Much vs. Too-Little modeling balance (can model-centric be agile?)
  - Best way to model existing vocabularies and code sets.
  - How much harmonization with NIEM models is possible
- Next Steps
  - Create a more complete IEPD based on specification effort going on with NHIN Direct
  - Establishing the tooling and repositories needed
  - Establishing the practices and guidelines for modeling
  - Continue to incorporate existing and emerging S&I specifications into S&I model

NHIN
Nationwide Health Information Network

Questions