



# FIM-FHIR-FHIM-MDHT Summary Briefing

## HL7 EHR Work Group (EHR-WG)



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to Edmond-Scientific VA support-contract  
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**December 16, 2013 Complete-and-current working-drafts are at**  
[http://wiki.hl7.org/index.php?title=EHR\\_Interoperability\\_WG](http://wiki.hl7.org/index.php?title=EHR_Interoperability_WG)



# Call for Participation



**Schedule:** <http://www.hl7.org/concalls/default.aspx>

**List Server:** <http://www.hl7.org/myhl7/managelistsevs.cfm>

Health Level Seven – Electronic Health Record Work Group  
 Weekly Teleconference Schedule  
 Revised: 20 November 2013

Day	Time US ET	Activity	Lead(s)	Dial-In	Screen Sharing	List Server (for agendas, announcements)
Mon	1200	Records Management/ Evidentiary Support	Warner, Gelzer	1-877-668-4493 Code 927 002 088#	<a href="#">Link</a>	EHR Legal
Tues	1300	EHRs FM Release 3 Planning	Hufnagel, Dickinson	1-770-657-9270, Passcode 510269#	<a href="#">Link</a>	EHR Interop
	1400	Meaningful Use Functional Profile	Datta, Dickinson	1-770-657-9270, Passcode 510269#	<a href="#">Link</a>	EHR Interop
	1500	FULL EHR WG	Co-Chairs	1-770-657-9270, Passcode 510269#	<a href="#">Link</a>	EHR WG
Wed	1200	Personal Health Record WG	Ritter, Dickinson, Doo	1-770-657-9270, Passcode 510269#	TBA	EHR PHR
	1300	EHR System Usability WG	Mon, Ritter, Rocca, Gartner	1-770-657-9270, Passcode 510269#	<a href="#">Link</a>	EHR Usability
Thur	Open					
Fri	0930	EHR WG Co-Chairs	Co-Chairs	1-770-657-9270, Passcode 510269#	TBA	N/A

# EHR-S FIM Acronyms

- **aka** also known as
- **CC** EHR-S FIM Conformance Criteria
- **CDA** **Clinical Document Architecture**
- **DD** Data Dictionary
- **CIM** Conceptual Information Model
- **CP** Care Provision
- **CPS** Care Provisioning Support
- **DFD** Data Flow Diagram
- **EA** Enterprise Architect
- **EHR-S** EHR System
- **EHR-S FIM** EHR-S Function and Information Model
- **FHA** US Federal Health Architecture
- **FHIM** US Federal Health Information Model
- **FHIR** Fast Healthcare Interoperability Resources
- **FIM** EHR-S Function and Information Model
- **FIM(MU)** EHR-S FIM Meaningful Use profile
- **FM** Function Model
- **FY** Fiscal Year
- **IHE** [Integrating the Healthcare Enterprise](#)
- **IM** Information Model
- **MDHT** Model Driven Health Tools
- **MU** US Meaningful Use objectives-and-criteria
- **ONC** US Office of the National-Coordinator
- **OHT** Open Health Tools
- **POA&M** Plan of Actions and Milestones
- **R 2/3** Release 2 or 3
- **RI** Resource Infrastructure
- **RIM** HL7 Reference Information Model
- **S&I** ONC Standards & Interoperability Framework
- **WBS** Work Breakdown Structure
- **WG** Work Group

# Executive Summary

## EHR-S FIM-FHIR-FHIM Requirements-Specifications

### Prototype Conclusions

EHR-S FIM, FHIR, FHIM, MDHT complement each other; where,

- EHR-S FIM defines Requirements; including,
  - data context-applicability-and-use
- FHIR defines International Data-Specifications (“The 80% solution set”)
- FHIM defines US-Realm FHIR-Profile, including terminology bindings
- MDHT defines Implementation Guides (e.g., CDA)
- Joint Configuration Mgmt. will help FIM/FHIR/FHIM consistency; ideally,
  - A single UML-Tool (e.g., EA or RSA) maintains FIM-FHIR-FHIM

**ISSUES:** FIM-FHIR-FHIM-MDHT consistency, tool usability, configuration mgmt, IP licensing.

**RECOMMENDATION:** [www.HL7.org/EHRSFIM](http://www.HL7.org/EHRSFIM) web site for browsing & feedback.

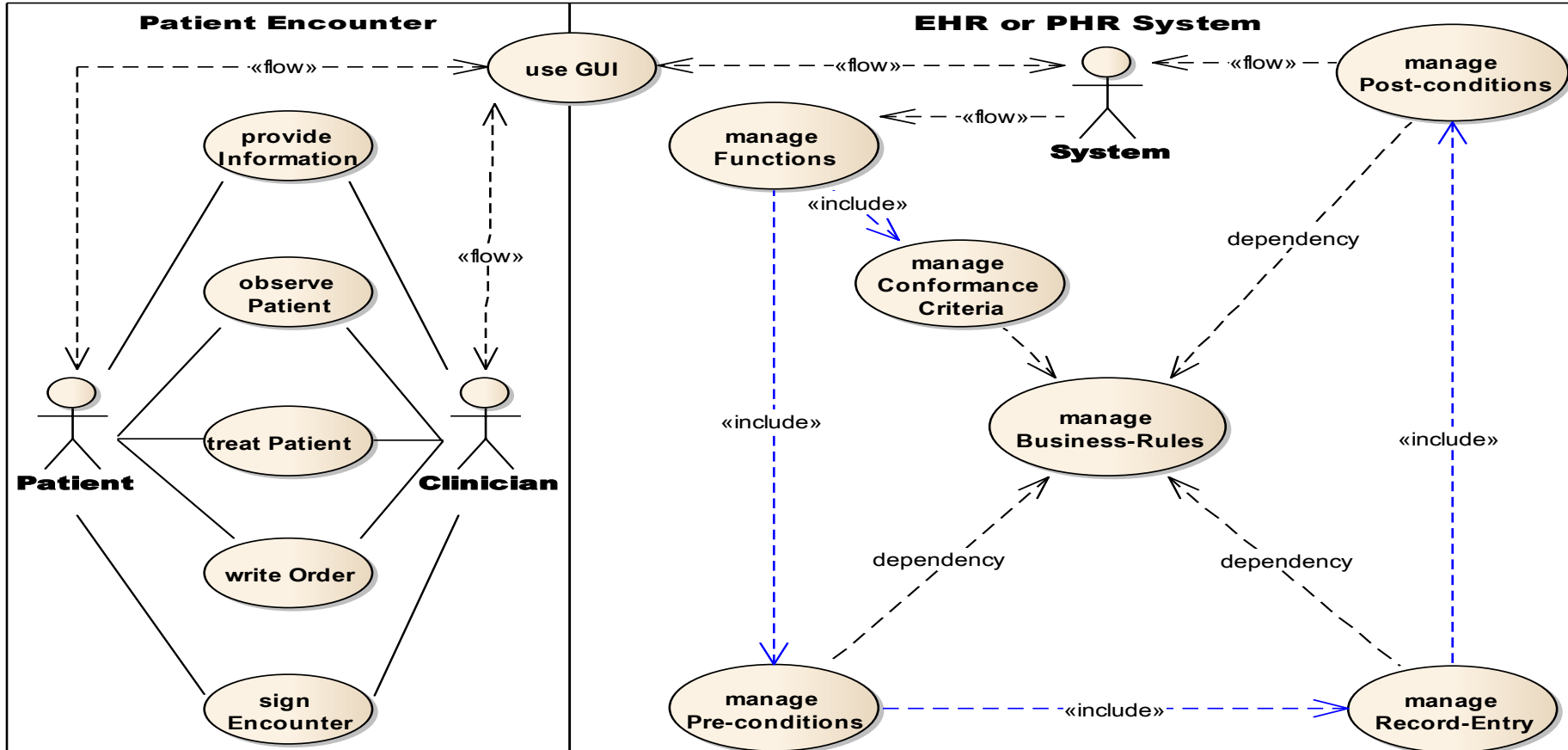
# EHR-S & PHR-S Reference Model (RM)



## uc EHR-S & PHR-S Reference-Model

Name: EHR-S & PHR-S Reference-Model  
 Author: EHR Interoperability WG  
 Version: EHR-S FIM (r3 2013 Prototype)  
 Created: 12/14/2013 1:18:17 PM  
 Updated: 12/15/2013 7:36:00 AM

**Functions** are modeled-as "*manage Record-Entry*" sub-type **Use-Cases**.  
**Conformance Criteria** are modeled-as (subject, verb, object) **Scenarios**; where,  
 • subjects-and-objects are Record-Entry sub-types  
 • verbs are *manage* sub-types  
**Business Rules** are "*according to scope of practice, organizational policy, jurisdictional law, patient preference or consent.*"



# EHR-S & PHR-S Reference Model (RM)



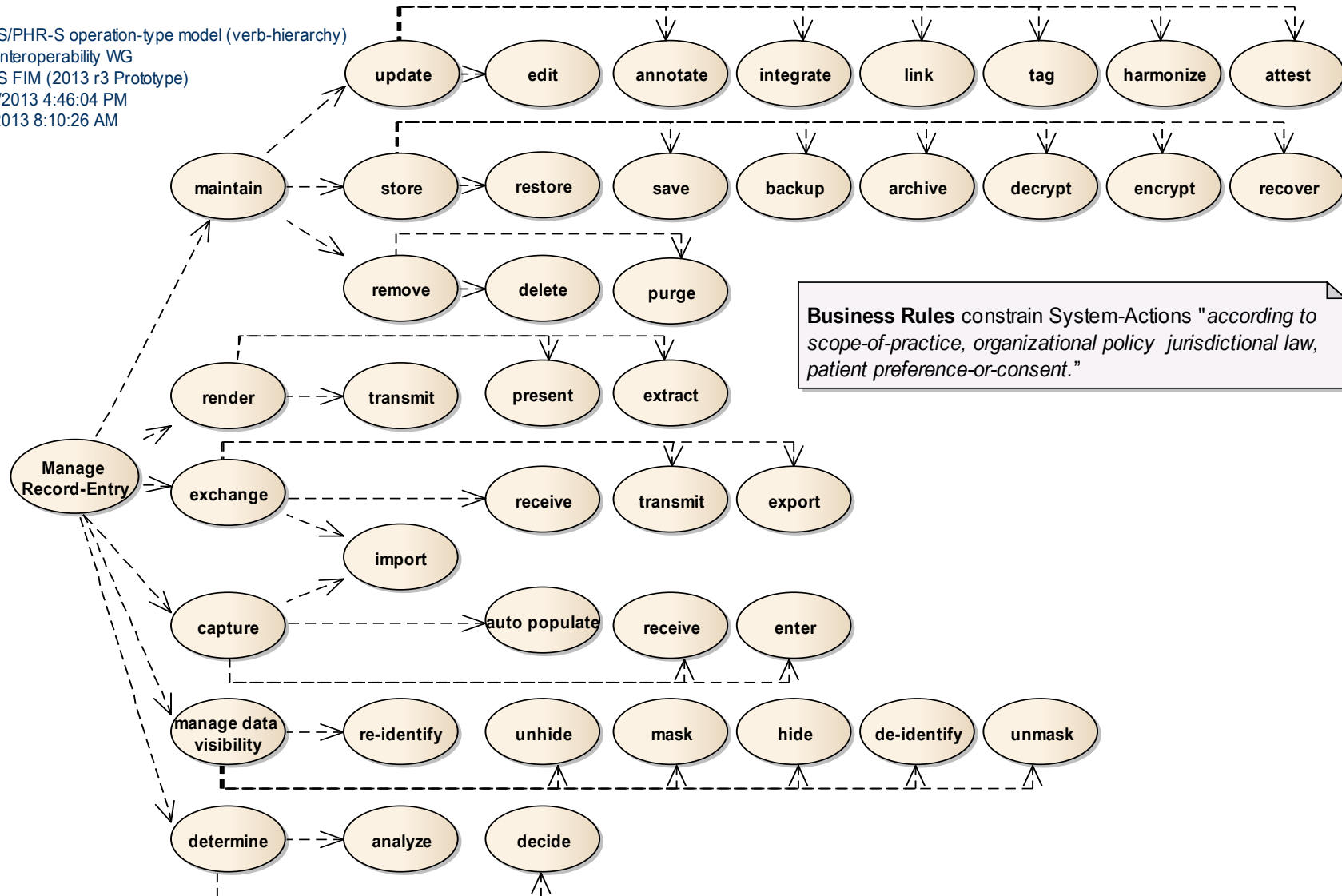
- The **EHR-S and PHR-S Reference Model** includes Functions and their Conformance-Criteria; where,
- Functions are modelled as “*manage Record-Entry*” Concept-of-Operations (CONOPS) **Use-Cases**
  - Conformance-Criteria (CC) are modelled as “*manage Record-Entry*” Functional **Scenarios**
  - Clinicians and Patient have Encounters; where, they use System-GUIs (Graphical-User-Interface); such that,  
The Clinicians, Patients or their designated agent may
    - review* the Patient EMR (Electronic Medical Record) and other types of Information
    - Observe, treat, write Orders and document* the Patient-Encounter
    - provide* Patient-Information and Educational-Information
    - sign* Encounters
  - Systems Functions include *manage Record-Entry* Conformance Criteria (CC); where,
    - CC Pre-Condition Business-Rules manage entering-data-flows and data-context
    - CC Data-management Business-Rules manage applicability
    - CC Post-Condition Business-Rules manage exiting-data-flows and data-use
    - CC Business-Rules are in-accordance with
      - scope-of-practice, organizational-policy, jurisdictional-law, and patient-preferences.

# EHR-S and PHR-S RM “Manage” Verb-Types (Verb Hierarchy)



uc EHR-S/PHR-S operation-type model (verb-hierarchy)

Name: EHR-S/PHR-S operation-type model (verb-hierarchy)  
 Author: EHR Interoperability WG  
 Version: EHR-S FIM (2013 r3 Prototype)  
 Created: 11/21/2013 4:46:04 PM  
 Updated: 12/7/2013 8:10:26 AM



**Business Rules** constrain System-Actions "according to scope-of-practice, organizational policy jurisdictional law, patient preference-or-consent."

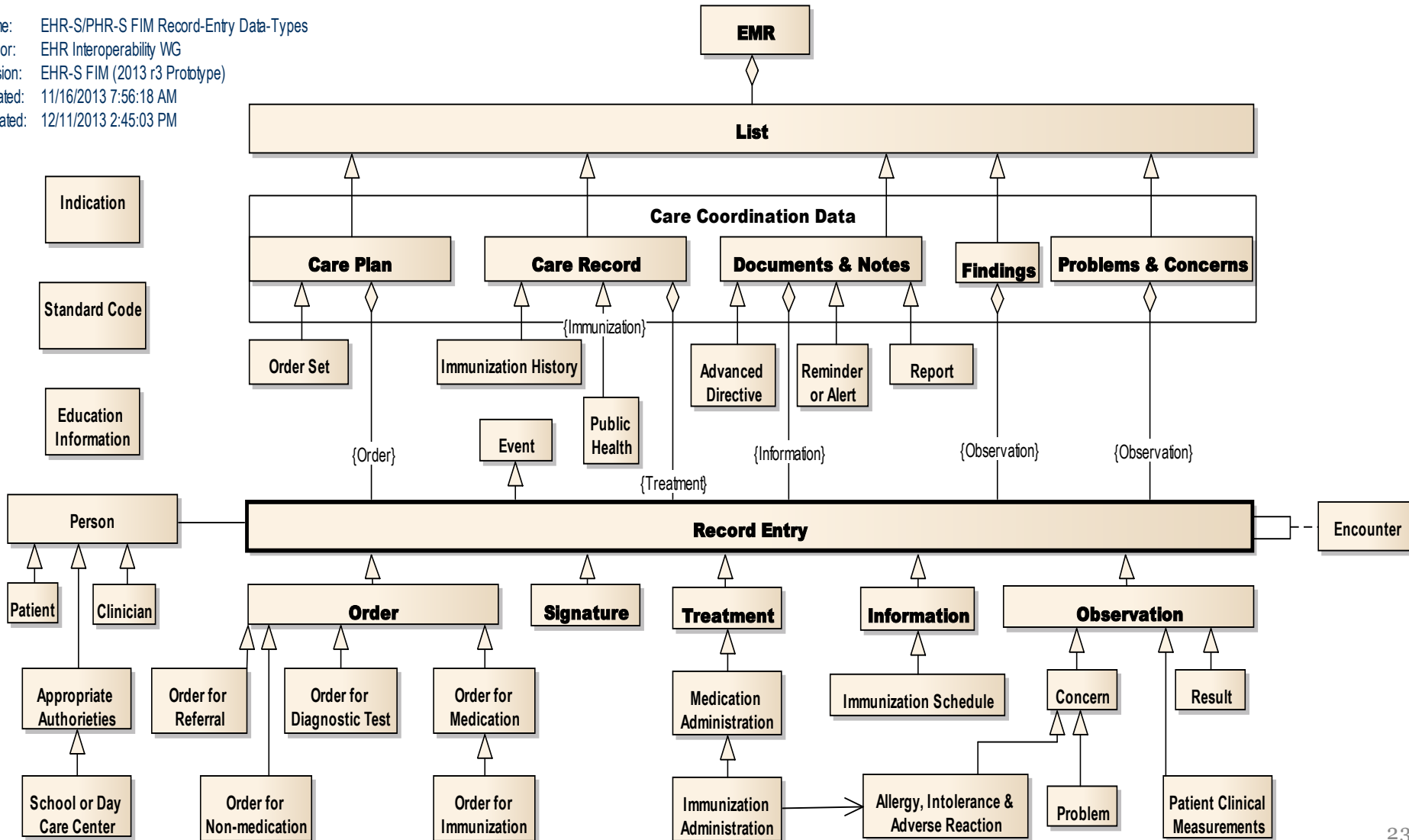
# EHR-S and PHR-S RM

## “Record-Entry” Data-Types



Class EHR-S/PHR-S FIM Record-Entry Data-Types

Name: EHR-S/PHR-S FIM Record-Entry Data-Types  
 Author: EHR Interoperability WG  
 Version: EHR-S FIM (2013 r3 Prototype)  
 Created: 11/16/2013 7:56:18 AM  
 Updated: 12/11/2013 2:45:03 PM



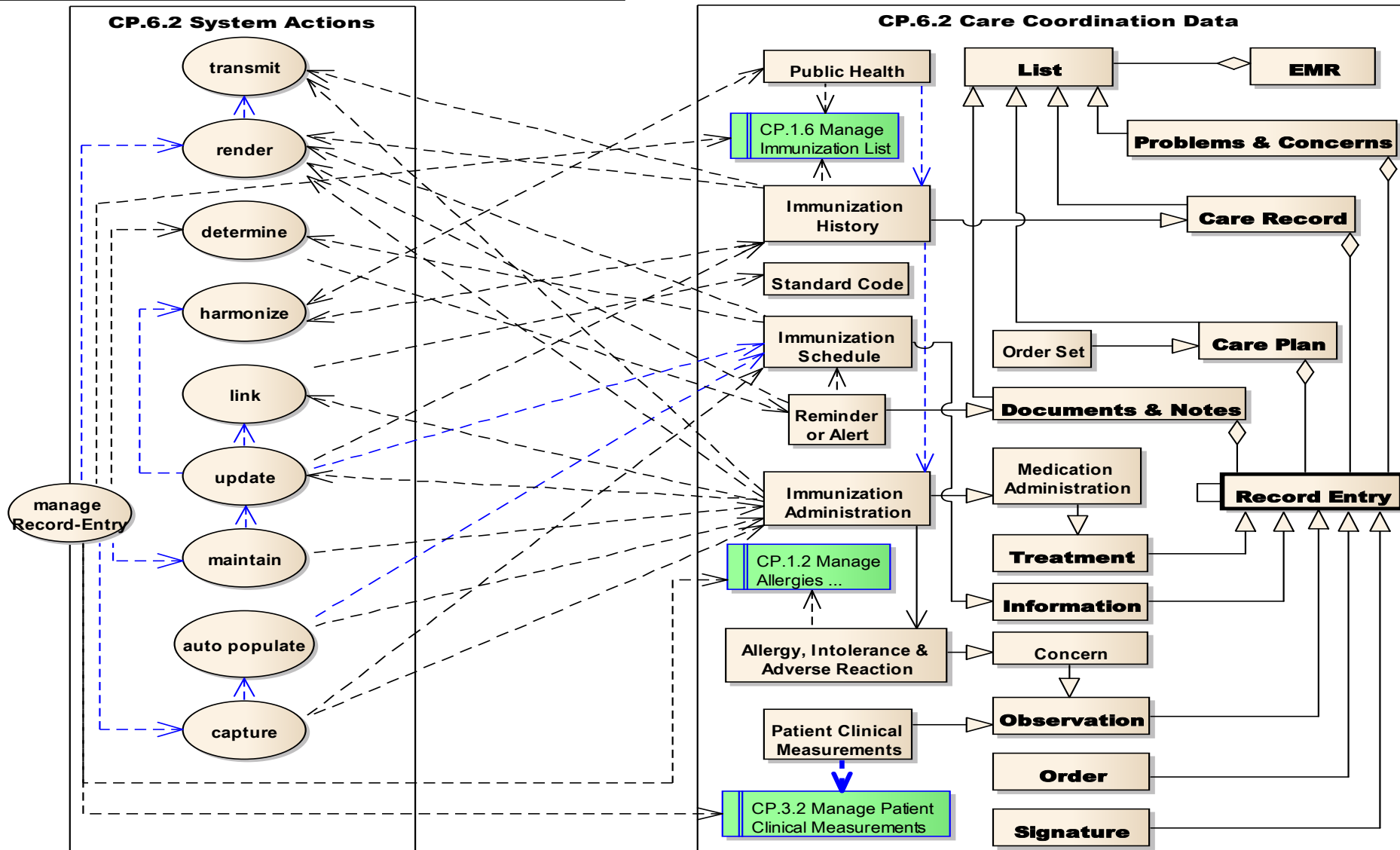


# EHR-S & PHR-S FIM r3 Example

## CP.6.2 Immunization Management Use Case



uc EHR-S FIM R3 CP.6.2 Immunization Management Conformance Criteria



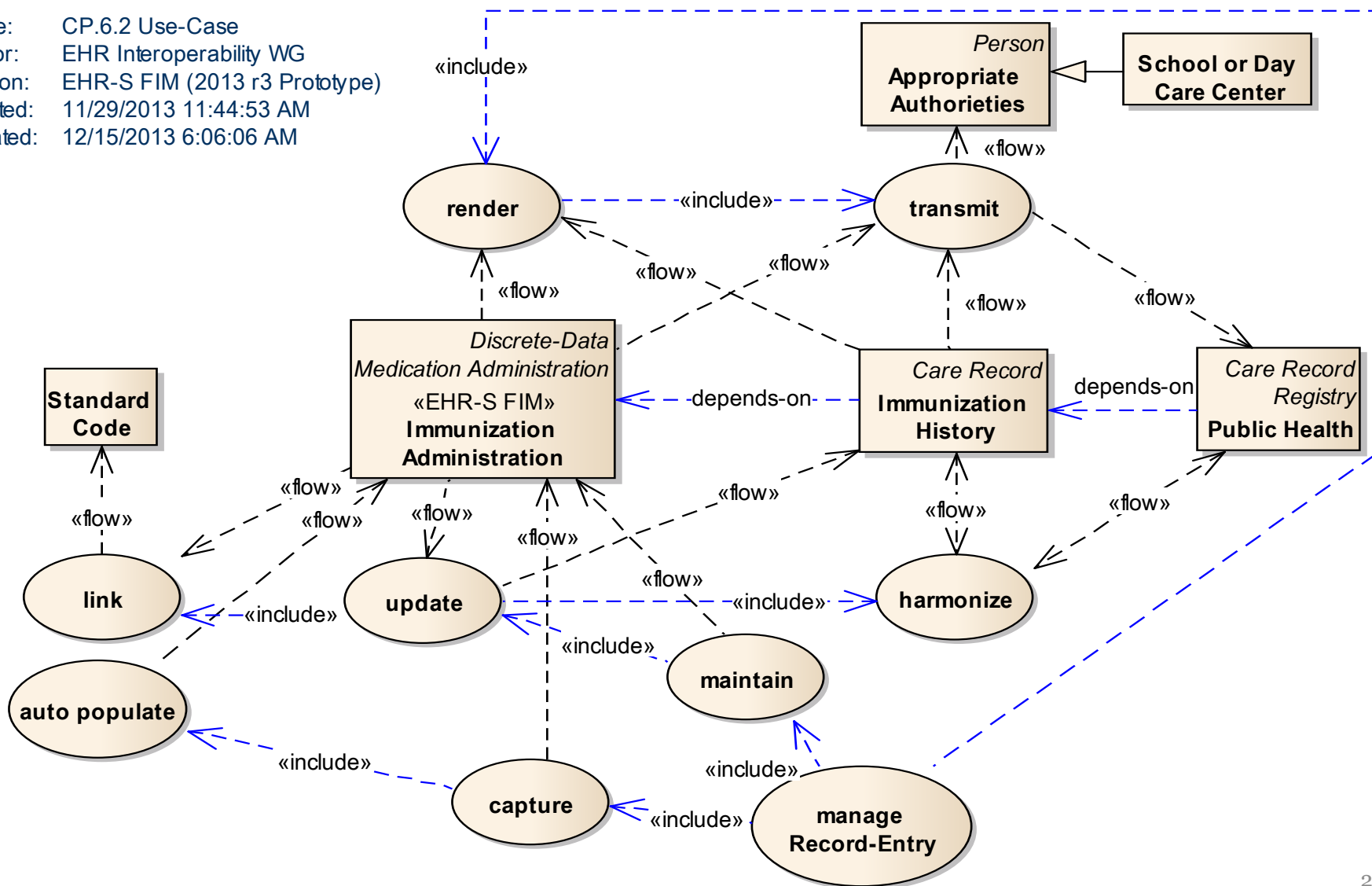
# EHR-S & PHR-S FIM r3 Simplified Example

## CP.6.2 Immunization Management Use Case



### uc CP.6.2 Use-Case

Name: CP.6.2 Use-Case  
 Author: EHR Interoperability WG  
 Version: EHR-S FIM (2013 r3 Prototype)  
 Created: 11/29/2013 11:44:53 AM  
 Updated: 12/15/2013 6:06:06 AM



# EHR-S & PHR-S FIM r3 Example

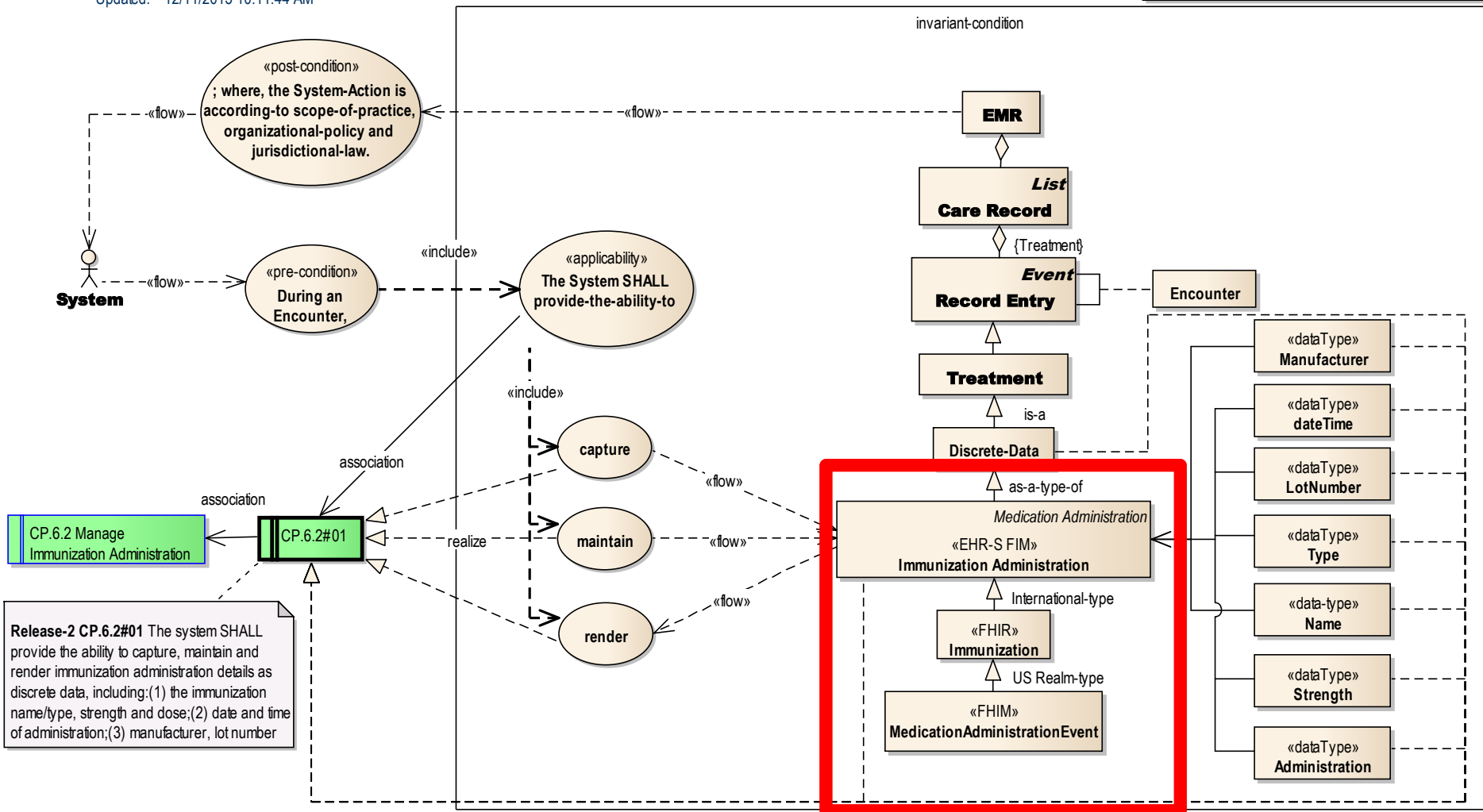
## CP.6.2#01 Immunization Management Scenario



class EHR-S FIM CP.6.2 CC#01 Scenario

Name: EHR-S FIM CP.6.2 CC#01 Scenario  
 Author: EHR Interoperability WG  
 Version: EHR-S FIM (2013 r3 Prototype)  
 Created: 12/2/2013 7:25:59 AM  
 Updated: 12/11/2013 10:11:44 AM

EHR-S FIM CP.6.2 Immunization Management



# EHR-S FIM Using FHIR

- **FHIR Administrative**

- **Attribution:** Patient, RelatedPerson, Practitioner, Organization
- **Resources:** Device, Location, Substance, Group
- **Workflow Management:** Encounter, Alert, Supply, Order, OrderResponse
- **Financial:** Coverage

- **FHIR Clinical**

- **General:** [AdverseReaction](#), [AllergyIntolerance](#), CarePlan, FamilyHistory, Condition, Procedure, Questionnaire
- **Medications:** Medication, MedicationPrescription, MedicationAdministration, MedicationDispense, MedicationStatement, Immunization, ImmunizationProfile
- **Diagnostic:** Observation, DiagnosticReport, DiagnosticOrder, ImagingStudy, Specimen
- **Device Interaction:** DeviceCapabilities, DeviceLog, DeviceObservation

- **FHIR Infrastructure**

- **Support:** List, Media, Other, DocumentReference, (Binary)
- **Audit:** Provenance, SecurityEvent
- **Exchange:** Document, Message, OperationOutcome, Query
- **Conformance:** Conformance, ValueSet, Profile

# EHR-S FIM Prototype

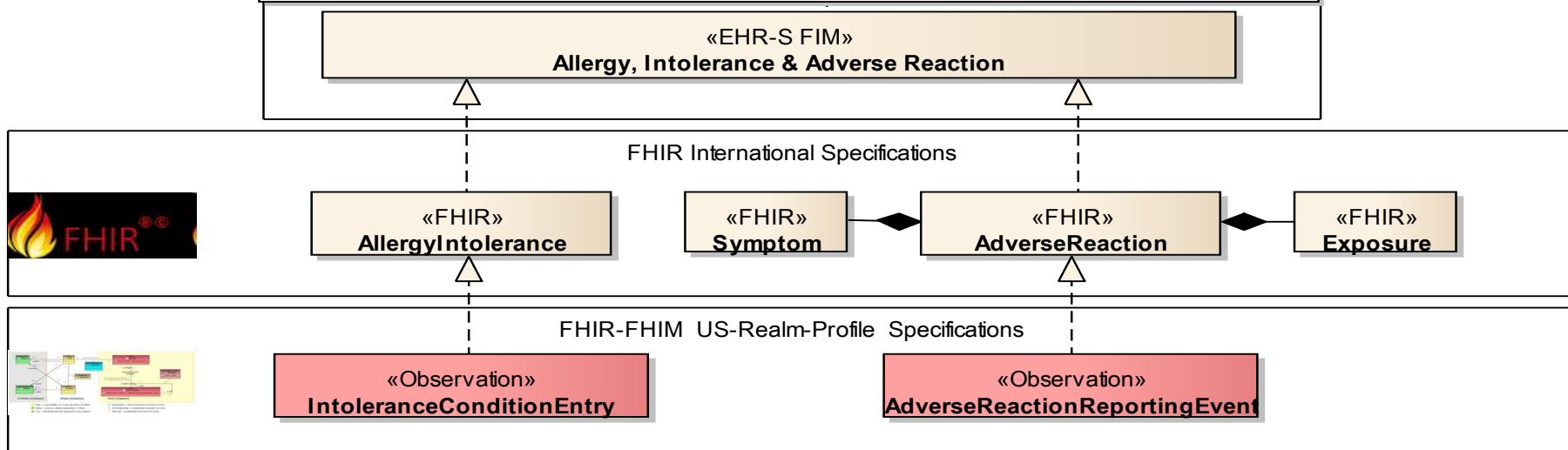
## Allergy, Intolerance & Adverse-Reaction

### FIM-FHIR-FHIM Requirements-Specifications

**CM ISSUE:** Should EHR-S FIM map at Data-Module or Data-Element Level?

- The EHR-S FIM release-3 objective is for an analyst-or-architect to use the EA-tool to
1. Create a use case from a prescribed lexicon of Entities, Events, Modifiers and Actions; where,
  2. the lexicon is mapped to applicable EHR System Functions; where,
  3. the EA-tool can generate an Interoperability-Specification (IS) containing
    - UML EHR-S-FIM/FHIR/FHIM profile, based-on the use-case
    - including FHIR-XML (International)
    - including FHIR-FHIM-XML (US Realm) with appropriate terminology value-set binding;
    - Where, other realm models could be added to the EA-tool by interested stakeholders
    - profiles can be further refined to support local needs.

**EHR-S-FIM** is EHR System Function-and-Information model  
**FHIR** is Fast Healthcare Interoperability Resource  
**FHIM** is US Federal Health Information Model



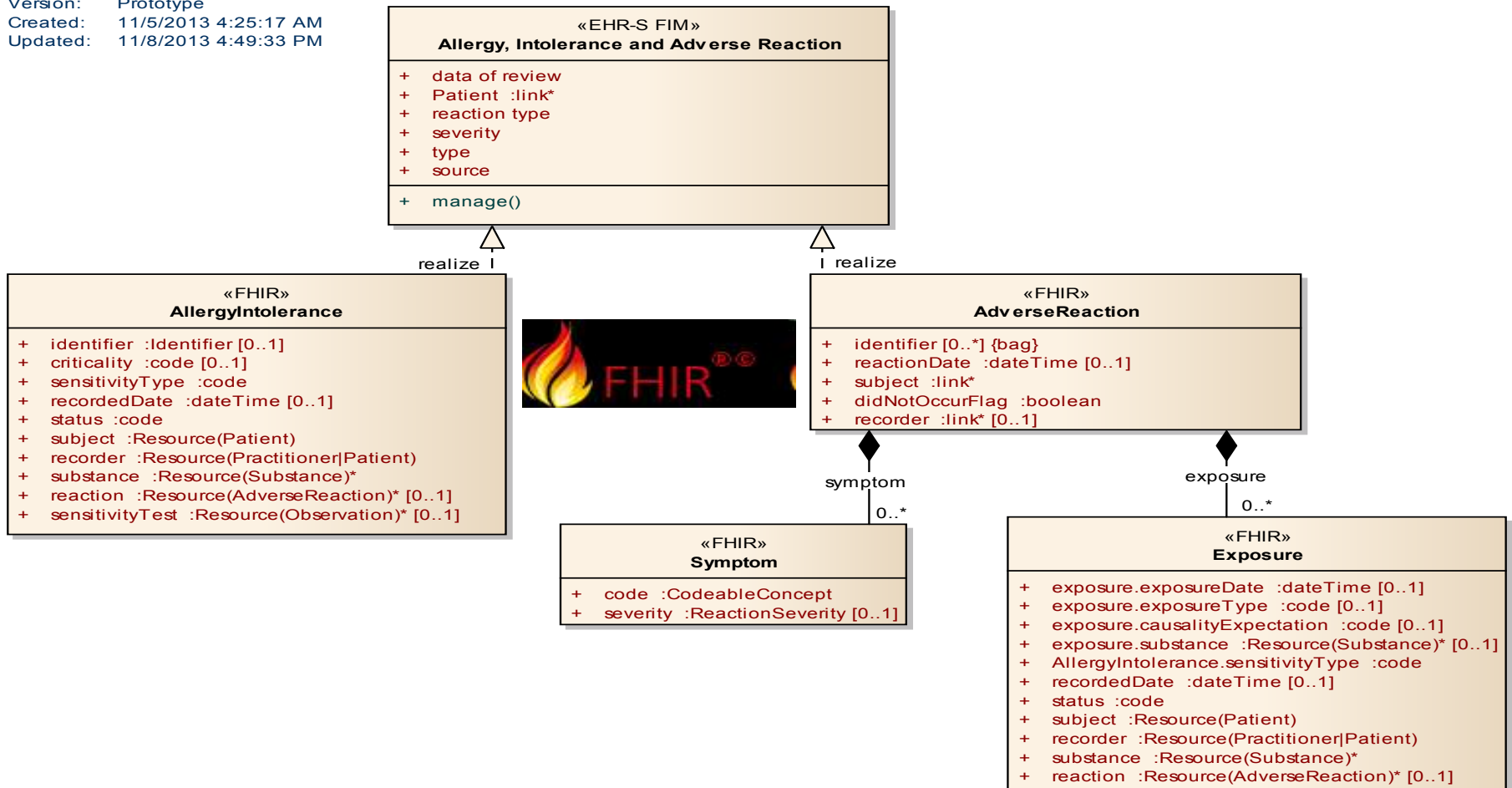
# Prototype

## Allergy, Intolerance & Adverse-Reaction

### FHIR Design-Specification

#### class FHIR Specification for Allergy, Intolerance and Adverse Reaction

Name: FHIR Specification for Allergy, Intolerance and Adverse Reaction  
 Author: Steve Hufnagel  
 Version: Prototype  
 Created: 11/5/2013 4:25:17 AM  
 Updated: 11/8/2013 4:49:33 PM

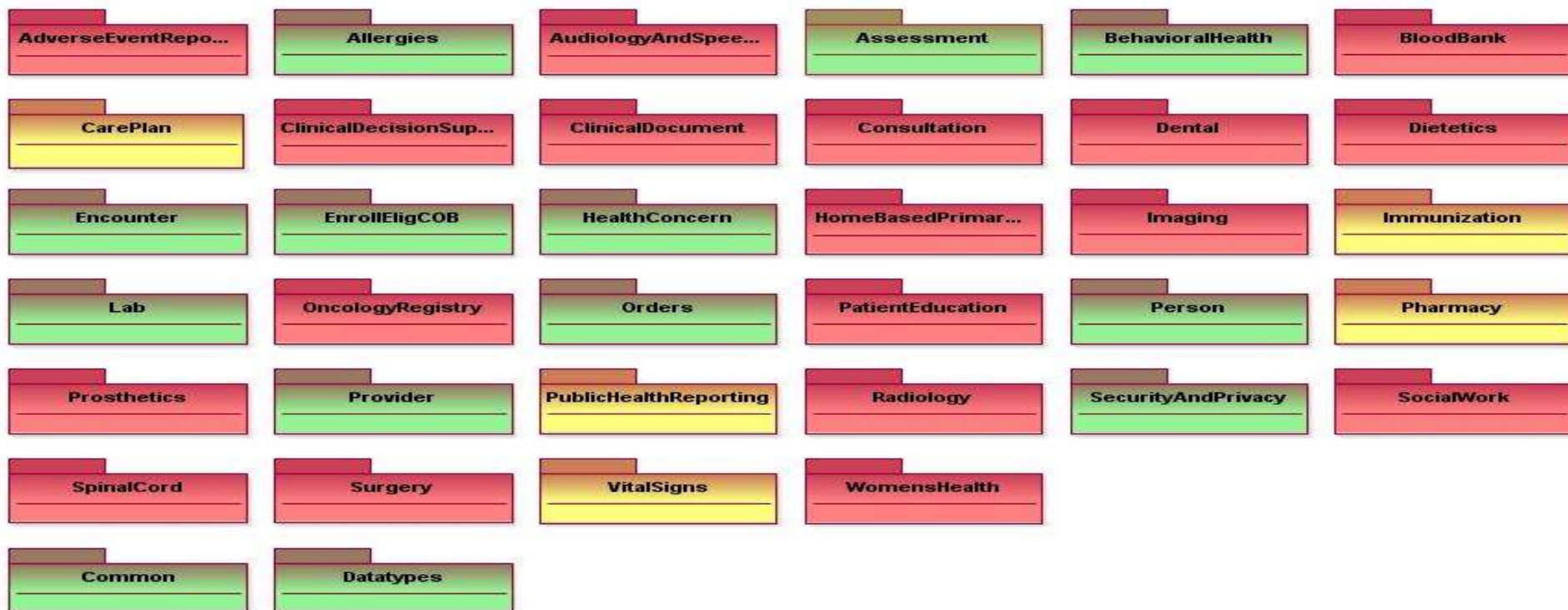


# EHR-S FIM Using Federal Health Information Model (FHIM)



[http://www.fhims.org/content/420A62FD03B6\\_root.html](http://www.fhims.org/content/420A62FD03B6_root.html)

FHA Federal Health Information Model (FHIM)



FHIM modeling complete

FHIM modeling in progress

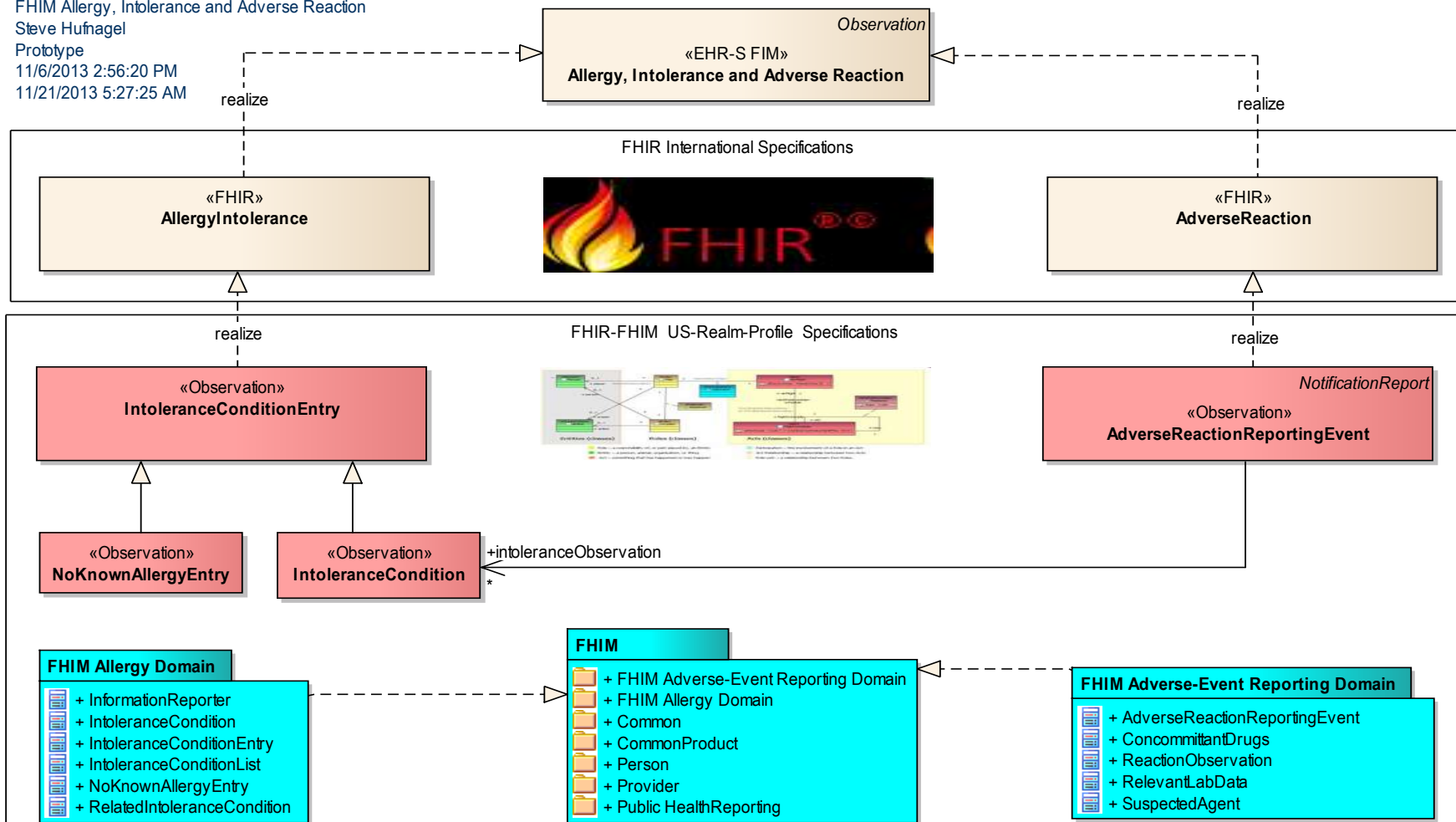
Unchanged from the VHIM

Color Key

# Prototype Allergy, Intolerance & Adverse-Reaction FHIM High-Level US-Realm Specification

## class FHIM Allergy, Intolerance and Adverse Reaction

Name: FHIM Allergy, Intolerance and Adverse Reaction  
 Author: Steve Hufnagel  
 Version: Prototype  
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 Updated: 11/21/2013 5:27:25 AM



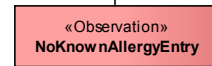
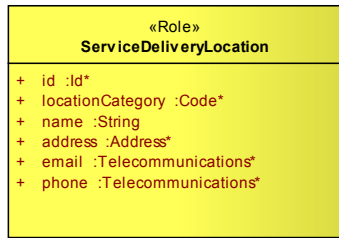
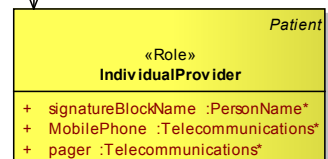
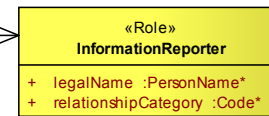
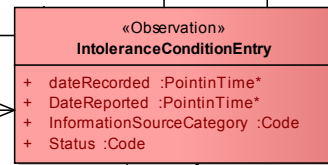
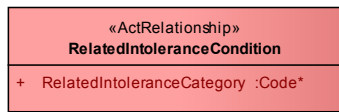
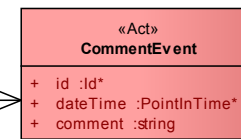
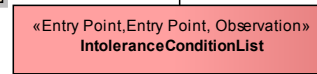
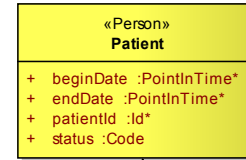
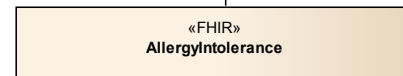
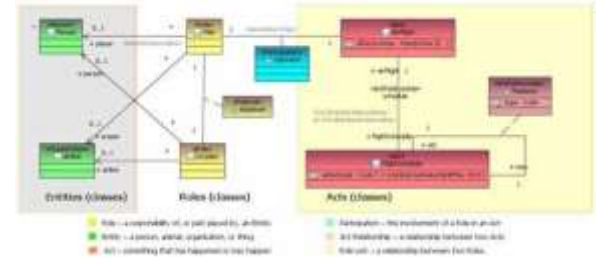
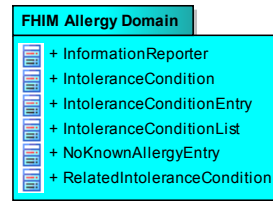
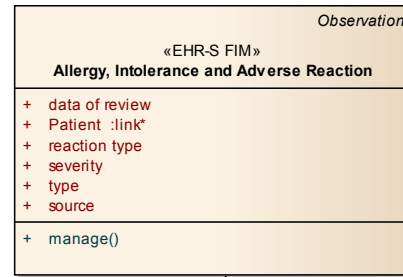


# Prototype

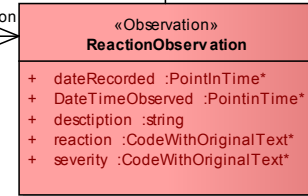
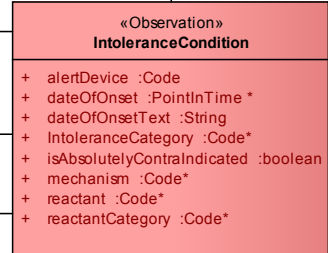
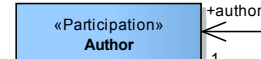
## FHIM-Detailed Allergy & Intolerance Specification

class FHIM Allergies Domain

Name: FHIM Allergies Domain  
 Author: Steve Hufnagel  
 Version: Prototype  
 Created: 11/6/2013 4:40:24 AM  
 Updated: 11/8/2013 4:50:55 PM



May need to know drug allergies and no known food allergies entries



Note that participation classes are used when we need date/time or comments, otherwise, we point directly to Individual Provider. This why there are "authors" from Comment Event, etc., but Intolerance Condition uses the Author Participation.

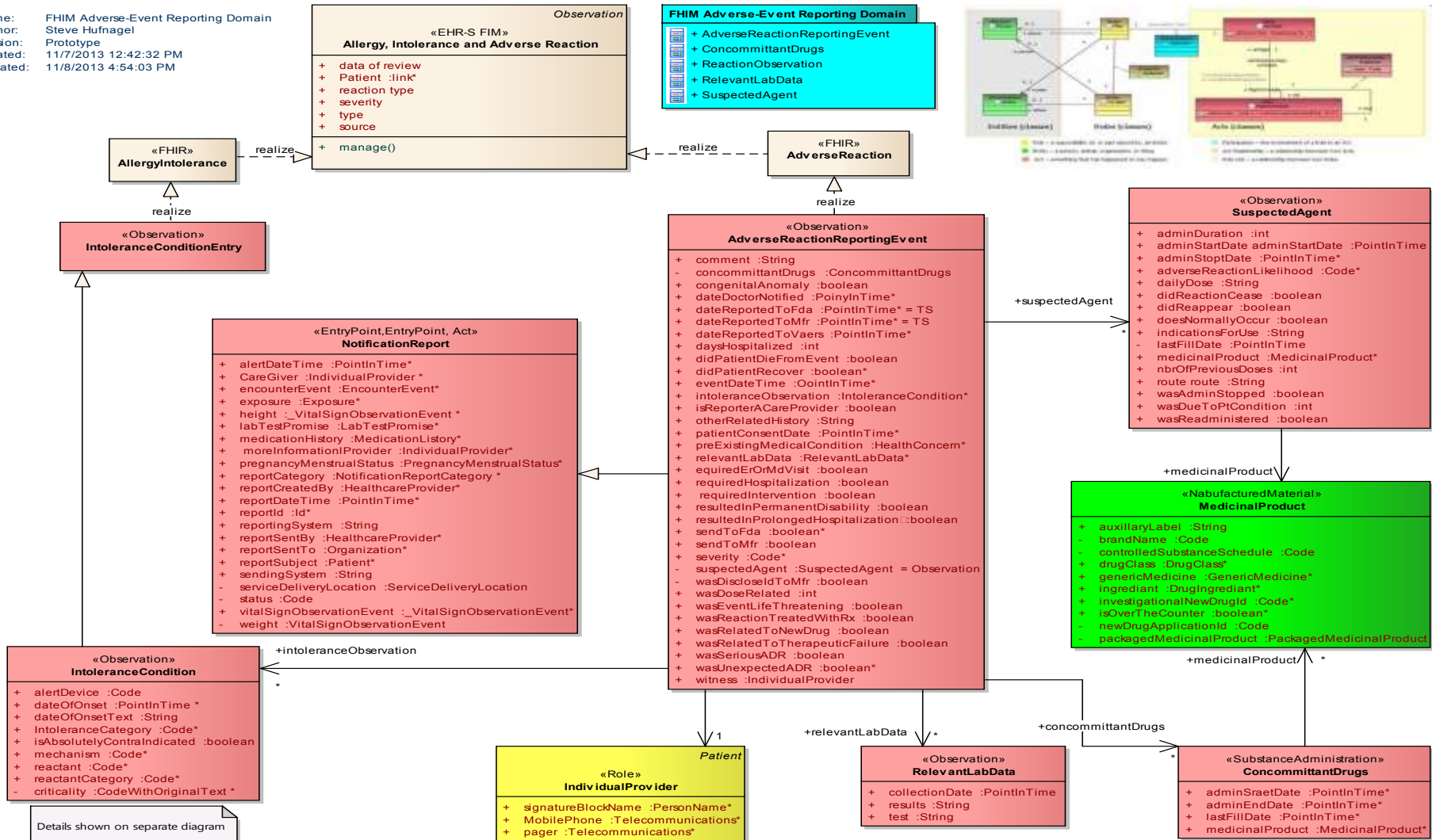
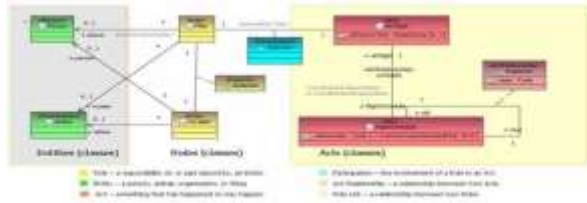
# Prototype FHIM Detailed Adverse-Reaction Specification

class FHIM Adverse-Event Reporting Domain

Name: FHIM Adverse-Event Reporting Domain  
 Author: Steve Hufnagel  
 Version: Prototype  
 Created: 11/7/2013 12:42:32 PM  
 Updated: 11/8/2013 4:54:03 PM

**FHIM Adverse-Event Reporting Domain**

- + AdverseReactionReportingEvent
- + ConcomittantDrugs
- + ReactionObservation
- + RelevantLabData
- + SuspectedAgent



Details shown on separate diagram

# ■ Immunization Prototype Allergy, Intolerance & Adverse-Reaction EHR-S FIM-FHIR & FHIM Requirements-Specifications

## Prototype Conclusions

EHR-S FIM, FHIR, FHIM, MDHT complement each other; where,

- EHR-S FIM defines Requirements; including,
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- FHIR defines International Data-Specifications (“The 80% solution set”)
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- Joint Configuration Mgmt. will help FIM/FHIR/FHIM consistency; ideally,
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**ISSUES:** FIM-FHIR-FHIM-MDHT consistency, tool usability, configuration mgmt, IP licensing.

**RECOMMENDATION:** [www.HL7.org/EHRSFIM](http://www.HL7.org/EHRSFIM) web site for browsing & feedback.

# EHR-S FIM, FHIR, FHIM & MDHT Development Relationship in DOD-VA

## Development of Conceptual View

Capability Approach Proposal (CAP) identifies candidate-reusable FHIM/CLIM SCS-content; where, missing content will require new DCM / SCS development

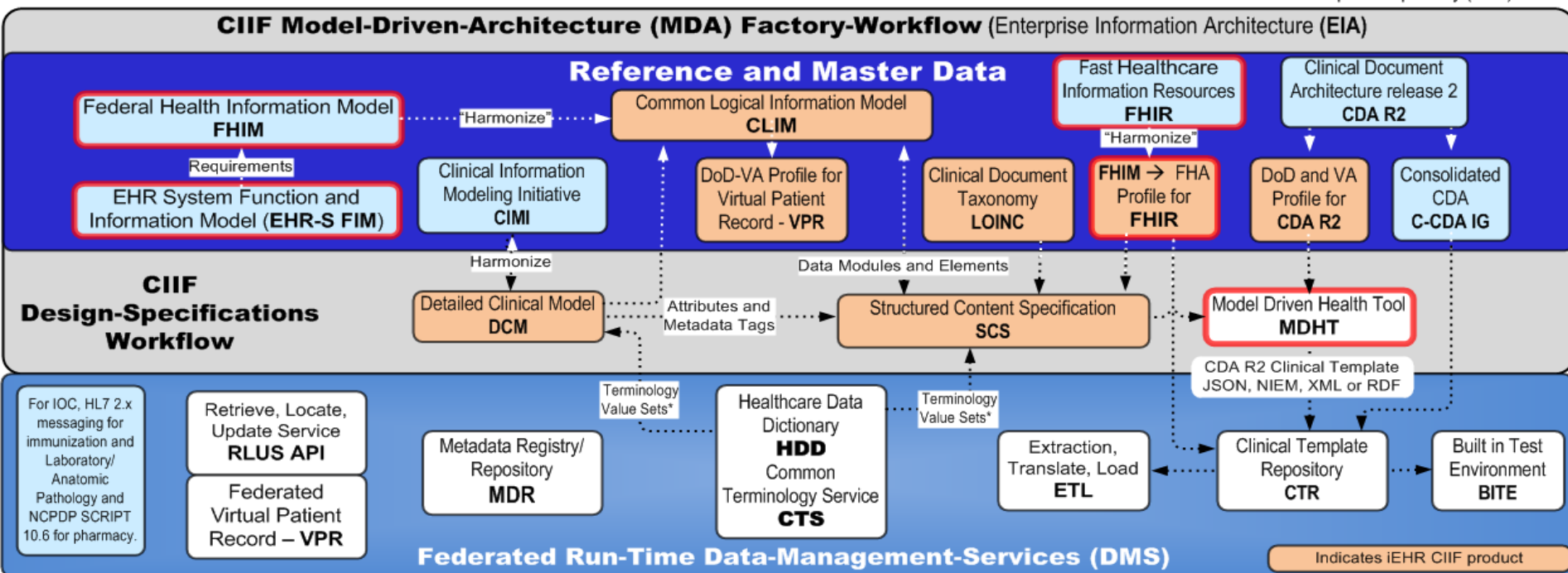
## Development of Logical View

Interoperability Specification (IS) contains the SCSs for each capability's Information Exchange (IE)

## Development of Physical View

C-CDA and CDA R2 schemas supporting FHIR data-module content, bound to terminology value sets, within the Run-Time Clinical Template Repository (CTR)

### CIIF Model-Driven-Architecture (MDA) Factory-Workflow (Enterprise Information Architecture (EIA))



\* Terminology Value Sets are distributed by Public Health Information Network Vocabulary Access and Distribution System (PHIN VADS).

DoD Architectural Framework (DODAF) Data and Information Viewpoints (DIVs) = Enterprise Information Architecture (EIA); where,

- DODAF DIV-1 = EIA Conceptual Data Model (CDM) = CIIF Common Logical Information Model (CLIM) classes and associations, without attributes
- DODAF DIV-2 = EIA Logical Platform Independent Model (PIM) = CIIF Fast Healthcare Information Resources (FHIR) data modules / classes
- DODAF DIV-3 = EIA Physical Platform Specific Model (PSM) = CIIF Clinical Template schemas

# Operational View of DOD-VA Sharing Using FHIR

