



December 2013

### EHR Work-Group (EHR WG)

## Cumulative FY14 Summary-Report

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Edmond Scientific subcontractor to Veterans Health Administration/  
Health Informatics/ Office of Informatics & Analytics/ Knowledge Based Systems

The complete-and-latest version of the Summary-Report is available at:  
[http://wiki.hl7.org/images/0/0a/Hufnagel - FY2014 HL7-EHR-WG Summary-Report.pdf](http://wiki.hl7.org/images/0/0a/Hufnagel_-_FY2014_HL7-EHR-WG_Summary-Report.pdf)

## EXECUTIVE SUMMARY Release-3 EHR-S and PHR-S FIM

*This executive-summary and report specifically address potential EHR impacts and/or EHR trends, which are important for the VA, IPO and DOD to-be aware-of.*

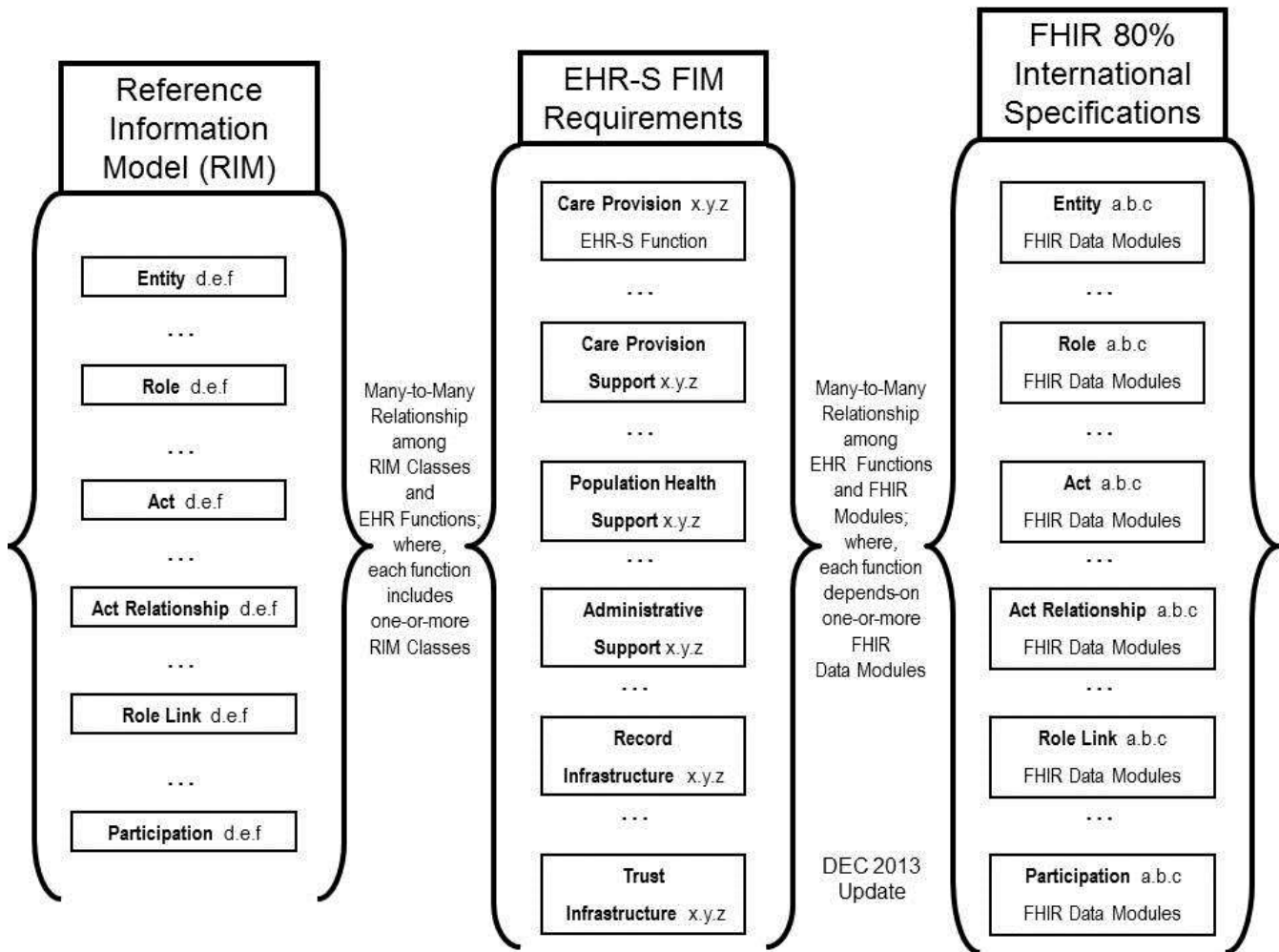


Figure 1 HL7 EHR-S FIM release-3 Relationship with HL7 RIM-and-FHIR [Jan 2012 PSS #688]

**INTRODUCTION:** the *purpose* of this report is to document the tentative '2016 release-3 EHR-and-PHR System Function-and-Information-Model (FIM) development and related projects; where, EHR-S FIM release-3 restructures and adds an information model to the '2013 release-2 EHR-S FM. An agile approach is being followed, where monthly report-content is refined; until ultimately, EHR-S and PHR-S FIM can be generated by the Sparx Enterprise Architect tool as a demonstration of the release-3 FIM "Easy-Button" Interoperability-Specification (IS) report-generation capability. All EHR WG release-3 FIM working-draft documentation is published at [http://wiki.hl7.org/index.php?title=EHR\\_Interoperability\\_WG](http://wiki.hl7.org/index.php?title=EHR_Interoperability_WG).

## LEGEND:

- 1) Capitalized and Underlined nouns-and-adjectives are Record-Entry data-types aka data-model, which should be in the EHR-S FM data dictionary; and, *italicized* verbs are *manage* sub-types aka verb-hierarchy. See [www.skmtglossary.org](http://www.skmtglossary.org) for standard healthcare data-dictionary / glossary.
- 2) **Blue-Bold words** are recommended -additions to original text.
- 3) **Red-Bold words** are recommended-deletions from the original text.
- 4) **Highlighted Yellow words** are issues-Actions and/or important new material for the main EHR WG to-review.

**GOAL:** The *goal* of the Electronic Health Record (EHR) Work Group (WG) is to support the HL7 mission of developing standards for EHR data, information, functionality, and interoperability. The Work Group creates and promotes appropriate and necessary standards. EHR WG *objectives* include:

- 1) Functional-and-Information Requirements-**Specifications** for Electronic Health Records (EHR) and systems (**EHR-S**),
  - 2) Functional-and-Information Requirements-**Specifications** for Personal Health Records (PHR) and systems (**PHR-S**),
  - 3) Definition of a high-level framework to support the interoperability requirements-**specifications** and life cycles, and
  - 4) Identification of existing and emerging information **interoperability**-requirements and **related HL7 artifacts**.
- A Jan 2012 Project #688 System Function-and-Information Model release-3 (**EHR-S FIM r3**) *objective* of the EHR Interoperability WG is an **UML-specified EHR/PHR Concept-of-Operations (CONOPS), Reference Model (RM), set-of Function Use-Cases with Conformance-Criteria Scenarios; where, EHR-S FIM r3 is to-be**
    - create a clear, complete, concise, correct, consistent and easy-to-use; because,
    - **HL7 ballot-publishable from the Sparx Systems Enterprise-Architect tool**
    - **targeted for 3-to-5 years from now; because,**
      - **joint ISO-HL7 ballots are very challenging to manage and**
      - **sufficient-time is needed to address the structural issues identified by the EHR-S FM r2 ballot; where, VA voted negative, due to inconsistency, non-intuitiveness and unnecessary-complexity/non-usability.**
  - A *second-objective* of the EHR Interoperability WG is to produce a Meaningful Use profile for EHR-S FM r2 and r3.
  - The *objective* of the Resource Management Evidentiary Support (RM-ES) project team is to provide expertise to the EHR work group, other standards groups and the healthcare industry on records management, compliance, and data/record integrity for, EHR systems and related to EHR governance to support the use of medical records for clinical care and decision-making, business, legal and disclosure purposes.
  - The *objective* of the EHR Usability Project is to translate existing, well established usability guidelines and health information management principles into functional conformance-criteria in the EHR-S FM standard.

# SITUATION

## EHR-S and PHR-S FIM '2016 Release-3 Preparation

An EHR/PHR **Concept-of-Operation** (CONOPS) was defined-and-refined into a **System Reference-Model** (RM); where,

- 1) **System Functions** are defined-by **Use-Cases**; where,
  - a) **System-operations** are verbs refined into a "**manage verb-hierarchy**" aka operation-type model,
  - b) **System-entities** are subject-and-object nouns refined into a "**Record-Entry data-model**" aka data-type model
  - c) **Terminology value-sets** are bound-to discrete-data-elements within each Record-Entry.
- 2) **Requirements** Conformance-Criteria are defined-by use-case scenarios; where,  
**Scenarios** define **business-context** and **subject-verb-object-terminology bindings**; where,
- 3) **Business-Context** is defines pre, post and invariant conditions; where,
  - a) **pre-condition** are triggers, followed by
  - b) **applicability**; where,
    - i) "The System SHOULD or SHALL or MAY"
    - ii) "provide-the-ability-to-manage Record-Entries" or "directly-manage Record-Entries," where,
      - (1) a use-case constrained manage-hierarchy verbs apply and
      - (2) a use-case constrained data-model nouns applies; where,
  - c) **post-condition** Business-Rules are  
"according-to scope-of-practice, organizational-policy, jurisdictional-law, and patient-preferences."
- 4) **Information-Exchanges** are defined-by scenarios mapped-to
  - a) **FHIR** (Fast Healthcare Interoperability Resource) specifications, for the International-Realm, profiled-with
  - b) **FHIM** (Federal Health Information Model) specifications, for the US-Realm, bound to
    - **Terminology value-sets**,
  - c) **IHE information-exchange behavioral-protocols** refined by,
    - **SLA** and **DURSA** (Service-level-agreement Data-Use-and-Reciprocal-Support-Agreement ) and
    - **KPPs** (Key Performance Parameters).
    - **Cost** estimation factors
- 5) **EHR-S/PHR-S Profiles** are defined-by a set-of System-Function Use-Cases, with further constrained scenario' Applicability, business-context and subject-verb-object-terminology bindings.
- 6) **Interoperability-Specifications** are generated with the FIM r3 reporting-tool.

The **benefit** of this formally-specified **Concept-of-Operation** (CONOPS) and **Reference Model** (RM) is a clear, complete, concise, correct and consistent Function-and-Information Model (FIM) and resultant Interoperability-Specifications (ISs).

## ACTIONS

1. **HL7 Board approval** of EHR-S FIM Release-3 open-IP; where, the EHR-S FIM home page is [www.hl7.org/EHRSFIM](http://www.hl7.org/EHRSFIM)
2. **FHIR WG Coordination** to integrate EHR-S FIM-FHIR into a joint Sparx Enterprise Architect (EA) model; where, EA can generate integrated EHR-S FIM-FHIR International-Realm interoperability requirements-specifications
3. **FHIM Team Coordination** to integrate EHR-S FIM-FHIR-FHIM into a joint Sparx Enterprise Architect (EA) model; where EA can generate integrated EHR-S FIM-FHIR-FHIM US-Realm interoperability requirements-specifications
4. **Call-for-Participation** in EHR-S/PHR-S FIM r3 based on a common EHR-S/PHR-S RM (Reference Model), where, 6 Full Time Equivalent (FTE) level-of-effort is estimated (2-FTEs per-year for three-years)  
Calls every-Tuesday, 1PM ET, + 1-770-657-9270, PC 510269# and please joint EHR Interoperability ListServer

## Release-3 EHR-S and PHR-S FIM Plan-of-Actions & Milestones Dashboard

POA&M Task	#	Start	Done	POC	Comment
CONOPS		12-2013	12-2013	SH, GD	Potential for minor changes in the future
Reference Model		06-2013	12-2013	SH, GD	Potential for minor changes in the future
manage operation-type			05-2013	EHRWG	Verb-Hierarchy w as part of r2 ballot
Record-Entry data-types		01-2012	active	SH, GD	Data-Model to-be refined for each function
www.HL7.org/EHR&FIM		01-2014		EHRWG	<b>ISSUE:</b> Open IP approval by board
FHIR Integration		01-2014		EHRWG	<b>ISSUE:</b> Integrated or linked models?
FHIM Integration		01-2014		EHRWG	<b>ISSUE:</b> Integrated or linked models?
EHR-S FIM r3 Resources	6	01-2014		EHRWG	<b>ISSUE:</b> 6 FTEs for EHR-S & PHR-S FIM r3
Other work (Pub., FHIR, FHIM)		pending	1-2017	EHRWG	1 FTE
EHR-S specific work		pending	1-2017	EHRWG	1 FTE
PHR-S specific work		pending	1-2017	EHRWG	1 FTE
EHR-S and PHR-S FM Modelling specific	143	1-2014	1-2017	Interop	3 FTEs = 1 week-per-function (143)
<b>Care Provision</b>	<b>37</b>				
CP.1 Manage Clinical History	9	pending			
CP.2 Render Externally Sourced Information	2	pending			
CP.3 Manage Clinical Documentation	6	pending			
CP.4 Manage Orders	7	01-2012	inactive	SH, GD	√ 2012 prototype → Todo wrt RM
CP.5 Manage Results	2	01-2012	inactive	SH, GD	√ 2012 prototype → Todo wrt RM
CP.6 Manage Treatment Administration	3	01-2012	inactive	SH, GD	√ 2012 prototype → Todo wrt RM
CP.6.1 Medication Management			active		
CP.6.2 Immunization Management		10-2013			√ Use case done, CCs in progress
CP.7 Manage Future Care	3	pending			
CP.8 Manage Patient Education & Communication	2	pending			
CP.9 Manage Care Coordination & Reporting	3	pending			
<b>Care Provision Support</b>	<b>67</b>				
CPS.1 Record Management	14	pending			
CPS.2 Support Externally Sourced Information	9	pending			
CPS.3 Support Clinical Documentation	13	pending			
CPS.4 Support Orders	10	pending			
CPS.5 Support for Results	1	pending			
CPS.6 Support Treatment Administration	5	pending			
CPS.7 Support Future Care	2	pending			
CPS.8 Support Patient Education & Communication	7	pending			
CPS.9 Support Care Coordination & Reporting	6	pending			
<b>Population Health Support</b>	<b>17</b>				
POP.1 Support for Health Maintenance, Preventive Care and Wellness	3	pending			
POP.2 Support for Epidemiological Investigations of Clinical Health Within a Population	1	pending			
POP.3 Support for Notification and Response	1	pending			
POP.4 Support for Monitoring Response Notifications Regarding a Specific Patient's Health	1	pending			
POP.5 Donor Management Support	1	pending			
POP.6 Measurement, Analysis, Research and Reports	6	pending			
POP.7 Public Health Related Updates	1	pending			
POP.8 De-Identified Data Request Management	1	pending			
POP.9 Support Consistent Healthcare Management of Patient Groups or Populations	1	pending			
POP.10 Manage Population Health Study -	1	pending			

POA&M Task	#	Start	Done	POC	Comment
Related Identifiers					
<b>Administration Support</b>	22				
AS.1 Manage Provider Information	8	pending			
AS.2 Manage Patient Demographics, Location and Synchronization	1	pending			
AS.3 Manage Personal Health Record Interaction	3	pending			
AS.4 Manage Communication	5	pending			
AS.5 Manage Clinical Workflow Tasking	5	pending			
AS.6 Manage Resource Availability	7	pending			
AS.7 Support Encounter/Episode of Care Management	6	pending			
AS.8 Manage Information Access for Supplemental Use	6	pending			
AS.9 Manage Administrative Transaction Processing	6	pending			
<b>Trust Infrastructure</b>					
T1.1 Security	25	01-2012	inactive	GD, SH	√ 2012 prototype → Todo wrt RM
T1.2 Audit	1	01-2012	inactive	GD, SH	√ 2012 prototype → Todo wrt RM
T1.3 Registry and Directory Services	1	pending			
T1.4 Standard Terminology and Terminology Services	1	pending			
T1.5 Standards-Based Interoperability	6	pending			
T1.6 Business Rules Management	1	pending			
T1.7 Workflow Management	1	pending			
T1.8 Database Backup and Recovery	1	pending			
T1.9 System Management Operations and Performance	1	pending			
<b>Record Infrastructure</b>					
RI.1 Record Lifecycle and Lifespan RI.1.1.2 Record Entry Create	25	12-2012	inactive	GD, SH	√ 2012 prototype → Todo wrt RM
RI.2 Record Synchronization	1	pending			
RI.3 Record Archive and Restore	1	pending			

## WORKGROUP AND PROJECT LOGISTICS

- HL7 List Server Registration: <http://www.hl7.org/myhl7/managelistsevs.cfm>
- HL7 Workgroup Call-Schedule: <http://www.hl7.org/concalls/default.aspx>
- EHR WG Wiki: <http://wiki.hl7.org/index.php?title=EHR>

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	EHR-S 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 CCD to Blue Button Tool Project Wiki** - This project defined the conversion of an HL7 Continuity of Care Document (CCD) to the Blue Button format via an XSLT style sheet tool.  
Project contact: Lenel James and Keith Boone. List Service: [EHRTeamCCD@lists.hl7.org](mailto:EHRTeamCCD@lists.hl7.org)
- **EHR-S FM Profile Tool Project Wiki** – This project, sponsored by the HL7 Tooling Workgroup, will produce a (web-based and/or desktop) tool to create EHR-S FM profiles (starting with the EHR-S FM R2), with enforced profiling rules, and exports as documents, support for and XML interchange format for reuse across profile tool instances or for use in other tools. Project contact: John Ritter; [johnritter1@verizon.net](mailto:johnritter1@verizon.net)
- **EHR Usability Project Wiki** This project has been launched to translate existing, well established usability guidelines and health information management principles into functional criteria in the EHR System Functional Model (EHR -S FM) standard.  
Project contact: John Ritter, Don Mon, Mitra Rocca and Walter Suarez  
List Service: [ehrwgusability@lists.hl7.org](mailto:ehrwgusability@lists.hl7.org)
- **PHR Project Wiki** The HL7 Personal Health Record System Functional Model provides a reference list of functions that may be present in a Personal Health Record System (PHRS).  
Project contact: John Ritter; [johnritter1@verizon.net](mailto:johnritter1@verizon.net)
- **Diabetes Data Strategy Project Wiki** The scope for this project is to focus on the minimum data set and data standards in EHR systems for diabetes assessment in children in outpatient clinic settings, based on clinical and business requirements. Project contact: Don Mon; [donmon@rti.org](mailto:donmon@rti.org)



## REFERENCE INFORMATION

### 1) Common Clinical informatics standards:

- a) **SNOMED CT** for problems, smoking status
- b) **DICOM** for radiology
- c) **LOINC** for laboratory anatomical pathology, **LOINC** taxonomy for document types for inpatient notes
- d) **RxNorm** for pharmacy
- e) **CVX** and **MXV** for immunology
- f) **HITSP C32**, **HL7 CCD** and **CCDA-CCD** for VLER Health data
- g) **ICD9 CPT4/HCPCS ICD9PCS** for TRICARE billing data.
- h) **ICD-10** and **SNOMED CT** for outpatient visits, **ICD-10** and **LOINC** for admissions encounter data
- i) **CPT4** and **HCPCS** for procedures
- j) **PDA-F** for scanned paper reports
- k) **CDC** value set race codes for demographics
- l) **UCUM** for units of lab measures
- m) **NUCC** Health provider taxonomy for provider types

### 2) Common technical standards:

- a) **CTS** or Common Terminology Service
- b) **FHIR** or Fast Healthcare Interoperability Resource with RESTful API.
- c) **CDS** or Clinical Decision Support API
- d) **CCDA** is Consolidated CDA
- e) **VPR** or Virtual Patient Record
- f) **RDF** or Resource Description Framework for semantic web applications
- g) **RLUS** or Retrieve Locate Update Service for heterogeneous database facades
- h) **JSON** or JavaScript Object Notation
- i) **WS\*** or Web Service Standards

### 3) EHR-S FM r2.0 Perspectives

#### a) Care Provision

- i) CP.1 Manage Clinical History
- ii) CP.2 Render Externally Sourced Information
- iii) CP.3 Manage Clinical Documentation
- iv) CP.4 Manage Orders
- v) CP.5 Manage Results
- vi) CP.6 Manage Treatment Administration
- vii) CP.7 Manage Future Care
- viii) CP.8 Manage Patient Education & Communication
- ix) CP.9 Manage Care Coordination & Reporting

#### b) Care Provision Support

- i) CPS.1 Record Management
- ii) CPS.2 Support Externally Sourced Information
- iii) CPS.3 Support Clinical Documentation
- iv) CPS.4 Support Orders
- v) CPS.5 Support for Results
- vi) CPS.6 Support Treatment Administration
- vii) CPS.7 Support Future Care
- viii) CPS.8 Support Patient Education & Communication
- ix) CPS.9 Support Care Coordination & Reporting

#### c) Population Health Support

- i) POP.1 Support for Health Maintenance, Preventive Care and Wellness
- ii) POP.2 Support for Epidemiological Investigations of Clinical Health Within a Population
- iii) POP.3 Support for Notification and Response
- iv) POP.4 Support for Monitoring Response Notifications Regarding a Specific Patient's Health
- v) POP.5 Donor Management Support
- vi) POP.6 Measurement, Analysis, Research and Reports

- vii) POP.7 Public Health Related Updates
- viii) POP.8 De-Identified Data Request Management
- ix) POP.9 Support Consistent Healthcare Management of Patient Groups or Populations
- x) POP.10 Manage Population Health Study-Related Identifiers

#### d) Administration Support

- i) AS.1 Manage Provider Information
- ii) AS.2 Manage Patient Demographics, Location and Synchronization
- iii) AS.3 Manage Personal Health Record Interaction
- iv) AS.4 Manage Communication
- v) AS.5 Manage Clinical Workflow Tasking
- vi) AS.6 Manage Resource Availability
- vii) AS.7 Support Encounter/Episode of Care Management
- viii) AS.8 Manage Information Access for Supplemental Use
- ix) AS.9 Manage Administrative Transaction Processing

#### e) Trust Infrastructure

- i) TI.1 Security
  - ii) TI.2 Audit
  - iii) TI.3 Registry and Directory Services
  - iv) TI.4 Standard Terminology and Terminology Services
  - v) TI.5 Standards-Based Interoperability
  - vi) TI.6 Business Rules Management
  - vii) TI.7 Workflow Management
  - viii) TI.8 Database Backup and Recovery
  - ix) TI.9 System Management Operations and Performance
- f) Record Infrastructure
- i) RI.1 Record Lifecycle and Lifespan
  - ii) RI.2 Record Synchronization
  - iii) RI.3 Record Archive and Restore

### 4) FHIR (Fast Healthcare Interoperability Resources)

- a) FHIR Data Dictionary is at <http://www.hl7.org/implementation/standards/fhir/>
- b) **FHIR Administrative**
  - i) Attribution: Patient, RelatedPerson, Practitioner, Organization
  - ii) Resources: Device, Location, Substance, Group
  - iii) Workflow Management: Encounter, Alert, Supply, Order, OrderResponse
  - iv) Financial: Coverage
- c) **FHIR Clinical**
  - i) General: AdverseReaction, AllergyIntolerance, CarePlan, FamilyHistory, Condition, Procedure, Questionnaire
  - ii) Medications: Medication, MedicationPrescription, MedicationAdministration, MedicationDispense, MedicationStatement, Immunization, ImmunizationProfile
  - iii) Diagnostic: Observation, DiagnosticReport, DiagnosticOrder, ImagingStudy, Specimen
  - iv) Device Interaction: DeviceCapabilities, DeviceLog, DeviceObservation
- d) **FHIR Infrastructure**
  - i) Support: List, Media, Other, DocumentReference, (Binary)
  - ii) Audit: Provenance, SecurityEvent
  - iii) Exchange: Document, Message, OperationOutcome, Query
  - iv) Conformance: Conformance, ValueSet, Profile

e) **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
- **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



# MONTHLY SUMMARIES

(Reverse Chronological Order)

## 6 1 November 2013

7 For details see [http://wiki.hl7.org/images/8/83/HL7\\_EHR-WG\\_Summary-Presentation\\_November\\_2013.pdf](http://wiki.hl7.org/images/8/83/HL7_EHR-WG_Summary-Presentation_November_2013.pdf)

- 9 1) **EHR WG** is waiting on the EHR-S FM Release-2 ISO ballot comments; where, the HL7 release-2 ballot-comments have already been reconciled. The ISO ballot closes on 3-Dec-2013; and then, the ISO-ballot-comments can be reconciled during December-and-January and EHR-S FM release-2 can be finalized in January 2014. The EHR WG has also been updating the EHR-S FM release-2 add-on to the Sparx EA-tool to support the creation of profiles.
- 14 2) **PHR WG** is waiting on the PHR FM Release-2 ISO ballot-comments, which close 3-Dec-2013 and will be reconciled during December-and-January; where, the HL7 release-2 ballot-comments have already been reconciled.
- 17 3) **EHR RMES WG** is discussing release authorization within the S&I Framework esMd group; where, esMD is analyzing the situation where healthcare-payers frequently request that providers submit additional medical-documentation for a specific claim, to support claims processing and other administrative functions, such as the identification of improper payments. Currently, Medicare Review Contractors request approximately 2 million medical documents per year by mailing a paper request letter via US Postal Service to healthcare providers. Until recently, providers had only two options for submitting the requested records: 1) mail paper or 2) send a fax. The manual paper process is costly, time consuming and can delay proper claims processing on both the senders' and receivers' end.
- 26 4) **EHR Usability WG** is collecting issues and mitigations into a reference library, which can be the basis of integrating usability into the release-3 EHR-S FIM.
- 28 5) **EHR Interoperability WG** focused on the May-2014 Meaningful-Use Profile for the EHR-S FM release-2 and preparation for release-3:2016; where, the November release-3 focus was to define Reference-Models for Concept-of-Operations, Function Information-and-Conformance-Criteria:
  - 31 • Figure 1 HL7 EHR-S FIM release-3 Relationship with HL7 RIM-and-FHIR [Jan 2012 PSS#688]
  - 32 • Figure 2 EHR-S/PHR-S Concept-of-Operations (CONOPS)
  - 33 • Figure 3 EHR-S/PHR-S RM
  - 34 • Figure 4 EHR-S/PHR-S RM Operation-Type Verb-Hierarchy
  - 35 • Figure 5 EHR/PHR-RM Data-Types Model
  - 36 • Figure 6 CP.6.2 Immunization-Management Use-Case Model
  - 37 • Figure 7 CP.6.2#01 Immunization-Management Conformance-Criteria Scenario-Model
  - 38 • Figure 8 EHR-S FIM-FHIR-FHIM Requirements-Specifications
  - 39 • Figure 9 Example EHR-S FIM-FHIR Requirements-Specifications
  - 40 • Figure 10 Example EHR-S FIM-FHIR-FHIM Requirements-Specifications

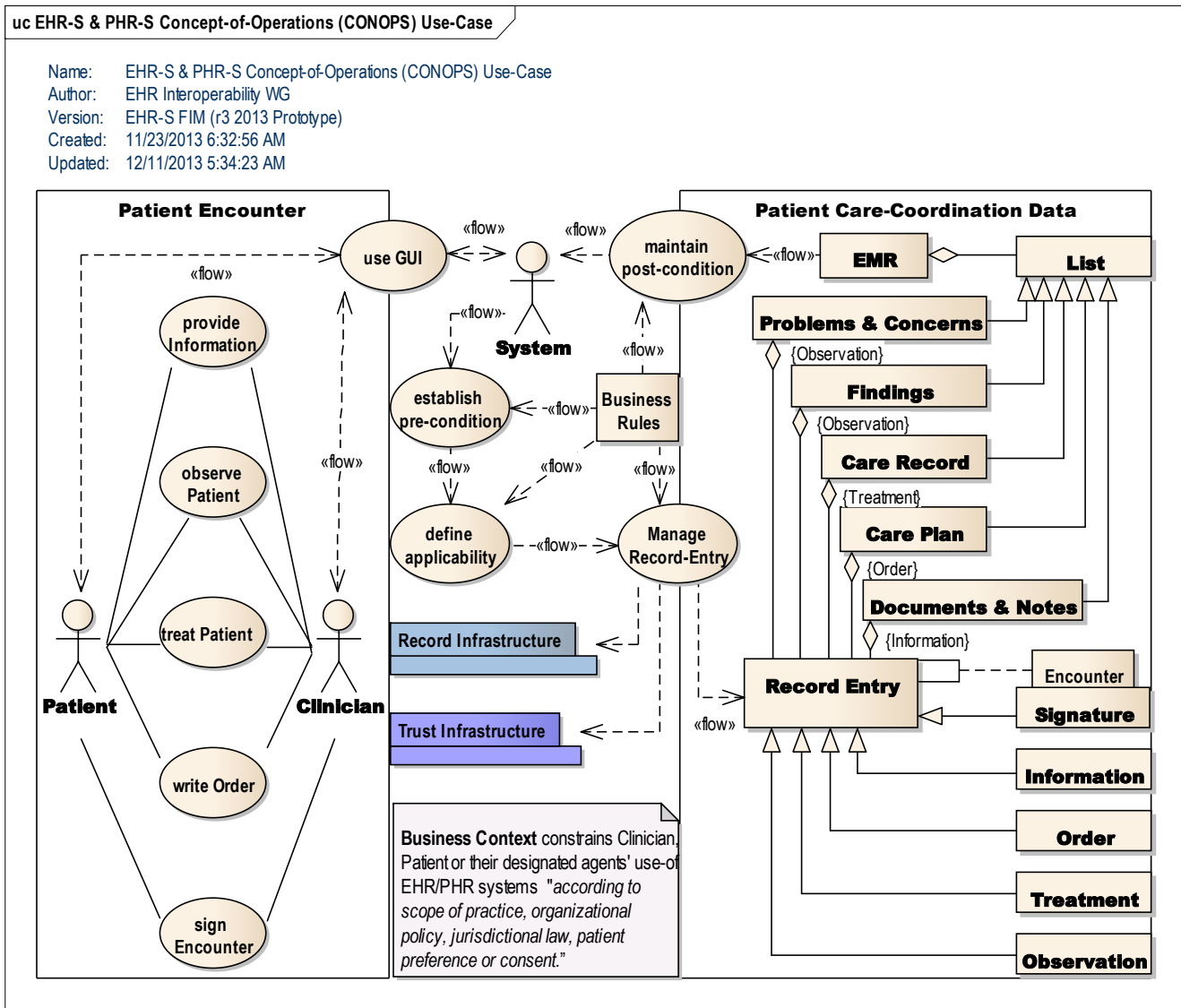
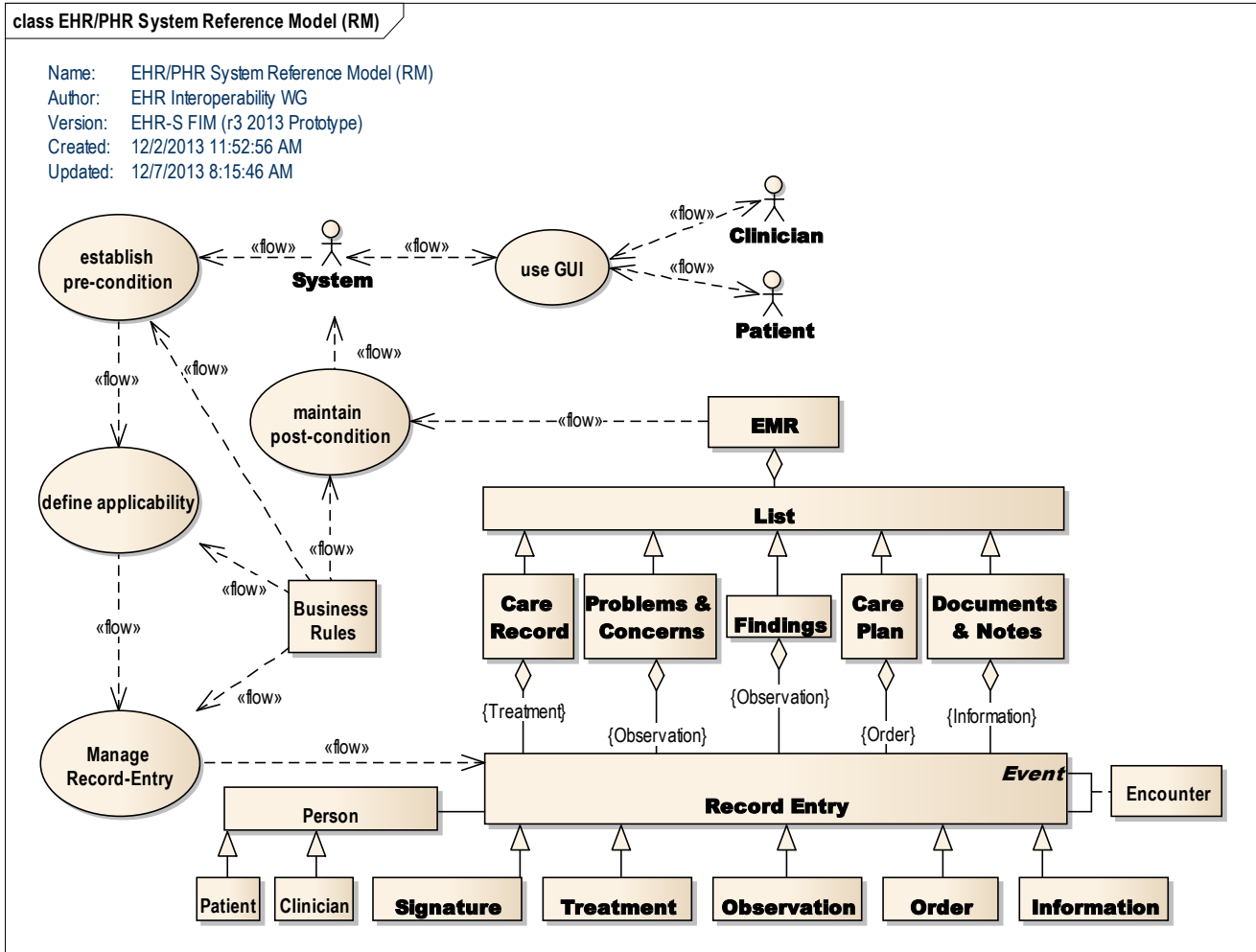


Figure 2 EHR-S/PHR-S Concept-of-Operations (CONOPS)

EHR-S and PHR-S Concept-of-Operations (CONOPS) Use-Case: A Clinician and/or Patient and/or their designated Agents have Encounters; where, they use a System GUI (Graphical-User-Interface) to manage Record-Entries and EMRs (Electronic Medical Records); where,

- The System, based-on business-context,
  - *establishes pre-conditions to trigger information flows*
  - *determines (SHALL/SHOULD/MAY) applicability for the System to-provide-the ability-to-manage or directly-manage*
    - Record-Entries and EMRs
  - *maintains post-conditions in accordance with*
    - *scope-of-practice, organizational-policy, jurisdictional-law, and patient-preferences.*
- The Clinician, Patient (or their designated agent) can
  - *review the Patient EMR (Electronic Medical Record) and associated Information*
  - *observe and treat the Patient, write Orders, document the Encounter, provide Information*

- 58 • provide patient-Information and educational-Information
- 59 • enter EMR Records and associated Information; where, Record Entries are typically
  - 60 • Orders organized-into Care-Plans,
  - 61 • Treatments organized-into Care-Records,
  - 62 • Observations and associated Information organized-into
    - 63 • Findings, Problems-and-Concerns, Documents & Notes
  - 64 • sign Encounter by the Clinician(s) and/or the Patient
- 65 • Conformance-Criteria Scenarios are threads-of-execution through the Use-Case Model.
- 66



67  
68 **Figure 3 EHR-S/PHR-S RM**

69 **The EHR Reference-Model (RM)**<sup>1</sup> [based-on OASIS RM definition]

70 1. Establishes pre-conditions

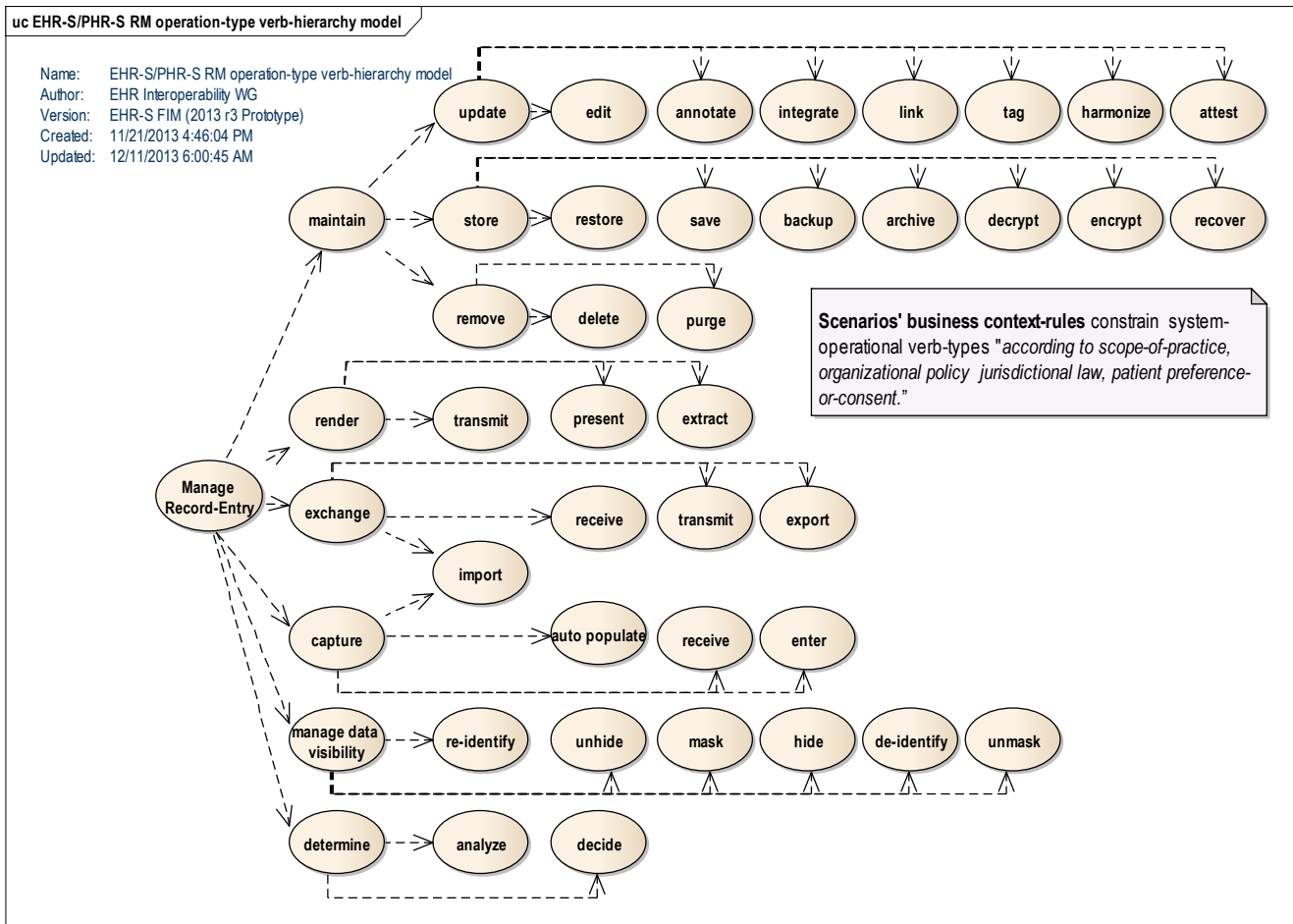
<sup>1</sup> According to the Organization for the Advancement of Structured Information Standards (OASIS) a reference model is "an abstract framework for understanding significant relationships among the entities of some environment, and for the development of consistent standards or specifications supporting that environment. A reference model is based on a small number of unifying concepts and may be used as a basis for education and explaining standards to a non-specialist. A reference model is not directly tied to any standards, technologies or other concrete implementation details, but it does seek to provide a common semantics that can be used unambiguously across and between different implementations."

- 71 2. Defines applicability (The System SHALL/SHOULD/MAY “provide-the-ability to *manage*” or “directly-*manage*”)
- 72 3. Structures **Record-Entry** relationships
- 73 – defined-by system operation-and-data models; where,
- 74 – EHR/PHR system RM is based-on a functional-use-case constrained hierarchical-lexicon of
- 75 • nouns (Record-Entry data-types) and noun qualifiers,
- 76 • verbs (*manage* operation-types) and verb qualifiers with
- 77 • conditions {Business Rules based on laws, policies, preferences}; where,
- 78 – Conformance Criteria (CC) are use-case scenario-threads (context and subject-verb-object bindings).
- 79 4. **Defines Function Conformance-Criteria (CC) scenarios’ syntax-and-semantics; where,**
- 80 – Pre-condition scenario triggers define a business-context
- 81 – CC Scenarios constrain the *manage* sub-types and Record-Entry sub-types
- 82 – Functions can-be linked-to Information Exchanges (IEs),
- 83 – IEs can-be linked-to implementation standards-technologies-paradigms-and-patterns (e.g., FHIR, FHIM, IHE).
- 84 5. Maintains post-conditions; where,
- 85

86 **A System-Function (SF) Use-Case** is a constrained-scope and refined-detail System Reference-Model; where,

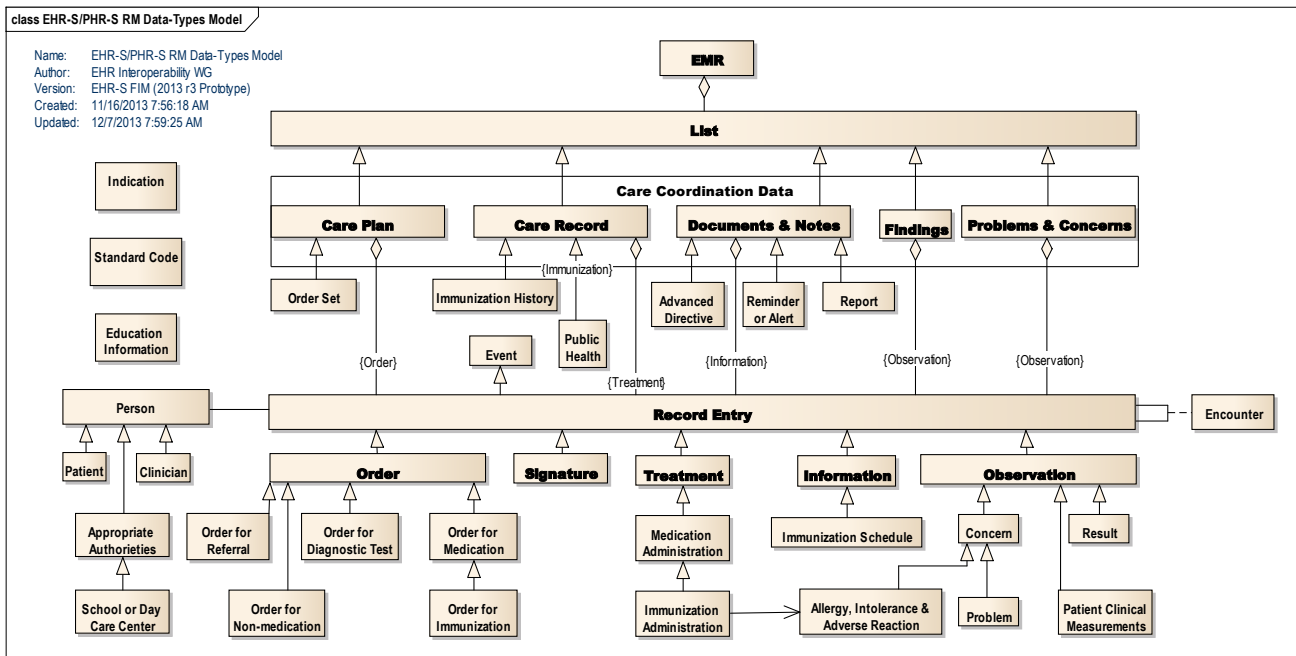
87 **SF Conformance-Criteria** are System-Action scenario-threads through the SF Use-Case Model containing:

- 88 1) **SF Invariant-condition** (context)
- 89 a) System Identifier (EHR or PHR)
- 90 b) System Function (SF) Identifier
- 91 c) Profile Identifier
- 92 2) **SF CC Identifier** (Number)
- 93 3) **SF CC Pre-condition** (trigger)
- 94 a) Pre-condition is a verb-clause.
- 95 b) After a Human-Action or System-Action; then,
- 96 4) **SF CC Applicability**
- 97 a) The System SHALL, SHOULD or MAY
- 98 i) “provide-the-ability-to”
- 99 ii) “directly”
- 100 5) **SF CC System-Action Bindings**
- 101 a) Operation linked-to Data-Type; where, conditionally,
- 102 b) the *System-Actions depends-on* other-SF
- 103 c) Data-Type are *associated-with* other Data-Types
- 104 d) Information Exchange(s) are *linked-to*
- 105 i) International Interoperability-Standards (e.g., FHIR)
- 106 ii) Realm Interoperability-Specifications (e.g., FHIM)
- 107 iii) Implementation Guides (e.g., Consolidated CDA)
- 108 iv) Behavioral Interoperability-Specifications (e.g., IHE)
- 109 v) Service Level Agreement (e.g., local workflow)
- 110 6) **SF CC Post-Condition** (expected-outcome)
- 111 a) Post-condition is a subordinate-clause.
- 112 b) “where, the System-Actions are ...”
- 113 7) **SF CC See Also**
- 114 a) Supporting or related SFs (e.g., Infrastructure)



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**Figure 4 EHR-S/PHR-S RM Operation-Type Verb-Hierarchy Model**



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**Figure 5 EHR/PHR-RM Data-Types Model**

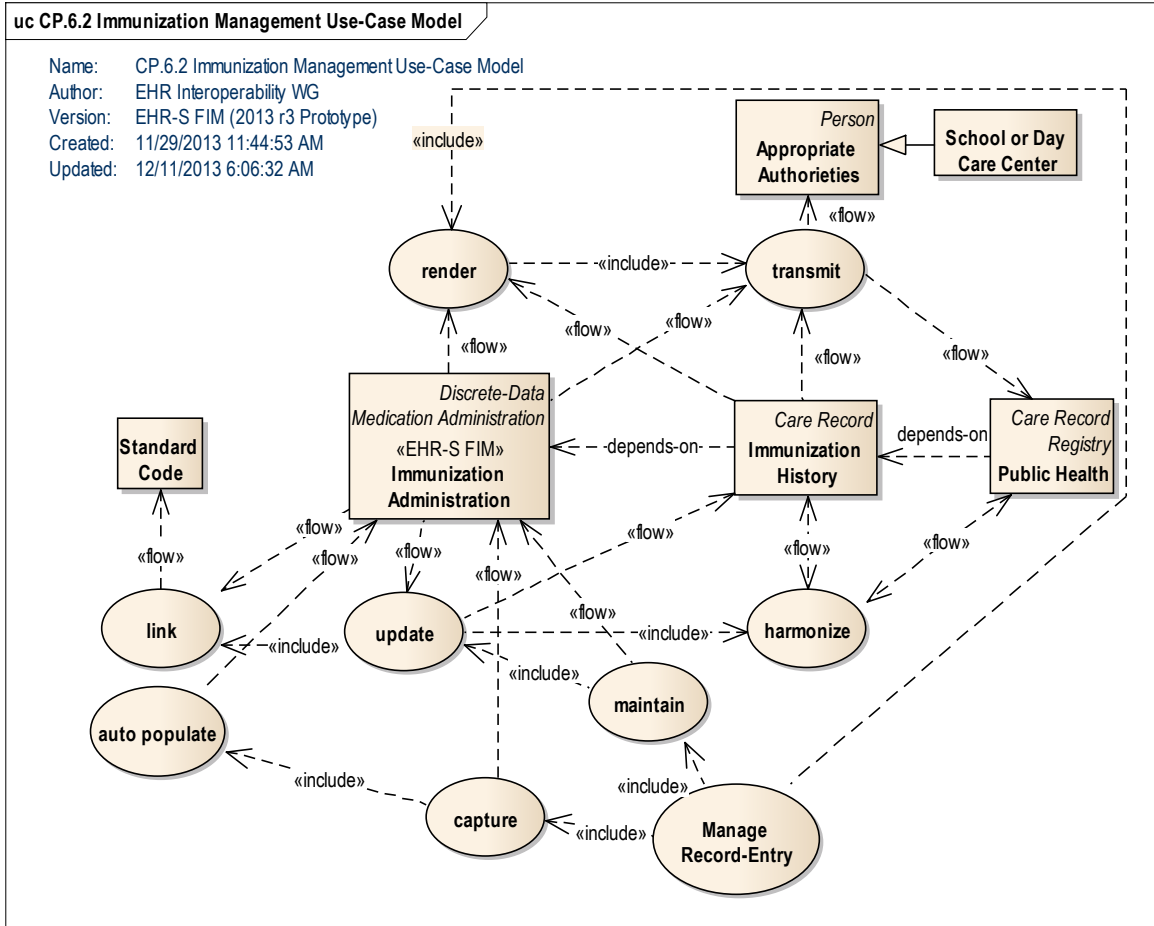


Figure 6 CP.6.2 Immunization-Management Use-Case Model

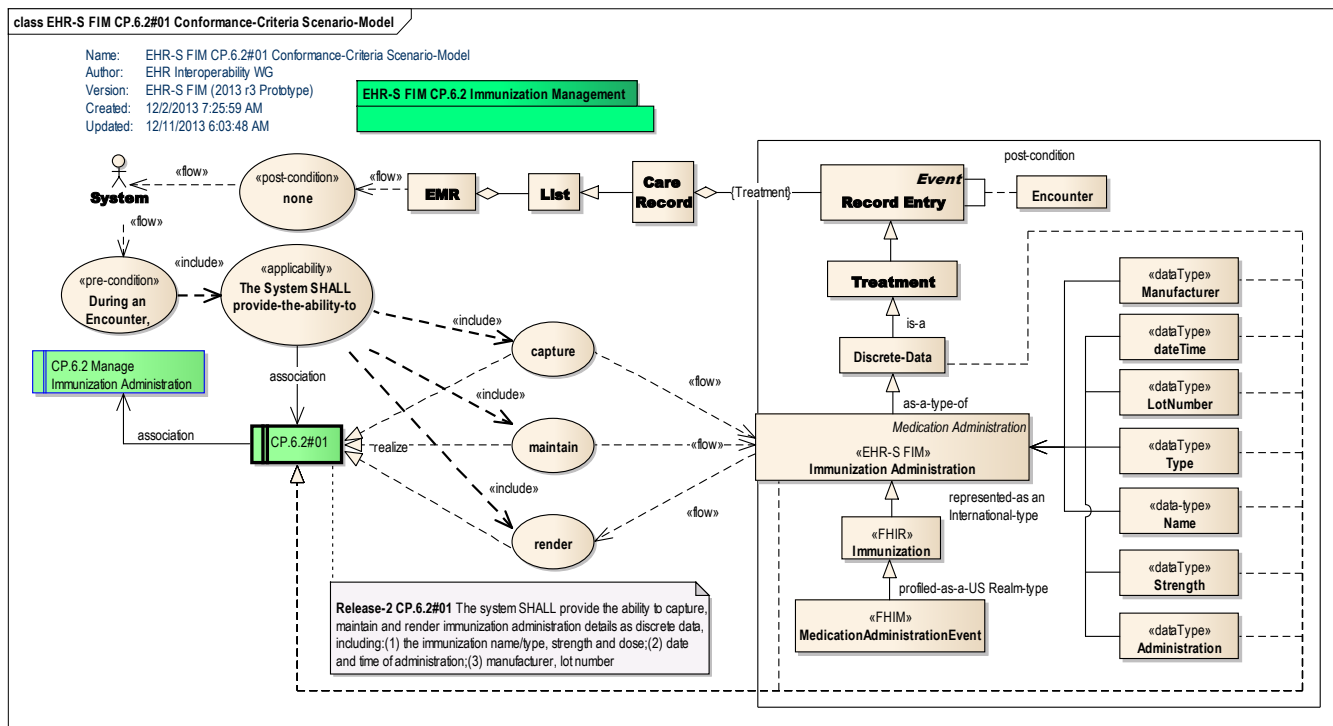
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The Release-3 EHR System Immunization-Management Function Use-Case includes

- 1) **A Clinician uses the EHR-S, during an Encounter, to**
  - a) *review* EMR, Alerts-and-Notifications
  - b) *enter* Observations, Treatments, Orders and associated Documents and Notes
  - c) *sign* the Encounter
  - d) **Immunization Management involves the following:**
    - i) **System-Actions:** *auto-populate, capture, determine, exchange, harmonize, link, maintain, manage, render, transmit, update*; where,
      - (1) Immunization-Administration is
        - (a) *linked* with Standard-Codes
        - (b) *transmitted* to Population Health Registries
        - (c) *auto-populated* as a by-product of verification of Administering-Provider, Patient, Medication, Dose, Route and Time.
      - (2) Immunization-History is
        - (a) *Updated*-with the Immunization-Administration Record-Entries
        - (b) *harmonized* with Public-Health Registries
        - (c) *rendered* and *transmitted*; where,



- 140 (i) transmitted to Appropriate Authorities (e.g., Schools and Day Care Centers);
- 141 ii) **Data:** Immunization-Administration, Immunization-History, Public-Health Registry
- 142 iii) **Associated Data:** Alerts-and-Notification, Allergy-Intolerance-or-Adverse-Event, Patient-Clinical-
- 143 Measurement, Patient-Directive, Immunization-Schedule, **Patient-Educational-Information**,
- 144 Signature.
- 145 e) Where all System-Actions are “according to scope-of-practice, organizational-policy, jurisdictional-law,
- 146 patient preference-or-consent.”
- 147



148 **Figure 7 CP.6.2#01 Immunization-Management Conformance-Criteria Scenario-Model**

149 CP.6.2#01 During an Encounter, the system SHALL provide-the-ability-to *capture, maintain and render*

150 Immunization Administration; where,

- 151
- 152
- 153 • Treatment Record-Entry details are as discrete-data, including
    - 154 – immunization name/type, strength and dose; date-and-time of administration;
    - 155 – manufacturer, lot number
  - 156 • Immunization Administration can be realized-by FHIR; where,
    - 157 – Immunization-Administration is then associated with the following resources:
      - 158 • AdverseReaction and other Observations,
      - 159 • Patient , Practitioner, Organization, Location;
  - 160 • Immunization-Administration can be realized-by FHIR-profiles based-on the US Realm FHIM
  - 161 Immunization and related Domains.
- 162

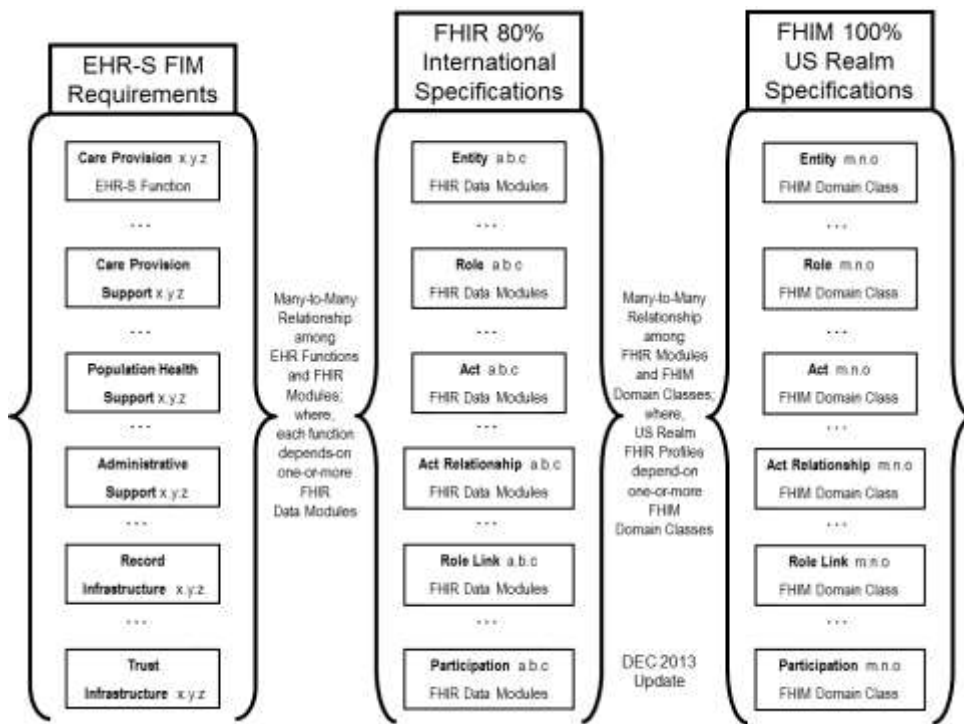


Figure 8 EHR-S FIM-FHIR-FHIM Requirements-Specifications

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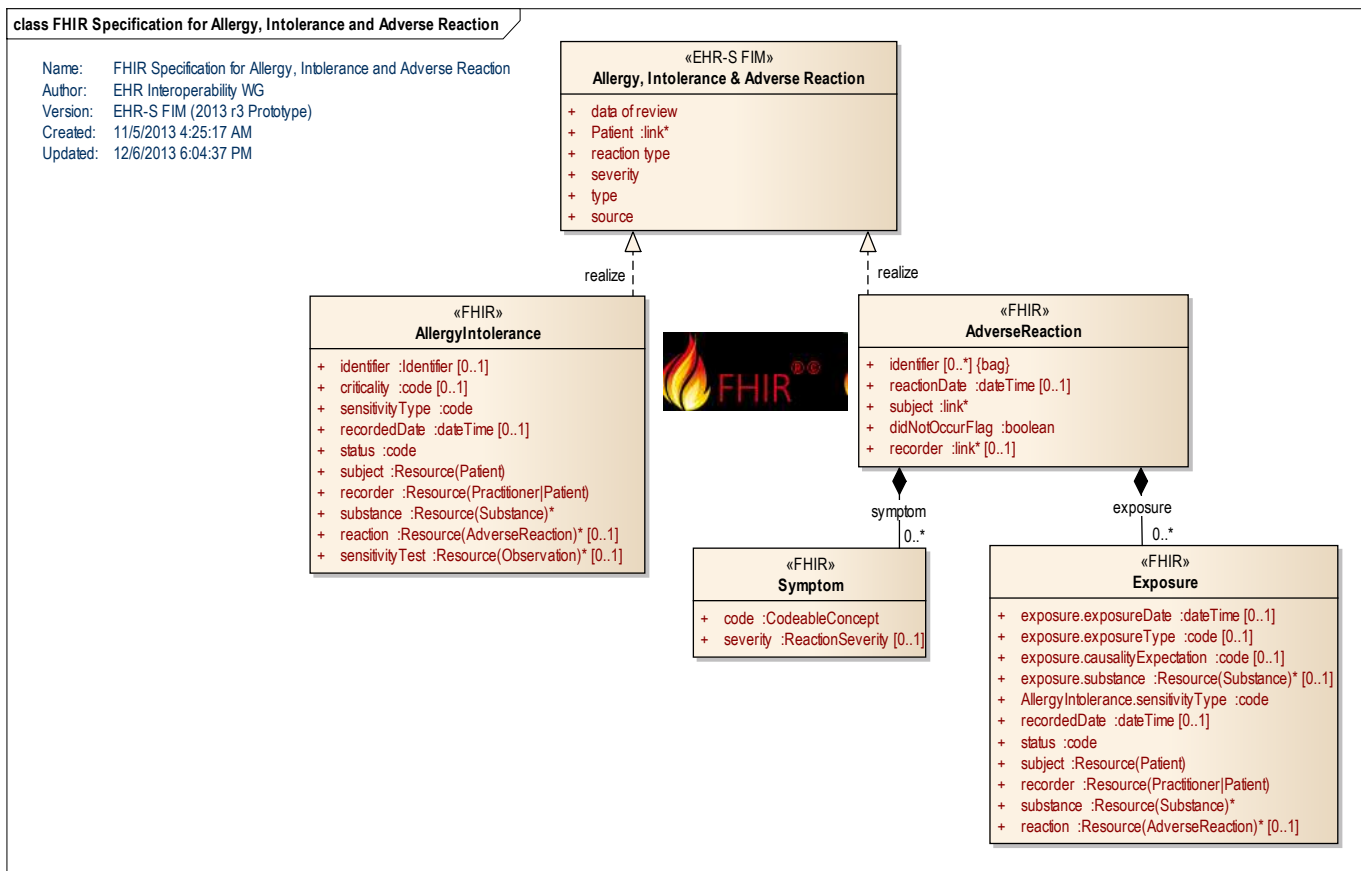


Figure 9 Example EHR-S FIM-FHIR Requirements-Specifications

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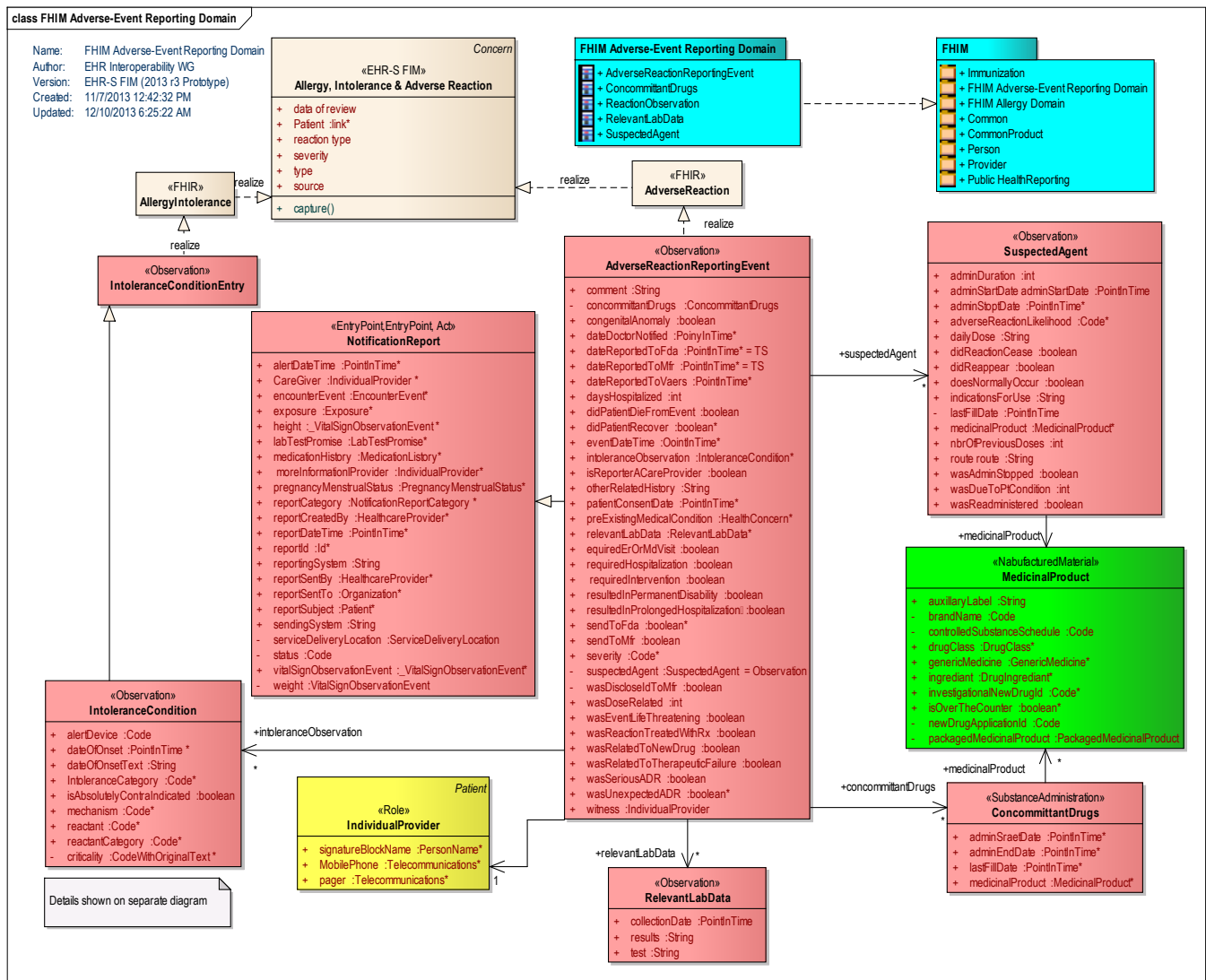


Figure 10 Example EHR-S FIM-FHIR-FHIM Requirements-Specifications

## CURRENT ISSUES-ACTIONS

5. **HL7 Board approval** of EHR-S FIM Release-3 open-IP; where, the EHR-S FIM home page is [www.hl7.org/EHRSFIM](http://www.hl7.org/EHRSFIM)
6. **FHIR WG Coordination** to integrate EHR-S FIM-FHIR into a joint Sparx Enterprise Architect (EA) model; where, EA can generate integrated EHR-S FIM-FHIR International-Realm interoperability requirements-specifications
7. **FHIR Team Coordination** to integrate EHR-S FIM-FHIR-FHIM into a joint Sparx Enterprise Architect (EA) model; where EA can generate integrated EHR-S FIM-FHIR-FHIM US-Realm interoperability requirements-specifications
8. **Call-for-Participation** in EHR-S/PHR-S FIM r3 based on a common EHR-S/PHR-S RM (ReferenSce Model), where,