

EHRIS-FM R2 – Record Infrastructure  
Record Entry Lifecycle Event  
Metadata on FHIR

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25 August 2014

<http://www.hl7.org/fhir>

# FHIR Resource Index

As of 1 August 2014

## General:

- AdverseReaction
- AllergyIntolerance
- CarePlan
- Condition (aka Problem)
- Procedure
- Contraindication
- RiskAssessment

## Administrative

### Attribution:

- Patient
- RelatedPerson
- Practitioner
- Organization

## Infrastructure

### Support:

- List
- Media
- Other
- Provenance
- SecurityEvent
- (Binary)

## Medications:

- Medication
- MedicationPrescription
- MedicationAdministration
- MedicationDispense
- MedicationStatement
- Immunization
- ImmunizationRecommendation

## Entities:

- Device
- Location
- Substance
- Group

## Documents:

- Composition
- DocumentReference
- DocumentManifest

## Diagnostics:

- Observation
- DiagnosticReport
- DiagnosticOrder
- ImagingStudy
- Specimen
- DeviceObservationReport

## Workflow Management:

- Encounter
- Alert
- Supply
- Order
- OrderResponse

## Exchange:

- MessageHeader
- OperationOutcome
- Query
- Subscription

## Data Collection:

- Questionnaire
- QuestionnaireAnswers
- FamilyHistory
- DataElement

## Scheduling:

- Appointment
- Appointment Response
- Availability
- Slot

## Conformance:

- Conformance
- Profile
- OperationDefinition
- ValueSet
- ConceptMap
- Namespace

Now Underway

# Mapping to FHIR

ISO/HL7 10781 EHR-S FM R2 Record Infrastructure (RI) → 24(+3) Record Lifecycle Events	FHIR Resources
<u>Basic Lifecycle Event</u>	<ul style="list-style-type: none"><li>• SecurityEvent</li></ul>
<u>Provenance Lifecycle Event</u> when Record Entry content is originated or updated	<ul style="list-style-type: none"><li>• SecurityEvent</li><li>• Provenance</li><li>• [other new/updated resource(s)] → corresponding to Action Taken</li></ul>

↑ Resources may also be indivisibly and immutably bound by one or more digital signatures in the Record Entry.

Best FHIR Resource for Record Lifecycle Metadata

# SecurityEvent or ?

- At Issue: Our use of SecurityEvent
- HL7 Security WG Co-Chairs
  - Not anxious to overload FHIR SecurityEvent with Record Lifecycle metadata and pre/post data state details
- Previously at issue in EHR-S FM R2 Ballot
  - EHR WG agreed to separate Record Lifecycle Event metadata from System/Security metadata and move it from Trust Infrastructure (TI.2) to Record Infrastructure (RI.1.1.x.1)

# Alternatives to SecurityEvent

- New LifecycleEvent or RecordEvent
  - Designed and instantiated entirely for Record Lifecycle Events
  - Extended from base set of SecurityEvent Attributes
- OR Profile of Core SecurityEvent
  - Also extended from base Attributes


Distinct SecurityEvent and LifecycleEvent

# Possible Advantages

- Any implementation:
  - May instantiate one or both: SecurityEvent and/or LifecycleEvent
  - Base SecurityEvent and LifecycleEvent Attributes are identical and interchangeable
- Easy scope, differentiation of new Resource
  - Explicit: Name and focus on Record Lifecycle
  - Implicit: RM-ES
- Easy management
  - Security WG – FHIR SecurityEvent
  - EHR WG – FHIR LifecycleEvent
- Easy case for where Action and Record go!

# EHR-S FM Record Lifecycle


## Pre/Post Events 1-9



Pre Event State	Resource @ Event	Post Event State				
	SecurityEvent + Provenance	Added Event Evidence	Retained Pre Edition Unaltered	Added New Edition	Signed as Author	Signed as System
[none]	1 Originate/Retain	X		X	Opt	X
[Record Entry as persisted, indivisible and immutable since previous Lifecycle Event]	2 Amend	X	X	X	Opt	X
	3 Translate	X	X	X		X
	4 Attest	X	X		X	X
	5 Access/View	X				
	6 Output/Report	X				X
	7 Disclose	X				X
	8 Transmit	X				X
	9 Receive/Retain	X	X			

# EHR-S FM Record Lifecycle

## Pre/Post Events 10-18




Pre Event State	Resource @ Event	Post Event State				
	SecurityEvent + Provenance	Added Event Evidence	Retained Pre Edition Unaltered	Added New Edition	Signed as Author	Signed as System
[Record Entry as persisted, indivisible and immutable since previous Lifecycle Event]	10 De-Identify	X	X	X		X
	11 Pseudonymize	X				
	12 Re-Identify	X				
	13 Extract	X	X	X		X
	14 Archive	X				
	15 Restore	X				
	16 Destroy/Delete	X	[none]			
	17 Deprecate	X				
	18 Re-Activate	X				



# EHR-S FM Record Lifecycle

## Pre/Post Events 19-27



Pre Event State	Resource @ Event	Post Event State				
	SecurityEvent + Provenance	Added Event Evidence	Retained Pre Edition Unaltered	Added New Edition	Signed as Author	Signed as System
[Record Entry as persisted, indivisible and immutable since previous Lifecycle Event]	19 Merge	X	X	X		
	20 Unmerge	X				
	21 Link	X				
	22 Unlink	X				
	23 Add Legal Hold	X				
	24 Remove Legal Hold	X				
	25 Verify (new event)	X				
	26 Encrypt (new event)	X	X	?		
	27 Decrypt (new event)	X	X	?		

## Record Entry Event Lifecycle

# Pre/Post Entry Content w/FHIR

Starts at Point of Origination (Creation/Capture) as New Event



	<u>Prior Event Added</u>	<u>During Interval between Events</u> Retains (at rest): Indivisibly+Immutablely	PRE	<u>At New Event Adds</u>	POST
Basic	1 SecurityEvent instance	1 or more SecurityEvent instances >> One per each prior Record Lifecycle Event	→	1 SecurityEvent instance	Becomes Prior Event
w/Provenance	1 Provenance instance	1 or more Provenance instances >> One per each prior Record Lifecycle Provenance Event	→	1 Provenance instance	
	1 or more other resource instance(s)	1 or more other FHIR resource instances > Corresponding to Action(s) Taken > As documented in Record Entry(ies)	→	1 or more other resource instance(s)	



# Originate/Retain Record Entry

RM-ES will vet Record Infrastructure (RI).

With Event Evidence (RI.1.1.1.1) →  
 ↓ At Lifecycle Event Occurrence (RI.1.1.1)

- 1 The system SHALL provide the ability to capture (originate) a Record Entry instance corresponding to an Action instance and context.
- 2 The system SHALL capture a unique instance identifier for each Record Entry.
- 3 The system SHALL capture the signature event (e.g., digital signature) of the origination entry Author, binding signature to Record Entry content.
- 4 The system SHALL provide the ability to capture both structured and unstructured content in Record Entries.
- 5 The system SHALL provide the ability to capture Record Entries from information recorded during system downtime.
- 6 The system SHOULD provide the ability to integrate Record Entries from Information recorded during system downtime.
- 7 The system SHALL provide the ability to capture date/time an Action was taken or data was collected if different than date/time of the Record Entry.
- 8 The system SHOULD capture metadata that identifies the source of non-originated Record Entry (e.g., templated, copied, duplicated, or boilerplate information).
- 9 The system MAY provide the ability to tag unstructured Record Entry content to organize it according to need, for example, in a time-related fashion or by application-specific groups (such as photographs, handwritten notes, or auditory sounds), or by order of relative importance.
- 10 The system MAY capture and maintain a Record Entry encoded as a standards-based data object (e.g., HL7 Continuity of Care, other HL7 CDA R2 Document, ISO 13606 artifact).
- 11 The system MAY capture and maintain a standards-based data object to mirror (be duplicate and synchronous with) internal Record Entry representation.

Fulfilled by FHIR Resource Implementation █  
 Lifecycle Event Metadata (who, what, when, where, why) █  
 Others to consider █

- 1 The system SHALL audit each occurrence when a Record Entry is originated and retained.
- 2 The system SHALL capture identity of the organization where Record Entry content is originated.
- 3 The system SHALL capture identity of the patient who is subject of Record Entry content.
- 4 The system SHALL capture identity of the individual(s) who performed the Action documented in Record Entry content.
- 5 The system SHALL capture identity of the user who entered/authored Record Entry content.
- 6 The system SHALL capture identity of the system application which originated Record Entry content.
- 7 IF the source of Record Entry content is a device THEN the system SHALL capture identity of the device.
- 8 The system SHALL capture the Action as evidenced by Record Entry content.
- 9 The system SHALL capture the type of Record Event trigger (i.e., originate/retain).
- 10 The system SHALL capture date and time of Action occurrence as evidenced by Record Entry content.
- 11 The system SHALL capture date and time Record Entry content is originated.
- 12 The system MAY capture the duration of the Action evidenced by Record Entry content.
- 13 The system MAY capture the physical location of the Action evidenced by Record Entry content.
- 14 The system SHOULD capture identity of the location (i.e., network address) where Record Entry content is originated.
- 15 The system MAY capture the rationale for the Action evidenced by Record Entry content.
- 16 The system MAY capture the rationale for originating Record Entry content.
- 17 IF Record Entry content includes templates (boilerplate information) or copied (duplicated) information THEN the system SHOULD capture the source of such content.

Individuals have specific...

# Action and Record Entry Roles

Action Roles	Record Entry Roles
<ul style="list-style-type: none"><li>• Subject</li><li>• Performer</li><li>• Observer</li></ul>	<ul style="list-style-type: none"><li>• Subject</li><li>• Author</li><li>• Scribe</li><li>• Attester</li><li>• Informant</li></ul>

Example – Medication Order

# Action and Record Entry Metadata

	Action Metadata	Record Entry Metadata
Who	Action Subject (Patient) <b>Johnny Walker</b> Role: <b>Subject</b>	Entry Subject (Patient) <b>Johnny Walker</b> Role: <b>Subject</b>
	Action Organization <b>Bay City Medical Center</b>	
	Action Practitioner/ Performer (Order Placer) <b>Doctor Sally Smith</b> Role: <b>Performer</b>	Entry Author/Scribe – Source of Entry <b>Nurse Janice Jones</b> Role: <b>Scribe</b>
		Entry Source – System/Device <b>EHR ABC/Device XX123456</b>

Example – Medication Order

# Action and Record Entry Metadata

	Action Metadata	Record Entry Metadata
What	Action Taken – Medication Order <i>Ambien 20mg PRN</i>	Entry Content – FHIR Resources related to Medication Order <i>SecurityEvent</i> <i>Provenance</i> <i>MedicationPrescription, et al</i>
When	Action Date/Time <i>22 Aug 2014 @1800</i>	Entry Date/Time <i>22 Aug 2014 @ 1810</i>
	Action Duration <i>3 Minutes</i>	
Where	Action Physical Location <i>Ward/Room B/12</i>	Entry Location – IP Address <i>255.255.255.1</i>
Why	Action Reason/Purpose <i>To Induce Sleep</i>	Entry Reason/Purpose <i>&lt;n/a&gt;</i>

## EHR-S FM Record Infrastructure (RI) – Lifecycle Events

# More Evidentiary Metadata

Record Entry ID
Record Entry Content: Data, Document and/or Artifact ID(s)
Corresponding/linked Record Entry(ies)
Amendment/Translation Sequence
Pointer to Pre-Event Entry, if chained: e.g., pre-amendment, pre-translation
Source of Copied Content: e.g., via copy/paste, template or boilerplate
Event is known Disclosure
Permissions associated with Entry Content
Entry(ies) in Event Transaction: e.g., set of entries viewed, entries extracted, entries to be archived or deleted.
Digital signature(s)

## Lifecycle Event Metadata

# Who

Metadata	FHIR Resource	Resource Attribute(s)
Organization	Provenance	<code>signature</code> : string 0..1
	Provenance.Agent : 0..*	<code>role</code> : Coding 1..1 « <code>ProvenanceAgentRole+</code> » <code>type</code> : Coding 1..1 « <code>ProvenanceAgentType+</code> » <code>reference</code> : uri 1..1
Patient	Provenance	<code>signature</code> : string 0..1
	Provenance.Agent : 0..*	<code>role</code> : code 1..1 « <code>ProvenanceEntityRole</code> » <code>type</code> : Coding 1..1 « <code>ProvenanceEntityType+</code> » <code>reference</code> : uri 1..1
	SecurityEvent.Participant : 1..*	<code>role</code> : CodeableConcept 0..* « <code>DICOMRoleId+</code> » <code>reference</code> : Resource(Organization Practitioner Patient Device) 0..1
Action - Performer	TBD	

For organizations and Patients, include Provenance.signature?

Need to distinguish Action from Record Metadata.

[See Medication Order Example]

Action-Performer not resolved.

Need to add RelatedPerson to Practitioner|Patient|Device choice (per Lloyd)?



## Lifecycle Event Metadata

# Who, con't

Metadata	FHIR Resource	Resource Attribute(s)
Record - Author/ User	Provenance	<code>signature</code> : string 0..1
	Provenance.Agent : 0..*	<code>role</code> : Coding 1..1 « <code>ProvenanceAgentRole+</code> » <code>type</code> : Coding 1..1 « <code>ProvenanceAgentType+</code> » <code>reference</code> : uri 1..1
	SecurityEvent.Participant : 1..*	<code>role</code> : CodeableConcept 0..* « <code>DICOMRoleId+</code> » <code>reference</code> : Resource( <code>Practitioner Patient Device</code> ) 0..1 <code>userId</code> : string 0..1
Record - System/Device	Provenance	<code>signature</code> : string 0..1
	Provenance.Agent : 0..*	<code>role</code> : Coding 1..1 « <code>ProvenanceAgentRole+</code> » <code>type</code> : Coding 1..1 « <code>ProvenanceAgentType+</code> » <code>reference</code> : uri 1..1
	SecurityEvent.Participant : 1..*	<code>role</code> : CodeableConcept 0..* « <code>DICOMRoleId+</code> » <code>reference</code> : Resource( <code>Practitioner Patient Device</code> ) 0..1 <code>userId</code> : string 0..1

Provenance.Agent.reference may resolve to a uri or Resource (like others)

## Lifecycle Event Metadata

# What

Metadata	FHIR Resource	Resource Attribute(s)
Action - Taken	TBD	
Record - Lifecycle Event	SecurityEvent.Event : 1..1	<b>type</b> : CodeableConcept 1..1 « SecurityEventType+ » <b>subtype</b> : CodeableConcept 0..* « SecurityEventSubType+ » <b>action</b> : code 0..1 « SecurityEventAction »
	SecurityEvent.Object : 0..*	<b>identifier</b> : Identifier 0..1 <b>reference</b> : Resource(Any) 0..1 <b>type</b> : code 0..1 « SecurityEventObjectType » <b>role</b> : code 0..1 « SecurityEventObjectRole » <b>lifecycle</b> : code 0..1 « SecurityEventObjectLifecycle »

Action Taken not resolved.

Action Taken = <set of resources>?

[See Medication Order Example <corresponding set of Med Order resources>]

## Lifecycle Event Metadata

# When

Metadata	FHIR Resource	Resource Attribute(s)
Action - Date/ Time	TBD	
Record - Date/ Time	Provenance	<b>recorded</b> : instant 1..1
	SecurityEvent.Event : 1..1	<b>dateTime</b> : instant 1..1
Action - Duration/ Elapsed Time	TBD	

Action Date/Time and Duration not resolved.

## Lifecycle Event Metadata

# Where

Metadata	FHIR Resource	Resource Attribute(s)
Action - Physical Location	TBD	
Record - Network Address	Provenance	<code>location</code> : Resource(Location) 0..1
	SecurityEvent.Participant.Network	<code>identifier</code> : string 0..1 <code>type</code> : code 0..1 « SecurityEventParticipantNetworkType »

Action Physical Location not resolved.  
Add "location" to SecurityEvent.Event?

## Lifecycle Event Metadata

# Why

Metadata	FHIR Resource	Resource Attribute(s)
Action - Reason, Rationale, Purpose	TBD	
Record - Reason, Rationale, Purpose	Provenance	<i>reason</i> : CodeableConcept 0..1
	SecurityEvent.Event : 1..1	<i>reason</i> : CodeableConcept 0..1

Action Reason not resolved.  
Add “reason” to SecurityEvent.Event?

## Lifecycle Event Metadata

# Evidentiary

Metadata	FHIR Resource	Resource Attribute(s)
Record Entry ID	SecurityEvent.Object : 0..*	<b>identifier</b> : Identifier 0..1 <b>reference</b> : Resource(Any) 0..1
Record Entry Content ID(s): data, documents, artifacts	SecurityEvent.Object : 0..*	<b>identifier</b> : Identifier 0..1 <b>reference</b> : Resource(Any) 0..1
Corresponding/ linked Record Entry(ies)	SecurityEvent.Object : 0..*	<b>identifier</b> : Identifier 0..1 <b>reference</b> : Resource(Any) 0..1
Amendment/ Translation Sequence	SecurityEvent.Object : 0..*	<b>lifecycle</b> : code 0..1 « SecurityEventObjectLifecycle »
Pointer to Pre-Event Entry, if chained	SecurityEvent.Object : 0..*	<b>identifier</b> : Identifier 0..1 <b>reference</b> : Resource(Any) 0..1

## Lifecycle Event Metadata

# Evidentiary, con't

Metadata	FHIR Resource	Resource Attribute(s)
Source of Copied Content	SecurityEvent.Object : 0..*	<b>identifier</b> : Identifier 0..1 <b>reference</b> : Resource(Any) 0..1 <b>type</b> : code 0..1 « SecurityEventObjectType » <b>role</b> : code 0..1 « SecurityEventObjectRole »
Event is known Disclosure	SecurityEvent.Object : 0..*	<b>lifecycle</b> : code 0..1 « SecurityEventObjectLifecycle », where lifecycle = "disclosure"
Record Entry Permissions	SecurityEvent.Participant : 1..*	<b>role</b> : CodeableConcept 0..* « DICOMRoleId+ » <b>reference</b> : Resource(Practitioner Patient Device) 0..1 <b>userId</b> : string 0..1
	SecurityEvent.Object : 0..*	<b>sensitivity</b> : code 0..1 «SecurityEvent.object.sensitivity »
Event Transaction Entry(ies)	SecurityEvent.Object : 0..*	<b>identifier</b> : Identifier 0..1 <b>reference</b> : Resource(Any) 0..1 <b>type</b> : code 0..1 « SecurityEventObjectType »

Source of copied content: e.g., via copy/paste, template, boilerplate?  
 What about context-based authorization/access control?

## FHIR Resource

# Provenance

Resource	Attribute	Description	Value Set
Provenance		→ Who, What, When for a set of resources	
	<b>target</b> : Resource(Any) 1..*	Target resources (usually version specific)	
	<b>period</b> : Period 0..1	When the activity occurred	
	<b>recorded</b> : instant 1..1	When the activity was recorded/updated	
	<b>location</b> : Resource(Location) 0..1	Where the activity occurred, if relevant	
	<b>reason</b> : CodeableConcept 0..1	Reason activity is occurring	
	<b>signature</b> : string 0..1	Base64 signature (DigSig) - integrity check	

Create value set for “reason”? [Galen, Diana P-M]



## FHIR Resource

# Provenance.Agent

Resource	Attribute	Description	Value Set
Provenance.Agent		→ Person, organization, records, etc. involved in creating resource	
	role : Coding 1..1 « ProvenanceAgentRole+ »		<confirm> Enterer, performer, author, verifier, attester, informant, source, cc, application, daemon
	type : Coding 1..1 « ProvenanceAgentType+ »		<confirm> Practitioner, organization, software, record, document
	reference : uri 1..1		

Provenance.Agent.reference may resolve to a uri or Resource (like others)  
Review value sets for “role” and “type”.

## FHIR Resource

# SecurityEvent.Event

Resource	Attribute	Description	Value Set
SecurityEvent.Event		→ What was done	
	<b>type</b> : CodeableConcept 1..1 « SecurityEventType+ »	Type/identifier of event	<confirm> Rest + DICOM codeset
	<b>subtype</b> : CodeableConcept 0..* « SecurityEventSubType+ »	More specific type/id for the event	<confirm> Read, vread, update, delete, validate, create, history-instance, history-type, history-system, search-type, search-system, transaction + DICOM codeset
	<b>action</b> : code 0..1 « SecurityEventAction »	Type of action performed during the event	<confirm> C) Create; R) Read/view/print; U) Update; D) Delete; E) Execute.
	<b>dateTime</b> : instant 1..1	Time when the event occurred on source	
	<b>location</b> : Resource(Location) 0..1	TBD	
	<b>reason</b> : CodeableConcept 0..1	TBD	TBD

Review value sets for “type”, “subtype” and “action”.  
Add “location” and “reason” and value set for “reason”.

## FHIR Resource

# SecurityEvent.Source

Resource	Attribute	Description	Value Set
SecurityEvent.Source		→ Application systems and processes	
	site	Logical source location within the enterprise	
	identifier	The id of source where event originated	
	<b>type</b> : CodeableConcept 1..1 « SecurityEventSourceType+ »	The type of source where event originated	<confirm> 1) User Device; 2) Data Interface; 3) Web Server; 4) Application Server; 5) Database Server; 6) Security Server Security server; 7) Network Device; 8)Network Router; 9) Other.
	<b>location</b> : Resource(Location) 0..1	TBD	

Why not “location” resource instead of site, identifier and type?  
 Review value set for “type”.

## FHIR Resource

# SecurityEvent.Object

Resource	Attribute	Description	Value Set
SecurityEvent.Object		→ Specific instances of data or objects accessed	
	<b>identifier</b> : Identifier 0..1	Specific instance of object (e.g. versioned)	
	<b>reference</b> : Resource(Any) 0..1	Specific instance of resource (e.g. versioned)	
	<b>type</b> : code 0..1 « SecurityEventObjectType »	Object type being audited	<confirm> 1) Person; 2) System Object; 3) Organization; 4) Other.
	<b>role</b> : code 0..1 « SecurityEventObjectRole »	Functional application role of Object	<confirm> 1) patient; 2) location; 3) report; 4) resource; 5) master file; 6) user; 7) list; 8) doctor; 9) subscriber; 10) guarantor; 11) security user entity; 12) security user group; 13) security resource; 14) security granularity definition; 15) practitioner; 16) data destination; 17) data reposition; 18) schedule; 19) customer; 20) job; 21) job stream; 22) table; 23) routing criteria; 24) query.

Review value sets for “type” and “role”.

## FHIR Resource

# SecurityEvent.Object, con't

Resource	Attribute	Description	Value Set
SecurityEvent.Object	<b>lifecycle</b> : code 0..1 « <b>SecurityEventObjectLifecycle</b> »	Life-cycle stage for the object	<confirm> 1 OriginationCreation; 2) Import/Copy from original; 3) Amendment; 4) Verification; 5) Translation; 6) Access/Use; 7) De-identification; 8) Aggregation, summarization, derivation; 9) Report; 10) Export/Copy to target; 11) Disclosure; 12) Receipt of disclosure; 13) Archiving; 14) Logical deletion; 15) Permanent erasure/Physical destruction
	<b>sensitivity</b> : code 0..1 « <b>SecurityEvent.object.sensitivity</b> »	Policy-defined sensitivity for the object	<confirm> L) Low; M) Moderate; N) Normal; R) Restricted; U) Unrestricted; V) Very restricted.

Review value sets for “lifecycle” and “sensitivity”.

## FHIR Resource

# SecurityEvent.Participant.Network

Resource	Attribute	Description	Value Set
SecurityEvent.Participant.Network		→ Logical network location for application activity	
	identifier : string 0..1	Identifier for the network access point of a user device	
	type : code 0..1 « SecurityEventParticipantNetworkType »	The type of network access point	<confirm>

Review value set for “type”.

# Record Entry and FHIR Resources

- An EHR System manages a persistent EHR comprising Record Entries for
  - one or more provider organizations,
  - one to many individual practitioners, and
  - one to many patients
- An EHR comprises
  - one to many Record Entry instances
- A Record Entry instance may comprise
  - one to many FHIR Resource instance(s)
  - with signature bindings

## Project Focus/Success Criteria

# FHIR Enabled Lifecycle Events

Project Focus	Success Criteria
<p>Binds (joins) FHIR Resource Instance(s) together in Record Entry Instance:</p> <ul style="list-style-type: none"><li>• Including applicable Clinical, Administrative, Infrastructure Resources</li><li>• Based on Action(s) Taken</li></ul>	<ul style="list-style-type: none"><li>• Complete specification of baseline Set of FHIR Resources applicable at each Record Lifecycle Event (1-24) and captured in the resulting Record Entry Instance</li><li>• Allowing additional Resources to be bound in a Record Entry Instance, per Clinical, Administration and/or other context</li></ul>
<p>Includes Pre- and Post-Lifecycle Event Entry States</p> <ul style="list-style-type: none"><li>• e.g., before/after amendment or translation</li></ul>	<ul style="list-style-type: none"><li>• Complete specification of how both pre- and post-lifecycle event states (of FHIR Resources) are captured and preserved in one or more Record Entries</li></ul>



Project Focus/Success Criteria

# FHIR Enabled Lifecycle Events

Project Focus	Success Criteria
Includes Action/Event Metadata	<ul style="list-style-type: none"><li>• Complete specification of Action/Event Metadata (in FHIR Resources) per Record Entry</li></ul>
Includes Attestation and Content Binding <ul style="list-style-type: none"><li>• With/without Digital Signature</li></ul>	<ul style="list-style-type: none"><li>• Complete specification of:<ul style="list-style-type: none"><li>• Attestation and/or Digital Signature bound to Record Entry content</li></ul></li></ul>

# Dimensions of End-to-End Flow

## Record Lifespan

### 1. Within Single System


- Starting at point of origination, in Source System
- Starting at point of receipt, in Receiving System
- Ending at point of deletion

### 2. Across Multiple Systems

- Starting at point of origination, in Source System
- Traversing one or more Points of Exchange
- Ending at point of deletion, in each System

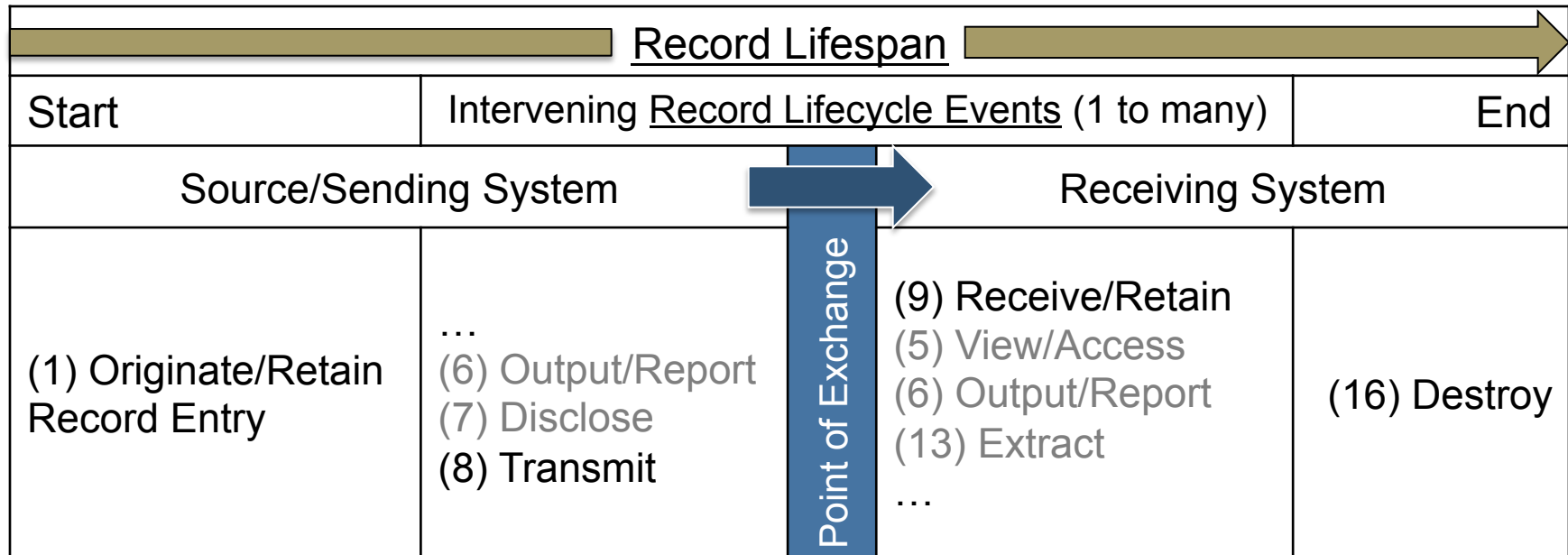
## Record Lifespan – End-to-End

# Within Single System

Record Lifespan 		
Start	Intervening Record Lifecycle Events (0 to many)	End
<u>Source System</u> (1) Originate/ Retain Record Entry	(2) Amend (3) Translate (25,4) Verify, Attest (5) View/Access (6) Output/Report (7) Disclose (8) Transmit (10) De-Identify (11) Pseudo-nymize (12) Re-Identify (13) Extract	(16) Destroy
<u>Receiving System</u> (9) Receive/Retain Record Entry	(14,15) Archive, Restore (17,18) Deprecate/Retract, Re-Activate (19,20) Merge, Unmerge (21,22) Link, Unlink (23,24) Place, Remove Legal Hold (26,27) Encrypt, Decrypt	(16) Destroy

Record Lifespan – End-to-End

# Across Multiple Systems



Repeated at each point of exchange...

Current/Emerging Projects Related to...

# EHR-S FM Record Infrastructure

- EHR Record Lifecycle Event Metadata using HL7 Fast Health Interoperable Resources (FHIR) – [this project](#)
- S&I Data Provenance
- S&I esMD
- S&I Simplification
  - S&I Use Case Requirements Analysis
  - Use Case Authoring Tool (UCAT) Development
- HL7 Functional Model Framework
  - Next Releases of EHR-S FM (R3), PHR-S FM (R2), Lab FM (?)
- HL7 Vocabulary Harmonization: EHR, Security, CBCC WGs
- Functional Profile Development: RM-ES R2, MU FP, PH FPs
- ISO 21089 Revision, Trusted End-to-End Information Flows
- ISO 13606 Revision, EHR Communication
- Others: HSPC?

ISO/HL7 Standard or S&I Activity →		ISO 21089:2004 Trusted End2End Published TR	ISO 21089:2014 Trusted End2End In development	ISO/HL7 10781 EHR FM R2:2014 Published	ISO/HL7 16527 PHRS FM R1:2014 Published	ISO/HL7 16527 PHRS FM R2 In development	ISO 19669 – Re- Usable Use Case In development	ISO 13606 – EHR Communication In Revision	HL7 EHR Lifecycle Model DSTU:2008 Published	HL7 RM-ES FP R1 2009 Published	HL7 RM-ES FP R2 In Development	HL7 Record Lifecycle on FHIR In Development	US S&I Simplification	US S&I Data Provenance
Vocabulary Alignment Underway: HL7 EHR, CBCC, Security WGs ↓														
Record Lifecycle Event ↓ (EHR-S FM RI.1.1.x)														
1	Originate/Retain Record Entry	X	X	X		X	X		X		X	X	X	
2	Amend Record Entry	X	X	X		X	X		X		X	X	X	
3	Translate Record Entry	X	X	X		X	X		X		X	X	X	
4	Attest Record Entry		X	X		X	X		X		X	X	X	
5	View/Access Record Entry	X	X	X		X	X		X		X	X	X	
6	Output/Report Record Entry	X	X	X		X	X	X	X		X	X	X	
7	Disclose Record Entry	X	X	X		X	X	X	X		X	X	X	
8	Transmit Record Entry	X	X	X		X	X	X	X		X	X	X	
9	Receive/Retain Record Entry	X	X	X		X	X	X	X		X	X	X	
10	De-Identify Record Entry	X	X	X		X	X		X		X	X	X	
11	Pseudo-nymize Record Entry	X	X	X		X	X		X		X	X	X	
12	Re-Identify Record Entry	X	X	X		X	X		X		X	X	X	
13	Extract Record Entry	X	X	X		X	X		X		X	X	X	
14	Archive Record Entry	X	X	X		X	X		X		X	X	X	
15	Restore Record Entry		X	X		X	X		X		X	X	X	
16	Destroy Record Entry	X	X	X		X	X		X		X	X	X	
17	Deprecate/Retract Record Entry		X	X		X	X				X	X	X	
18	Re-Activate Record Entry		X	X		X	X				X	X	X	
19	Merge Record Entry		X	X		X	X				X	X	X	
20	Unmerge Record Entry		X	X		X	X				X	X	X	
21	Link Record Entry		X	X		X	X				X	X	X	
22	Unlink Record Entry		X	X		X	X				X	X	X	
23	Place Legal Hold on Record Entry		X	X		N/A	X				X	X	X	
24	Remove Legal Hold on Record Entry		X	X			X				X	X	X	
25	Verify Record Entry Content	X	X			X	X		X		X	X	X	
26	Encrypt Record Entry		X			X	X				X	X	X	
27	Decrypt Record Entry		X			X	X				X	X	X	
Applicable Lifecycle Events →		15	27	24	0	25	27	4	16	0	27	27	27	?

TBD

Longer Term...

# Project Segments/Leads

		Leads
1	<a href="#">ISO/HL7 10781 EHR-S FM R2</a> RI – Record Infrastructure <a href="#">RM-ES – Records Management/ Evidentiary Support</a>	Gary Dickinson, Reed Gelzer, MD, Josh Mandel, Diana Warner
2	TI – Trust Infrastructure	TBD
3	CP – Care Provision	TBD
4	CPS – Care Provision Support	TBD
5	AS – Administrative Support	TBD
6	POP – Population Health Support	TBD
7	<a href="#">ISO/HL7 16527 PHR-S FM R1</a> PH – Personal Health S – Supportive II – Information Infrastructure	John Ritter, et al.

## EHR-S FM Record Lifecycle Events on FHIR

# Links

- HL7 EHR Interop Wiki:
  - [http://wiki.hl7.org/index.php?title=EHR\\_Interoperability\\_WG](http://wiki.hl7.org/index.php?title=EHR_Interoperability_WG)