

**FHIR Resources to Address  
EHR-S and PHR-S FMs and  
RM-ES FP Requirements  
(EHR-S FM + PHR-S FM + RM-ES on FHIR)**

**Gary Dickinson  
Co-Chair, HL7 EHR WG  
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<http://www.hl7.org/fhir>

# FHIR Resource Index

## Clinical

### General:

- [AdverseReaction](#)
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- [CarePlan](#)
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### Administrative Attribution:

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### Infrastructure Support:

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- [Media](#)
- [Other](#)
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- [MedicationPrescription](#)
- [MedicationAdministration](#)
- [MedicationDispense](#)
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### Entities:

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- [Location](#)
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### Document Handling:

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### Diagnostics:

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- [DiagnosticReport](#)
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### Workflow Management:

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- [Alert](#)
- [Supply](#)
- [Order](#)
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### Exchange:

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- [OperationOutcome](#)
- [Query](#)

### Device Interactions:

- [DeviceObservationReport](#)

### Financial:

- 

### Conformance:

- [Conformance](#)
- [Profile](#)
- [ValueSet](#)
- [ConceptMap](#) (informative)

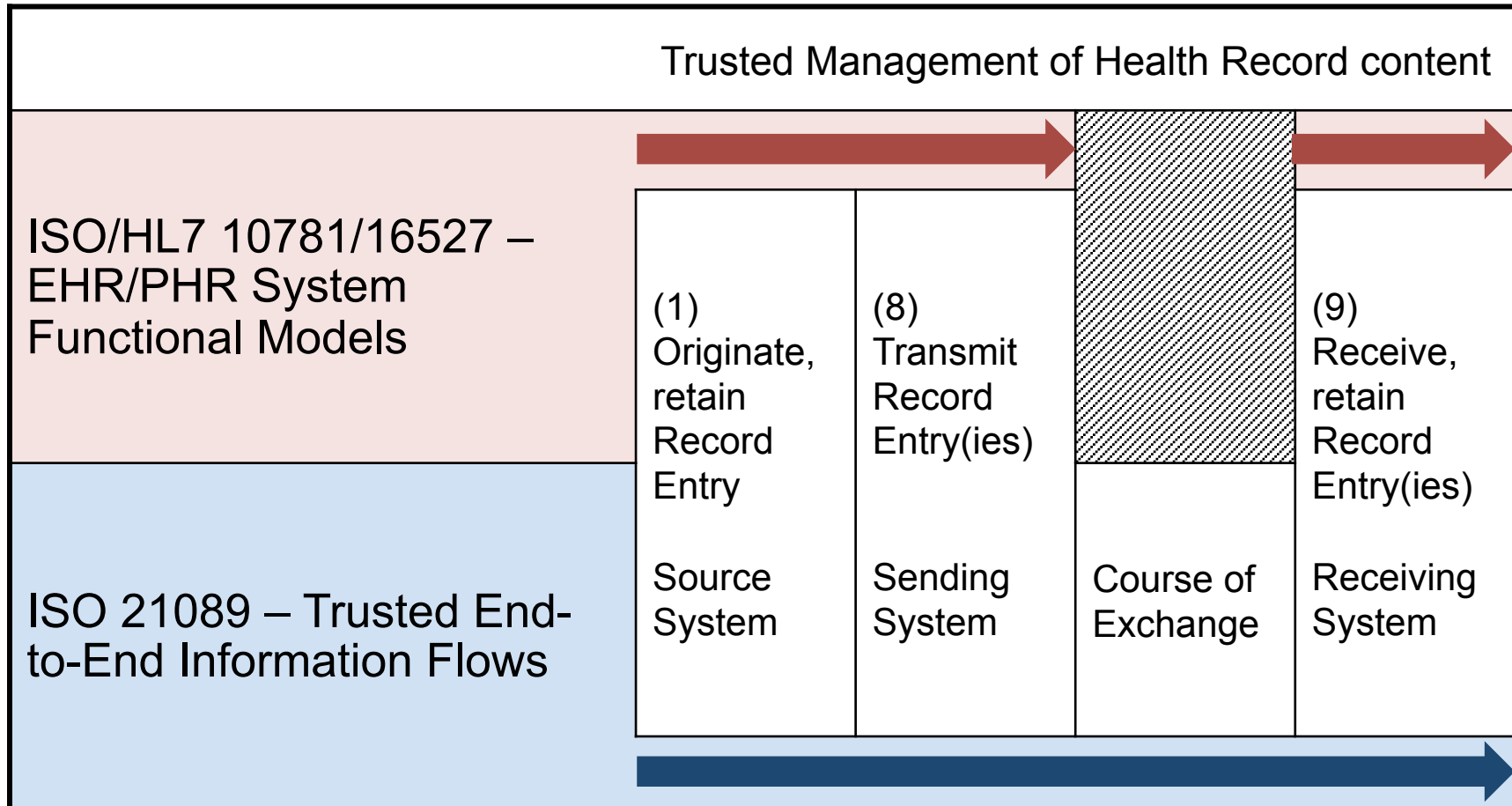
Based on Requirements Statements (Conformance Criteria) of

# Functional Models and Profiles

- Functional Models (FMs) include Requirements Statements (Conformance Criteria)
  - ISO/HL7 10781, EHR System Functional Model Release 2
  - ISO/HL7 16527, PHR System Functional Model Release 1
  - HL7 Records Management and Evidentiary Support Functional Profiles 1/2
- Functional Profiles are derived from FMs

# Complementary ISO/HL7 Standards

## Scope



(#) Lifecycle Event

Current/Emerging Projects Related to...

# EHR-S FM Record Infrastructure

- S&I Provenance
- S&I Simplification
  - Use Case Authoring Tool (UCAT) Development
- HL7 Functional Model Framework
  - Next Releases of EHR-S FM (R3) and PHR-S FM (R2)
- 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
- Health Services Platform Consortium – HSPC (?)

To Be Considered...

# Potential Project Segments

<b>ISO/HL7 10781 EHR-S FM R2</b>		
1	RI – Record Infrastructure RM-ES – Records Management/ Evidentiary Support  •• 24 Record Lifecycle Events ••	<u>Administrative</u> <ul style="list-style-type: none"> <li>• Attribution: Patient, Practitioner, Organization</li> <li>• Entities: Device, Location</li> </ul> <u>Infrastructure</u> <ul style="list-style-type: none"> <li>• Support: Provenance, Security Event, Exchange...</li> <li>• [Signature, Record Management/Lifecycle...]</li> </ul>
2	TI – Trust Infrastructure	TBD
3	CP – Care Provision	<u>Clinical</u>
4	CPS – Care Provision Support	• General, Medication, Diagnostics...
5	AS – Administrative Support	<u>Administrative</u>
6	POP – Population Health Support	• Attribution, Entities, Workflow...
<b>ISO/HL7 16527 PHR-S FM R1</b>		
7	PH – Personal Health S – Supportive II – Information Infrastructure	<u>Clinical</u> <ul style="list-style-type: none"> <li>• General, Medication, Diagnostics...</li> </ul> <u>Administrative</u> <ul style="list-style-type: none"> <li>• Attribution, Entities...</li> </ul>

Event Index		Record Lifecycle Event	ISO 21089:2004 Trusted End2End Published TR	ISO 21089:2014 Trusted End2End In development	ISO/HL7 10781 EHRS FM R2 Ready to Publish	ISO/HL7 16527 PHRS FM R1 Ready to Publish	ISO/HL7 16527 PHRS FM R2 In development	ISO 19969 – Re- Usable Use Case In development	HL7 EHR Lifecycle Model DSTU:2008 Published	HL7 RM-ES FP R1 2009 Published	HL7 RM-ES FP R2 In Development	US S&I Simplification	US S&I Provenance	
Record Entry Lifecycle Events during Lifespan	1	Originate/Retain Record Entry												
	2	Amend Record Entry												
	3	Translate Record Entry												
	4	Attest Record Entry												
	5	View/Access Record Entry												
	6	Output/Report Record Entry	Exchange											
	7	Disclose Record Entry												
	8	Transmit Record Entry												
	9	Receive/Retain Record Entry												
	10	De-Identify Record Entry												
	11	Pseudo-nymize Record Entry												
	12	Re-Identify Record Entry												
	13	Extract Record Entry												
	14	Archive Record Entry												
	15	Restore Record Entry												
	16	Destroy Record Entry												
	17	Deprecate/Retract Record Entry												
	18	Re-Activate Record Entry												
	19	Merge Record Entry												
	20	Unmerge Record Entry												
	21	Link Record Entry												
	22	Unlink Record Entry												
	23	Place Legal Hold on Record Entry												
	24	Remove Legal Hold on Record Entry												
	25	Verify Record Entry Content												
	26	Encrypt Record Entry												
	27	Decrypt Record Entry												
Applicable Lifecycle Events →			15	27	24	0	25	27	16	0	27	27		

# EHR Record Lifecycle


## Pre/Post Events 1-9

Pre Event State	Lifecycle Event	Post Event State				
		Add Event Evidence	Retain Unaltered Content	Append New Content	Sign as Author	Sign as System
[none]	1 Originate/Retain	X		X	X	X
[Record Entry as persisted unaltered since previous Lifecycle Event]	2 Amend	X	X	X	X	X
	3 Translate	X	X	X		
	4 Attest	X	X		X	
	5 Access/View	X				
	6 Output/Report	X				X
	7 Disclose	X				X
	8 Transmit	X				X
	9 Receive	X	X			



# EHR Record Lifecycle

## Pre/Post Events 10-18



Pre Event State	Lifecycle Event	Post Event State				
		Add Event Evidence	Retain Unaltered Content	Append New Content	Sign as Author	Sign as System
[Record Entry as persisted unaltered since previous Lifecycle Event]	10 De-Identify	X				
	11 Pseudonymize	X				
	12 Re-Identify	X				
	13 Extract	X				
	14 Archive	X				
	15 Restore	X				
	16 Destroy/Delete	[none]				
	17 Deprecate	X				
	18 Re-Activate	X				

# EHR Record Lifecycle

## Pre/Post Events 19-27

Pre Event State	Lifecycle Event	Post Event State				
		Add Event Evidence	Retain Unaltered Content	Append New Content	Sign as Author	Sign as System
[Record Entry as persisted unaltered since previous Lifecycle Event]	19 Merge	X				
	20 Unmerge	X				
	21 Link	X				
	22 Unlink	X				
	23 + Legal Hold	X				
	24 – Legal Hold	X				
	25 Verify	X				
	26 Encrypt	X				
	27 Decrypt	X				

## From ISO/HL7 10781 – Sample Conformance Criteria

# 1 – Originate/Retain Record Entry

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.
12. The system SHALL audit each occurrence when a Record Entry is originated and retained.
13. The system SHALL capture identity of the organization where Record Entry content is originated.
14. The system SHALL capture identity of the patient who is subject of Record Entry content.
15. The system SHALL capture identity of the individual(s) who performed the Action documented in Record Entry content.
16. The system SHALL capture identity of the user who entered/authored Record Entry content.
17. The system SHALL capture identity of the system application which originated Record Entry content.
18. IF the source of Record Entry content is a device THEN the system SHALL capture identity of the device.
19. The system SHALL capture the Action as evidenced by Record Entry content.
20. The system SHALL capture the type of Record Event trigger (i.e., originate/retain).
21. The system SHALL capture date and time of Action occurrence as evidenced by Record Entry content.
22. The system SHALL capture date and time Record Entry content is originated.
23. The system MAY capture the duration of the Action evidenced by Record Entry content.
24. The system MAY capture the physical location of the Action evidenced by Record Entry content.
25. The system SHOULD capture identity of the location (i.e., network address) where Record Entry content is originated.
26. The system MAY capture the rationale for the Action evidenced by Record Entry content.
27. The system MAY capture the rationale for originating Record Entry content.
28. IF Record Entry content includes templates (boilerplate information) or copied (duplicated) information THEN the system SHOULD capture the source of such content.

↑ At Lifecycle Event Occurrence  
With Event Evidence→

Record Infrastructure (RI)

# Record Lifecycle Event Metadata

	Action	Corresponding Record Entry(ies)
Who	Patient, Subject of Action or Entry	User/Author Source of Entry
	Practitioner, Performer of Action	System/Device Source of Entry
	Organization of Action	
What	Action Taken	Record Lifecycle Event
When	Date/Time/Duration of Action Occurrence	Date/Time of Entry Occurrence
Where	Location of Action Taken	Device ID, Network Address of Entry Occurrence
Why	Rationale, Purpose for Action Taken	Rationale, Purpose of Entry

Record Infrastructure (RI)

# Record Lifecycle Event Metadata

	Action	Corresponding Record Entry(ies)
And...	N/A	Data, Document or Artifact ID
		Amendment/Translation Sequence
		Pointer to Pre-Event Entry: e.g., pre-amendment, pre-translation
		Event flagged as (known to be) Disclosure
		Permissions associated with Entry Content
		Entries in Event Transaction: e.g., set of entries viewed, entries extracted, entries to be archived or deleted.

## Basics

# Record Entry and FHIR Resources

- A Record Entry instance may comprise one to many FHIR Resource instance(s)
- An EHR comprises one to many Record Entry instances.
- 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

## Project Focus/Success Criteria

# FHIR Enabled Lifecycle Events

Project Focus	Project Success
<p>Binds (joins) Resource Instance(s) together in Record Entry Instance:</p> <ul style="list-style-type: none"><li>• Including applicable Clinical, Administrative, Infrastructure Resources</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>• i.e., 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	Project Success
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 or 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>



EHR Record Lifecycle/Lifespan

# Dimensions of End-to-End Flow

## Record Lifespan

### 1. Within Single System


- Starting at origination, in Source System
- Starting at receipt, in downstream System

### 2. Across Multiple Systems

- Traversing one or more Points of Exchange

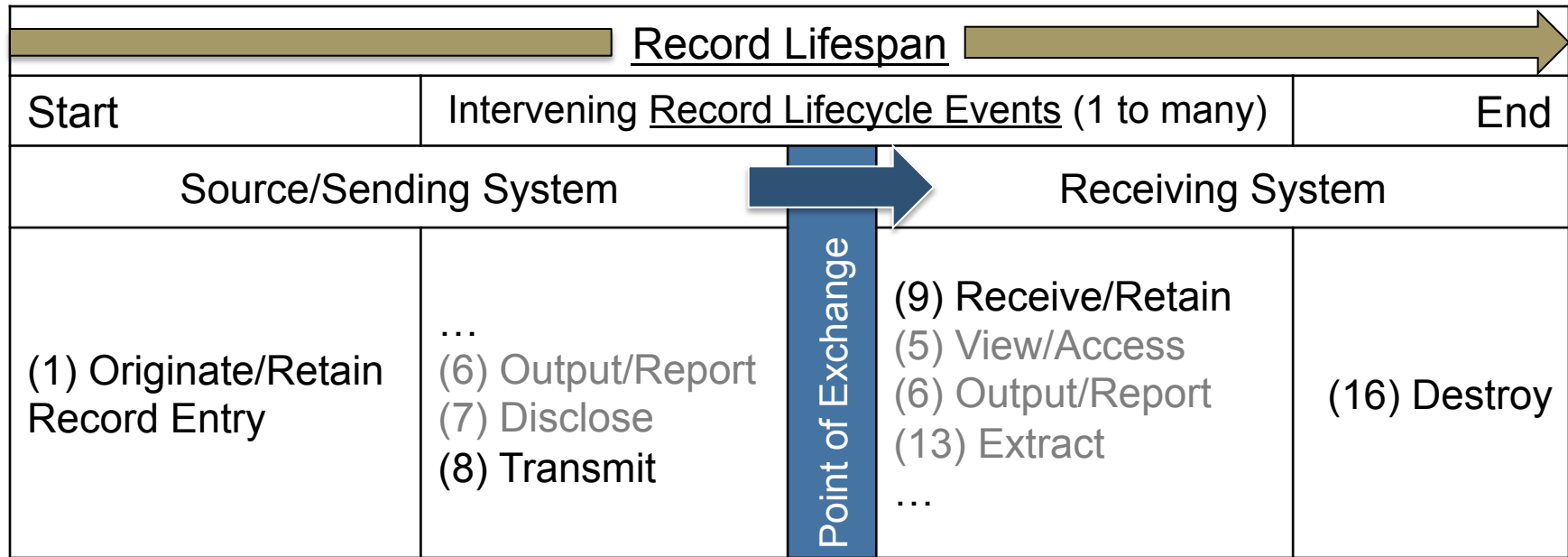
## Record Lifespan – End-to-End

# 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 (27,4) 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...

To Be Considered...

# Possible Assignments

		Assignments
1	<u>ISO/HL7 10781 EHR-S FM R2</u> RI – Record Infrastructure RM-ES – Records Management/ Evidentiary Support	Gary Dickinson Diana Warner, Reed Gelzer, MD Josh Mandel? Others?
2	TI – Trust Infrastructure	?
3	CP – Care Provision	Helen Stevens? Others?
4	CPS – Care Provision Support	Helen Stevens? Others?
5	AS – Administrative Support	Lenel James? Others?
6	POP – Population Health Support	Hetty Kahn? Others?
7	<u>ISO/HL7 16527 PHR-S FM R1</u> PH – Personal Health S – Supportive II – Information Infrastructure	John Ritter, PHR WG

EHR-S FM + PHR-S FM + RM-ES 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)