

Record Lifecycle Events on FHIR
W5 Analysis Project
October FHIR Connectathon Track

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FHIR Infrastructure Resources

Infrastructure

Support:

- Media
- Basic
- Provenance ←
- AuditEvent ←

Documents & Structure:

- List
- Composition (+ Clinical Document)
- DocumentReference (+ XDS)
- DocumentManifest

Exchange:

- MessageHeader
- OperationOutcome
- Subscription
- Bundle
- Binary

Conformance:

- Conformance
- StructureDefinition
- ValueSet
- ConceptMap
- DataElement
- OperationDefinition
- SearchParameter
- NamingSystem
- TestScript

Targets

- W5 = who, what, when, where, why
- FHIR W5 Report
 - <http://hl7-fhir.github.io/w5.html?>
- DSTU-2 Reconciliation Deadline
 - 31 August 2015

Mapping to FHIR

Requirements	Are Fulfilled by...
ISO/HL7 10781 EHR-S FM R2 Record Infrastructure (RI) → 24(+7) Record Lifecycle Events	Implementable FHIR Resources
<u>Basic Lifecycle Event</u>	<ul style="list-style-type: none">• AuditEvent
<u>Provenance Lifecycle Event</u> when Record Entry content is originated or updated	<ul style="list-style-type: none">• AuditEvent• Provenance• Other new/updated resource(s) → corresponding to Action Taken

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

Individuals have specific...

Action and Record Entry Roles

Action Roles	Record Entry Roles
<ul style="list-style-type: none">• Subject• Performer• Witness	<ul style="list-style-type: none">• Record Target• Author• Recorder (Enterer?)• Verifier• Attester• Informant• Source/Copy From

Example – Medication Order

Action and Record Entry Metadata

	Action Metadata	Record Entry Metadata
Who	Action Subject (Patient) Johnny Walker Role: Subject	Entry Subject (Patient) Johnny Walker Role: Record Target
	Action Organization Bay City Medical Center	
	Action Practitioner/Performer Doctor Sally Smith Role: Performer	Entry Source – Author or Scribe Nurse Janice Jones Role: Recorder
		Entry Source – System/Device Erstwhile EHR/Device XX123456

Example – Medication Order

Action and Record Entry Metadata

	Action Metadata	Record Entry Metadata
What	Action Taken Medication Order for Ambien 20mg PRN	Entry Origination/Retention evidenced by AuditEvent Provenance + FHIR Resources related to Medication Order MedicationPrescription, et al
When	Action Date/Time 22 Aug 2014 @ 1800	Entry Date/Time 22 Aug 2014 @ 1810
	Action Duration 3 Minutes	
Where	Action Physical Location Ward/Room B/12	Entry Location – IP Address 255.255.255.1
Why	Action Reason/Purpose To Induce Sleep	Entry Reason/Purpose <none entered>

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

Plus... More Evidentiary Metadata

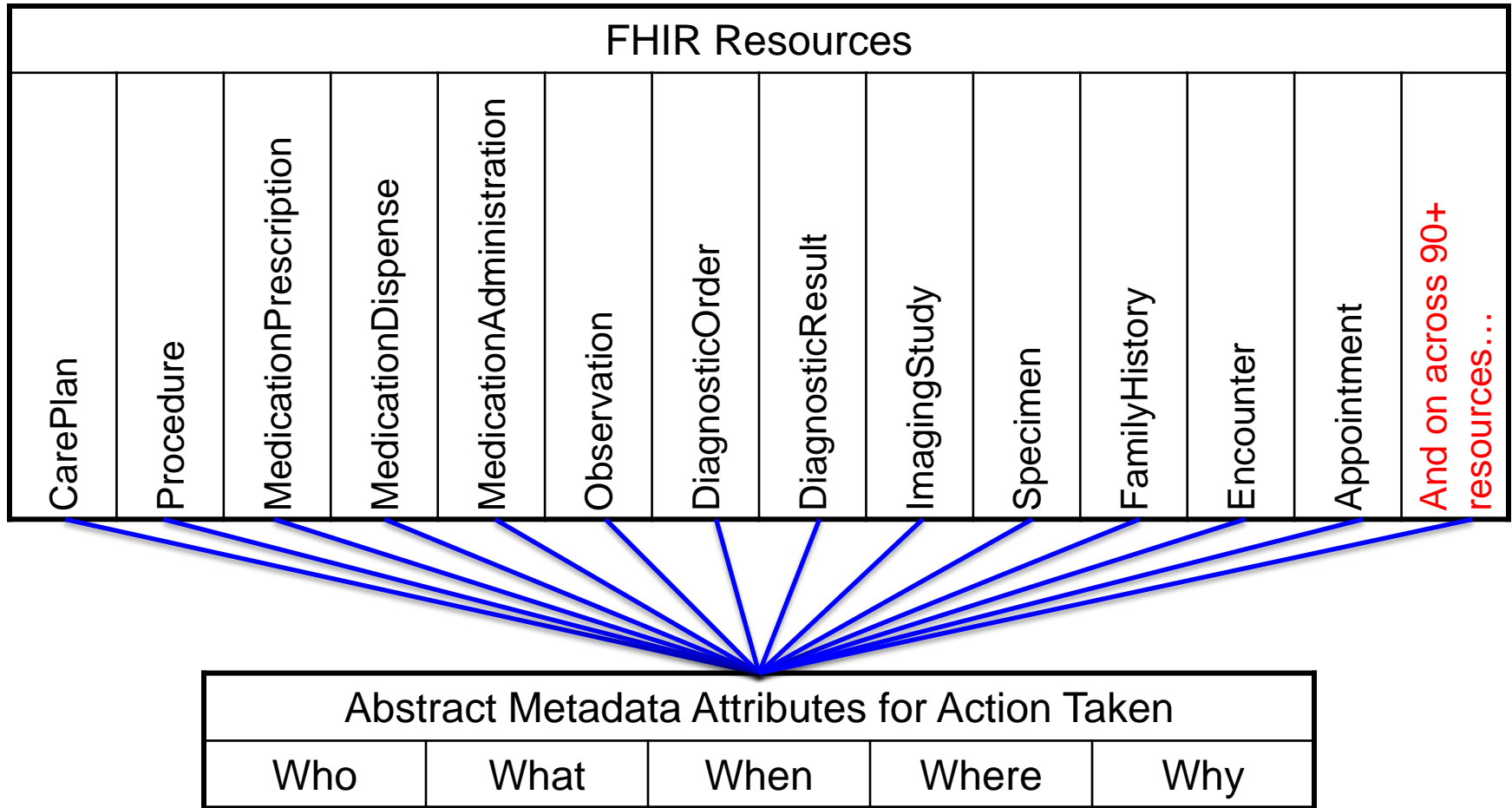
Lifecycle Event →	Originate Retain	Amend	Attest	Translate
Record Entry Unique ID	X			
Record Entry Content: Data, Document, Artifact ID(s)	X	X		
Digital Signature(s) – Individual(s)			X	
Digital Signature – Acting System/Device	Any/All			
Corresponding/linked Record Entry(ies)	X	X		
Pointer to Pre-Event Entry, if any: pre update/translation		X		X
Pointer to Post-Event Entry, if any: post update/translation		X		X
Amendment and/or Translation Sequence		X		X
Identity and version of Translation Tool(s), if any				X

Plus... More Evidentiary Metadata

Lifecycle Event →	Originate Retain	Amend	Attest	Disclose Transmit
Source of Copied Content: if copy/paste, template or boilerplate	X	X		
Event is Known Disclosure Indicator				X
Permissions associated with Record Entry Content	X	X		X
Entries in Event Transaction, if multiple	Set of Entries: <ul style="list-style-type: none"> • Accessed/Viewed • Transmitted • Received • Extracted • Archived/Restored • Destroyed/Deleted • On/Off Legal Hold ... 			

A Potential Solution for Action Metadata

Abstract Attributes



Notes

- [FHIR W5 Link \(Continuous Build\)](#)
 - Now Produced from Continuous Build
 - Compilation now includes all W5 metadata
 - Who, what, when, where, why
 - Across
 - FHIR Clinical, Administrative, Infrastructure Domains
 - Not Finance (yet)
 - Two Sections
 - Concise: FHIR Resources + Attributes
 - Full: FHIR Resources + Attributes + Data Types

Notes, con't

- [FHIR W5 Link \(Continuous Build\)](#)
- Based on designation of W5 metadata attributes by resource owner WG
 - Many empty cells, significance:
 - No equivalent Metadata Attribute? or
 - Not yet evaluated? or
 - Inadequate definition of W5 concept/term?
 - Not directly based on AuditEvent or Provenance W5 metadata attributes and datatypes

Consistency

- Objective: Establish consistent W5 metadata definitions
 - To include: attribute names, descriptions, data types, code/value sets, cardinalities
 - Across FHIR resources and especially:
 - When bound to AuditEvent:
 - Tracking resource (instance) lifecycle (including CRUDE) events
 - When bound to Provenance:
 - Tracking resource (instance) lifecycle events when content is created or updated (including signature)

Accountability, Authenticity

- Objective: Include FHIR AuditEvent and Provenance is designated best practice

Fundamentals

- EHR, PHR (or other) Record Entries document (show evidence of) Actions Taken in health and healthcare
- Actors take Actions
- Actors may be individuals, organizations or software/devices
- Actions and Record Entries have separate (yet corresponding) sets of metadata
- Thus: Action W5 + Record Entry W5

W5 Metadata Example

Action	Is documented/evidenced by	Record Entry
<p><u>Action W5:</u> Who/role – Action subject, patient Who/role – Action performer, assistant, observer What – Action taken When – Action date/time/duration Where – Action physical location Why – Action rationale, purpose</p>		<p><u>Record Entry W5:</u> Who/role – Entry target, subject, patient Who/role – Entry author, scribe, verifier, attester, witness... What – Entry Action: originate, update... When – Entry date/time Where – Entry device ID, network address Why – Entry rationale, purpose</p>

CRUDE Points

- W5 Metadata is captured (in FHIR resource instances) at CRUDE points
 - **Capture**: Originate content in new instance
 - **Read**: Access/view content in existing instance
 - **Update**: Update content in existing instance
 - **Delete**: Purge/destroy existing instance and its content
 - **Execute**: Perform operation(s) on content in existing instance

CRUDE per Record Lifecycle

	ISO/HL7 10781 EHRs FM R2 – Record Lifecycle Events																					New						
	1 Originate/retain	2 Amend	3 Translate	4 Attach/chain	5 Archive/view	6 Output/report	7 Delete	8 Transmit	9 Receive/retain	10 Re-identify	11 Re-adminimize	12 Re-identify	13 Extract	14 Archive	15 Restore	16 Destroy	17 Narrate	18 Re-activate	19 Merge	20 Inmerge	21 Link	22 Inlink	23 Logical Hold	24 Physical Hold	25 Verify	26 Encrypt	27 Decrypt	
Create	X			X					X																			
Read					X																							
Update		X	X	X					X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
Delete																X												
Execute			X	X		X	X	X		X	X	X	X				X	X			X	X	X	X	X	X	X	X

Duplicate U/E events – to be resolved

Persistent vs. Transient Instances

- A FHIR resource instance lifespan may be:
 - Persistent, long term, native artifact:
 - If originated or imported, then managed as a native artifact of the source EHR, PHR or other system for an extended period
 - Transient, short term, exchange artifact:
 - If created and processed, as an exchange artifact, and not retained long-term in source or receiving system

Other Notes

- Covering: who, what, when, where, why
- OK for same attribute in resource as AuditEvent and Provenance
- FMG will ensure W5 attributes are considered by each WG owning resources

Worksheet

[W5 Worksheet](#), 1st Tab

- **Col B – W5 Metadata**
 - Is W5 Metadata list complete?
 - Criteria to add metadata:
 - Breakout by role: e.g., subject, performer, assistant, witness, author, attester, informant
 - Requirement from ISO/HL7 10781 EHR System Functional Model Release 2 Record Infrastructure
 - Concept missing, not combinable
- **Col C – Action or Record Entry Metadata**
 - Is concept Action or Record Entry (or both) Metadata?

Worksheet

[W5 Worksheet](#), 1st Tab

- Col D – AuditEvent/Provenance Reference
 - Should all W5 metadata live in AuditEvent and/or Provenance resources?
 - Even if duplicative content to other bound resources?
- Col E – W5 Attribute Names
 - Review and disambiguate concepts...
 - Same concept, different attribute name?
 - Different concept, same or different attribute name?

Worksheet

[W5 Worksheet](#), 1st Tab

- Col F – Current W5 Definition
- Col G – Proposed Definition
 - Review and refine

October FHIR Connectathon

- [May 2015 FHIR Connectathon Link](#)
- Start with/piggyback on existing Scenario:
Track 1 – Patient ID/Demographic
- Identify CRUD points
- Add AuditEvent to all Scenarios
- Add Provenance resource to CUE Scenarios, as appropriate

Track 1 - Patient

Scenario		CRUDE	AuditEvent	Provenance
1	Register a New Patient	C	X	X
2	Update a Patient	U	X	X
3	Retrieve Patient History	R	X	
4	Search for a Patient on Name	R	X	

EHR-S FM Record Lifecycle Events on FHIR

Links

- RLE on FHIR Materials – HL7 EHR Interop Wiki:
 - http://wiki.hl7.org/index.php?title=EHR_Interoperability_WG
- FHIR DSTU-2 – Record Lifecycle Event Implementation Guide
 - <http://www.hl7.org/fhir/2015May/ehrs-rle.html>
- FHIR W5 Report (Continuous Build)
 - <http://hl7-fhir.github.io/w5.html?>
- FHIR May 2015 Connectathon
 - http://wiki.hl7.org/index.php?title=FHIR_Connectathon_9#Track_1_Patient