HL7 EHR Work Group
EHR Interoperability WG

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Co-Facilitators

EHR Interoperability Work Group
Areas of Focus

- "Coming to Terms" White Paper
  - Compilation and Analysis of Industry "Interoperability" Definitions

- EHR Interoperability Model (EHR/IM) DSTU
  - Characteristics of Interoperable EHR Records

- EHR/IM – CDAr2 Reference Profile for EHR Interoperability DSTU

- EHR/IM – Record Meta-Data Review
  - Alignment with RM/ES Functional Profile, CDAr2

EHR Interoperability Work Group
Areas of Focus, con't

- EHR Lifecycle Model (EHR/LM) DSTU
  - EHR Lifecycle Events
- ONC/AHIC/HITSP Use Case Alignment
  - w/HL7 EHR/PHR Models
- ANSI HITSP Foundations Framework Simplification Strategy

Interoperability Definition
HL7

- "Interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged.
  - "'Functional' interoperability is the capability to reliably exchange information without error.
  - "'Semantic' interoperability is the ability to interpret, and, therefore, to make effective use of the information so exchanged."

Compilation and Analysis of Industry Interoperability Definitions

- Lead: Pat Gibbons, Mayo Clinic
- Research/Reference/Foundation Project
- Compilation and Analysis
  - 100+ Definitions
  - Many sources, US and international, including HL7, ISO, IEEE, NAHIT, US Executive Order...

Compilation and Analysis
Key Aspects of Interoperability

- ## Technical Interoperability
  - Structure, syntax, reliable communication

- ## Semantic Interoperability
  - Meaning, intent and context preserved

- ## Process Interoperability
  - Integral to the process of health(care) delivery

Compilation and Analysis
Status

- "Coming to Terms" White Paper
  - Assessment and Findings
- Publication Package
  - White Paper & Slide Set Overview
  - Reference Spreadsheets
    - Source Summary and Acronyms
- Available on HL7 EHR TC Website
  - http://www.hl7.org/ehr

- To the question:
  "What is <u>Interoperability</u>?"
  - "Coming to Terms" White Paper

- To the point:
  "What is <u>EHR Interoperability</u>?"
  - HL7 EHR Interoperability Model DSTU
  - HL7 EHR Lifecycle Model DSTU

HL7 EHR Work Group
4 Complementary Models

- EHR System Functional Model
- PHR System Functional Model
- EHR Interoperability Model
- EHR Lifecycle Model

- Each specifies:
  – Requirements
  – Testable conformance criteria

Complementary EHR/EHRS/PHRS Models
Overview

	EHR System Functional Model (EHRS/FM)	PHR System Functional Model (PHRS/FM)	EHR Interoperability Model (EHR/IM)	EHR Lifecycle Model (EHR/LM)
Focus	Functions of <u>EHR Systems</u>	Functions of <u>PHR Systems</u>	Characteristics of Interoperable <u>EHR Records</u>	Key Audit/Trace Events in <u>EHR Record</u> Lifecycle
Specifies	~150 Functions	~100 Functions	~100 Characteristics	16 Events
Status	• HL7 Normative • ANSI Approved • ISO DIS (in ballot)	• HL7 DSTU	• HL7 DSTU	• HL7 DSTU

EHR Interoperability Model

- Lead
  - Gary L. Dickinson
  - Consultant, representing CentriHealth
- DSTU Release 1
  - Passed Ballot, January 2007
  - Published, March 2007
- Available
  - http://www.hl7.org/ehr

EHR Interoperability Model
What is It?

- A consensus Draft Standard for Trial Use
- A common industry reference point
- A set of characteristics of (requirements for) interoperable EHRs, encompassing
  - WHAT (EHR Interoperability Characteristics) and
  - WHY (Rationale) but
  - NOT HOW (Architectures and Implementations)
- A concrete approach to EHR interoperability: technical, semantic and process

EHR Interoperability Model
What is It? con't

- A set of benchmarks to achieve persistent legally qualified records

- A trust framework for key stakeholders
  - Patients/Consumers, Providers, Authors, Record Users...

- A structure to ensure record persistence and indelibility
  - End-to-end: point of record origination to <u>each</u> ultimate point of record access/use
  - Often traversing point-to-point record exchanges

EHR Interoperability Model
What is It? con't

- A context of the EHR as the immediate (concurrent) record of health(care)
  - Chronicle of health(care)
  - Documentation of health(care) Acts in Act Records
  - Creation of indelible Act Record entries in the persistent EHR

EHR Interoperability Model
What is It? con't

- An introduction of the Common EHR Unit of Record
  - An Act Record for each Act/Action
  - Sufficient to document all health(care) Acts
- A framework for Common Record Units (Act Records) to comprise the EHR
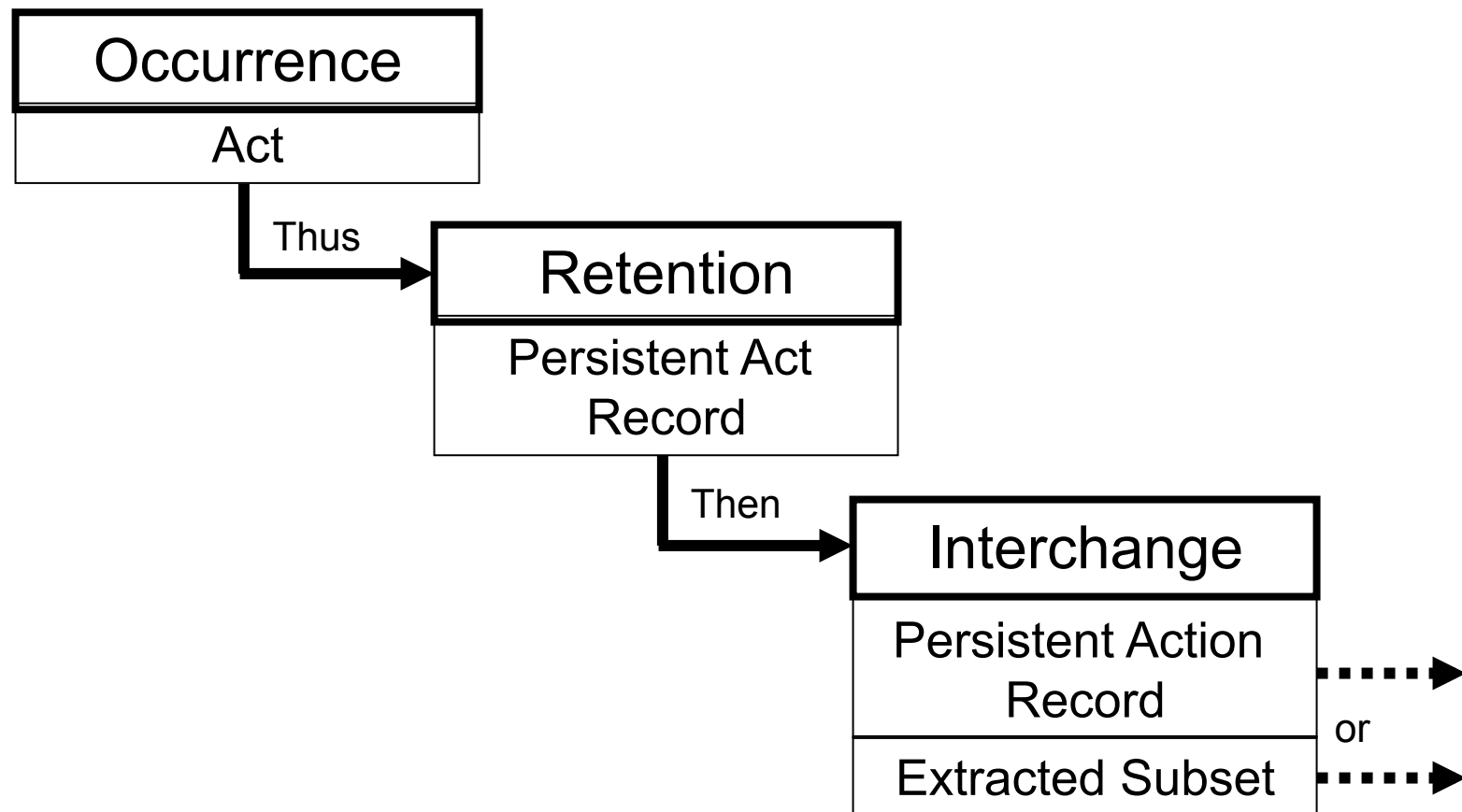
EHR Interoperability Model
What is It? con't

- A framework for conformance testing
  - Conformance criteria for record validation
  - Applicable to specific application roles
    - Record Source/Originator
    - Record Transmitter, Receiver
    - Interchange Mediator, Intermediary

- An approach which is technology and vendor neutral

EHR Interoperability Model
Act/Act Record/Interchange

```
┌─────────────────────────┐
│      Occurrence         │
├─────────────────────────┤
│          Act            │
└─────────────────────────┘
            │
            │ Thus
            ▼
        ┌─────────────────────────┐
        │      Retention          │
        ├─────────────────────────┤
        │   Persistent Act        │
        │      Record             │
        └─────────────────────────┘
                    │
                    │ Then
                    ▼
                ┌─────────────────────────┐
                │      Interchange        │
                ├─────────────────────────┤
                │   Persistent Action     │ ┄┄►
                │      Record             │
                ├─────────────────────────┤  or
                │   Extracted Subset      │ ┄┄►
                └─────────────────────────┘
```

Example Interchange Pattern
Persistent Records and Extracted Subsets

Source System	2nd System	3rd System	4th System

Source System
Originates
Retains

Persistent Record

2nd System
Accepts
Retains

Persistent Record

3rd System
Accepts
Retains

Persistent Record

4th System
Accepts
Retains

Persistent Record

Accepts
Retains

Persistent Record

Accepts
Extracts
Retains

Extracted Subset

Accepts
Retains

Extracted Subset

Accepts
Extracts
Retains

Extracted Subset

EHR Interoperability Model

Next Steps

- Incorporate into EHRS Functional Model R2

EHR Lifecycle Model

- Lead
  - Gary L. Dickinson
- Draft Standard for Trial Use
  - Passed Ballot January 2008
  - Published March 2008

EHR Lifecycle Model
What is It?

- A common industry reference point

- A specification of lifecycle events for interoperable EHR records

- A framework for EHR record audit and traceability

- A supplement to the EHR Interoperability Model
  - Audit/trace points (per EHR/IM Section 3.19)

EHR Lifecycle Model
What is It? con't

- A structure to ensure record persistence and indelibility

- A framework for conformance testing

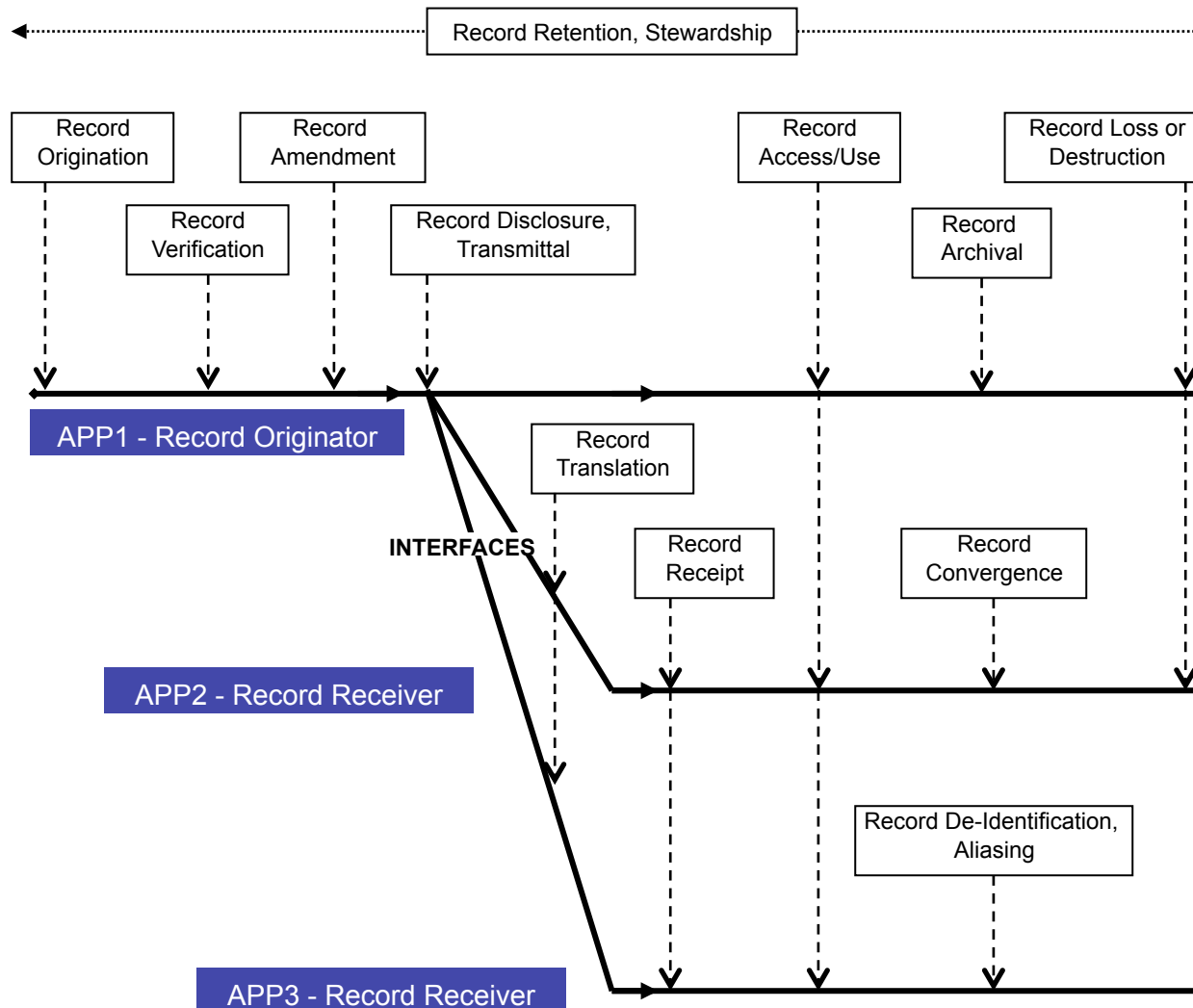- An approach which is technology and vendor neutral

EHR Lifecycle Model
EHR Lifecycle Events

Occurring at Point of Record:

- Origination and Retention
- Amendment
- Verification
- Access, View
- Translation
  - Language and Coding/Classification Scheme
- Transmittal and Disclosure
- Receipt and Retention
- De-identification, Aliasing, Re-Identification
- Archival

ISO 21089 - Key Trace Points in End-to-End Information Flow

Record Retention, Stewardship

Record Origination

Record Verification

Record Amendment

Record Disclosure, Transmittal

Record Access/Use

Record Archival

Record Loss or Destruction

APP1 - Record Originator

Record Translation

INTERFACES

Record Receipt

Record Convergence

APP2 - Record Receiver

Record De-Identification, Aliasing

APP3 - Record Receiver

EHR Lifecycle Model
Next Steps

- Incorporate into EHRS Functional Model R2

CDAr2 Reference Profile

- CDAr2 Reference Profile for EHR Interoperability
- Lead
  - Calvin Beebe, Mayo Clinic
  - Co-Chair, HL7 Structured Documents TC
- Draft Standard for Trial Use
  - Passed Ballot January 2008
  - Published March 2008

CDAr2 Reference Profile
What is It?

- A crosswalk of EHR/IM requirements vis-à-vis CDAr2 attributes
- A specification of CDAr2 as an implementation of the Common EHR Record Unit
  - Mapped to EHR/IM Sections 3&4
- A collaboration between HL7 WGs
  - EHR, Structured Documents, Security

CDAr2 Reference Profile
Now

- EHR Interoperability Requirements Fulfilled by CDAr2 attributes
  - Currently 51 of 56
- 5 Issues Under Review
  - Access Control, including Consent-Based
  - Record Audit
  - End-to-End Traceability

CDAr2 Reference Profile
Next Steps

- Resolution of 5 outstanding issues
  - In collaboration with HL7 Structured Documents and Security WGs

Record Meta-Data Review

- Lead
  - Michelle Dougherty, AHIMA
  - Facilitator, EHR TC Legal Aspects WG

Record Meta-Data Review
In Progress

- Review record meta-data
  - At the EHR unit of record level
- Three specifications under consideration
  - EHR Interoperability Model DSTU
  - Records Management and Evidenciary Support Profile (of the EHRS/FM)
  - Clinical Document Architecture Release 2
- Group Meets Mondays at 12 Noon ET

ONC/AHIC/HITSP Use Case Alignment w/HL7 EHR/PHR Models

Use Case Alignment
Analysis Complete

- Y1 EHR/Lab Results Reporting
  - Sherry Selover, Selover EDI Solutions

- Y1 Consumer Empowerment
  - Kim Salamone, Health Services Advisory Group

- Y1 Biosurveillance
  - Gora Datta, Cal2Cal

- Y2 Quality Reporting
  - Kim Salamone

- Y3 Remote Monitoring
  - Sherry Selover

Use Case Alignment
Objectives

- Show:
  - How ONC/AHIC/HITSP Use Cases are aligned with (supported by) HL7 EHR/PHR Models
  - Alignment methodology, gap analysis
  - How Use Case Actions are evidenced by persistent Action Records

ONC/AHIC/HITSP
Use Case Hierarchy

Granularity
COARSE

Use Case

Has one or more

Scenario(s)

Has one or more

Event(s)

Has one or more

Action(s)

FINE
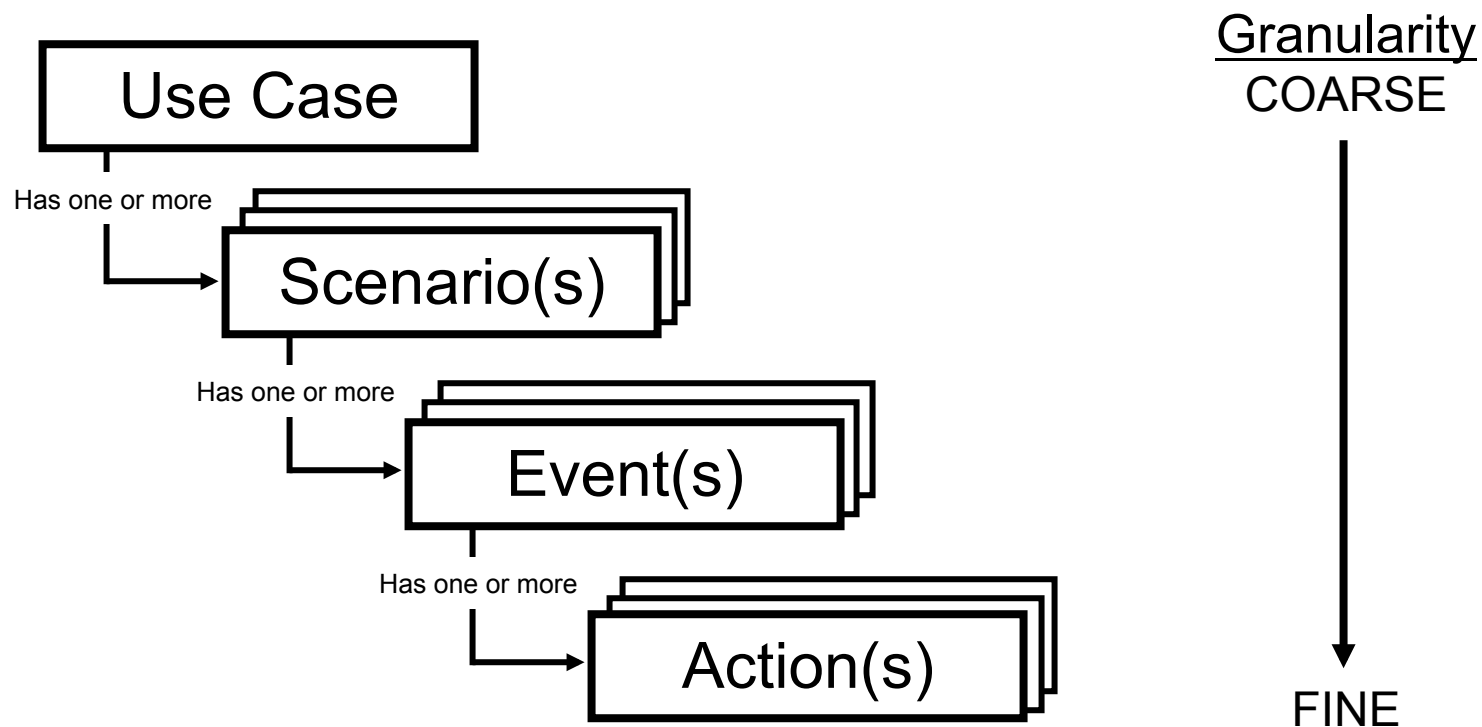
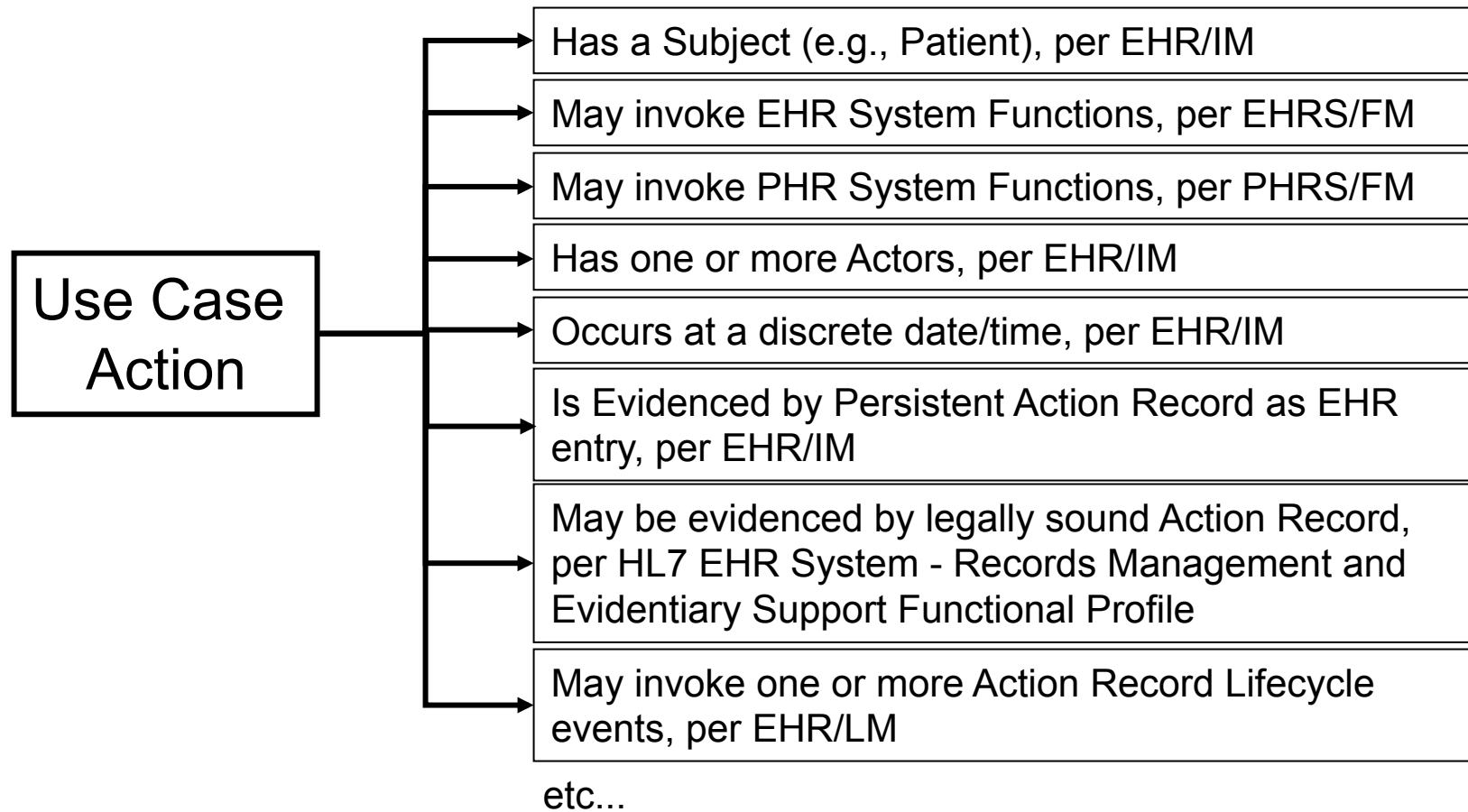- Actions occur at leaf level of each Use Case.
- All Use Cases resolve to a set (and sequence) of Actions.

Support for Use Case Actions
Designed into HL7 Models

```
                           ┌──────────────────────────────────────────────┐
                     ┌────▶│ Has a Subject (e.g., Patient), per EHR/IM      │
                     │     ├──────────────────────────────────────────────┤
                     ├────▶│ May invoke EHR System Functions, per EHRS/FM   │
                     │     ├──────────────────────────────────────────────┤
                     ├────▶│ May invoke PHR System Functions, per PHRS/FM   │
                     │     ├──────────────────────────────────────────────┤
                     ├────▶│ Has one or more Actors, per EHR/IM             │
┌──────────┐         │     ├──────────────────────────────────────────────┤
│ Use Case │─────────┼────▶│ Occurs at a discrete date/time, per EHR/IM     │
│  Action  │         │     ├──────────────────────────────────────────────┤
└──────────┘         │     │ Is Evidenced by Persistent Action Record as EHR│
                     ├────▶│ entry, per EHR/IM                              │
                     │     ├──────────────────────────────────────────────┤
                     │     │ May be evidenced by legally sound Action Record,│
                     ├────▶│ per HL7 EHR System - Records Management and     │
                     │     │ Evidentiary Support Functional Profile          │
                     │     ├──────────────────────────────────────────────┤
                     │     │ May invoke one or more Action Record Lifecycle  │
                     └────▶│ events, per EHR/LM                             │
                           └──────────────────────────────────────────────┘
                             etc...
```

EHR Interoperability Fundamentals
Simple Paradigm

- Start with a discrete unit of service
  - <u>Action</u>

- Establish a corresponding EHR unit of record
  - <u>Action Record</u>

- Persist in EHR
  - Action Records = persistent entries in EHR

Use Case Alignment Analysis
Methodology

1   Review Use Case narrative, Scenarios, Events and Actions.

For each Use Case Action:

2a   Specify which EHR system function(s) it likely invokes.

2b   Specify any EHR system function(s) that are required but absent from the current EHRS/FM (a gap).

3a   Specify which PHR system function(s) it likely invokes.

3b   Specify any PHR system function(s) that are required but absent from the current PHRS/FM draft (a gap).

4a   Many provider Actions are accountable from a clinical and medical/legal perspective and require a persistent Action Record. Determine which Use Case Actions require an Action Record, as persistent evidence of Action occurrence.

Use Case Alignment Analysis
Methodology, con't

For each Use Case Action (con't):

4b   For purposes of the persistent EHR, an Action is often logically combined with other closely corresponding Actions. (An Action may be comprised of one or more other Actions, thus an Action Record instance may document one or more Actions.) Determine which Actions may be logically combined in a single Action Record.

4c   Determine, as applicable, Actions which invoke Act Record Lifecycle Events (per the EHR Lifecycle Model).

5   Specify which EHR Interoperability characteristics (per Act/Action Record, Section 3 of the EHR Interoperability Model) are pertinent to evidence Action occurrence – in the form of a persistent Action Record.

To Participate

Contact Gary Dickinson or Gora Datta, Co-Facilitators
   gary.dickinson@ehr-standards.com
   gora@cal2cal.com

Subscribe to "ehrinterop" list on HL7 web site
   http://www.hl7.org

Join semi-weekly EHR Interoperability Teleconferences
   Fridays – 1PM ET (US)

Review Current Projects and Documents on HL7 Wiki
   http://wiki.hl7.org/index.php?title=EHR_Interoperability_WG
   (user = "wiki", pass = "wikiwiki")