

openEHR and FHIR



- Both have significant international communities
- Both have different perspectives
- But also high overlap and ability to learn from each other
- We can work together to make the overall Health IT landscape easier for implementers



Using openEHR with FHIR – how can we make it easier?

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openEHR



-
- Trailblazer: open content, open community
 - Solid Health Informatics base
 - Archetypes - shared design for configurable systems – best implementation
 - Tool chain has stood the test of time

FHIR



-
- Strong focus on openness (community, license, tooling, social media)
 - Built on HL7 community and experience
 - Two level modeling – Resources + profiles
 - Implementation ecosystem active and growing
 - Conformance tooling strength

Continuity



	Reference Model	Constraint Models
HL7 v3	RIM	DMIM / RMIM / CMET (MIF)
openEHR	RM	Archetypes / Templates
FHIR	Resources	Profiles

Interoperability



■ Interoperability

- Ability to exchange data between different systems

■ Intraoperability

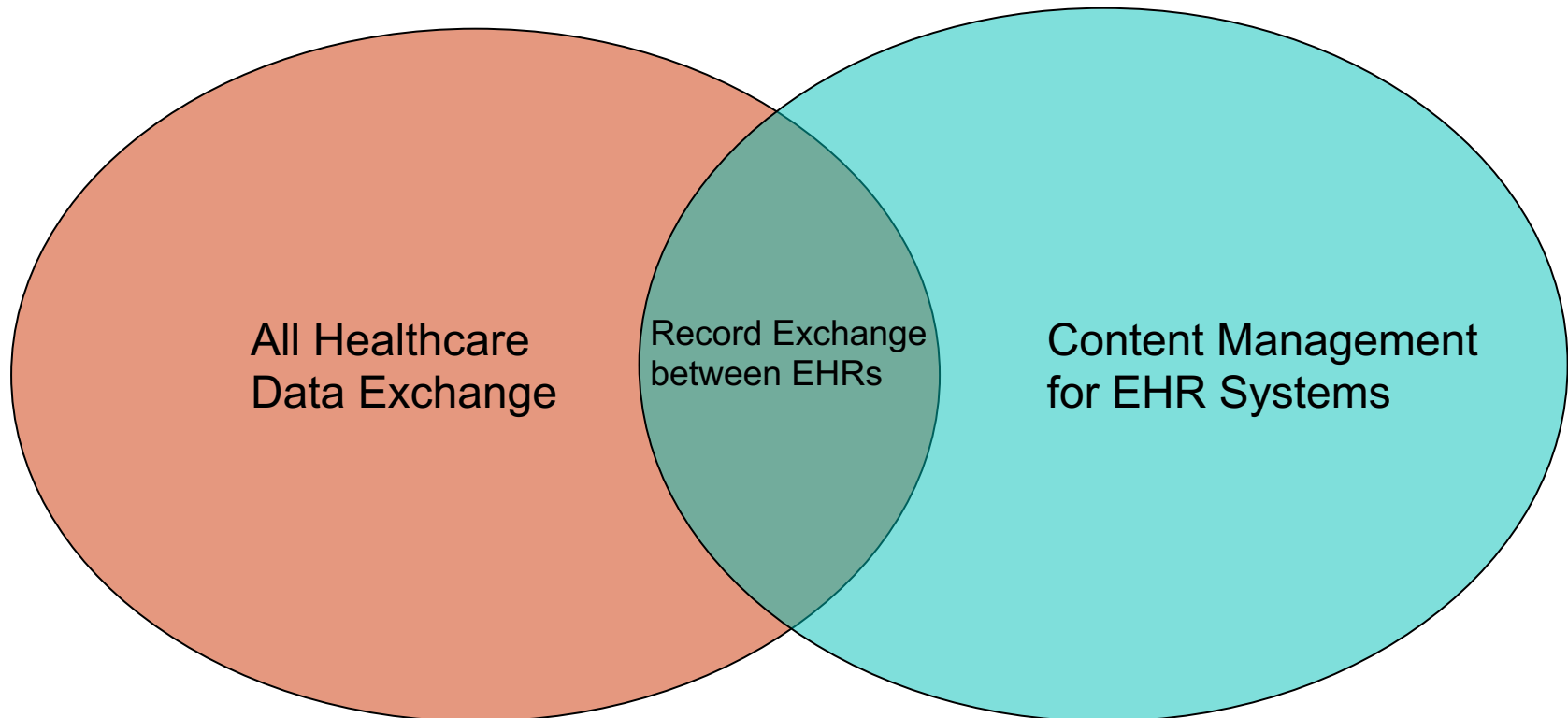
- Ability to exchange data between different instances of the same system

FHIR vs openEHR



FHIR

openEHR



Interoperability



- Interoperability is bad: get the systems to agree on content up front
 - Still have protocol challenges etc
- In general, the earlier you can agree, the better off everyone is
 - Healthcare is characterised by being unable to agree
 - Messy interoperability isn't going away

FHIR Shortcomings



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- Semantic base is much weaker than needed
 - Clinically focused design tooling is absent
 - FHIR isn't a full-fledged semantic/technical base for writing a clinical application
 - It wasn't/isn't intended to be but people do anyway
 - Trilemma: Cheap, flexible, interoperable – you can have any two

FHIR ~~Shortcomings~~



■ Too many profiles

- Should be: one profile per use case
- Are use cases aligned? How do you know?
- Functional and non-functional requirements...
- Still: too much choice?

■ Clinical Design is missing

- I don't see that the clinical community is ready for prospective top-down design standardization

openEHR Shortcomings



-
- Trading between text and structure
 - Pull out some facts into data elements, everything else into an uncontrolled text field
 - Balance varies by analysis
 - Sliding governance
 - Some things: rock solid million dollar consensus
 - Some things: a few friends agree & record
 - There's a spectrum, not just one open process

openEHR Shortcomings



■ Terminology binding

- Existing ADL terminology binding is rudimentary
- FHIR has a well-developed tx eco-system
- Services, binding language, validation, national tx
- Real world openEHR implementations using FHIR
- Formalise it in ADL!
- FHIR can do more to support (later)

openEHR Shortcomings



- Mappings / System engineering
 - I worked on an archetyped system
 - They were rudimentary compared to ADL
 - But 90% of content was about forms, presentation, mapping to external formats
 - E.g. engineering the archetype into the system
 - I think openEHR should do more formalisms in this space

Working together better



-
- Mapping from archetyped storage to FHIR interfaces
 - Terminology Usage
 - openEHR tools in the FHIR eco-system
 - FHIR tools in the openEHR eco-system
 - Organizational Collaboration

Mapping archetypes



- Can convert archetyped data to FHIR API by writing code (either direction)
- Typically: 90% easy, 9% tricky, 1% too hard
- Everyone starts from scratch each time
 - Mapping expressions (xslt, 3gl code) not portable
 - No way to share knowledge
- Good to do better!
- Write the mappings into the archetype?

Mapping Levels



- **Skeletal – Point humans in the right way**
 - Major decision points, tricky decisions
- **Conceptual**
 - Field to field based on the definition (ConceptMap)
- **Detailed**
 - Primitives to primitives for full value domain
- **Executable**
 - Logic for the special cases: execute directly (FML)

Mapping archetypes



- Extend ADL mapping to specify the whole mapping (conceptual or executable?)
- Extend openEHR tooling to make maintaining the conversion logic integrated
 - Not just for FHIR
- Also: FHIR Interop becoming more ubiquitous, design for it

Terminology Usage



GECCO_DIAGNOSE

Expand All

Show Annotations

Hide Paths

Other context

Vorliegende Diagnose

at [openEHR-EHR-COMPOSITION.registereintrag.v1]/content[openEHR-EHR-EVALUATION.problem_diagnosis.v1]

data

at [openEHR-EHR-COMPOSITION.registereintrag.v1]/content[openEHR-EHR-EVALUATION.problem_diagnosis.v1]/data[at0001]

T ²³/₇₆ Name des Problems/ der Diagnose [1..1] [http://fhir.de/CodeSystem/bfarm/icd-10-gm, http://snomed.info/sct] [diseases-combined]

at [openEHR-EHR-COMPOSITION.registereintrag.v1]/content[openEHR-EHR-EVALUATION.problem_diagnosis.v1]/data[at0001]/items[at0002]

▷ Körperstelle [0..*]

at [openEHR-EHR-COMPOSITION.registereintrag.v1]/content[openEHR-EHR-EVALUATION.problem_diagnosis.v1]/data[at0001]/items[openEHR-EHR-CLUSTER.anatomical_location.v1]

T ²³/₇₆ Datum/ Zeitpunkt des Auftretens/ der Erstdiagnose

at [openEHR-EHR-COMPOSITION.registereintrag.v1]/content[openEHR-EHR-EVALUATION.problem_diagnosis.v1]/data[at0001]/items[at0077]

T ²³/₇₆ Schweregrad or

at [openEHR-EHR-COMPOSITION.registereintrag.v1]/content[openEHR-EHR-EVALUATION.problem_diagnosis.v1]/data[at0001]/items[at0005]

T ²³/₇₆ Datum/Zeitpunkt der Genesung

at [openEHR-EHR-COMPOSITION.registereintrag.v1]/content[openEHR-EHR-EVALUATION.problem_diagnosis.v1]/data[at0001]/items[at0030]

T Kommentar

at [openEHR-EHR-COMPOSITION.registereintrag.v1]/content[openEHR-EHR-EVALUATION.problem_diagnosis.v1]/data[at0001]/items[at0069]

Terminology Usage



FHIR Binding Features:

- Example / Preferred / Extensible / Required
- Multiple bindings:
 - UI, decision support
 - Context specific bindings (incl Multi-lingual)
 - Min, Max, Legacy
- Integrated ValueSet definition & expansion
- Full fledged terminology service ecosystem

Terminology Usage



-
- Bindings in openEHR are not well described
 - Depend on FHIR Terminology service in practice
 - Not well specified
 - Bindings are not interoperable and not checked
 - Establish a culture of not tolerating errors and broken links

openEHR tools



- CKM is a great community consultation tool
- openEHR has other useful design tooling
- Profiles can be represented as ADL
 - Constraint languages are close to interconvertable
- FHIR needs more non-technical community consultation
- Can use CKM and other tools?
 - A reference model question

FHIR tools



■ Validator

- Check instances are valid against definitions
- Fully terminology capable

■ IG Publisher

- Builds on validator
- Publish a set of designs – human & computable
- Provides packaging & distribution mechanism

■ Can use these tools with archetypes

FHIR Tools (CDA)



- Latest CDA is still CDA
- But it's actually FHIR under the hood!

4.90.1.1 Formal Views of Profile Content

Description of Profiles, Differentials, Snapshots and how the different presentations work [↗](#).

Differential Table | Key Elements Table | Snapshot Table | Statistics/References | All

This structure is derived from [ANY](#)

Name	Flags	Card.	Type	Description & Constraints
CD		1..*	ANY	XML Namespace: urn:hl7-org:v3 Elements defined in Ancestors: @nullFlavor Base for all types and resources Binding: This type can be bound to a value set using the CDA binding style Logical Container: ClinicalDocument (CDA Class)
@code		0..1	cs	
@codeSystem		0..1	oid, uuid, ruid	
@codeSystemName		0..1	st	
@codeSystemVersion		0..1	st	
@displayName		0..1	st	
@sdtcValueSet		0..1	oid	XML Namespace: urn:hl7-org:sdtc XML: valueSet (urn:hl7-org:sdtc)
@sdtcValueSetVersion		0..1	st	XML Namespace: urn:hl7-org:sdtc XML: valueSetVersion (urn:hl7-org:sdtc)
originalText		0..1	ED	
qualifier		0..*	CR	
translation		0..*	CD	

FHIR Tools (openEHR)



-
- Define the reference model as a set of FHIR structures
 - Convert the archetypes to profiles on the openEHR reference model
 - Program the validator for the openEHR instance format
 - Bingo: all the FHIR tools work with openEHR

Organisational Collaboration



HL7 and openEHR:

- Different communities of influence

HL7:

- Conformance, Testing, Regulatory exp.

openEHR:

- Good relationships with clinical communities

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