Mettertron – Bridging Metadata Repositories and Terminology Servers

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Motivation

- Secondary use of clinical data plays crucial role for current research

- Interoperability is fundamental for achieving goals

- Syntactic interoperability:
  - FHIR, openEHR

- Semantic interoperability:
  - Terminologies, classifications, value sets etc. (SNOMED CT, LOINC)

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- Syntactic interoperability:
    - FHIR, openEHR
    - Metadata repositories (MDRs) for metadata

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- Syntactic interoperability:
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- Semantic interoperability:
  - Coding systems (SNOMED CT, LOINC, ICD), value set bindings
  - Metadata repositories (MDRs) for metadata
  - Terminology servers (TS) for terminological services

Motivation

- MDRs and TS not considered related
  → Separate development and research cycles for both systems

- Need for maintenance of terminological content in MDR

- Problems:
  - Limited support for complex terminologies like SNOMED CT
  - Maintaining synchronicity and consistency between MDR and TS

- Previous work: TermiCron
  - Generate resources for MDR based on TS
  - Updates/deletions can cause conflicts
  - → Conclusion: Terminology should not be maintained in the MDR

Methods

- Terminology binding
  - Data elements bound to use-case specific ValueSets (VS)
  - CodeSystems (CS) containing all concepts (and their properties) of a terminology, basis for VS
  - ConceptMaps (CM) for mappings between two VS

- ISO/IEC 11179 and ISO/TS 21526
  - Standards for MDRs in general (11179) and for healthcare (21526)
  - Anticipate binding against external VSs

Goals

- Link MDR and TS, fully delegating terminology tasks to TS

- No maintenance of terminological resources in MDR

- Achieve separation of concerns with clear split of responsibilities

- Improve support for complex terminologies

Mettertron

- Middleware acting as proxy in front of MDR

- Written in Kotlin using Ktor framework, runs in a JVM

- Passes MDR-API requests on to MDR

- Offer endpoints mirroring those from the FHIR terminological module
  - $validate-code: Verification if a code belongs to CS/VS
  - $translate: Translate a code from one VS to another

- Defined attributes for terminological parameters of data elements
  - Attributes contain canonical URLs for CS/VS/CM
  - Attribute names freely configurable

- Currently supports Data Element Hub and CentraXX® MDR

Example

- Attributes in CentraXX® MDR

Edit Attribute values		
Domain	**Name**	**Value**
fhir-terminology	FHIR-MapsToCS	http://snomed.info/sct?fhir_vs=isa/118956008
fhir-terminology	FHIR-ValueFromCS	https://imi.uni-luebeck.de/fhir/CodeSystem/ICD-O-M
fhir-terminology	FHIR-ValueFromVS	https://imi.uni-luebeck.de/fhir/ValueSet/ICD-O-M
fhir-terminology	FHIR-ConceptMap	https://imi.uni-luebeck.de/fhir/ConceptMap/ICD-O-Topography_to_SNOMED

Sequence diagram: $validate-code
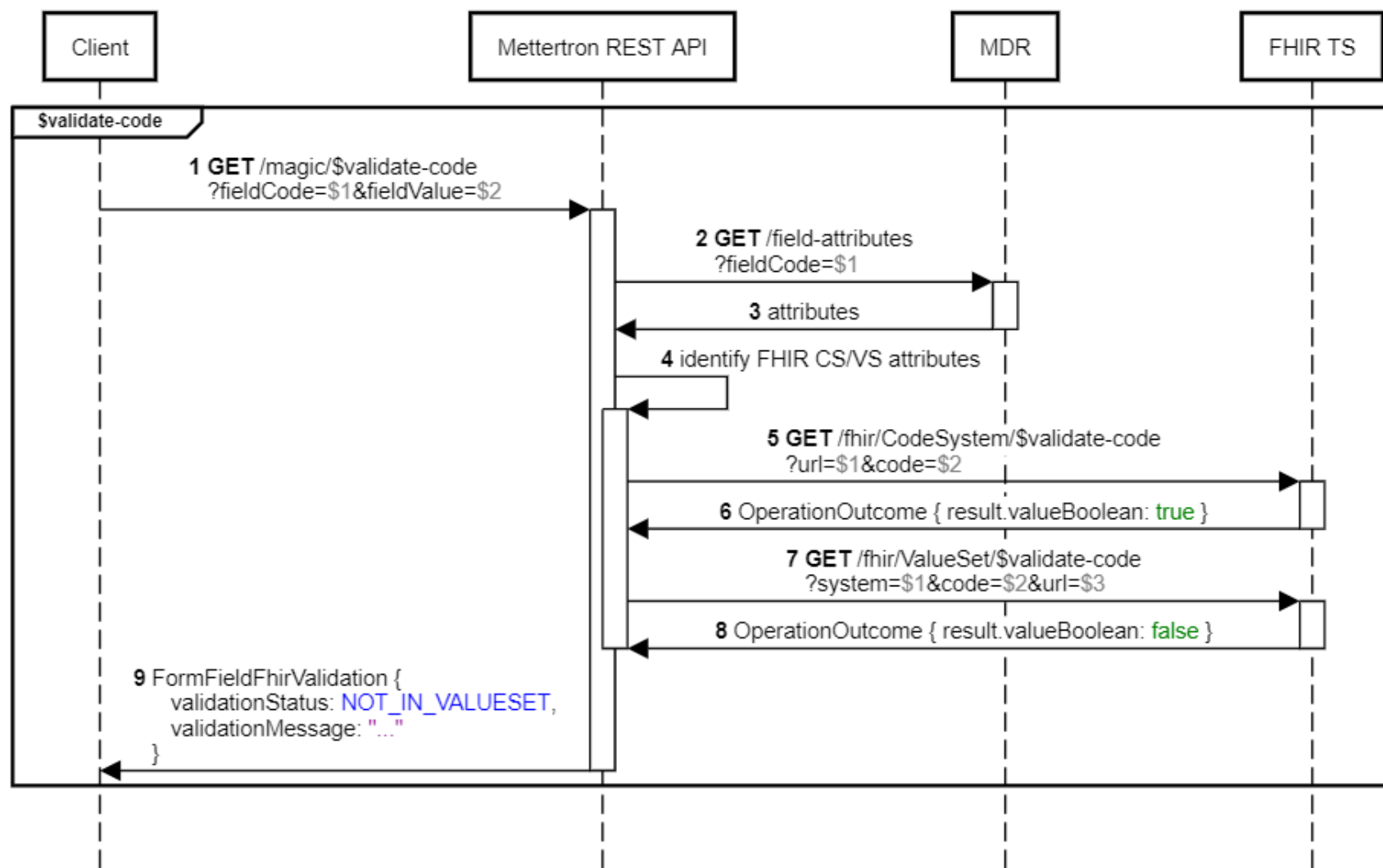
Sequence diagram: $translate
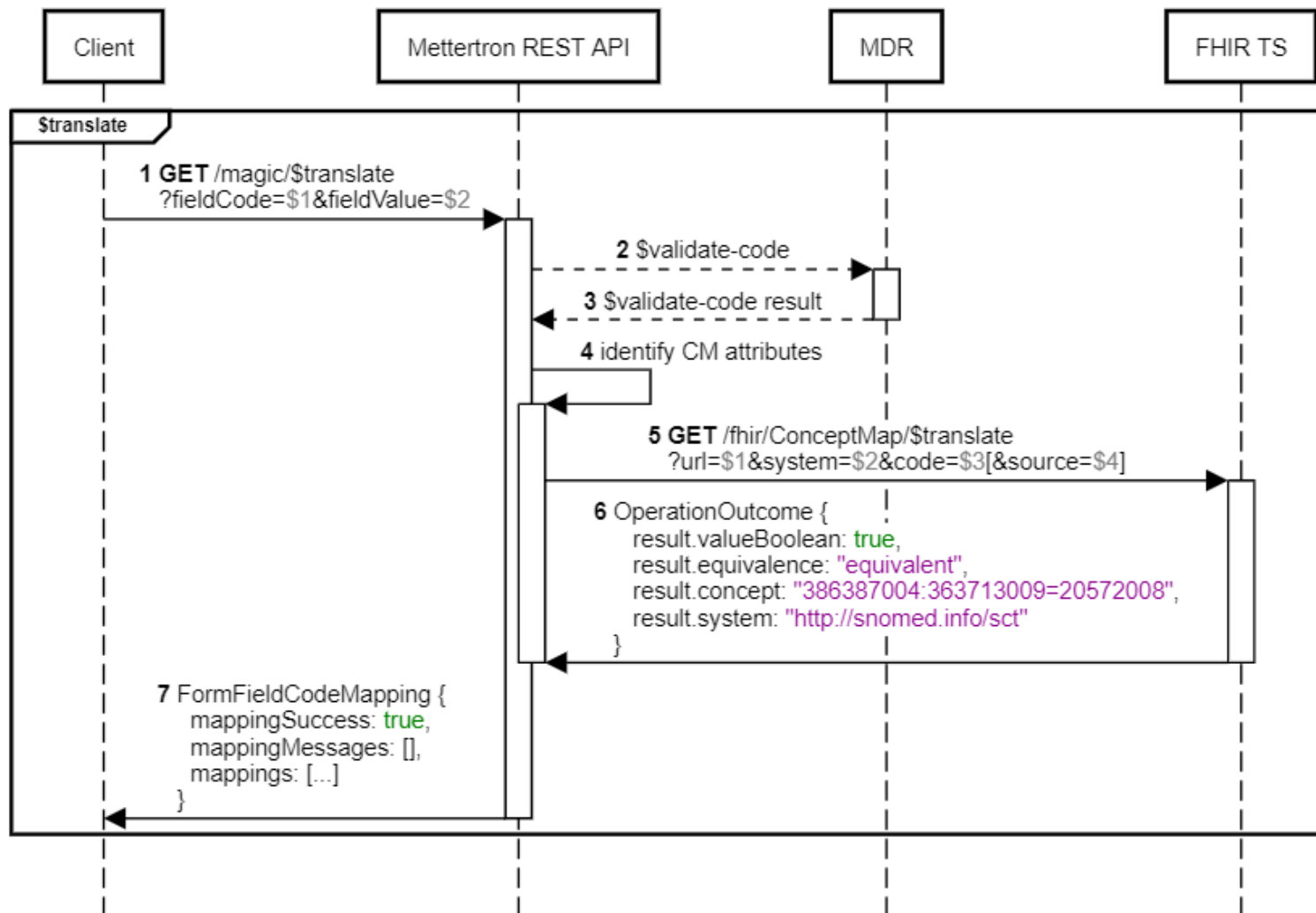
Discussion

- Approach's validity tested with data element bound to ICD-10-GM and SNOMED CT

- Feasible in terms of performance, dependent of TS

- TS interchangeable due to FHIR-API

- MDR **not** interchangeable due to very different APIs
  - Data Element Hub: /element/$urn/slots
  - CentraXX® MDR: /definitions/attribute/definition/version?code=$code&version=$version

- Opinion: Best approach would be integration of such logic directly into MDR

Conclusion

- Solution simplifies maintenance of terminological resources

- Bridging the gap between MDR and TS fosters sharing and reuse of metadata

- Standardized MDR-API necessary to make MDRs interchangeable

- Mettertron facilitates combined use of a TS and a MDR through its API
    - Enables use of TS where MDR does not offer support for terminological services
    - improves on our previous work but direct integration in MDR highly preferable

Contact

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