Collaborative, opensource and OMOP centric web application for international terminologies mapping

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Background

- Electronic health records (EHRs) improve efficiency and quality of care[1]. It opens opportunities for data sharing in healthcare and collaborative research.

- System interoperability is the ability of systems to exchange and use the information that has been transmitted[2] and has been identified as a major challenge. Data standardization is considered fundamental to semantic interoperability and is even more difficult in Europe due to its 24 official languages.

- The OMOP vocabulary tables are designed for data standardisation allowing mapping terminologies together and share the same standards.

- On top of OMOP we have developed an web-based application to help map source terminologies to standard one as defined by OHDSI teams. It is called **omop-mapper.fgh.ovh** and it is a OMOP-centric, collaborative, international and ergonomic website which combine: **a free text research tool** and **a mapping user-based tool**.

1 Objectives

1. Evaluate the omop-mapper web app in the context of a french national datathon.
2. Compare omop-mapper to Usagi (OHDSI tool) and Relma (LOINC tool).

2 Methods

2.1 Development

- Backend : We use python-flask to build our API. The database is built on top of OMOP and postgreSQL. We use Solr for the full-text search, hit highlighting, faceted search. Apache Spark allows complex and fast data transformations. Apache Livy has been used to synchronize PostgreSQL and Solr.

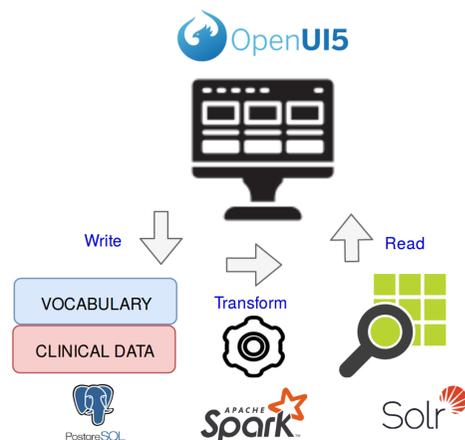- Frontend : we use openui5[3], an opensource framework developped by SAP corporation.

Figure 1: Backend and frontend architecture

2.2 Terminology sharing

- All the french hospitals were invited to share their own terminology.

- We use a private framagit[4] as it is sensitive data. A template is provided to standardize the import format. The frequencies of local terminologies are used to prioritize the mapping. Their are not mandatory. As it may be sensitive informations, a semi quantitive approch was used and french hospitals didn't have to give the exact count.

- As standard standard terminologies we use athena version 5.0

2.3 Comparison

- **Usagi**[5] is an opensource software used by OHDSI community to help in the process of mapping codes from a source system into terminologies, preferably standard ones, stored in the Observational Medical Outcomes Partnership (OMOP) Vocabulary[6].

- **Relma**[7] is developed by the Regenstrief Institute and distributed free of charge (in its basic version) through the LOINC website. It help for mapping local terms to LOINC, including automated functions to suggest candidate LOINC codes.

- The perfect mapping tool would be free, open source, without installation and quick to process. It would be possible to share terminologies between users. To help map, structured queries should be provided. It should be possible to use frequency and distribution values to improve the quality of the mapping. As an international tool, translation should be automatic.

APHP teams manually have mapped APHP laboratory terminology (ANABIO) to standard one (LOINC). The mapping was reviewed by engineers and doctors. We take a subpart of 117 concepts and used it as a reference. We evaluate the three tools and try to find the same code as the expert's code.

3 Results

3.1 Development

- Backend : OMOP core need an extension to meet our needs. We provide our extension tables in the following schema.
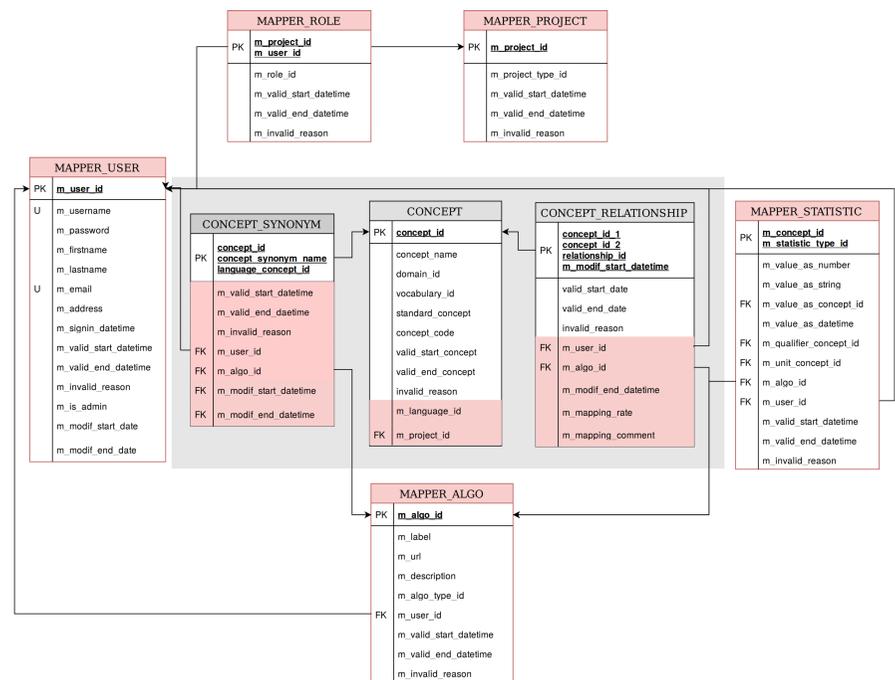

Figure 2: Omop-Mapper database desing

- Frontend : openui5 is an opensource css/javascript framework for fast data-centric web application developpment with built-in UX internationalization feature. We want to highlight that 30 SAP engineers are highly active to develop this framework.

3.2 Terminology sharing

5 French hospital shared their terminology : Bordeaux, Lille, Paris, Rennes and Toulouse. The domains of interest were : condition, billing codes, person, labs and prescritpions.

3.3 Comparison

	USAGI	RELMA	OMOP-MAPPER
Structured queries	No	No	Yes
Installation needed	Yes	Yes	No
Platform	All OS	Windows	Web
Automatic translation	No	No	Yes
Automatic matching	Yes	Yes	Yes
opensource	Yes	Basic version	Yes
use frequencies to map	No	No	Yes
use distribution to map	No	No	Yes
Allowed collaborative works	No	?	Yes
Allowed convergence	No	No	Yes
Time to import tests concepts	4 minutes	5 minutes	framagit
% reference concept found in the top 5 results	19% (23)	1% (1)	21% (25)
% reference concept find in the top 20 results	37% (44)	29% (34)	36% (43)
% of non pertinent results	21	82	15

Table 1: Comparison between USAGI, RELMA and OMOP-MAPPER

4 Discussion

The performance evaluation was similar between Usagi and omop-mapper. Relma had weaker performances. Our tool provides others contributions such as collaborative works, quality controls prior to csv import, no installation required, and internationalization. omop-mapper.fgh.ovh is an open source web application that allows intra and inter langual mapping.
Several algorithms can be chosen and help to map items with different approaches.

5 Conclusion

We will use the tool for the semantic mapping between French hospitals. This tool will help to organize a french datathon during next MedInfo congress. We hope this tool will help international semantic interoperability. We want to highlight that all OMOP databases will benefit from the statistics provided by our tool and will facilitate the mapping process.

References

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