Utilizing OMOP and OHDSI Tools to Enable Data Integration for Improving Healthcare Research and Delivery Via the Signet Accel Platform

Jason D. Brown, PhD[1], David Billiter, MBA[1], Philip R.O. Payne, PhD[1,2], Peter J. Embi, MD[1,2]

[1]Signet Accel, LLC, Columbus, OH; [2]The Ohio State University College of Medicine, Columbus, OH

Abstract

The use of technology solutions to enable the rapid, efficient, and systematic discovery, query, integration, and analysis of heterogeneous biomedical and healthcare related data has become an increasingly critical need in the modern life sciences and clinical environments as they have progressively shifted away from narrowly focused and individualized research programs and data management tools or platforms towards an environment that facilitates and enables team-based approaches to complex problem solving. This new focus on a team-based approach regularly crosses traditional organizational boundaries, introducing new problems associated with the integration of disparate data sources and the security of sensitive information. Realizing the promise of a data-driven healthcare computing environment that vastly improves research and delivery requires new approaches that have traditionally been isolated or otherwise separated due to technical, operational, and cultural norms or concerns, specifically, overcoming the established barriers between separate institutions and organizations in a manner that maintains the required security and privacy.

Traditional solutions to the data integration challenge that is essential for achieving the vision of a data-driven healthcare environment have relied on centralized data warehouses or repositories. However, there are significant drawbacks to this centralized data management model. As an alternative, the Signet Accel platform, originally developed at The Ohio State University, enables a rapid-cycle data, information, and knowledge discovery, query, integration, and analytics environment in a federated data integration platform. This federated model allows for the data storage to be hosted at each individual site with each institution maintaining the control and security over their data.

Signet Accel offers true interoperability, allowing for the combination of health data from varying sources and databases within a single institution and also across multiple institutions into a coherent and consistent model that the researcher or clinician can easily understand. This coherent and consistent model is the OMOP Common Data Model, which is at the core of the Signet Accel interoperability capabilities. The Signet Accel software solution can map the data elements from disparate data sources into the extensive and comprehensive OMOP v5+ CDM at each of the individual institutions of a research-focused data network. This mapping of data elements annotates the data elements both syntactically and semantically from each site-specific data source into the Version 5 of the OMOP CDM, including the Specimen Table that we at Signet Accel authored, as well as some additional vocabulary that we have added. Additionally, we have been working on a Genomics Table for use by the Inova Translational Medicine Institute that could be utilized in the OMOP CDM v6.

Following the mapping of data elements into the OMOP standard data format, the researchers and clinicians can utilize the Signet Accel web portal and its Federated Query Processor (FQP) to perform both common and custom queries of the disparate data sources in real time as though they existed in a single physical repository. The Signet Accel web portal and FQP make extensive use of the OHDSI open-source tools, specifically Achilles, to bring all of the data elements together and enhance the effectiveness for the user. The key to the Signet Accel data integration platform is the possibility for rapid onboarding of Data Sharing Networks, on OMOP, with our ETL engine. Additionally, one current barrier for Data Sharing Networks is choosing a data model, which the rapid implementation of our platform enables. Details about the technology and general approach for the Signet Accel platform and its ETL process to the OMOP v5+ Common Data Model and how the OHDSI suite of tools are incorporated into the Signet Accel platform to greatly increase healthcare research and delivery will be further explained in this poster.