

Odysseus ARACHNE Data Network - Federated Study Execution

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Background

OHDSI's mission is to improve health by empowering a community to collaboratively generate the evidence that promotes better health decisions and better care. To realize this mission, OHDSI brings together data providers, investigators, and data scientists to generate reliable and reproducible evidence to conduct large-scale multicenter observational research. A typical study states a hypothesis requiring testing, a protocol outlining design, parameters and process, a number of data sources containing sufficient number of patient level data, analytical code developed to interrogate data and compute statistical evidence and a final research paper published containing study insights and conclusions.

The process of conducting a study in OHDSI has so far been partly manual, requiring communication and exchange of the study package through email or GitHub pull requests. During the execution phase, adopting code to different environments often requires tweaking and these changes and activities are typically not tracked. The statistical code and related results are not linked, and often stored in personal folders. *A platform for efficient observational research across a network of participants within the OHDSI community and other life sciences, healthcare, academic, payer and other organizations working with patient level data would streamline this process and increase the efficiency and reliability of the generated evidence.*

Methods

ARACHNE Research Network platform was built by Odysseus to solve the federated study challenges and enable both OHDSI community and EHDEN initiative with an ability to execute federated studies at scale. The platform is taking full advantage of OHDSI standards and establishes a consistent, transparent, secure, and compliant observational research process, across multiple organizations. ARACHNE standardizes the communication protocol to access the data and exchange analysis results, while enabling authentication and authorization for restricted content. It brings participating organizations, e.g. data providers, investigators, sponsors and data scientists, into a single, collaborative study team and facilitates an end-to-end observational study. The tool enables the creation of a complete, standards-based R, Python and SQL execution environment including approval workflows controlled by the data custodian.

ARACHNE is not only built to take full advantage of the OHDSI standards, but also to provide a seamless integration with other OHDSI tools, including ACHILLES reports and an ability to import ATLAS design artefacts, create self-contained packages and execute those across multiple data sites. Additionally, ARACHNE implements a very flexible, open-source standards-based repository of study results.

The future vision is to eventually enable multiple networks to be linked together for the purpose of conducting research not only between organizations within a single network, but also between organizations across multiple networks (Network of Networks), including OHDSI and EHDEN networks.

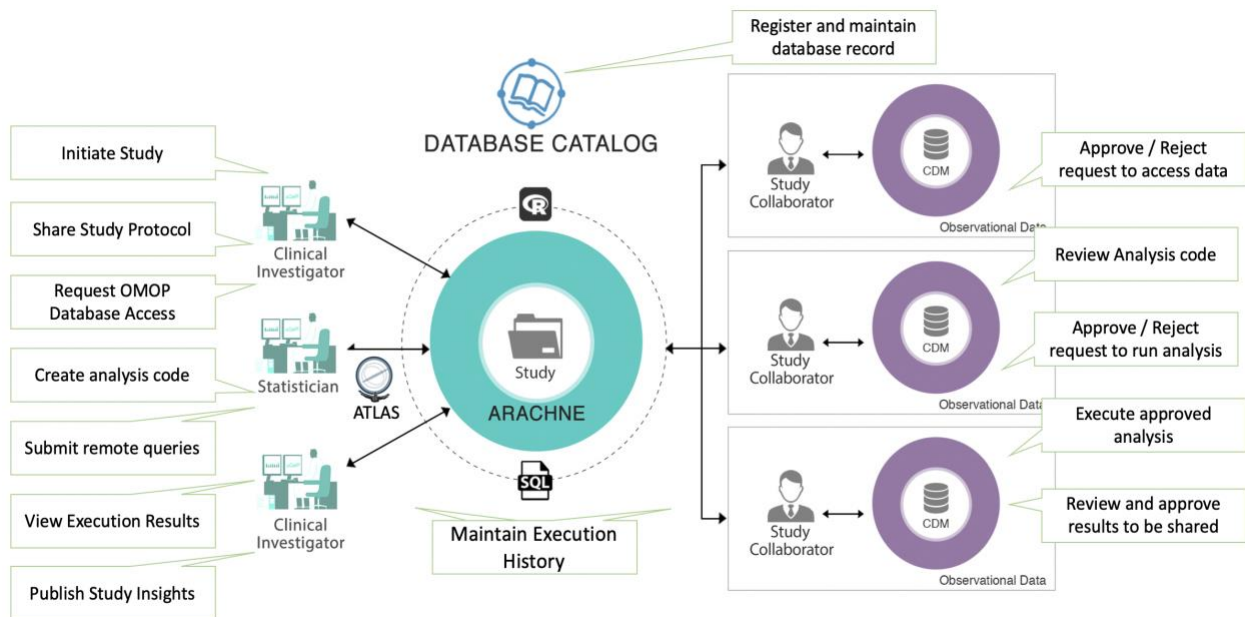


Figure 1: The ARACHNE federated study execution process.

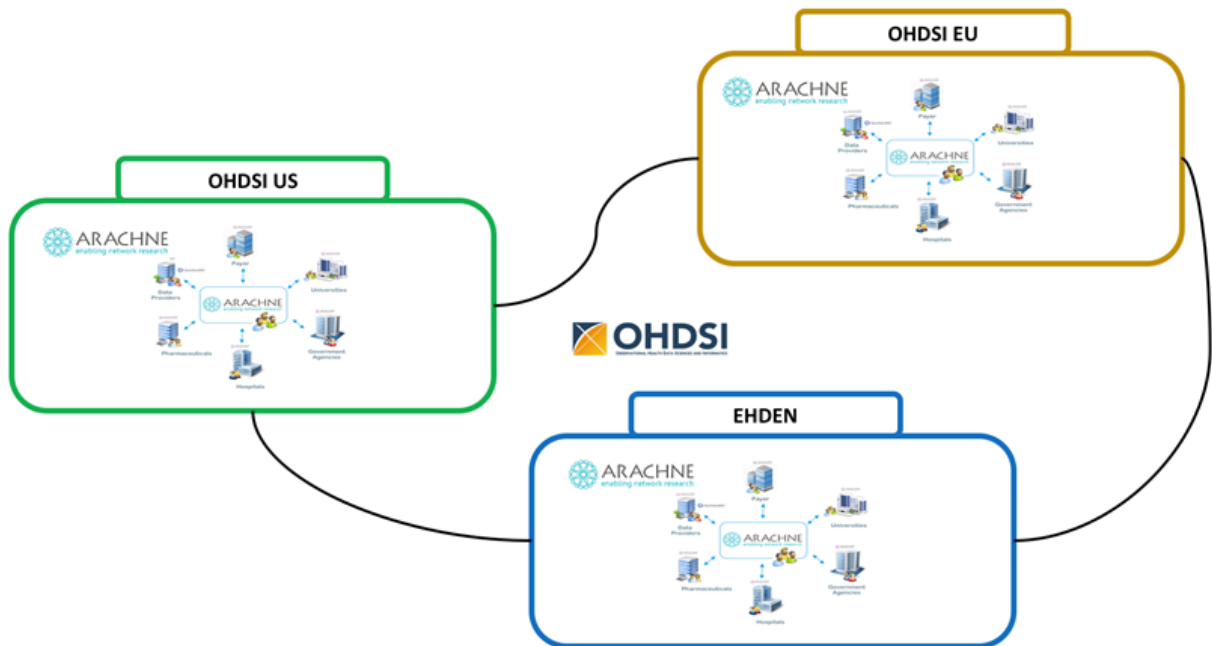


Figure 2: The concept of Network of Networks

Results / Conclusion

ARACHNE is a key to providing an efficient, consistent, secure, and compliant observational research.

OHDSI has already achieved impressive quality and speed of observational research by providing

- Standardization of data formats and coding (vocabularies),

- Standardization of methods and analytical code,
- Standardization of cohort definitions,
- Collaborative network of renowned scientists in the areas of clinical research, statistics, method development and scaling.

ARACHNE aims at removing the remaining impediments by enabling a consistent and compliant observational study process workflow while utilizing all OHDSI best practices and standard , as well as streamlining the execution of studies across a network of distributed databases. This includes:

- Standardized study lifecycle and workflow
- Standardized distributed execution and data exchange
- Full lineage between hypothesis, protocol, code, analytical results, data sources and study insights
- An easy to navigate, secure, compliant, and integrated into the process data catalog of patient-level data (data marketplace)
- Standardized evidence library linked to the archived study

Odysseus Data Network is the data network implementation by Odysseus that enables secure and scalable OHDSI open science as well as commercial research.

References

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2. Nick Puntikov, Gleb Malikov “Vision for Technical Infrastructure to Facilitate OHDSI Network Research” <http://www.ohdsi.org/web/wiki/lib/exe/fetch.php?media=resources:arachneposterabstract.pdf>
3. Gregory Klebanov, Christian Reich, Aaron Galaznik <https://www.ohdsi.org/resources/presentations/community-meeting-presentations/>