Empowering the OHDSI community: Multi-modal data handling and network study design with Data2Evidence

DATA4LIFE.CARE

An initiative by the
HASSO PLATTNER
FOUNDATION

data4life

Mission-driven.
We digitalize health research to advance public health & personalized medicine.

Non-profit.
We are 100% nonprofit, always putting impact first.

Open source.
We contribute back to the open source community with key solutions.

DATA4LIFE.CARE

Our co-created solutions address health researchers' specific needs

D4L COLLECT.

Sensor Data Collection Platform

Collection of data from sensors, wearables, and questionnaires

D2E DATA2EVIDENCE.

Health Data Management Solution

Extract, combine, and analyze data to generate evidence-based insights

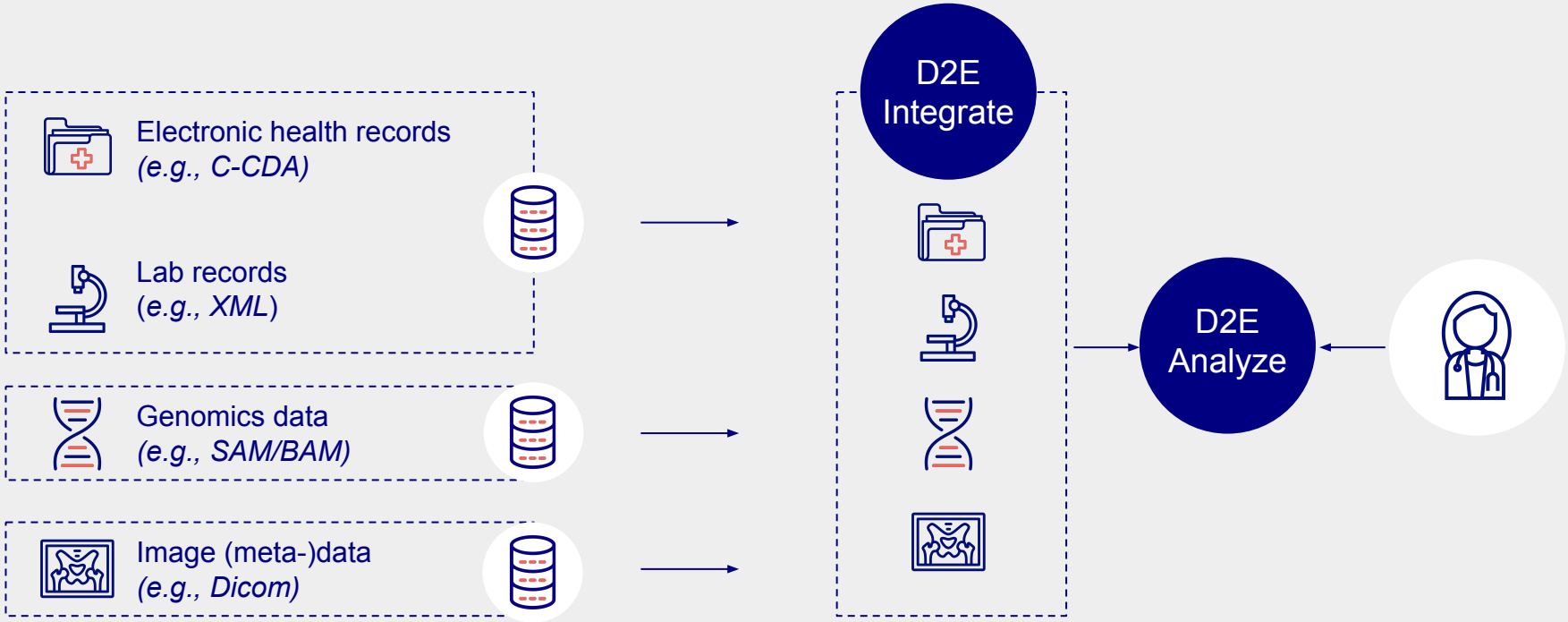
D4L FAIR.

Health Research Metadata Catalog

Easy identification of datasets suitable for secondary research

DATA2EVIDENCE.

Enabling end to end access to real world data



DATA2EVIDENCE

AI-Powered multi-modal health data platform for enhanced discovery

OMOP CDM[1]

~11M electronic health records

Customized OMOP extensions

~60K genomics records

~3.5M pathology records

~66M imaging records

~1.9M ECG data

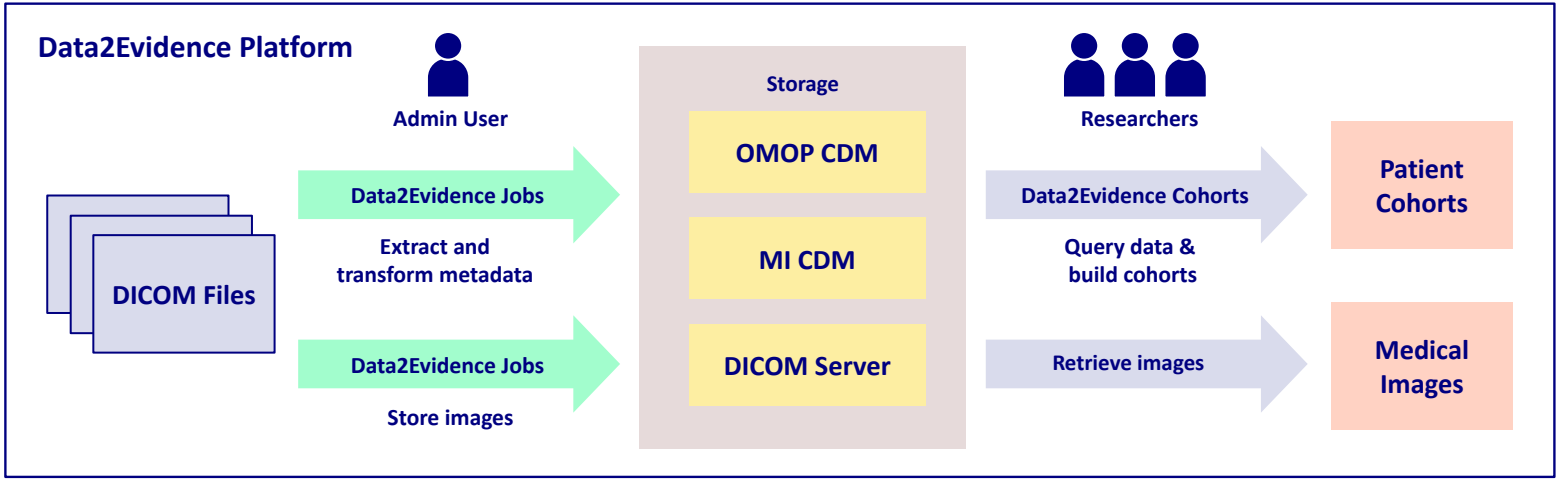
Hospital Platform

Harmonized data set enabling research with real-world data

- Modern development experience with a container orchestration framework based on Kubernetes
- Multi-modal data analysis, model training, and inference across siloed datasets
- Cross-institutional network studies
- Increased analysis quality due to a larger and broader pool of data
- Access to individual data sets consolidated on a single data platform

[1] OMOP CDM = Observational Medical Outcomes Partnership Common Data Model

Data2Evidence Imaging Data Support



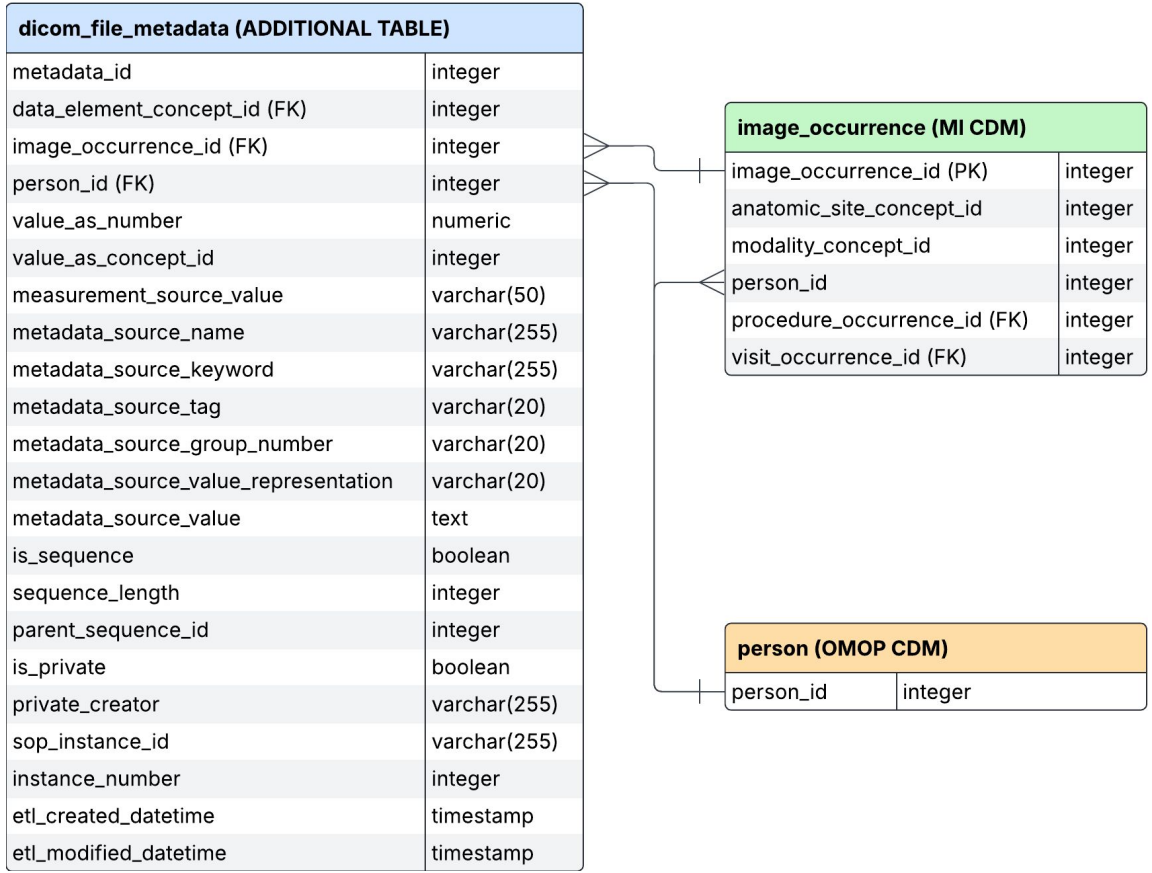
The Data2Evidence platform offers an end-to-end integration of medical imaging data, from ingestion of metadata extracted from the headers of DICOM files to the creation of patient cohorts.

Our solution is based on the work done by the OHDSI Medical Imaging Working Group.

Medical Imaging Extension

Our custom table *dicom_file_metadata* allows users to ingest all metadata values from DICOM files

Since the metadata sits in a separate schema from the OMOP CDM, admins can impose access controls based on schema.

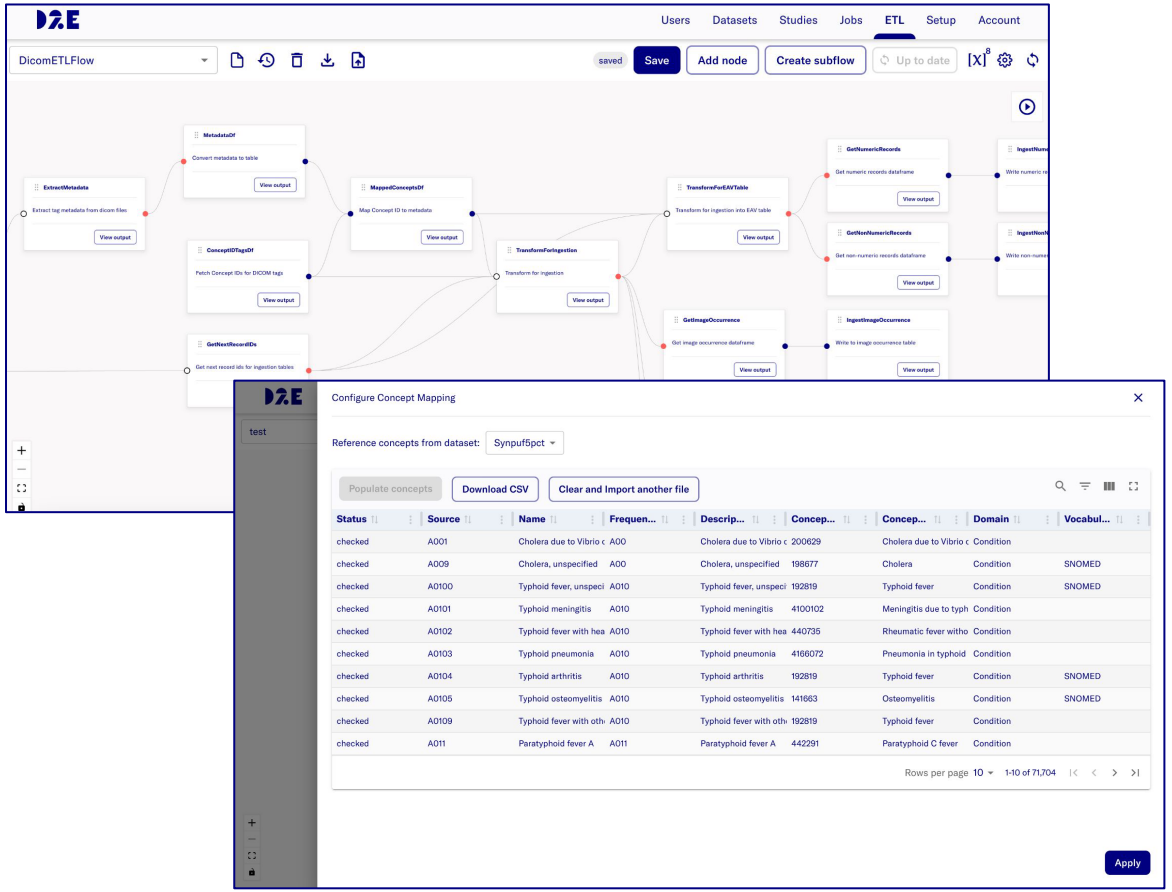


Imaging Data Integration

A graphical tool for orchestrating ETL workloads with the use of modular, drag-and-drop nodes

Supports whole workflow of Data Integration:

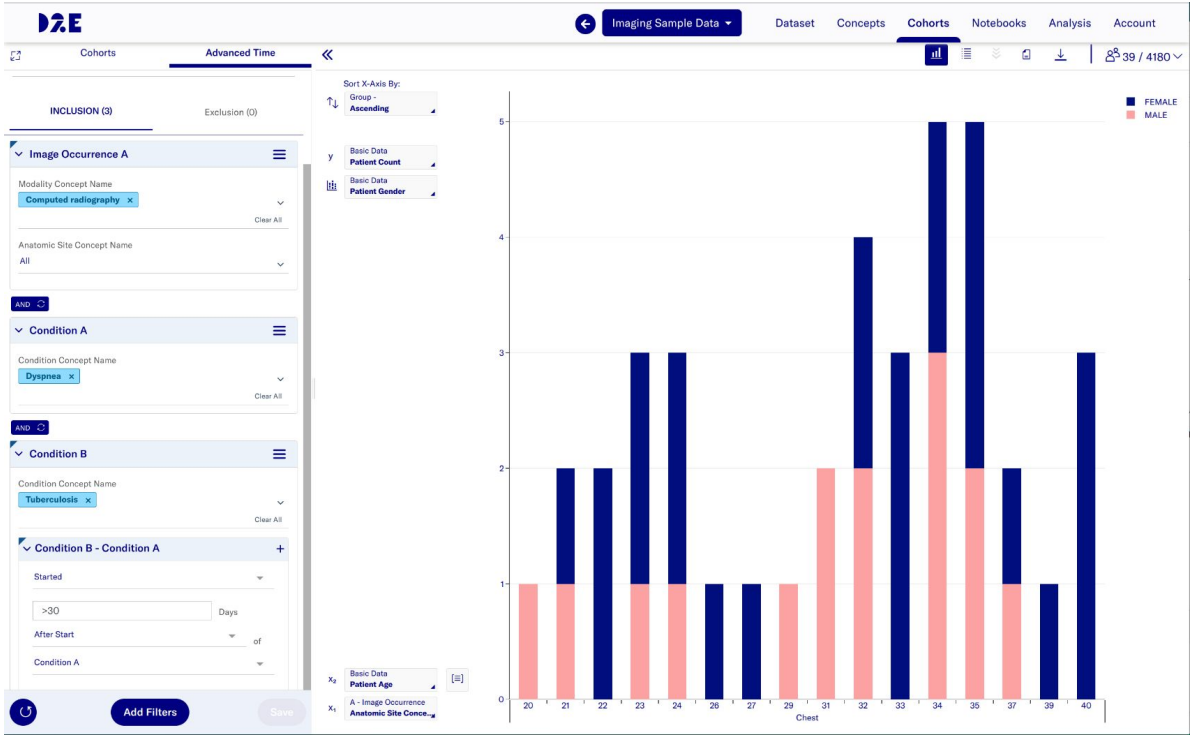
- Concept Mapping (full text and semantic)
- Data Mapping (based on White Rabbit and Rabbit-in-a-Hat)
- Implementation of the transformation



Data2Evidence Cohorts

A graphical tool for building patient cohorts

Users can apply filters on various attributes of the clinical and imaging data



This cohort show 39 patients, categorized by age and gender, who underwent Computed Radiography of the chest and were diagnosed with tuberculosis more than 30 days after the onset of dyspnea.

Imaging Data Integration

Demo

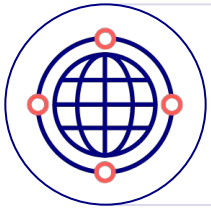
Types of OHDSI Network studies

Clinical characterization

- Which treatment did patients obtain after diagnosis?
- How many patients experienced the outcome after treatment?

Patient-level prediction

- What is the probability a patient will develop a disease?
- What is the probability a patient will experience the outcome?



Population-level effect estimation

- Does one treatment cause an outcome?
- Does one treatment cause an outcome more than an alternative?

OHDSI Network Studies - Current approach vs Strategus

Traditional Approach

- Create an R package for executing the study
- Distribute this R package to network sites via OHDSI Studies · GitHub
- OHDSI network sites download the R package
- The sites configure an R installation and run the downloaded R study package
- Results are reviewed and contributed back to the study coordinator

Strategus approach

- Install & configure Strategus (HADES module)
- Create a JSON document to specify the study design choices
- Distribute the JSON document to network sites via OHDSI Studies · GitHub
- OHDSI network sites download the JSON document and execute the study via Strategus
- Results are reviewed and contributed back to the study coordinator

Source - https://www.ohdsi.org/wp-content/uploads/2022/11/2022_11_22_Strategus_OHDSI_Community_Call.pdf

OHDSI Network Studies - Strategus + Data2Evidence

- Jupyter notebook based interface for Strategus study design and execution
  - Researcher can focus on the study question without worrying about R infrastructure
  - Execution engine with all HADES & Strategus dependencies pre-installed
  - Docker based R kernels with all required modules installed and configured
- Pre-built study templates for commonly used network studies
  - Boilerplate code, loaded from github, including relevant HADES module(s) & default settings
- Decoupling of study design & execution
  - Researcher - create a study specification (JSON format), push to github repo
  - Data Partners - fetch the JSON and execute the study (custom execution settings)
- Integrated Shiny app based result viewer (under development)
  - Visualize study outcomes using shiny app

Clinical characterization

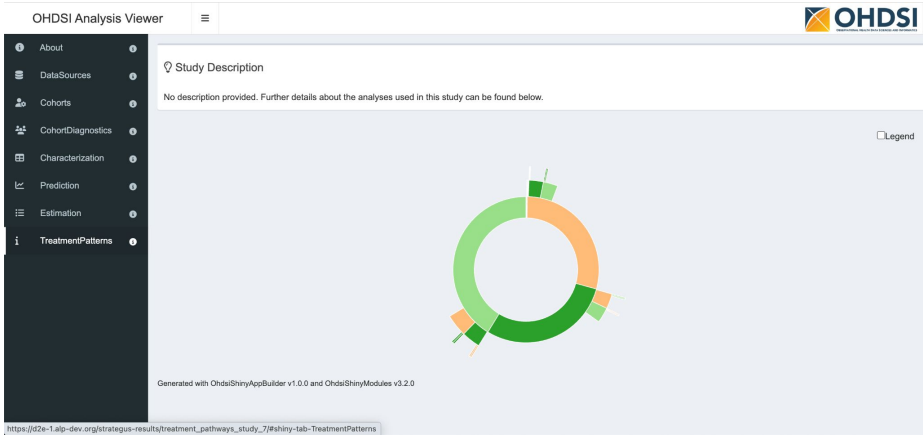
Treatment utilization: What treatments were done and in what sequence?

Question: In patients diagnosed with depression, what antidepressant treatments (SSRIs, SNRIs, and bupropion) were they exposed to, and in what order?

Why

Knowledge of current treatment practices to improve clinical practice:

- Better design of randomized control trials
- Give insight in choice of treatment and doctors preference



Clinical characterization

Demo

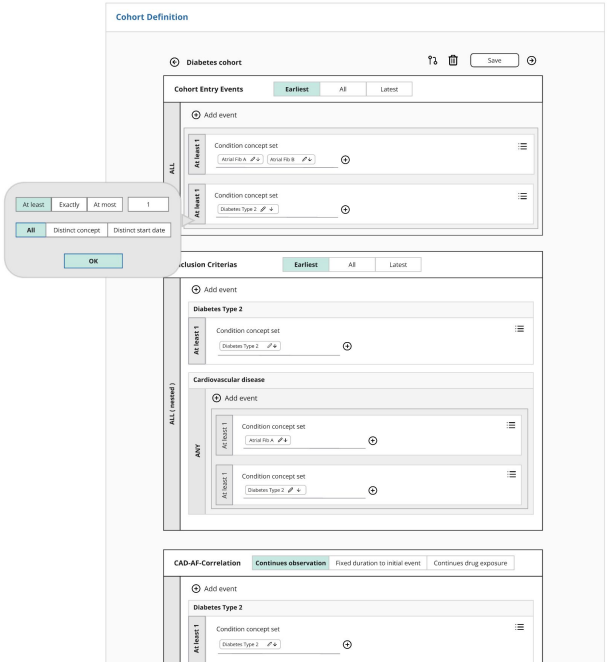
Data4Life and ATLAS

Data4Life is working together with the ATLAS team on a new UI to reduce the entry barrier of novice users and non-technical users to using ATLAS.

To this effect, we have envisioned three workstreams:

- User Interviews
- UX re-design
- Implementation of a new user interface

We plan to show a prototype of the new ATLAS UI as part of the ATLAS WG meeting at the Global OHDSI Symposium

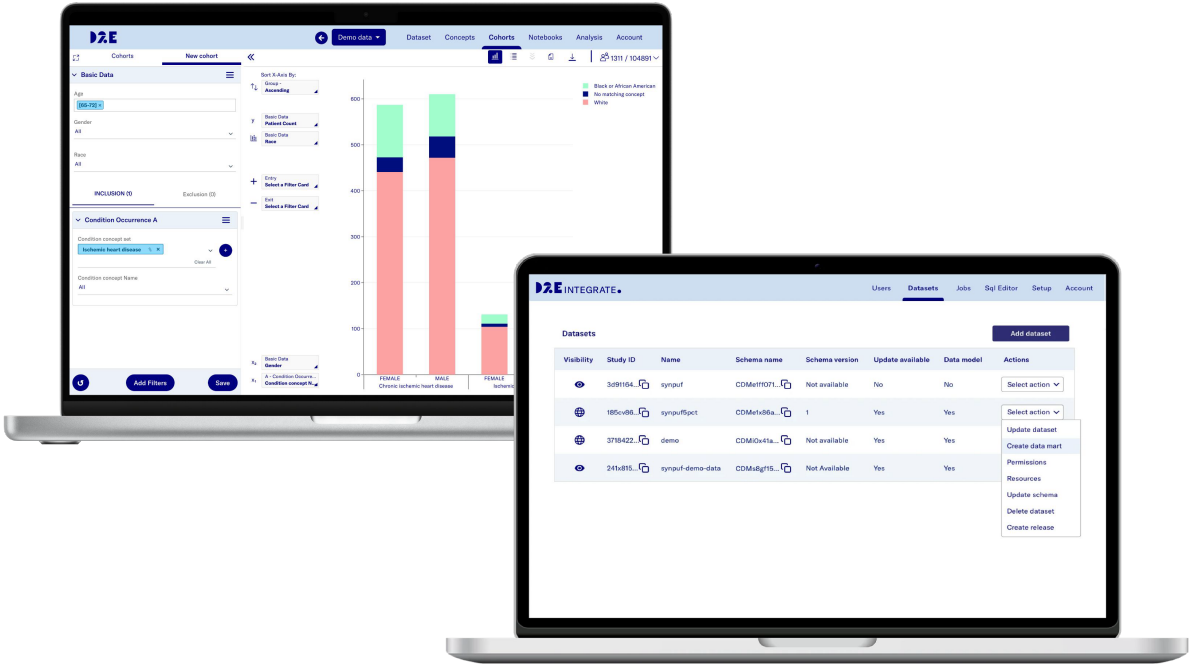


Initial wireframe of possible changes to the ATLAS user interface

Data4Life at the OHDSI global symposium

Join us on **October 7** at the OHDSI Global Symposium for a hands-on collaborative session! Together, we'll design a network study using Data2Evidence and explore the power of real-world research in action.

Your research. Our platform.
DATA2EVIDENCE. is **open source**!



Get started: www.d2e.sg

Github repo:
https://github.com/OHDSI/D2E

Thank you.

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