A Journey through the OHDSI Central Coordinating Center

George Hripcsak, MD, MS
Vivian Beaumont Allen Professor of Biomedical Informatics, Columbia University
Director, OHDSI Central Coordinating Center
1907 Plummer (Mayo) develops medical record
1910 Flexner recommends medical record

**1916** Presbyterian Hospital
adopts, uses for quality research [Openchowski 1925], and disseminates around the nation

**1958**
Donald AB Lindberg, a founder of biomedical informatics, graduates P&S, starts a 2-year pathology fellowship

**1966**
William Bauman, P&S ’47 starts Columbia’s first Medical Data Processing Department

**1987**
Decision to create the Center for Medical Informatics (Robert Levy, Rachel Anderson, Henrik Bendixen, Thomas Morris)

**1980**
Daniel Fink, P&S ’75
Columbia’s first Laboratory Information System

~**1980**
Columbia University Irving Medical Center
Department of Biomedical Informatics


Center for Medical Informatics
HIP13
Department of Medical Informatics
VC5
Biomedical Informatics
PH20

Paul Clayton
Ted Shortliffe
George Hripcsak
### DBMI vital stats

#### Personnel
- 45 total faculty
  - 15 PH20 primary DBMI
  - 6 ICRC with Systems Bio.
  - Other joint, adjunct
- 50 trainees
  - 25 PhD
  - 14 masters
  - 11 post-doc
- 24 developers, managers
- 8 admin staff

#### Budget
- $9M DC grants PH20
- $2M other grants
- $3M ICR
- $2M hospital passthru
- $1M tuition, recruit, ...

#### Space
- Presby Hosp 20
  - 11368 sq ft (15924 gross)
  - res, teach, admin
- Irving Canc Res Ct 8,9
Three “communities”

• Empirical discovery & prediction (natural, data science)
  – systems biology and medicine
  – modeling, data mining, and knowledge discovery

• Human & organizational factors (social science)
  – cognition, team interaction, & organizational impact
  – human-computer interface and usability
  – consumer health

• Information management (engineering)
  – clinical information systems
  – knowledge management
  – information standards and interoperability
OHDSI’s mission

To improve health by empowering a community to collaboratively generate the evidence that promotes better health decisions and better care
OHDSI community
We’re all in this journey together...

DBMI is here
Here is how the OHDSI Community works

**OHDSI data network**

**OHDSI Data partner 1**
- Source data in local structure and vocabularies
- **ETL**
- Standardized patient-level database (OMOP CDM)
- **Standardized analytics** (OHDSI tools)

**OHDSI Data partner 2**
- Source data
- **ETL**
- OMOP CDM
- OHDSI tools

**OHDSI Data partner 3**
- Source data
- **ETL**
- OMOP CDM
- OHDSI tools

**OHDSI Data partner n**
- Source data
- **ETL**
- OMOP CDM
- OHDSI tools

**OHDSI collaborations**
- Open community data standards (OMOP CDM)
- Open source development (OHDSI tools)
- Methodological research
- Clinical evidence generation

**OHDSI Network studies**
- Pre-specified protocol with analysis specification
- Standardized summary statistics results repository
- Collaborative Interpretation
- Evidence dissemination

*Hripcsak Yearb Med Inform 2021*
Coordinating Center support to OHDSI

• Coordinating Center role:
  – Provide central shared infrastructure and coordinate community activities to enable community collaborations to advance OHDSI’s mission
  – Lead Steering workgroup to provide guidance and support to enable the community to collaboratively generate evidence and the scientific work products necessary to generate evidence
Coordinating Center support to OHDSI’s leaders

• Leaders across OHDSI community
  – Workgroup and chapter leads
  – Project maintainers
  – Study coordinators
  – Event hosts

• Coordinating Center role:
  – Support current leaders to achieve their objectives and align with OHDSI’s mission
    • Promote ongoing activities and successful accomplishments
    • Encourage participation and contributions from other collaborators
  – Empower more collaborators to become leaders
Coordinating Center support to OHDSI’s collaborators

- Collaborators across OHDSI community
  - Open and inclusive community of individuals with diverse backgrounds, disciplinary perspectives, stakeholder representation, geographies
  - Membership is open and free, just need to sign up to participate in community activities

- Coordinating Center role:
  - Maintain infrastructure and provide support to connect collaborators with collaboration opportunities
    - Forums for community discussion
    - MSTeams for workgroup activities
    - Git for open-source development
    - OHDSI Symposium for network sharing
  - Encourage more visitors to become collaborators
Coordinating Center support to others

- Visitors are encouraged to benefit from the work of OHDSI’s open science community
  - We aim to generate the evidence that promotes better health decisions and better care for everyone, not only our collaborators

- Coordinating Center role:
  - Provide open access to OHDSI evidence and work products, including:
    - Distribute standardized vocabularies
    - Support open-source software with permissive licenses
    - Encourage open sharing of study design and implementation
    - Maintain open access to study results
  - Expand awareness and impact of OHDSI’s work across the broad healthcare ecosystem
OHDSI Central Coordinating Center responsibilities

- Steward open community data standards
- Enable open source development
- Facilitate methods research and clinical applications
- Encourage open sharing and evidence dissemination

Foster collaborations and empower community
OHDSI Central Coordinating Center responsibilities

- Steward open community data standards
- Enable open source development
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Foster collaborations and empower community
Maintenance and release of OHDSI standardized vocabularies

OHDSI vocabularies by the numbers (as of 20 March 2022):

- **134** vocabularies
- **40** domains
- **10,088,289** concepts
- **3,533,508** standard concepts
- **752,175** classification concepts
- **76,192,476** Concept relationships
- **84,898,314** Ancestral relations
- **3,016,130** Concept synonyms

1 shared resource to enable OHDSI
Maintenance and release of OHDSI standardized vocabularies

<table>
<thead>
<tr>
<th>ID (CDM V4.5)</th>
<th>CODE (CDM V5)</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SNOMED</td>
<td>Systematic Nomenclature of Medicine - Clinical Terms (HTSDO)</td>
</tr>
<tr>
<td>2</td>
<td>ICD10CM</td>
<td>International Classification of Diseases, Ninth Revision, Clinical Modification, Volume 1 and 2 (NCHS)</td>
</tr>
<tr>
<td>3</td>
<td>ICD8Proc</td>
<td>International Classification of Diseases, Ninth Revision, Clinical Modification, Volume 3 (NCHS)</td>
</tr>
<tr>
<td>5</td>
<td>HCPCS</td>
<td>Healthcare Common Procedure Coding System (CMS)</td>
</tr>
<tr>
<td>6</td>
<td>LOINC</td>
<td>Logical Observation Identifiers Names and Codes (Registrial Institute)</td>
</tr>
<tr>
<td>7</td>
<td>NDFRT</td>
<td>National Drug File - Reference Terminology (VA)</td>
</tr>
<tr>
<td>8</td>
<td>RxNorm</td>
<td>RxNorm (NLM)</td>
</tr>
<tr>
<td>9</td>
<td>NDC</td>
<td>National Drug Code (FDA and manufacturers)</td>
</tr>
<tr>
<td>10</td>
<td>GPI</td>
<td>Medi-Span Generic Product Identifier (Wolters Kluwer Health)</td>
</tr>
<tr>
<td>12</td>
<td>Gender</td>
<td>OMOP Gender</td>
</tr>
<tr>
<td>13</td>
<td>Race</td>
<td>Race and Ethnicity Code Set (USBC)</td>
</tr>
<tr>
<td>14</td>
<td>CMS Place of Service</td>
<td>Place of Service Codes for Professional Claims (CMS)</td>
</tr>
<tr>
<td>15</td>
<td>MedDRA</td>
<td>Medical Dictionary for Regulatory Activities (MSSO)</td>
</tr>
<tr>
<td>16</td>
<td>Multum</td>
<td>Career Multum (Cerner)</td>
</tr>
</tbody>
</table>

Usage statistics on athena.ohdsi.org:
- 35,411 downloads in 2021
- 15,362 downloads so far in 2022
- 1733 of unique accounts with a download
- 26 vocabulary releases in 2021
Maintenance and release of OHDSI standardized vocabularies

See 22Mar2022 OHDSI community call: https://youtu.be/kn6MCYs0neM
Stewardship and advocacy of the OMOP Common Data Model open community data standard

OMOP CDM adoption through 2021:
- 331 databases
  - 284 electronic health records
  - 28 administrative claims sources
- 34 countries
- >810 million unique patient records
Stewardship and advocacy of the OMOP Common Data Model open community data standard

HL7 International and OHDSI Announce Collaboration to Provide Single Common Data Model for Sharing Information in Clinical Care and Observational Research

Health Level Seven International (HL7) and the Observational Health Data Sciences and Informatics (OHDSI) network today announced a collaboration to address the sharing and tracking of data in the healthcare and research industries by creating a single common data model. The organizations will integrate HL7 Fast Healthcare Interoperability Resources (FHIR®) and OHDSI’s Observational Medical Outcomes Partnership (OMOP™) common data model to achieve this goal.

HL7 International CEO Dr. Charles Jaffe, M.D., Ph.D., underscored the significance of this partnership. “The Covid-19 pandemic has emphasized the need to share global health and research data.” He continued, “Collaboration with OHDSI is critical to solving this challenge and will help our mutual vision of a world in which everyone can securely access and use the right data when and where they need it.”

The organizations will align their standards to capture data in a clearly defined way into a single common data model. This will allow clinicians as well as researchers to pull data from multiple sources and compile it in the same structure without degradation of the information. This endeavor has global implications with the potential to permit the clinical community to define the elements they need, package and share them in a consistent single structure.

“We are excited to have the OHDSI community join this partnership with HL7 to evolve community standards around observational research and clinical care,” said George Hripcsak, MD, MS, OHDSI’s coordinating center director. “These standards set the foundation for our mission of global, open-science research, and this partnership will accelerate the development of effective and safe treatments for diseases facing today’s global population.”

Support adoption in large multi-center initiatives, such as AllOfUs, eMERGE

Foster collaborations with other standards organizations, such as HL7
OHDSI Central Coordinating Center responsibilities

- Steward open community data standards
- Enable open source development
- Facilitate methods research and clinical applications
- Encourage open sharing and evidence dissemination

Foster collaborations and empower community
Maintain computing environment for continuous integration testing of all open-source tools, including HADES and WebAPI/ATLAS

- Host servers to enable open-source development and continuous integration testing on:
  - MS Sql Server
  - Oracle
  - PostgreSQL
  - RedShift
- Host Nexus repository for OHDSI webAPI resources
Enable community open-source software development through GitHub repository support, permissive licensing and OHDSI copyright

https://github.com/OHDSI
Host ATLAS demonstration environment

- Maintain demonstration environment to provide unrestricted access to all visitors who want to learn more about the capabilities of the ATLAS platform
- Provides access to latest ATLAS version
- Contains recent vocabulary version and multiple synthetic datasets to provide full user experience
- Large-scale utilization:
  - >17,000 conceptsets
  - >10,000 cohort definitions
  - >900 characterizations
  - >400 estimation designs
  - >250 prediction designs

https://atlas-demo.ohdsi.org/
OHDSI Central Coordinating Center responsibilities

Steward open community data standards
Enable open source development
Facilitate methods research and clinical applications
Encourage open sharing and evidence dissemination

Foster collaborations and empower community
Host ATLAS collaboration environment

- Maintain security-enabled ATLAS environments to facilitate collaborations and allow for read-only access to final cohort definitions and study artifacts used in network studies
  - >400 cohorts defined on https://atlas.ohdsi.org
  - >100 collaborators access https://atlas-phenotype.ohdsi.org during Phenotype Phbruary 2022

https://atlas.ohdsi.org/
Support for OHDSI network studies for clinical evidence generation

- Support
  - >90 study repositories

https://github.com/ohdsi-studies/
Columbia DBMI as a collaborating partner (beyond Coordinating Center responsibilities)

- Lead multiple OHDSI network studies
  - Treatment pathways (Hripcsak PNAS 2016)
  - LEGEND-HTN studies (Chen Hypertension 2021; Hripcsak JIM 2021)
  - Concept Prevalence (Ostropolets AMIA 2021)
  - HERA (Elhadad)

- Develop open-source tools
  - PHOEBE for conceptset recommendation
  - Criteria2Query for cohort definition

- Active participant and data partner in most OHDSI network studies
OHDSI Central Coordinating Center responsibilities

- Steward open community data standards
- Enable open source development
- Facilitate methods research and clinical applications
- Encourage open sharing and evidence dissemination

Foster collaborations and empower community
Host OHDSI RShiny servers for open sharing of results

- Maintain Rshiny server and supporting back-end databases that contain results for OHDSI network studies
- 134 Shiny applications on [https://data.ohdsi.org](https://data.ohdsi.org), including LEGEND, CHARYBDIS, COVID AESI Incidence...
Create and maintain servers for OHDSI community training and hack-a-thon events

OHDSI-in-a-Box Architecture

OHDSI-in-a-Box is specifically created as a learning environment, and is used in most of the tutorials provided by the OHDSI community. It includes many OHDSI tools, sample data sets, RStudio and other supporting software in a single, low cost Windows virtual machine. A PostgreSQL database is used to store the CDM and also to store the intermediary results from ATLAS. The OMOP CDM data mapping and ETL tools are also included in OHDSI-in-a-Box. A high-level diagram showing how the different components of OHDSI map to AWS Services is shown below.

- Create shared ATLAS instances and dedicated OHDSI-in-a-box training servers for tutorials and community activities
- >100 instances created for 2021 Symposium
OHDSI Central Coordinating Center responsibilities

- Steward open community data standards
- Enable open source development
- Facilitate methods research and clinical applications
- Encourage open sharing and evidence dissemination

Foster collaborations and empower community
We are thrilled to announce that registration for the 2022 OHDSI Symposium, which will be held Oct. 14-16 at the Bethesda North Marriott Hotel & Conference Center, is now open!

It is so exciting to bring our community back together this fall. Our collaborator showcase will return; please click the link to participate in our poster presentations, software demos and lightning talks. The full agenda for our conference is still being developed and will continue to check the OHDSI website (www.ohdsi.org) and our social platforms for updates as we plan for the 2022 Symposium.

The main conference will be held Friday, Oct. 14. A full-day tutorial will be held Saturday, Oct. 15, while other community activities will take place on both Oct. 15 and Oct. 16.

**Symposium Registration Details**

**Friday, Oct. 14 – Main Conference**

**Registration Fee**: $500*

*This is an open and inclusive event. If the registration fee represents a burden to you, please contact symposium@ohdsi.org.

Should you need to make changes or cancel your registration ticket, please follow the instructions you will receive on your Eventbrite confirmation upon registration completion. Please note that tickets can be refunded up until 7 days prior to the event; Eventbrite fees are not refundable.

Register For The Main Conference • Friday, Oct. 14

• Host and fund logistics (hotel, food, audio-visual) for annual global Symposium, including main conference, tutorials, and workshops
  • >500 registrants and >100 tutorial students for last in-person event in 2019
  • >1,600 registrations for virtual symposium in 2020-2021
Maintain online forums and wiki for open community interactions

- Host and maintain Discourse server for [https://forums.ohdsi.org/](https://forums.ohdsi.org/)
  - >2,900 registered forum users
  - >4,100 posts on >800 topics in last year
  - >102,000 pageviews in last 30 days
Maintain collaboration space in MSTeams for community and its >30 active workgroups

• Provide technical and user support all OHDSI collaborators with creating MSTeams accounts and providing access to workgroup activities
  • >5,000 total users
  • 74 teams
Facilitate weekly OHDSI community calls

- Lead weekly community calls to communicate where we’ve been, where we are now, and where we’re going together
  - 150-250 participants weekly since 2021
Provide monthly newsletter and ‘On the Journey’ podcast

The Journey Newsletter (April 2022)

Leaders from our Common Data Model Workgroup led the community on a two-session CDM Workshop this past month, while our Open-Source Community has put together a DevCon for April. We discussed standardized vocabularies and reproducibility, and opened registration for OHDSI2022! All that and more is available in the latest edition of The Journey Newsletter.

#JoinTheJourney

April Update Videocast

- Monthly newsletter to highlight community accomplishments and future collaboration opportunities
  - >3,000 readers
Produce annual report 'Our Journey' highlighting community accomplishments and impact.
Communicate OHDSI activities across social media

- LinkedIn: 3,165 followers
- Twitter: 2,386 Followers
Coordinating center costs >$1M
(not counting Columbia costs as an OHDSI collaborator >$1M; and assumes George Hripcsak and Patrick Ryan donate their time)
Funding sources

• Sponsorships and contracts from industry and academics
  – Takeda, Janssen, Bayer, Odysseus, IQVIA, The Hyve, Case Western/Cleveland Inst for Comp Bio, ITTM, Google Cloud, Evident, AWS, Deloitte, Georgia Tech, BCBS South Carolina, MUSC, Cloudera, Evalytica, Shyft, Informatics Institute, Regenstrief, UAB, ZS, J Koskinas T Giovanis, Pfizer, Celgene, Signet Accel, Amgen, Merck, AstraZeneca, KHIDI

• Symposium and related grants: FDA, PCORI, AHRQ

• Provide infrastructural support for several projects, which contribute to the necessary general infrastructure
  – OHDSI Convener as part of the FDA BEST initiative
  – All of Us Research Program
  – eMERGE Network
  – N3C and PASC

• Research grants that contribute to the necessary general infrastructure
  – NIH, etc.
OHDSI Sponsorship

• Hoping to move to a new funding model
  – OHDSI is expanding in collaborators, scope, external use, and impact
  – Sustain and grow the community, adopt more mature funding model

• Launch new sponsorship model for OHDSI
  – Larger scale
  – For broad central activities, not just the Symposium (replaces Symposium sponsorship)
  – More active solicitation
Support The Journey

OHDSI Sponsorship Helps Provide A Foundation For Our Global Research Efforts

The OHDSI community is comprised of a global team of volunteers who collaborate together using open-source tools and shared best practices to support our shared mission of generating real-world evidence that promotes better health decisions and better care. In order to foster growth in our community of nearly 3,000 volunteers across six continents, the OHDSI Coordinating Center at Columbia University has created a sponsorship program.

[Check out our OHDSI sponsors here](https://www.ohdsi.org/sponsorship/)

This program allows both corporations and individuals to make meaningful contributions in support of OHDSI’s central coordinating activities. There are three levels of support, including donation amount and benefits to the sponsor, detailed below. Any level of support enhances both our community and our mission.

Below the sponsorship level information is a section on how your sponsorship impacts our community. To learn more about OHDSI’s activities, achievements and many other aspects of our global community, please search our webpage or check out our 2021 Annual Report: Our Journey.

**Sponsorship Levels**

**GOLD**

- Donation level: US $60k/year
  - Your logo (max size: 400x180) will be placed on our [OHDSI Sponsors page](https://www.ohdsi.org/sponsorship/) with link to your home page
  - Logo placed in top section under Gold Level Sponsors heading
  - Logo placed in alphabetical order
  - Logo placed in a two-column row
  - Use of OHDSI Gold Sponsor logo on your site
  - Joint press release with OHDSI
  - Annual meeting with OHDSI leadership to learn about current and future initiatives, and participate in an OHDSI sponsor question & answer session
  - Weekly logo placement on title slide of OHDSI community call (average >180 listeners per week)
  - Logo placement on monthly “Thank You Sponsors” slide during OHDSI community call
  - Sponsors Spotlight feature (Q&A with a member of your organization) placed on website and newsletter
  - Monthly recognition on OHDSI: Twitter (230+ followers) and LinkedIn (310+) pages
  - Inclusion in “Thank You Sponsors” graphic in all OHDSI monthly newsletters (4200+ on mailing list)
  - Listing in all OHDSI annual reports: Our Journey
  - Recognition at all OHDSI in-person events

**SILVER**

- Donation level: US $30k/year
  - Your logo (max size: 225x110) will be placed on our [OHDSI Sponsors page](https://www.ohdsi.org/sponsorship/) with link to your home page
  - Logo placed in middle section under Silver Level Sponsors heading
  - Logo placed in alphabetical order
  - Logo placed in a three-column row
  - Use of OHDSI Silver Sponsor logo on your site

**Why Should I Sponsor OHDSI?**

The OHDSI Central Coordinating Center provides support for the OHDSI open-source community and the community’s mission to improve health by empowering a community to collaboratively generate the evidence that promotes better health decisions and better care. OHDSI collaborates in many aspects of the journey from data to evidence, including open community data standards, open source software development, open methodological research, and open network clinical research.

The OHDSI central coordinating center facilitates these collaborations by providing a central shared infrastructure and coordinating community activities that allow individuals from diverse backgrounds, disciplinary perspectives, stakeholder representation, and geographies to come together for a common cause. The OHDSI central coordinating center is responsible for the maintenance and release of the OHDSI standardized vocabularies, an integrated biomedical ontology and knowledge resource that is made public and has been downloaded >50,000 times by more than 1500 organizations. The OHDSI central coordinating center built and maintains a central computing environment to enable community open-source analytics development, providing an infrastructure for continuous integrating testing across multiple relational database platforms for open-source tools such as HADES and WebAPIVATLAS. The OHDSI coordinating center also hosts servers that provide demonstration and collaboration environments to give community members opportunity to learn about OHDSI best practices and capabilities, and to apply them within their own research activities.

The OHDSI central coordinating center also organizes the annual OHDSI Symposium, a multi-day event that allows individuals to come together to share their ongoing research, learn from the community, and create new collaboration opportunities. OHDSI community communications, including weekly community calls, monthly newsletters, annual reports, our website, forums, and social media, are all led by the OHDSI central coordinating center.

Your sponsorship funding will be used by the OHDSI central coordinating center at Columbia University Irving Medical Center to finance the expenses associated with these activities. This includes funding for vocabulary development, central computing infrastructure, and community event costs (hotel, food, audio/visual), as well as support staff for project management, communications, and administration. Because Columbia University is a non-profit organization, sponsorship can have tax benefits.

By sponsoring the OHDSI central coordinating center, you show your support for OHDSI’s mission and help sustain our community. You also demonstrate a commitment to the principles of Open Science and the opportunities this brings to improve health care.

**I Want To Sponsor OHDSI! How Do I Do It?**

If you would like more information about supporting the OHDSI central coordinating center, please contact [sponsorship@ohdsi.org](mailto:sponsorship@ohdsi.org). We handle sponsorships differently from other one-time donations, so if you want your contributions to be part of the sponsorship program and receive the benefits of the program, we will be delighted to work with you. All sponsorship information will be kept in confidence.

[https://www.ohdsi.org/sponsorship/](https://www.ohdsi.org/sponsorship/)