

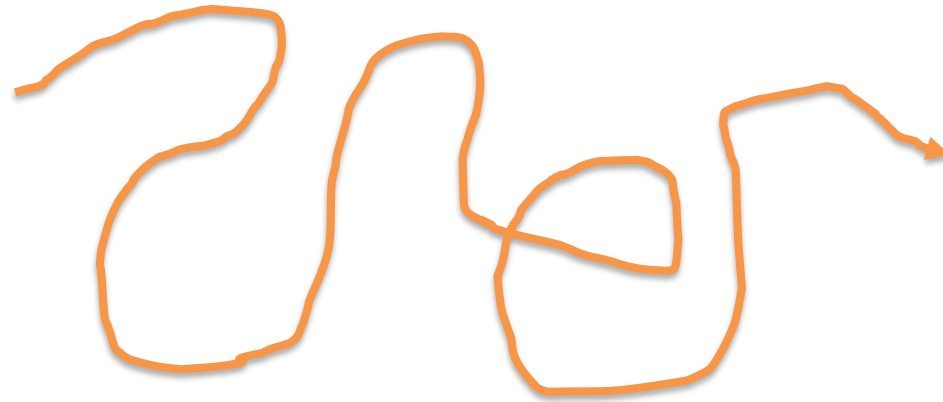
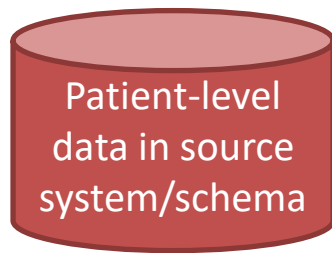


The Journey of OHDSI: Where have we been and where can we go together?

Patrick Ryan, PhD
Vice President, Observational Health Data Analytics, Janssen
Research and Development
Assistant Professor, Adjunct, Department of Biomedical
Informatics, Columbia University Medical Center

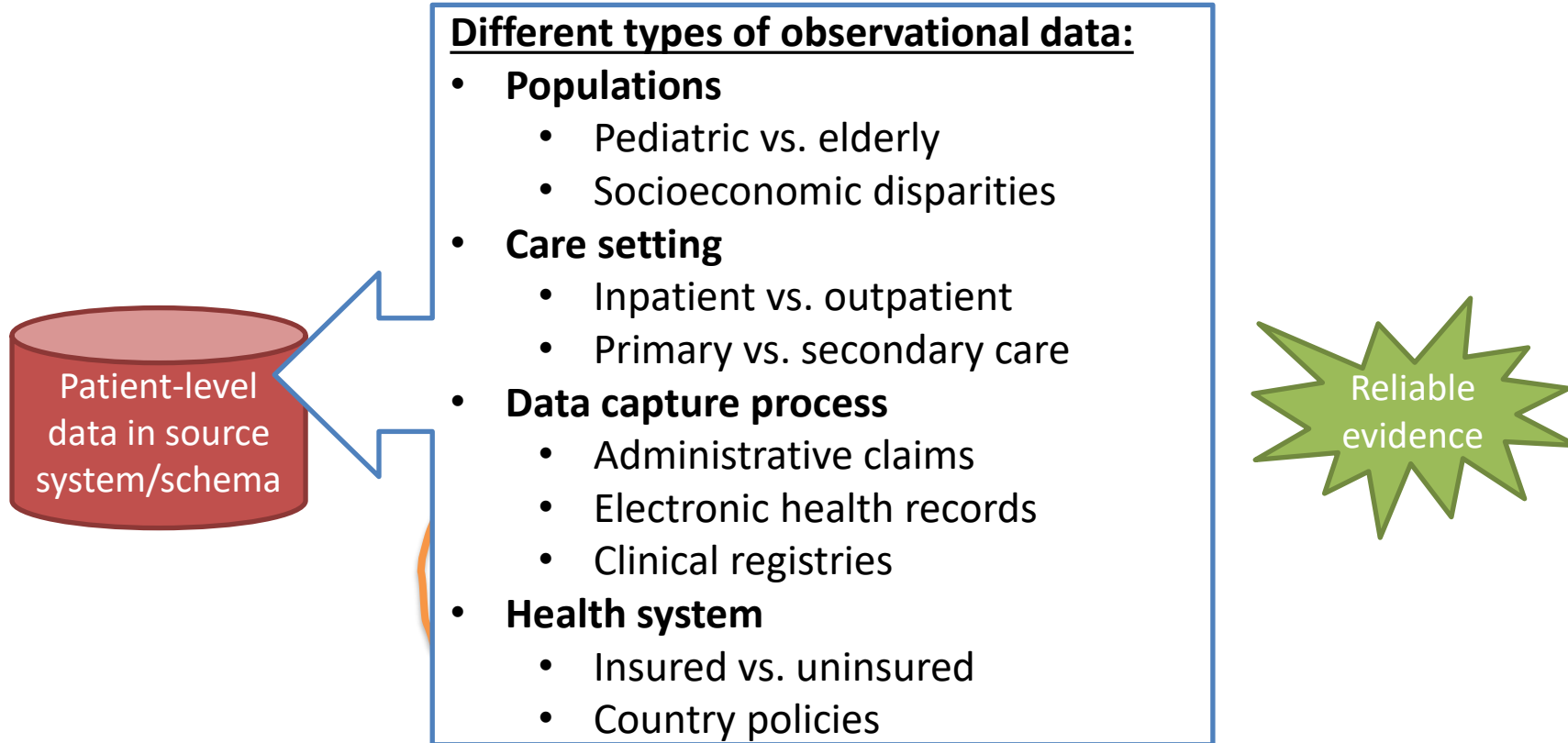


The journey to real-world evidence



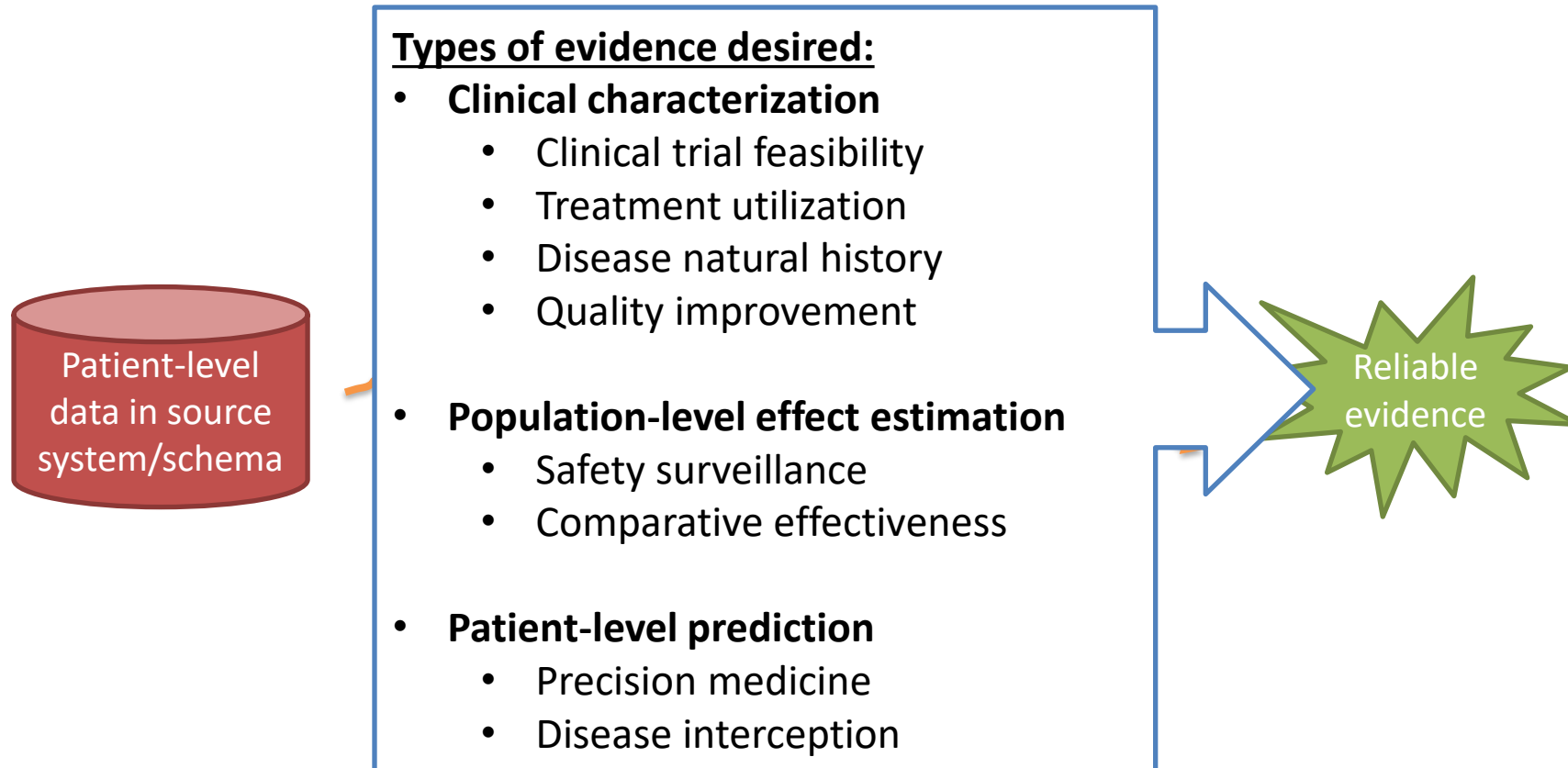


The journey to real-world evidence





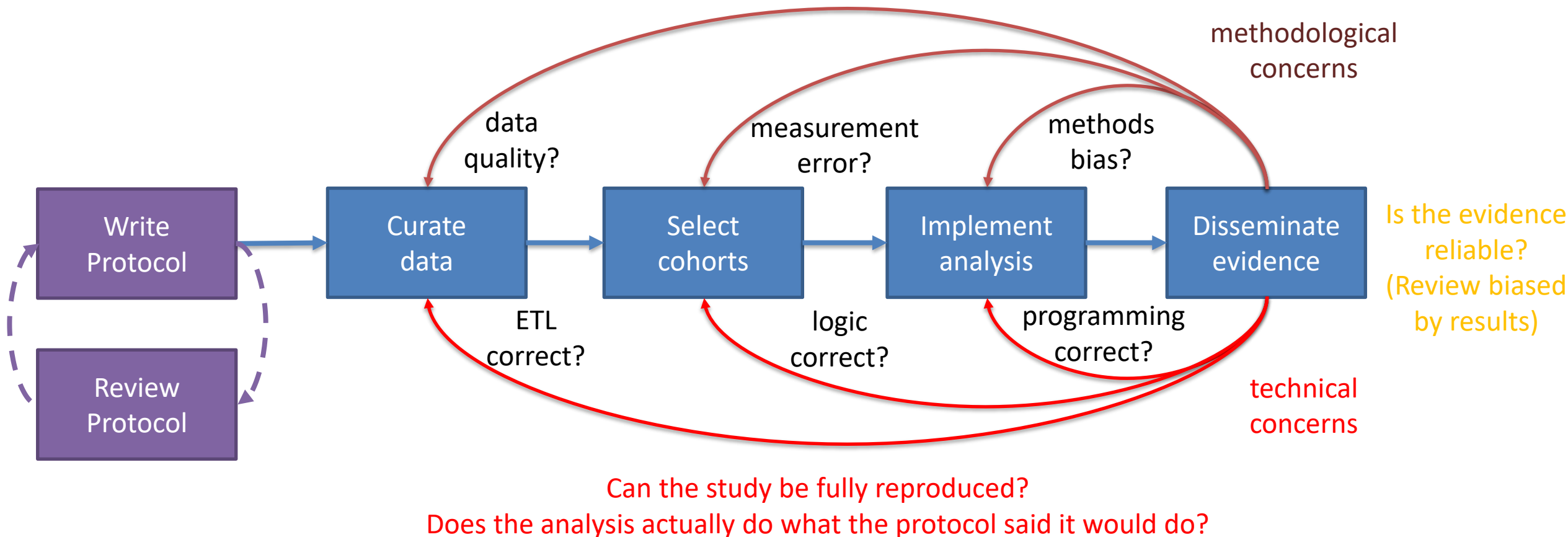
The journey to real-world evidence





Current status quo in observational research makes it challenging to build trust in evidence

Does the study provide an unbiased effect estimate?
Are the findings generalizable to the population of interest?





Desired attributes for reliable evidence

Desired attribute	Question	Researcher	Data	Analysis		Result
Repeatable	Identical	Identical	Identical	Identical	=	Identical
Reproducible	Identical	Different	Identical	Identical	=	Identical
Replicable	Identical	Same or different	Similar	Identical	=	Similar
Generalizable	Identical	Same or different	Different	Identical	=	Similar
Robust	Identical	Same or different	Same or different	Different	=	Similar
Calibrated	Similar (controls)	Identical	Identical	Identical	=	Statistically consistent



OHDSI's mission

To improve health by empowering a community to collaboratively generate the evidence that promotes better health decisions and better care



Our Journey

*Where The OHDSI Community Has Been
And Where We Are Going*

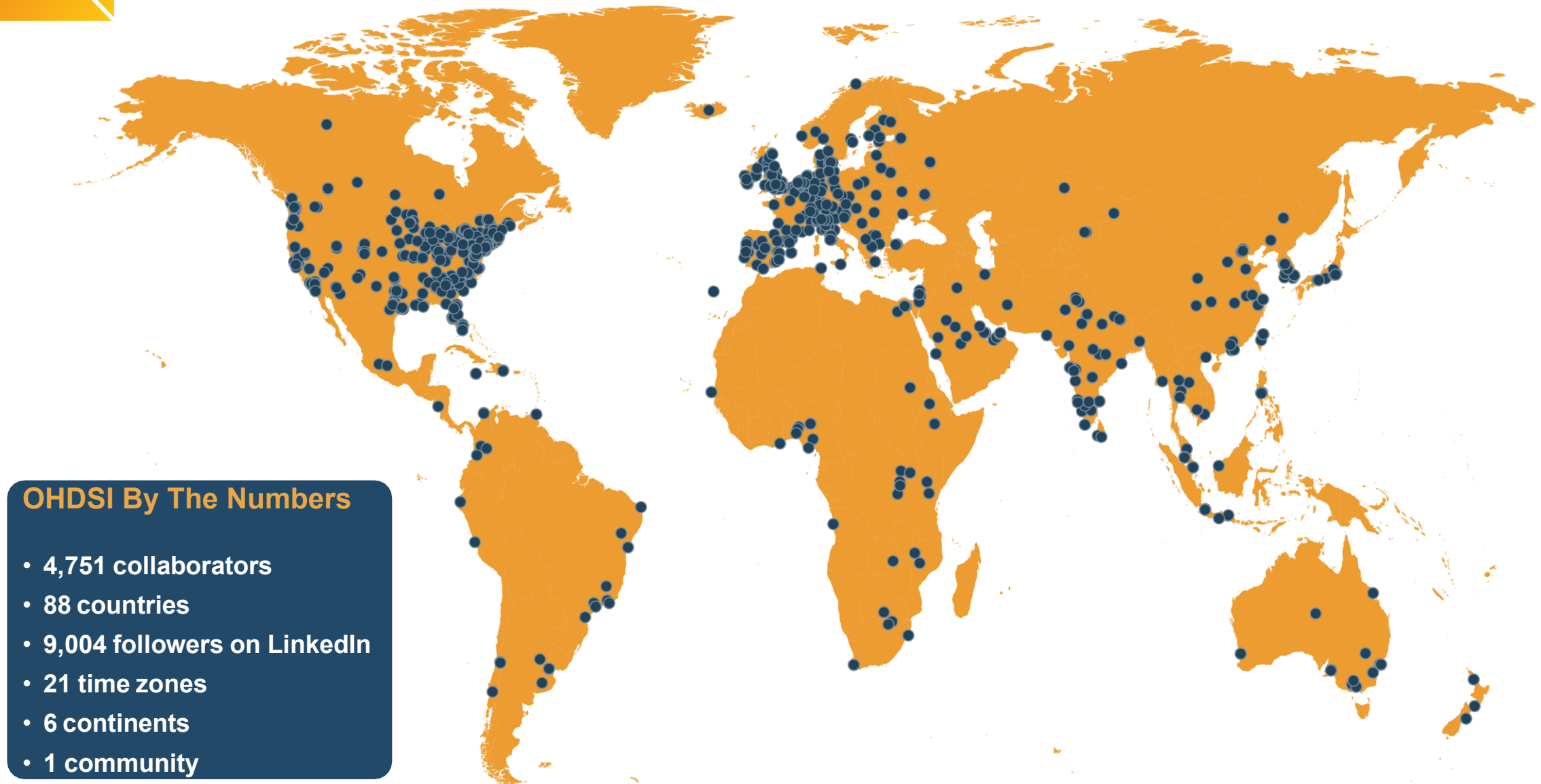
2025 edition



OHDSI
OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS



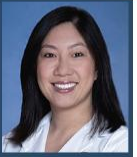
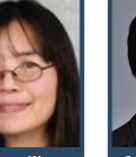
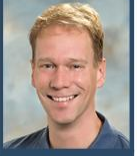
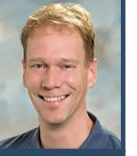
OHDSI collaborators



Join the Journey at <https://ohdsi.org/>



Workgroups led by community

ATLAS/WebAPI		Clinical Trials		Common Data Model		CDM Survey		CDM Vocabulary		Medical Imaging		Methods Research		Natural Language Processing		Network Data Quality	
 Christopher Knoll	 Alexey Manoylenko	 Mike Hamidi	 Zhen Lin	 Clair Blacketer	 Nicole Gerlane	 Anna Ostropolets	 Paul Nagy	 Seng Chan You	 Martijn Schuemie	 Marc Suchard	 Vipina Keloeth	 Hua Xu	 Clair Blacketer				
Databricks Users		Dentistry		Early-Stage Researchers		Electronic Animal Health Records		Oncology		Open-Source Community		Patient-Level Prediction (PLP)		Perinatal and Reproductive Health			
 John Gresh	 Robert Koski	 Shounak Chattopadhyay	 Ben Martin	 Harry Reyes Nieva	 Manlik Kwong	 Wayde Shipman	 Asieh Golozar	 Adam Black	 Paul Nagy	 Jenna Reys	 Ross Williams	 Alison Callahan	 Stephanie Leonard				
Evidence Network Partners		Eye Care and Vision Research				FHIR and OMOP		Perinatal and Reproductive Health		Phenotype Development & Evaluation		Psychiatry		Rare Diseases			
 Clair Blacketer	 Paul Nagy	 Sally Baxter	 Cindy Cai	 Kerry Goetz	 Michelle Hribar	 Davera Gabriel	 Louisa Smith	 Gowtham Rao	 Azza Shoalbi	 Dmytry Dymshyts	 Callum Harding	 Xiaoyan Wang	 Chunhua Weng				
FHIR and OMOP		Generative AI & Analytics in Healthcare		GIS - Geographic Information Systems		HADES		Rehabilitation		Steering		Surgery and Perioperative Medicine		Themis			
 Ben Hamlin	 Guy Tsafnat	 Martijn Schuemie	 Robert Miller	 Kyle Zollo-Venecsek	 Anthony Sena	 Martijn Schuemie	 Esther Janssen	 Ruud Salles	 George Hripesak	 Patrick Ryan	 Jenny Lane	 Evan Minty	 Melanie Philofsky				
Health Economics and Value Assessment		Health Equity		Healthcare Systems		Industry		Medical Devices		Transplant		Vaccine Vocabulary		Women of OHDSI			
 Gaurav Dravida	 Gowtham Rao	 Atif Amin	 Melanie Philofsky	 Paul Dougall	 Sarah Seager	 Asiyah Lin	 Michal Mankowski	 Oliver He	 Asiyah Lin	 Sarah Seager							

Workgroups Homepage

In OHDSI, there is a home for you. Please visit our workgroups home page to learn more about each group, find the meeting schedule and sign up to one or several workgroups!



www.ohdsi.org/workgroups



Regional chapters and national nodes

Africa



Agnes Kiragga

Asia-Pacific (APAC)



Cynthia Sung



Mui Van Zandt

Australia



Nicole Pratt

China



Hua Xu

Europe



Peter Rijnbeek

India



Swetha Kiranmayi Jakkuv



Vikram Patil



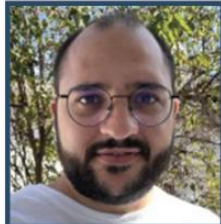
Parthiban Sulur

Japan



Tatsuo Hiramatsu

Latin America



Julio Oliveira

Republic of Korea



Rae Woong Park



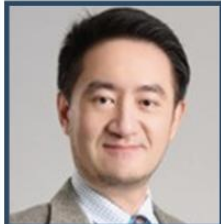
Seng Chan You

Singapore



Mengling 'Mornin' Feng

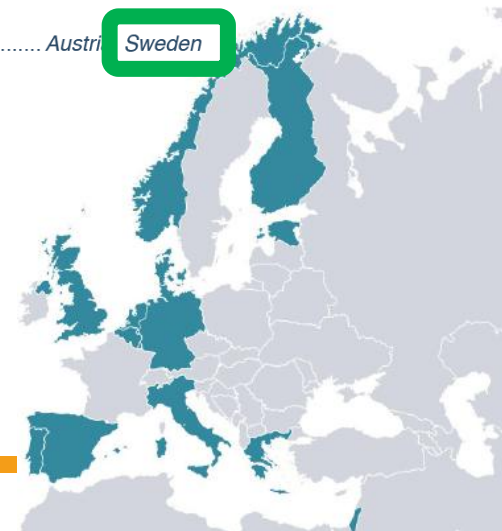
Taiwan



Jason Hsu

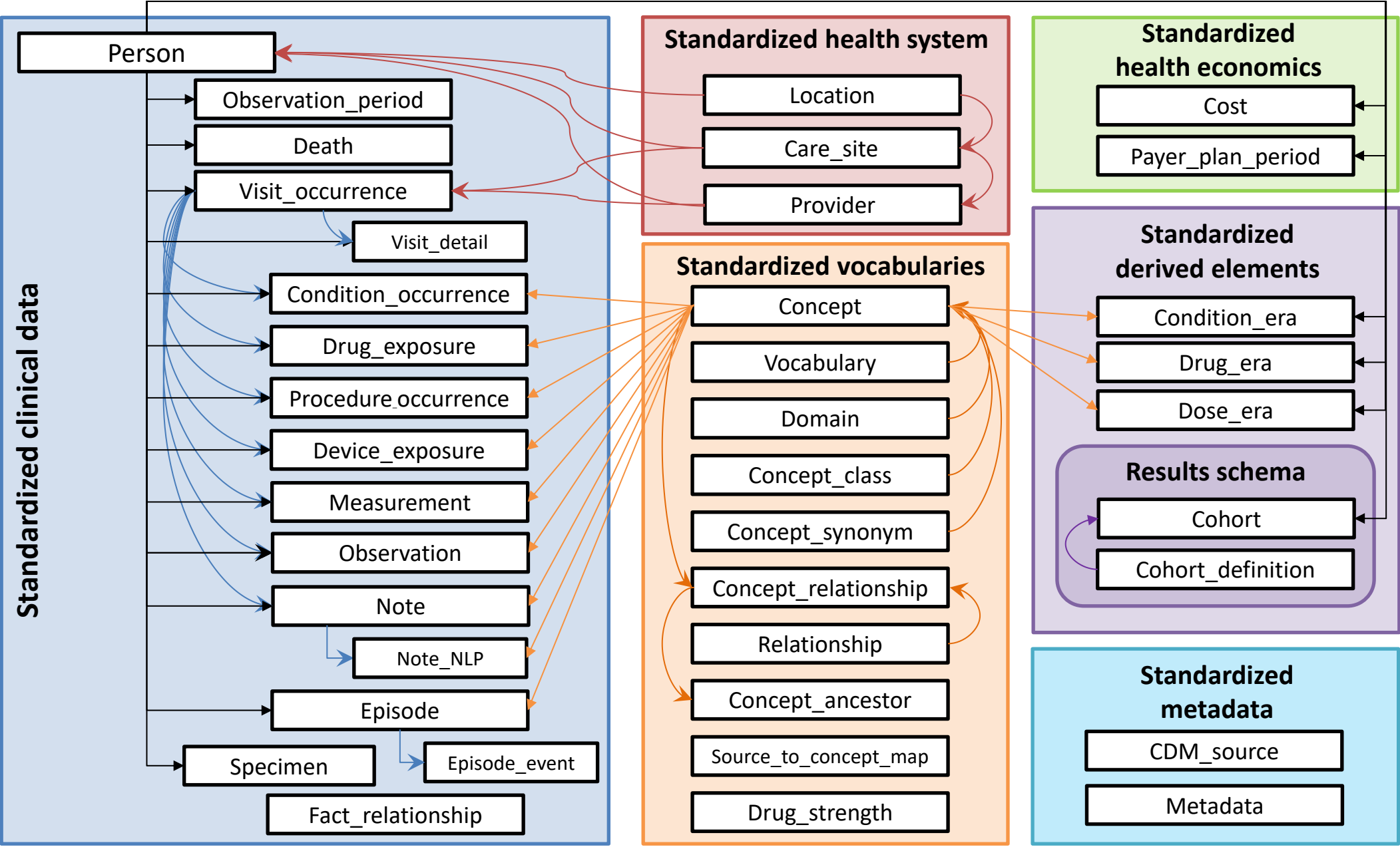
Node..... Lead(s)

Belgium Liesbet Peeters, Annelies Verbiest, Ilse Vermeulen
Denmark Ismail Gögenur, Martin Høyer Rose, Andreas Weinberger Rosen
Estonia Raivo Kolde, Sulev Reisberg
Finland Eric Fey, Gustav Klingstedt
Germany Ines Reinecke, Michele Zoch
Greece Anastasia Farmaki, Pantelis Natsiavas, Grigoris Papapostolou
Hungary Zsolt Bagyura, Ágota Mészáros
Ireland Aedin Culhane, Mark Lawler, Catherine Mahoney
Israel Chen Yanover
Italy Lucia Sacchi, Matteo Gabetta
Luxembourg Claudine Backes, Andreas Kremer, Maria Quaranta
Netherlands Renske Los, Aniek Markus
Norway Espen Enerly, Siri Larønningen
Portugal Patricia Couceiro, Carmen Nogueira
Spain Miguel Angel Mayer, Talita Duarte Salles
Switzerland Olga Endrich, Karen Triep
United Kingdom Dani Prieto-Alhambra
coming soon Austria Sweden



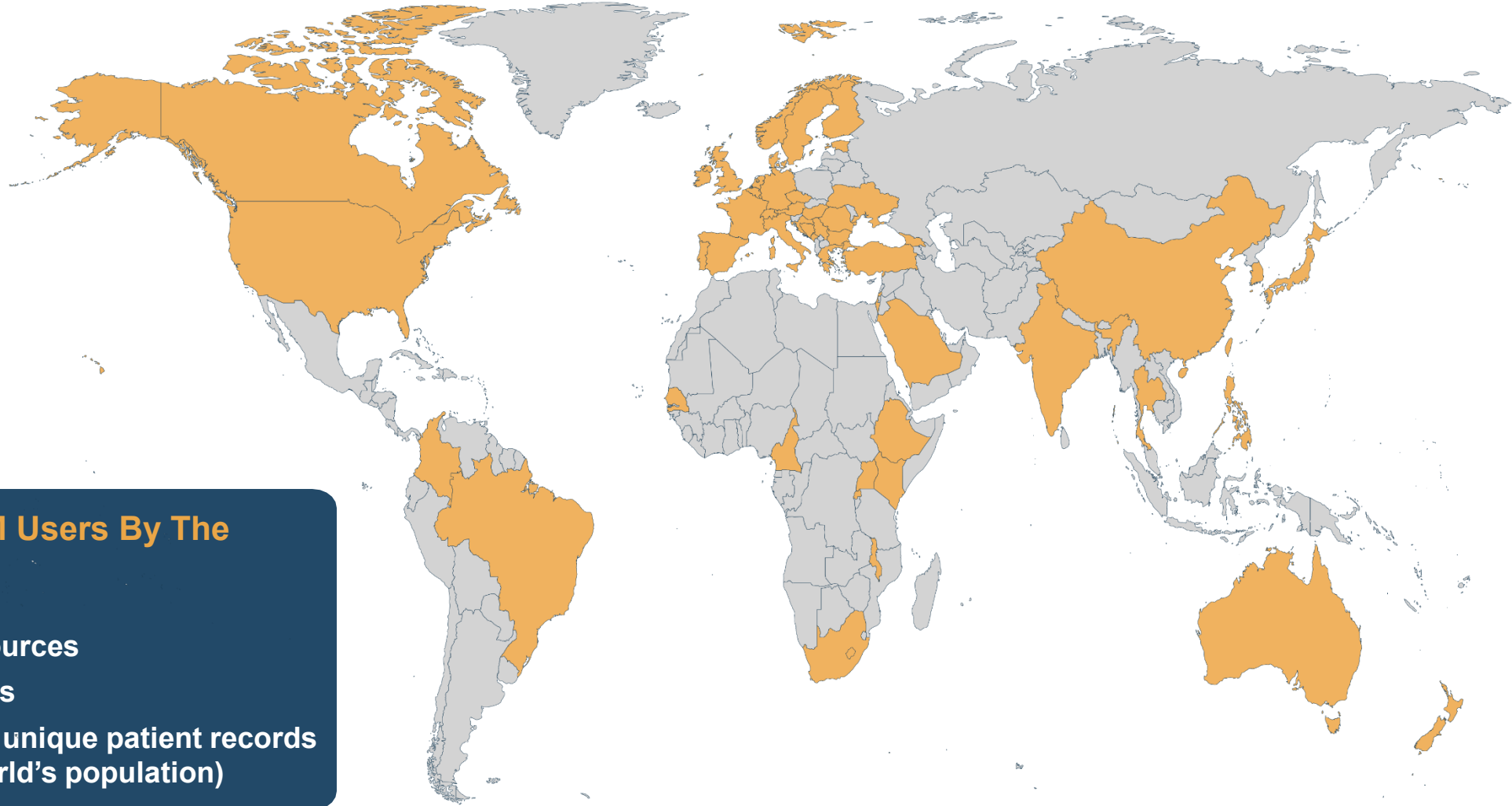


OMOP Common Data Model v5.4





OMOP Common Data Model adoption

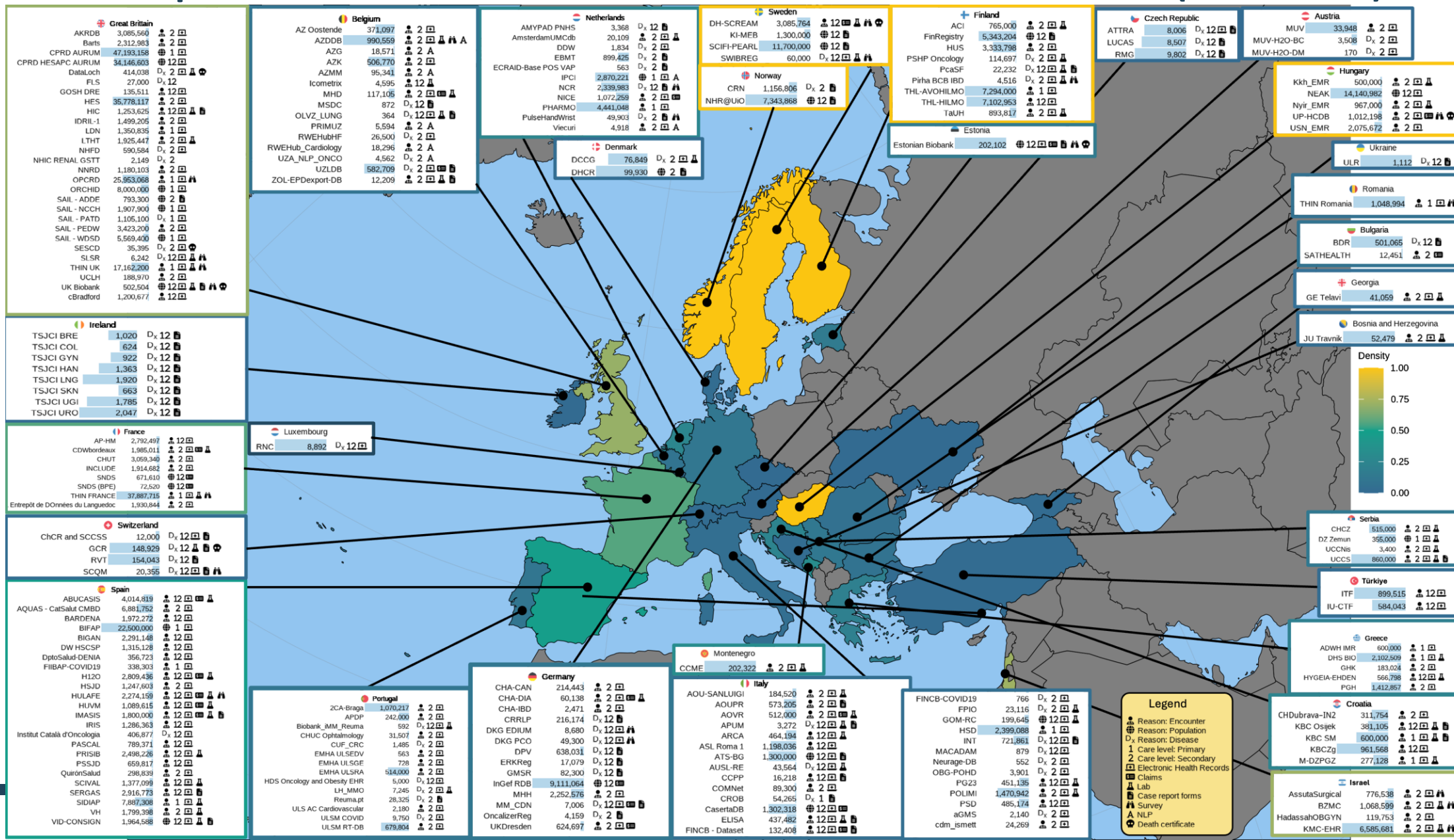


OMOP CDM Users By The Numbers

- 544 data sources
- 54 countries
- 974 million unique patient records (12% of world's population)



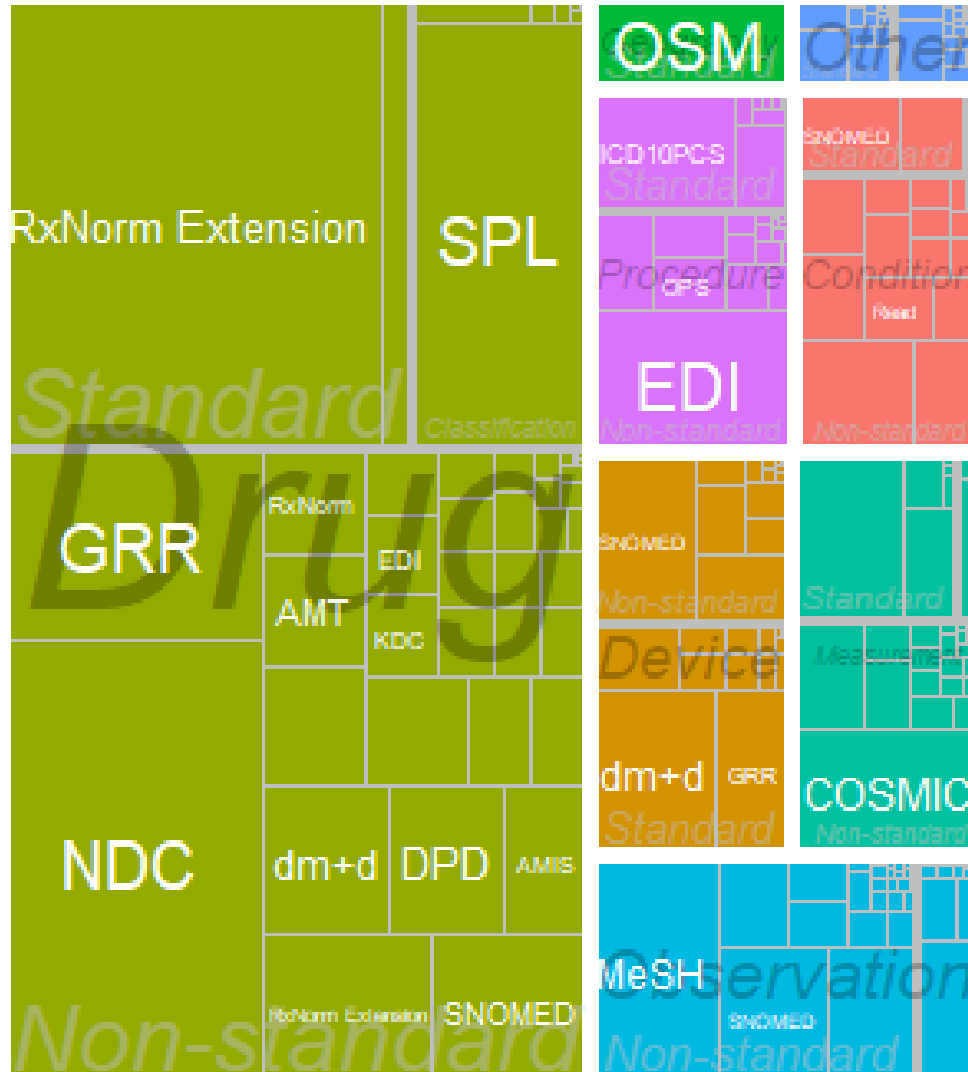
European Health Data & Evidence Network (EHDEN)



Blacketer
JMIR
2025



OHDSI standardized vocabularies

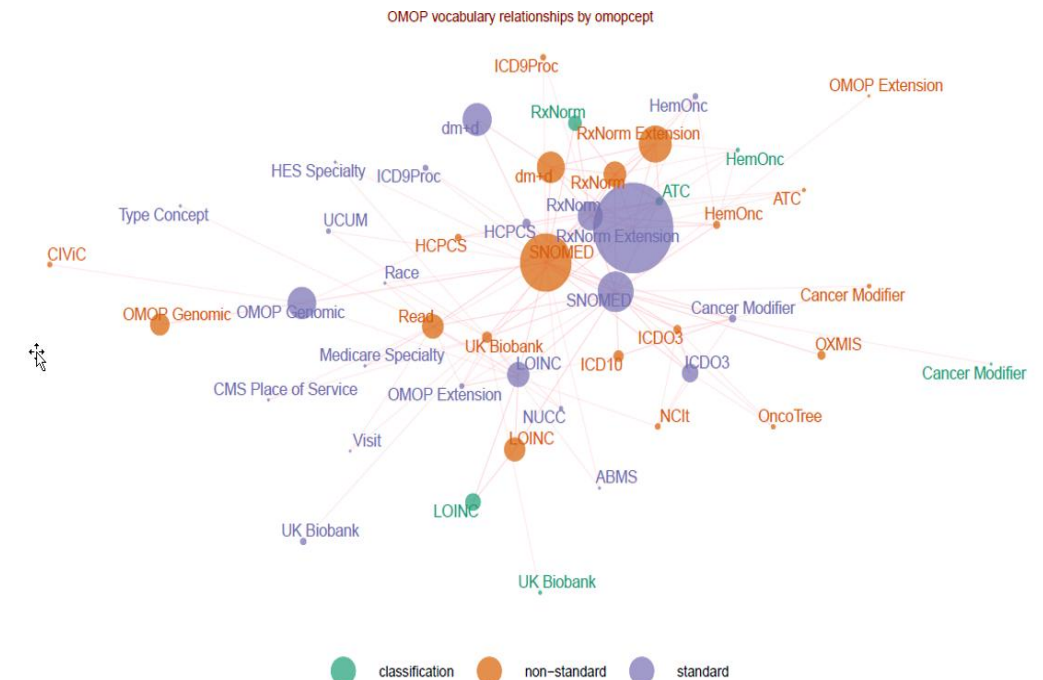


OHDSI Vocabularies By The Numbers

as of August 2025 release

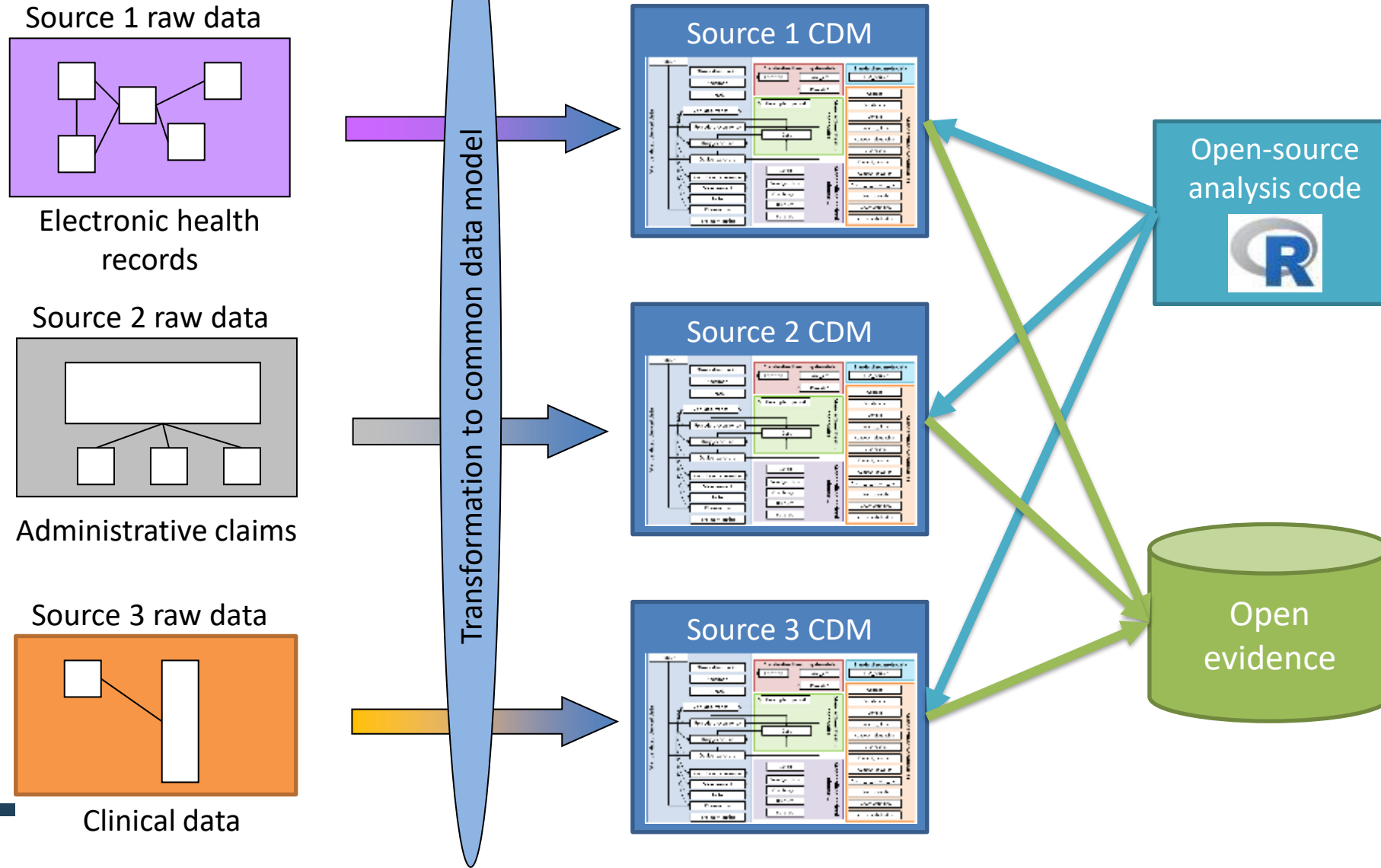
- 11,804,307 concepts
 - 3,784,263 standard concepts
 - 971,914 classification concepts
- 87,948,636 concept relationships
- 101,696,159 ancestral relationships
- 145 vocabularies
- 6,028,711 concept synonyms
- 43 domains

1 Shared Resource to Enable Data Standards

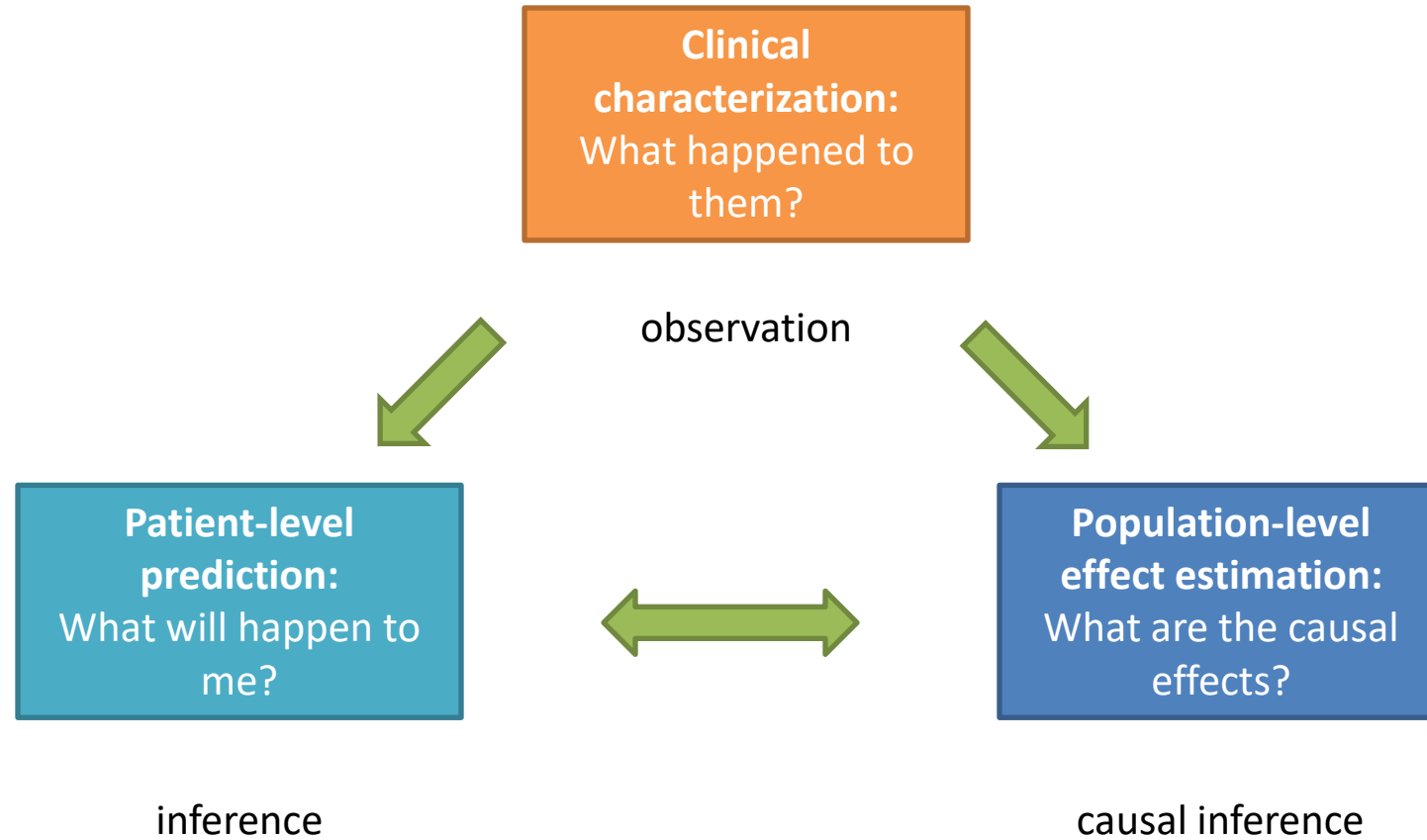




Common data model can enable standardized analytics across a distributed data network



Complementary evidence to inform the patient journey

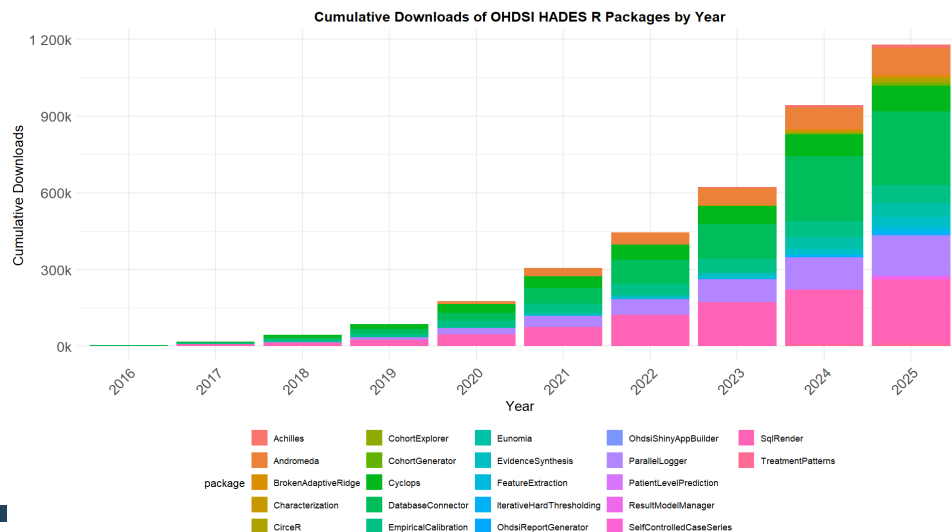


Analytic use case	Type	Structure	Example
Clinical characterization	Disease Natural History	Amongst patients who are diagnosed with <insert your favorite disease>, what are the patient's characteristics from their medical history?	Amongst patients with rheumatoid arthritis , what are their demographics (age, gender), prior conditions, medications, and health service utilization behaviors?
	Treatment utilization	Amongst patients who have <insert your favorite disease>, which treatments were patients exposed to amongst <list of treatments for disease> and in which sequence?	Amongst patients with depression , which treatments were patients exposed to SSRI, SNRI, TCA, bupropion, esketamine and in which sequence?
	Outcome incidence	Amongst patients who are new users of <insert your favorite drug>, how many patients experienced <insert your favorite known adverse event from the drug profile> within <time horizon following exposure start>?	Amongst patients who are new users of methylphenidate , how many patients experienced psychosis within 1 year of initiating treatment ?
Population-level effect estimation	Safety surveillance	Does exposure to <insert your favorite drug> increase the risk of experiencing <insert an adverse event> within <time horizon following exposure start>?	Does exposure to ACE inhibitor increase the risk of experiencing Angioedema within 1 month after exposure start ?
	Comparative effectiveness	Does exposure to <insert your favorite drug> have a different risk of experiencing <insert any outcome (safety or benefit) > within <time horizon following exposure start>, relative to <insert your comparator treatment>?	Does exposure to ACE inhibitor have a different risk of experiencing acute myocardial infarction while on treatment , relative to thiazide diuretic ?
Patient level prediction	Disease onset and progression	For a given patient who is diagnosed with <insert your favorite disease>, what is the probability that they will go on to have <another disease or related complication> within <time horizon from diagnosis>?	For a given patient who is newly diagnosed with atrial fibrillation , what is the probability that they will go onto to have ischemic stroke in next 3 years ?
	Treatment response	For a given patient who is a new user of <insert your favorite chronically-used drug>, what is the probability that they will <insert desired effect> in <time window>?	For a given patient with T2DM who start on metformin , what is the probability that they will maintain HbA1C<6.5% after 3 years ?
	Treatment safety	For a given patient who is a new user of <insert your favorite drug>, what is the probability that they will experience <insert adverse event > within <time horizon following exposure>?	For a given patients who is a new user of warfarin , what is the probability that they will have GI bleed in 1 year ?



Open-source software development

- HADES is an ecosystem of 41 R packages to support standardized analytics for the OMOP CDM and across OHDSI network
- OHDSI CRAN packages (n=22) have been downloaded >1m times



Package	Version	Maintainer(s)	Availability
Achilles	v4.7.2	Frank DeFalco	CRAN
Andromeda	v3.1.1	Martijn Schuemie	CRAN
BioRx	v0.2.2	Martijn Schuemie	GitHub
BrokenAdaptiveBridge	v0.1.1	Marc Suchard	CRAN
C4R	v2.1.0	Martin Lavallee	GitHub
Characterization	v2.2.0	Jenna Reys	CRAN
CirceR	v1.3.3	Chris Knoll	CRAN
CohortDiagnostics	v3.4.2	Jamie Gilbert	GitHub
CohortExplorer	v0.1.0	Gowtham Rao	CRAN
CohortGenerator	v0.12.0	Anthony Sena	CRAN
CohortIncidence	v4.1.0	Chris Knoll	GitHub
CohortMethod	v5.1.0	Martijn Schuemie	GitHub
Cyclops	v3.6.0	Marc Suchard	CRAN
DatabaseConnector	v6.4.0	Martijn Schuemie	CRAN
DataQualityDashboard	v2.7.0	Katy Sadowski	GitHub
DeepPatientLevelPrediction	v2.2.0	Egill Fridgeirsson	GitHub
EmpiricalCalibration	v3.1.4	Martijn Schuemie	CRAN
EnsemblePatientLevelPrediction	v1.1.2	Jenna Reys	GitHub
Eunomia	v2.1.0	Frank DeFalco	CRAN
EvidenceSynthesis	v1.0.0	Martijn Schuemie	CRAN
FeatureExtraction	v1.11.0	Ger Inberg	CRAN
Hydra	v0.4.0	Anthony Sena	Deprecated
IterativeHardThresholding	v1.0.3	Marc Suchard	CRAN
Keeper	v0.1.1	Anna Ostropolets	GitHub
MethodEvaluation	v2.4.0	Martijn Schuemie	GitHub
OhdsiReportGenerator	v1.1.1	Jenna Reys	CRAN
OhdsiShinyAppBuilder	v0.1.2	Lee Evans	GitHub
OhdsiShinyAppBuilder	v1.0.0	Jenna Reys	CRAN
OhdsiShinyModules	v3.1.0	Jenna Reys	GitHub
ParallelLogger	v3.5.0	Martijn Schuemie	CRAN
PatientLevelPrediction	v6.5.0	Egill Fridgeirsson & Jenna Reys	CRAN
PhenotypeLibrary	v1.16.0	Gowtham Rao	GitHub
Phenotator	v2.2.10	Joel Swerdel	GitHub
ResultModelManager	v1.1.1	Jamie Gilbert	CRAN
ROhdsiWebapi	v1.1.1	Gowtham Rao	GitHub
SelfControlledCaseSeries	v6.1.0	Martijn Schuemie	CRAN
SelfControlledCohort	v1.6.0	Jamie Gilbert	GitHub
ShinyAppBuilder	v2.2.0	Jenna Reys	Deprecated
SqIRender	v1.10.3	Martijn Schuemie	CRAN
Stratus	v1.4.1	Anthony Sena	GitHub
TreatmentPatterns	v3.4.1	Maarten van Kessel	CRAN

The open-source tools that empower OHDSI research are not only available to the community, but they are DEVELOPED by the community. We thank the many developers and maintainers who empower our research initiatives around the world!



Adam Black



Frank DeFalco



Lee Evans



Egill Fridgeirsson



Jamie Gilbert



Ger Inberg



Christopher Knoll



Martin Lavallee



Anna Ostropolets



Gowtham Rao



Jenna Reys



Katy Sadowski



Martijn Schuemie



Anthony Sena



Marc Suchard



Joel Swerdel

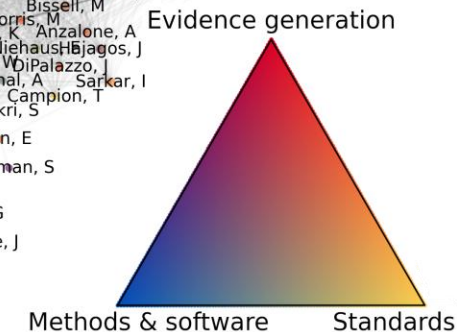
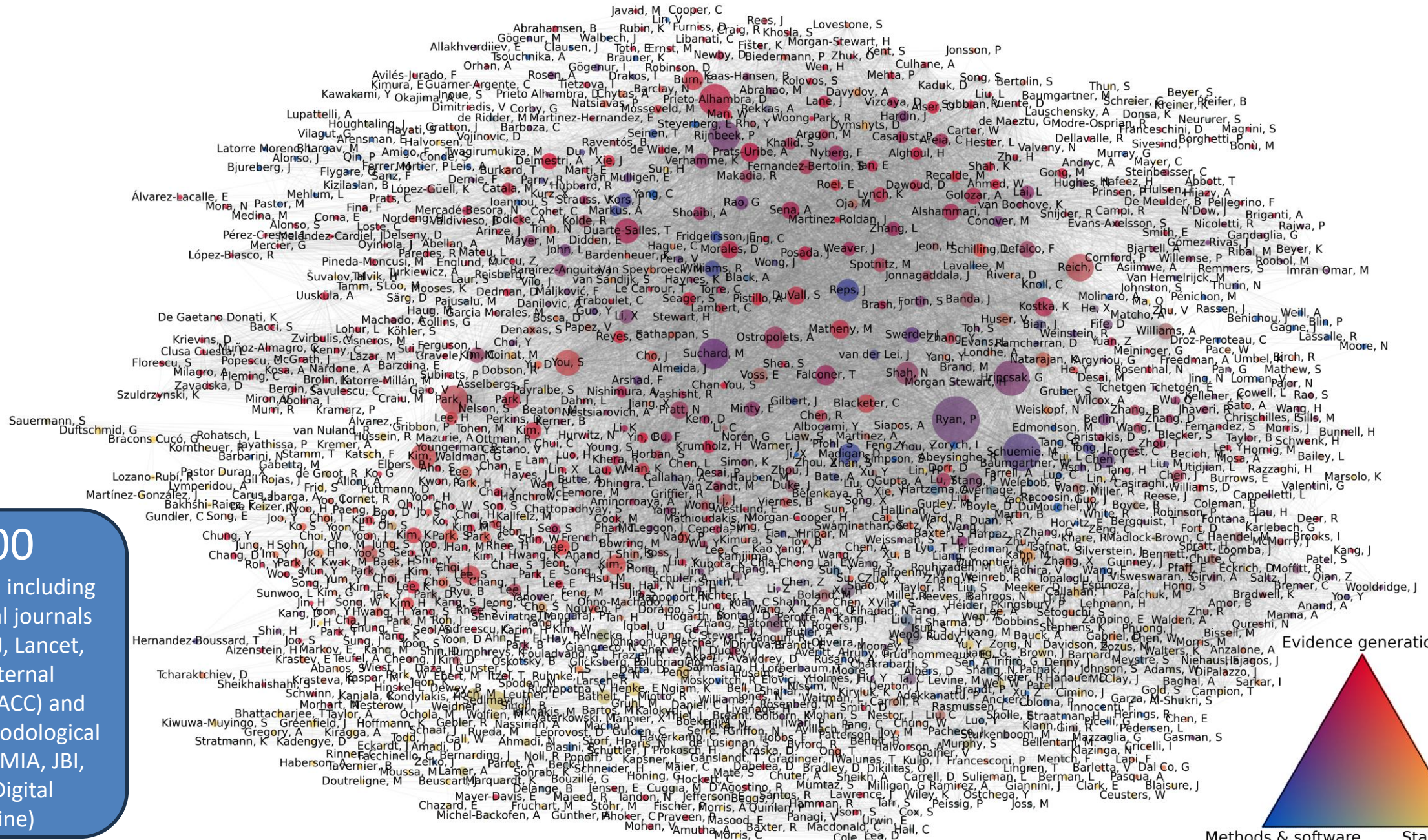


Maarten van Kessel



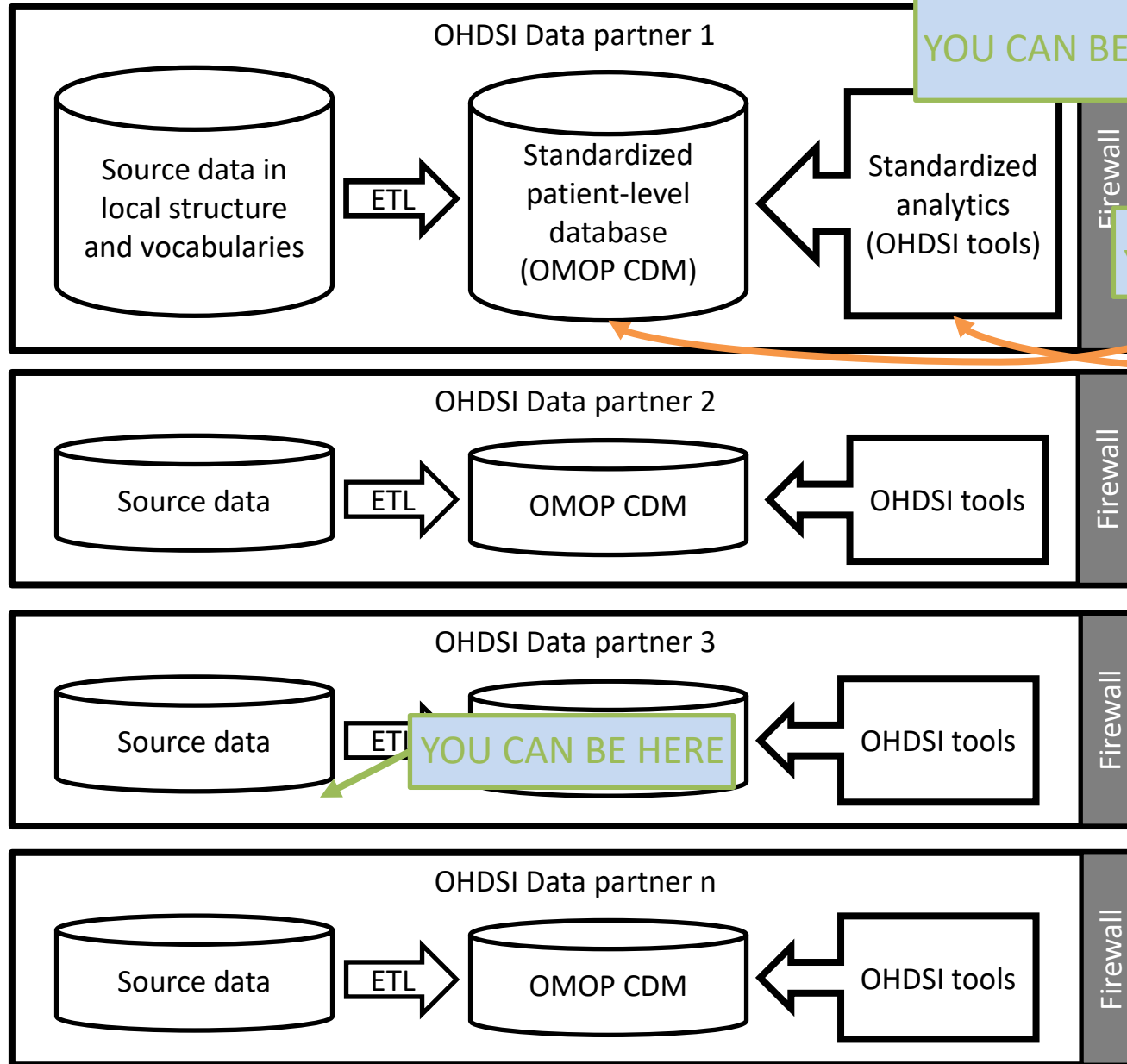
OHDSI collaborations in scholarship

>900
publications, including
in top clinical journals
(JAMA, BMJ, Lancet,
JAMA Internal
Medicine, JACC) and
leading methodological
journals (JAMIA, JBI,
Nature Digital
Medicine)





OHDSI data network



OHDSI collaborations

Open community data standards (OMOP CDM)

YOU CAN BE HERE

Open source development (OHDSI tools)

YOU CAN BE HERE

Methodological research

YOU CAN BE HERE

Clinical evidence generation

OHDSI Network

Pre-specified protocol with analysis specification

Standardized summary statistics results repository

YOU CAN BE HERE

Collaborative Interpretation

Evidence dissemination

YOU CAN BE HERE



Why OHDSI and the world needs Sweden

The Legatum Prosperity Index™ Ranks 1–56

European Journal of Epidemiology (2025) 40:563–579
<https://doi.org/10.1007/s10654-025-01226-9>

DATA RESOURCE



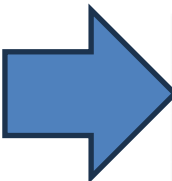
The healthcare system in Sweden

Jonas F. Ludvigsson^{1,2,3} · David Bergman¹ · Catharina Ihre Lundgren^{4,5} · Kristina Sundquist⁶ · Jean-Luc af Geijerstam⁷ · Anna H. Glenngård⁸ · Marie Lindh⁹ · Johan Sundström^{10,11} · Johan Kaarme^{12,13} · Jialu Yao¹

Received: 10 March 2025 / Accepted: 23 March 2025 / Published online: 19 May 2025
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Abstract

The Swedish population is characterized by high life expectancy and low avoidable mortality rates. This review outlines the Swedish healthcare system, which offers universal access to all residents and has a long tradition of reforms for social equity. Responsibility for healthcare is shared between the state, the regions, and the municipalities. The Ministry of Health and Social Affairs provides the overall healthcare framework; additionally, several governmental agencies are directly involved in healthcare and public health initiatives. The 21 regions organize, finance, and provide most primary, secondary, and tertiary care, as well as health information channels. Resources for primary care are less plentiful than in many other countries. The 290 municipalities deliver care to elderly people and those with functional impairment. The Swedish healthcare system is primarily tax-funded, with 86% of total healthcare expenditures from public expenses and <1% from voluntary health insurance. The gross domestic product (GDP) share of healthcare expenditures, 10.5% in 2022, is above the EU average. The level of unmet needs in the population is low, due to universal coverage and caps on user charges except for dental care. Sweden's healthcare system performs well on care quality and patient satisfaction, but suffers from workforce shortage and care fragmentation. Limitations in care coordination can be attributed to a siloed digital infrastructure and care governance, a low number of hospital beds per capita, and a compensation system that often does not incentivize coordination. Despite these challenges, life expectancy is high and avoidable mortality rates are low in Sweden.



2013 rank	2022 rank	2023 rank	Country
4	1	1	Denmark
1	3	2	Sweden
2	2	3	Norway
5	4	4	Finland
3	5	5	Switzerland
6	6	6	Netherlands
8	7	7	Luxembourg
14	9	8	Iceland
9	8	9	Germany
7	10	10	New Zealand

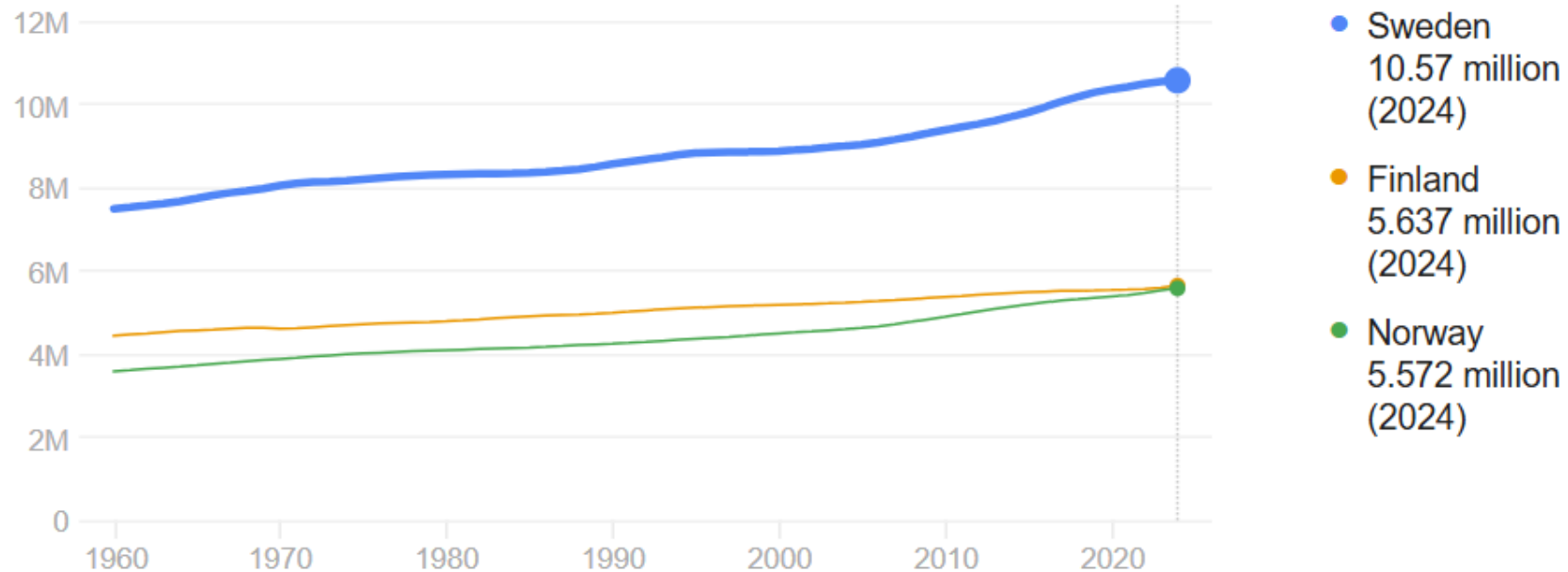
Health	Education	Natural Environment
16	5	5
9	8	1
7	10	9
15	2	2
10	4	6
11	6	39
12	36	10
8	11	13
13	19	12
25	18	11



Why Sweden needs OHDSI and the rest of the world

Sweden / Population

10.57 million (2024)





Why Sweden needs OHDSI and the rest of the world

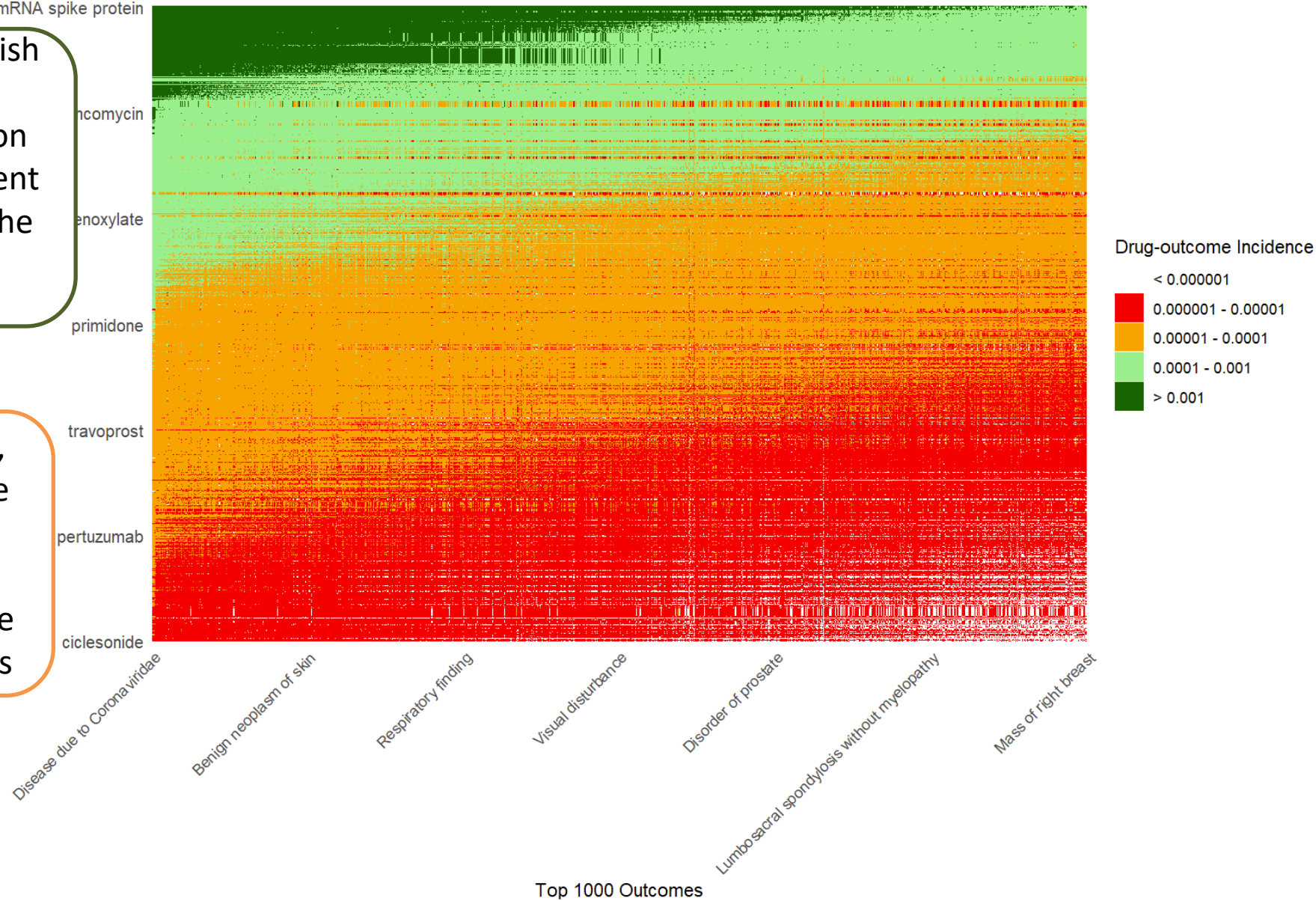
SARS-CoV-2 (COVID-19) vaccine, mRNA spike protein

If full health data for the entire Swedish population of 10 million were accessible, then ~10% of questions on drug-outcome pairs may have sufficient statistical power to answer alone if the incidence are comparable to US population....

Top 100

...but even with a national database, >70% of drug-outcome questions are likely to have insufficient data for prediction or estimation, so an international network study would be required to generate reliable answers

Drug Outcome Incidence in a large US claims database





Join the Journey!

<https://www.ohdsi.org/join-the-journey/>

Looking forward to collaborating with all of you!

Email me: ryan@ohdsi.org