Welcome OHDSI: Where's our journey?

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Janssen Research and Development
Columbia University Medical Center
18 October 2017

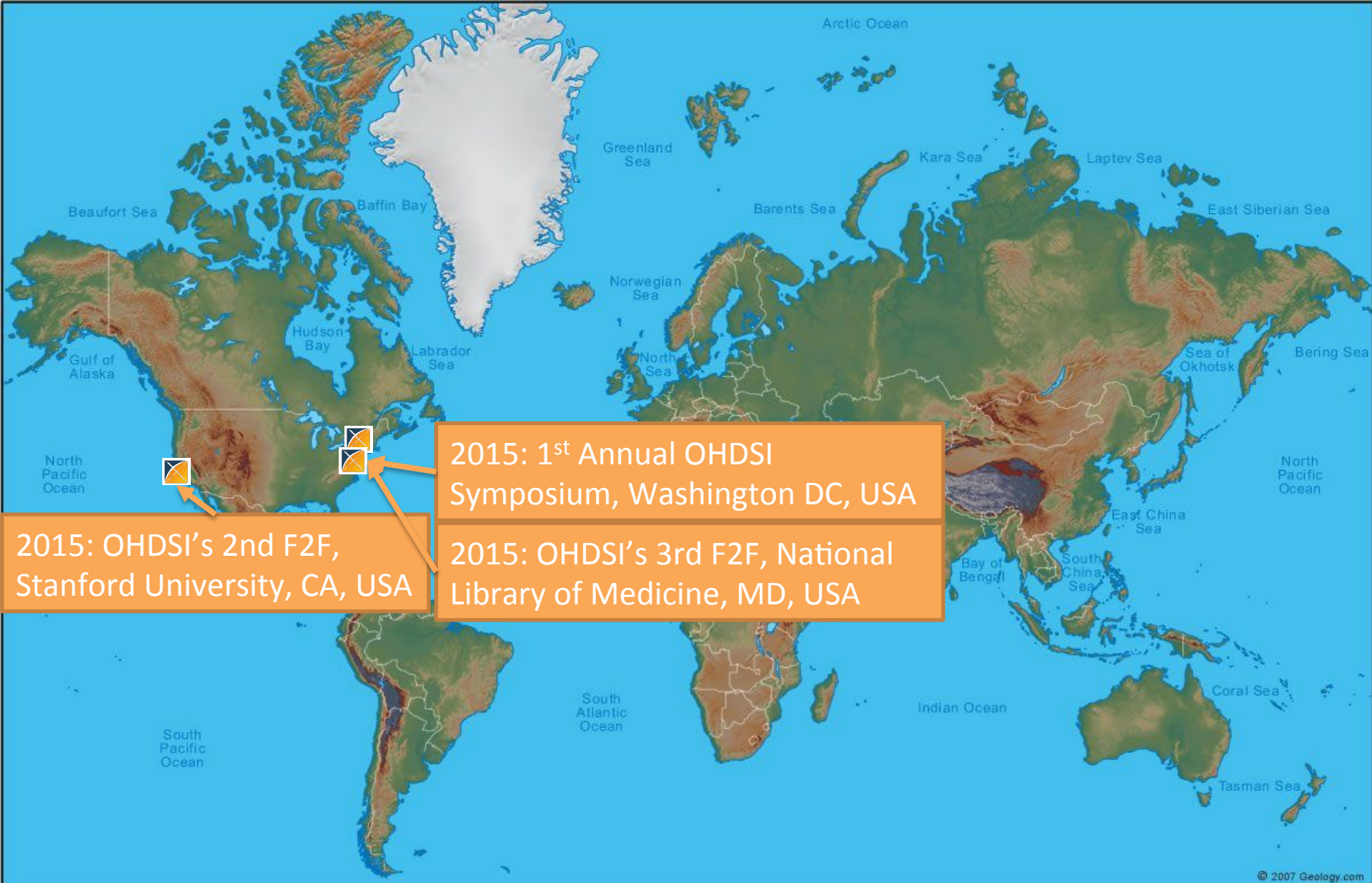# Odyssey (*noun*): \oh-d-si\

1. A long journey full of adventures

The Journey of Odysseus

2014: OHDSI's 1st F2F meeting, Columbia University, NY, USA

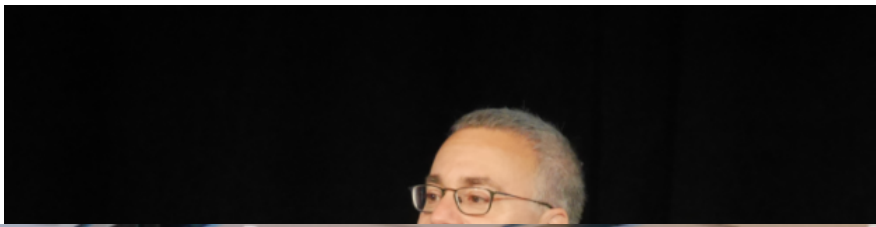Welcome! To the OHDSI Community!

2015: 1st Annual OHDSI Symposium, Washington DC, USA

2015: OHDSI's 2nd F2F, Stanford University, CA, USA

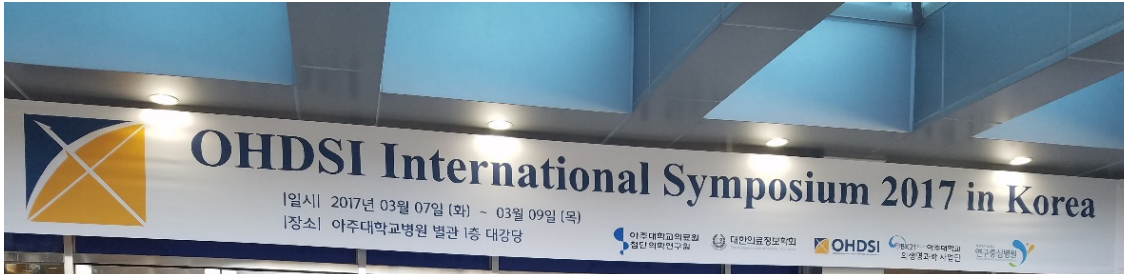2015: OHDSI's 3rd F2F, National Library of Medicine, MD, USA

2016: 2nd Annual OHDSI Symposium, Washington DC, USA

2017: OHDSI Korea Symposium
Ajou University, Suwon, South Korea

2017: OHDSI Korea Symposium
Ajou University, Suwon, South Korea

2017: OHDSI's 4th F2F,
Georgia Tech, GA, USA

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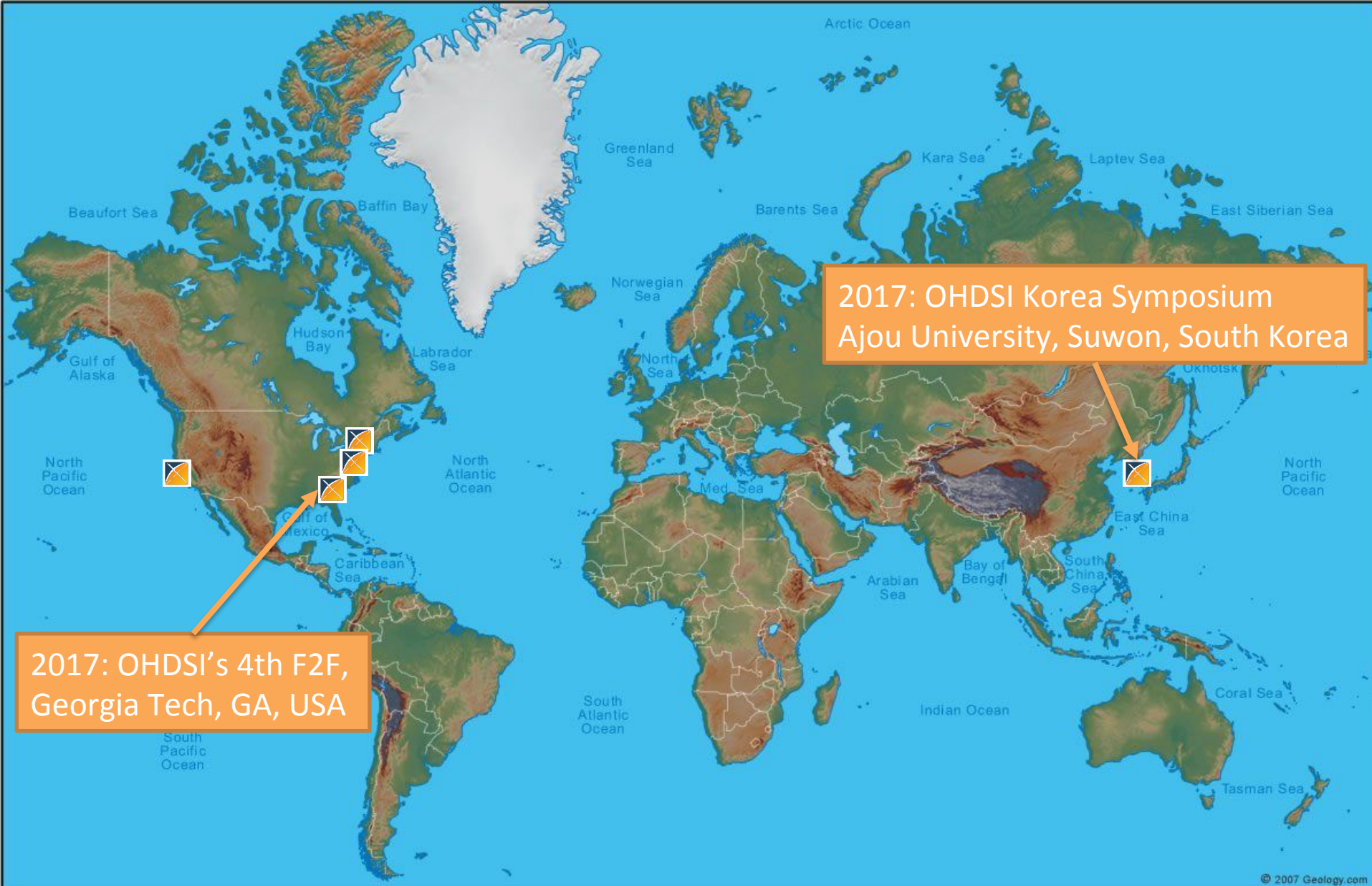
2017: OHDSI Hadoop hack-a-thon, QuintilesIMS, PA, USA
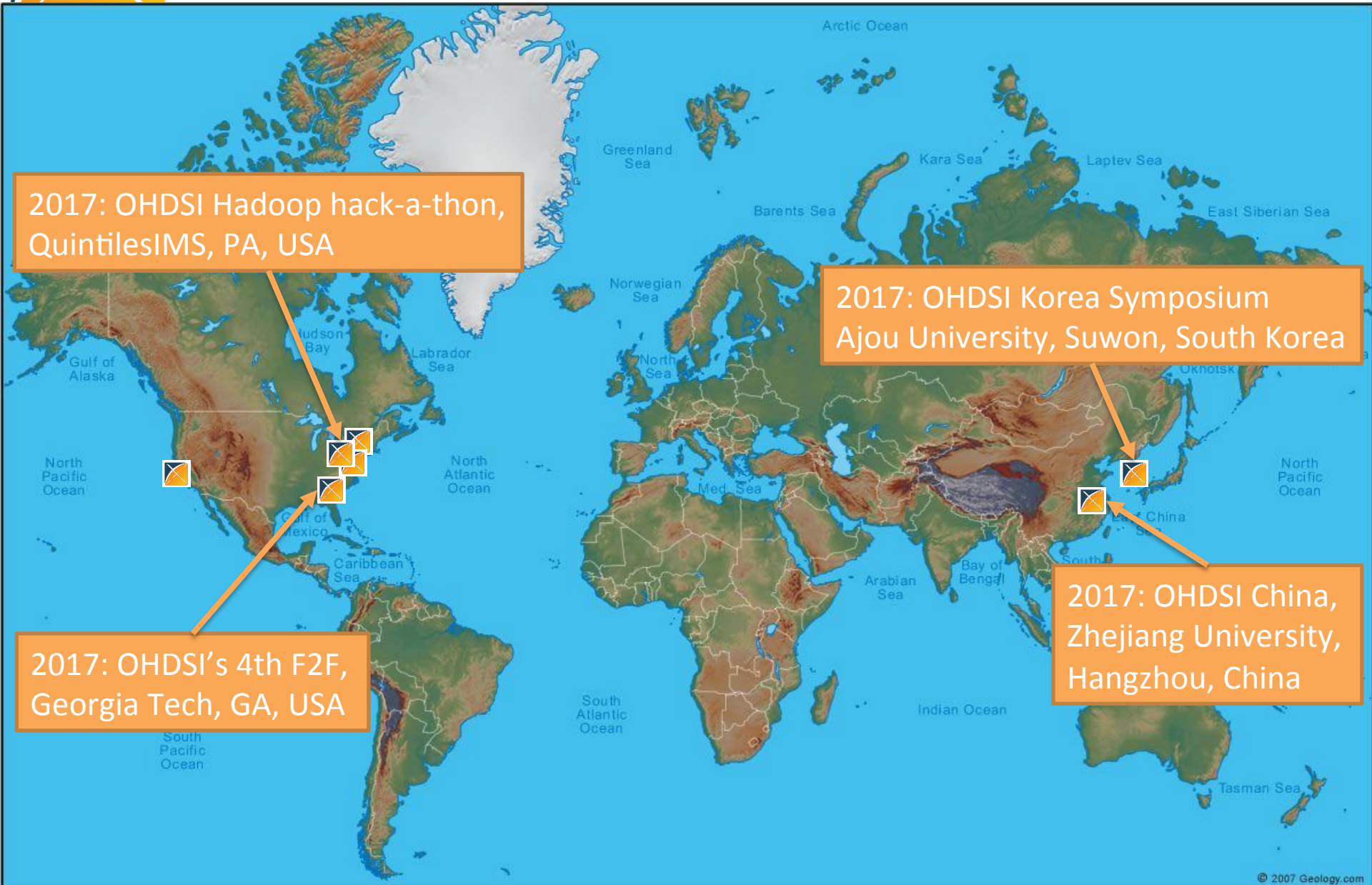
2017: OHDSI's 4th F2F, Georgia Tech, GA, USA

2017: OHDSI Hadoop hack-a-thon, QuintilesIMS, PA, USA
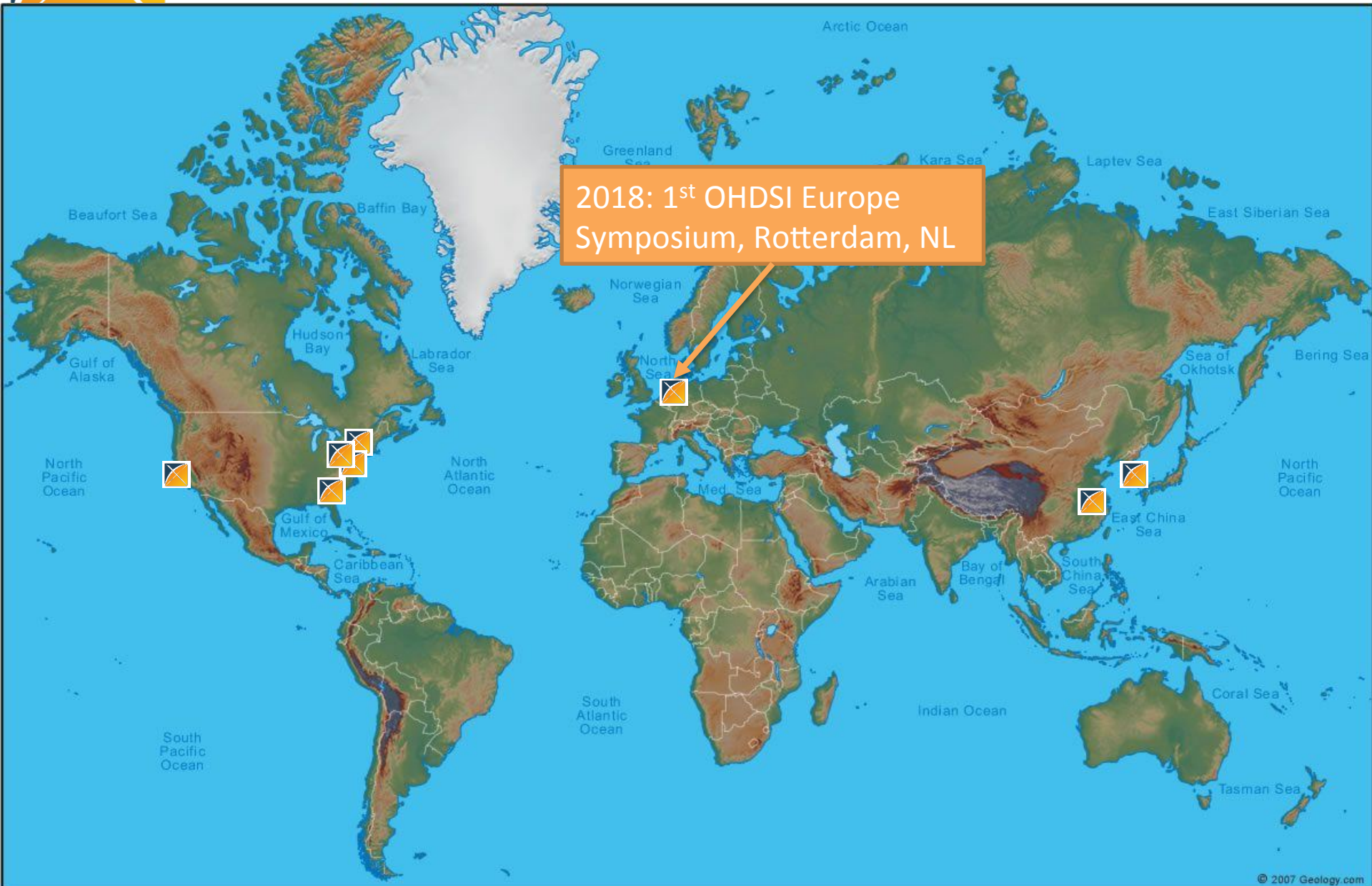
2017: OHDSI Korea Symposium
Ajou University, Suwon, South Korea

2017: OHDSI's 4th F2F, Georgia Tech, GA, USA

2017: OHDSI China, Zhejiang University, Hangzhou, China

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2018: 1st OHDSI Europe Symposium, Rotterdam, NL

European OHDSI Symposium

Bridging Europe

23-24th March 2018, Rotterdam, The Netherlands

More Info

http://www.ohdsi-europe.org/

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2017: OHDSI's 4th F2F, Georgia Tech, GA, USA

2016: 2nd Annual OHDSI Symposium, Washington DC, USA

2017: OHDSI China, Zhejiang University, Hangzhou, China

2017: 3rd Annual OHDSI Symposium, Bethesda, MD, USA
YOU ARE HERE

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Welcome!

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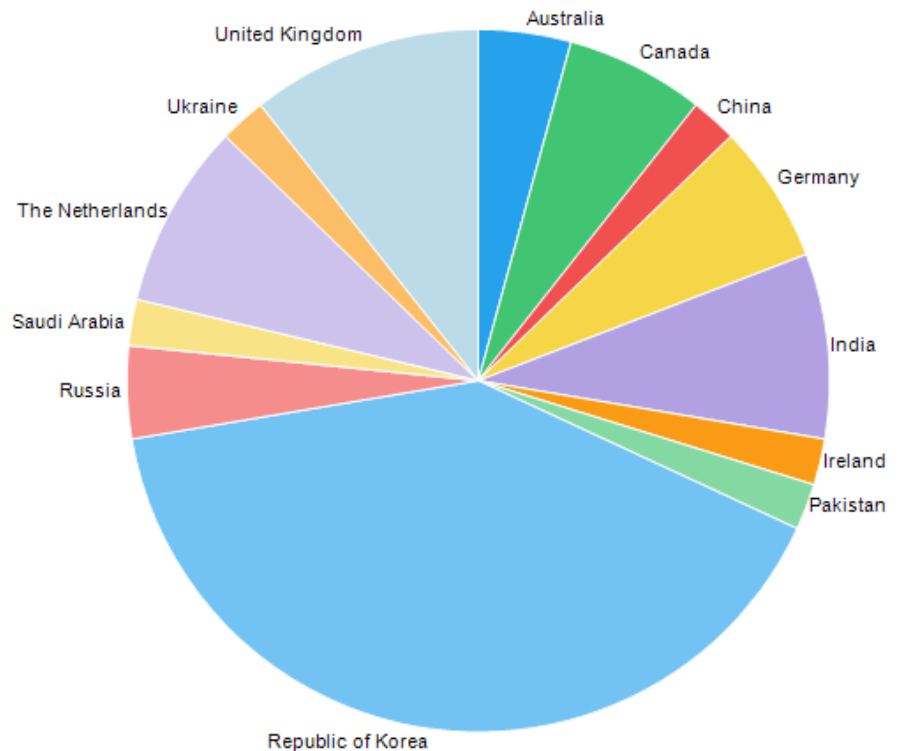
OHDSI symposium, by the numbers

- 437 collaborators registered
- 47 participants from 14 different countries
- US collaborators hailing from 29 states
- 48 friends from FDA

OHDSI Symposium, by the numbers

- 118 different organizations

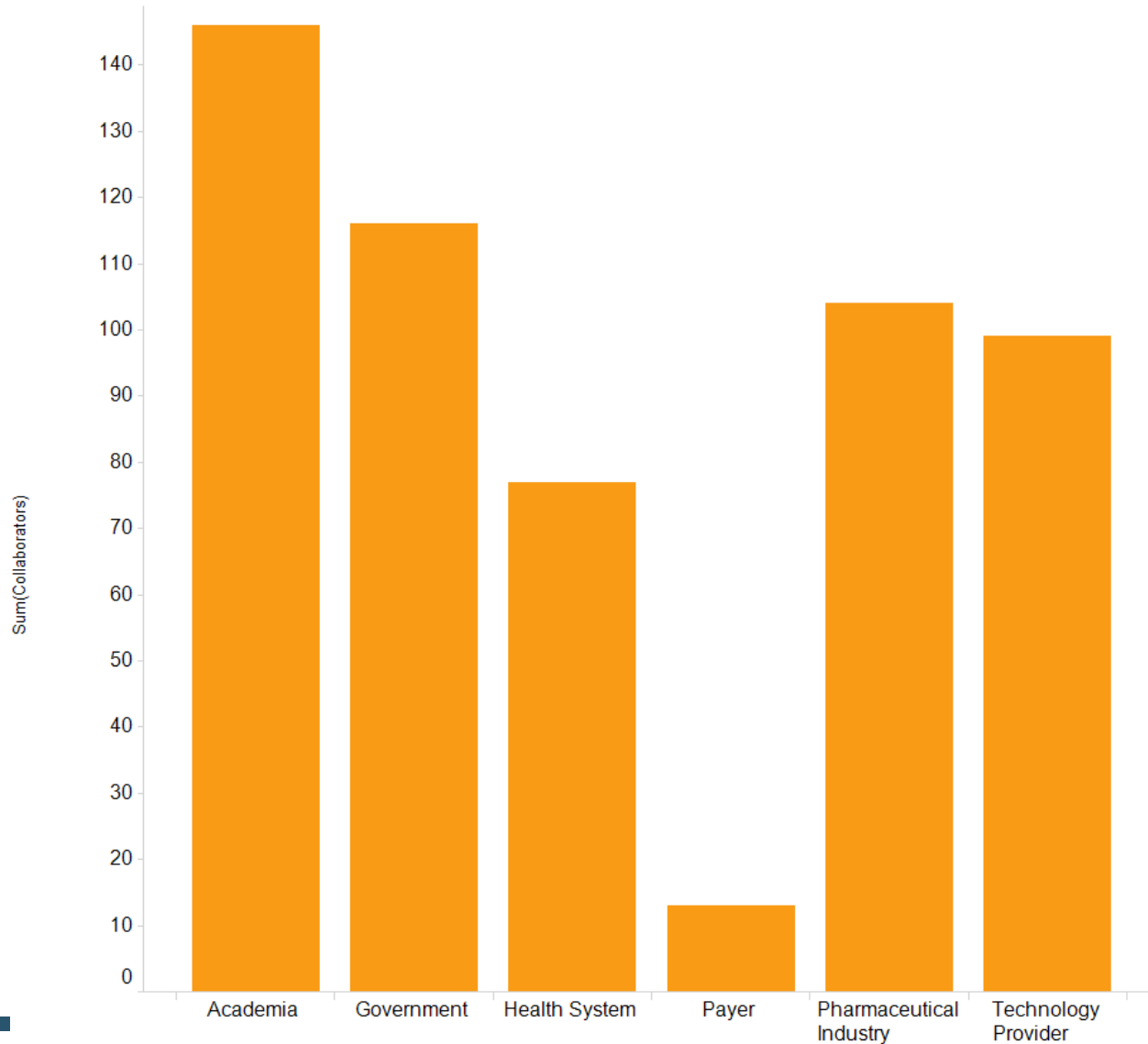|	
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Geisinger	Tufts
Harvard	U.S. Bureau of Economic Analysis
IBM	Virginia Tech
Johns Hopkins	Weill Cornell Medical College
Kaiser Permanente	X
LTS Consulting	Y
Mayo Clinic	ZS Associates

OHDSI Symposium, by the numbers

OHDSI Symposium, by the numbers
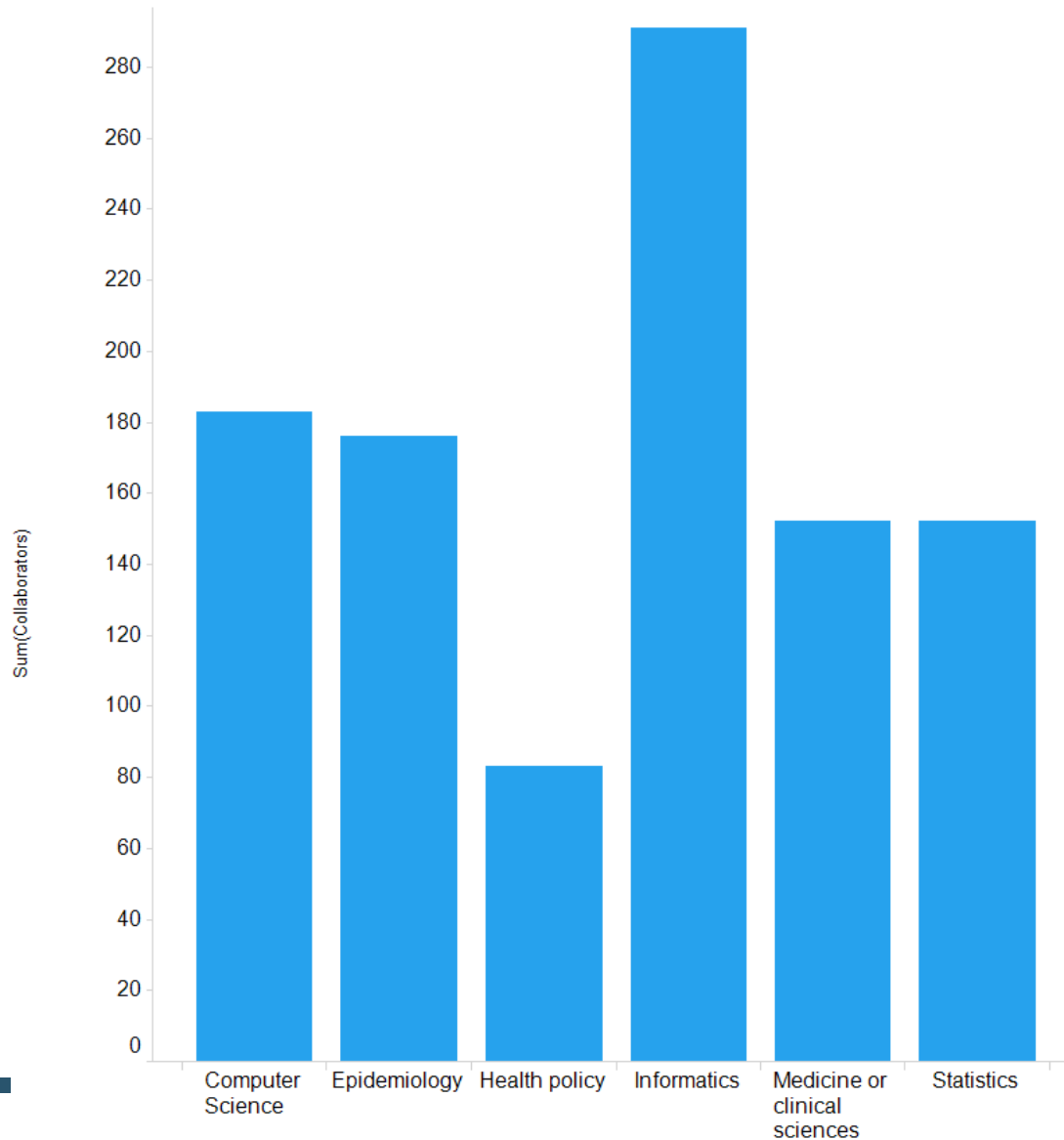
193

"I'm new to OHDSI and curious to learn more"

OHDSI is

an open science community

OHDSI's mission

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

OHDSI's values

- **Innovation**: Observational research is a field which will benefit greatly from disruptive thinking. We actively seek and encourage fresh methodological approaches in our work.

- **Reproducibility**: Accurate, reproducible, and well-calibrated evidence is necessary for health improvement.

- **Community**: Everyone is welcome to actively participate in OHDSI, whether you are a patient, a health professional, a researcher, or someone who simply believes in our cause.

- **Collaboration**: We work collectively to prioritize and address the real world needs of our community's participants.

- **Openness**: We strive to make all our community's proceeds open and publicly accessible, including the methods, tools and the evidence that we generate.

- **Beneficence**: We seek to protect the rights of individuals and organizations within our community at all times.

OHDSI community

We're all in this journey together...

OHDSI' community engagement

- Weekly community web conferences for all collaborators to share their research ideas and progress

- 15 workgroups for solving shared problems of interest
  - Common Data Model, Population-level Estimation, Patient-level Prediction, Architecture, Phenotype, NLP, GIS, Oncology, ...

- Active community online discussion: forums.ohdsi.org

- 594 distinct users have made 8,894 posts on 1,631 topics:
  - Implementers, Developers, Researchers, CDM Builders, Vocabulary users, OHDSI in Korea, OHDSI in China, OHDSI in Europe

OHDSI is
an international data network

Data across the OHDSI community

- 84 organizations have access to 64 different databases
- Patient-level data from various perspectives:
  - Electronic health records, administrative claims, hospital systems, clinical registries, health surveys, biobanks
- Collectively, totaling 1.26 billion patient records
- Data in 17 different countries, with 115 million patient records from outside US

**All using one open community data standard:
OMOP Common Data Model**

http://www.ohdsi.org/web/wiki/doku.php?id=resources:2017_data_network

Journey of an open community data standard

Journey of an open community data standard

OMOP CDM v1

May2009
Strawman

Nov2009
Focus on drug safety surveillance, methods research

OMOP CDM v2

OMOP CDM v4

June2012
Expanded to support comparative effectiveness research

Nov2014
Expanded to support medical device research, health economics, biobanks, freetext clinical notes; vocabulary-driven domains

OMOP CDM v5

OMOP CDM v5.0.1
OMOP CDM v5.1
OMOP CDM v5.2

2015-2017
Improvements to support additional analytical use cases of the community

https://github.com/OHDSI/CommonDataModel

OMOP CDM v5.3 …coming soon!

OHDSI / **CommonDataModel**

👁 Unwatch ▾ 41   ★ Star 94   ⑂ Fork 77

<> Code   ⊘ Issues 45   Pull requests 4   Projects 0   Wiki   Insights   Settings

Filters ▾   🔍 is:open is:issue label:Proposal   Labels   Milestones   **New issue**

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⊘ 19 Open   ✓ 11 Closed   Author ▾   Labels ▾   Projects ▾   Milestones ▾   Assignee ▾   Sort ▾

Thanks to Rimma Belenkaya, Christian Reich, and Clair Blacketer for leading our community data model stewardship!

⊘ Link cost table to payer_plan_period table Proposal   💬 1
#121 opened 24 days ago by gowthamrao

⊘ Payer_plan_period - new fields to allow standardized health economic analysis accepted Proposal
#120 opened 24 days ago by gowthamrao   ⌖ CDM vTBD

OHDSI's standardized vocabularies

- 78 Vocabularies across 32 domains
  - MU3 standards: SNOMED, RxNorm, LOINC
  - Disparate sources: ICD9CM, ICD10(CM), Read, NDC, Gemscript, CPT4, HCPCS...

- 5,720,848 concepts

Thank you Christian and the Odysseus team for continue to steward, maintain, and improve this invaluable resource for the entire community!

- 32,612,650 concept relationships

What is OHDSI's strategy to deliver reliable evidence?

- **Methodological research**
  - Develop new approaches to observational data analysis
  - Evaluate the performance of new and existing methods
  - Establish empirically-based scientific best practices

- **Open-source analytics development**
  - Design tools for data transformation and standardization
  - Implement statistical methods for large-scale analytics
  - Build interactive visualization for evidence exploration

- **Clinical evidence generation**
  - Identify clinically-relevant questions that require real-world evidence
  - Execute research studies by applying scientific best practices through open-source tools across the OHDSI international data network
  - Promote open-science strategies for transparent study design and evidence dissemination

Estimation methods

Cohort Method
New-user cohort studies using large-scale regression for propensity and outcome models

Self-Controlled Case Series
Self-Controlled Case Series analysis using few or many predictors, includes splines for age and seasonality.

Self-Controlled Cohort
A self-controlled cohort design, where time preceding exposure is used as control.

IC Temporal Pattern Disc.
A self-controlled design, but using temporal patterns around other exposures and outcomes to correct for time-varying confounding.

Case-control
Case-control studies, matching controls on age, gender, provider, and visit date. Allows nesting of the study in another cohort.

Case-crossover
Case-crossover design including the option to adjust for time-trends in exposures (so-called case-time-control).

Method charac[teristics]

exposure-outcome pairs to profile and calibrate a particular analysis design.

reference sets as well as simulations injected in real data to evaluate the performance of methods.

Thank you Martijn Schuemie, Marc Suchard, Peter Rijnbeek, and Jenna Reps for leading methods research and development efforts!

Supporting packages

Database Connector
Connect directly to a wide range of database platforms, including SQL Server, Oracle, and PostgreSQL.

Sql Render
Generate SQL on the fly for the various SQL dialects.

Cyclops
Highly efficient implementation of regularized logistic, Poisson and Cox regression.

Ohdsi R Tools
Support tools that didn't fit other categories, including tools for maintaining R libraries.

Under construction

Journey toward open-source analytics development

- 88 developers on 101 OHDSI GitHub repositories

- Applications released for:
  - CDM ETL design and implementation
  - Clinical characterization (ACHILLES, ATLAS)
  - Population-level effect estimation
  - Patient-level prediction
  - OHDSI network studies (protocol + source code, ARACHNE)

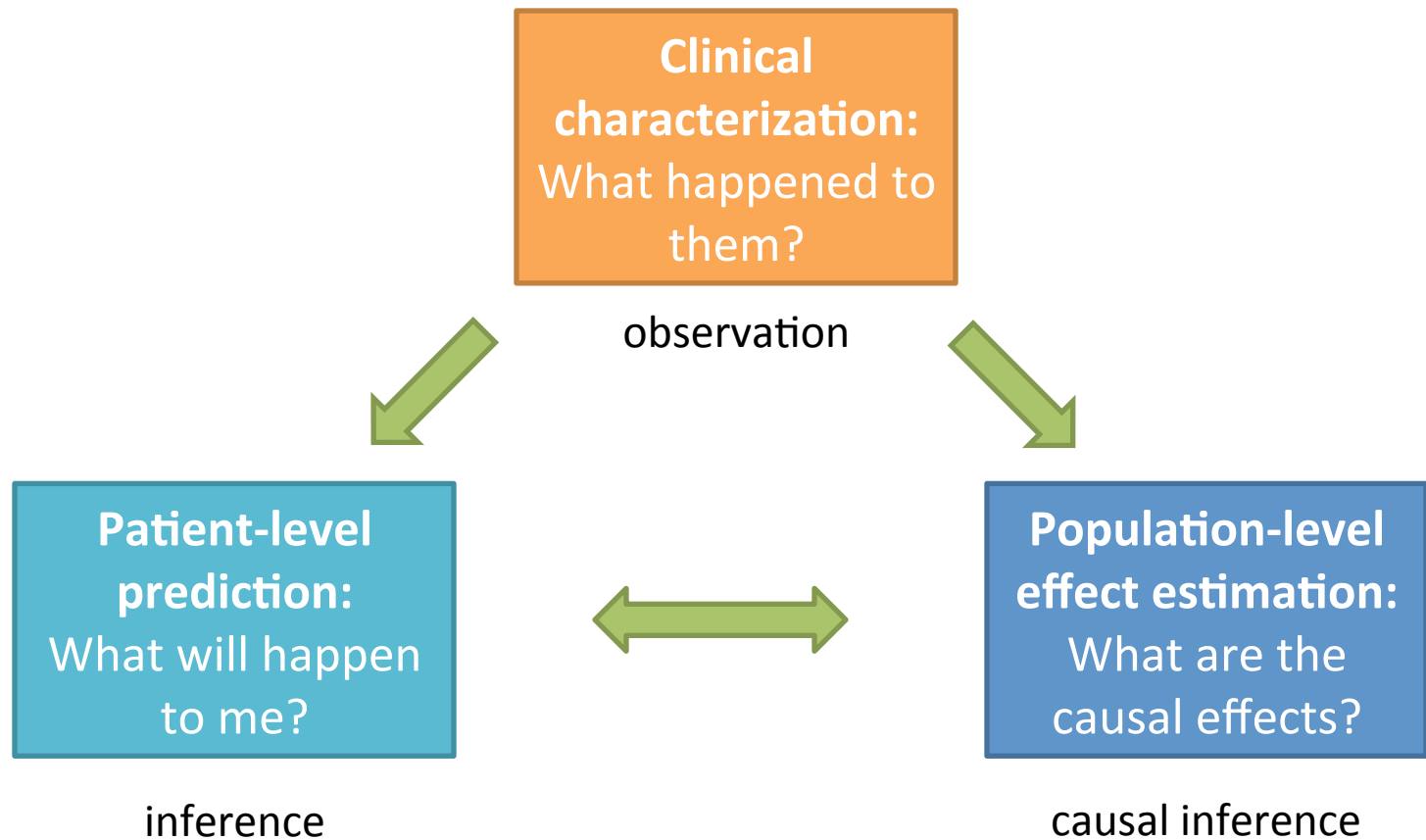# Journey toward open-source analytics development

Thank you teams from Columbia, Google, Cloudera, Erasmus MC, Odysseus, BlueCrossBlueShield-South Carolina, Regenstrief, Janssen for contributing to the ATLAS 2.2 release!

(OHDSI/WebAPI#228) - Concept set 'preview' in the cohort designer
(#436) - Atlas configuration changes - using confg-local.js to override settings in config.js
(#450) - Atlas charts upgrade to D3 V4
(#457 & OHDSI/WebAPI#223) - Care_site entropy for report-manager
(#447) - Improve client side caching reset
(#438) - Refactor service configuration for single WebAPI reference
(#464 & OHDSI/WebAPI#224) - Patient Level Prediction specification editor
(#463) - Cohort editor - choose collapse strategy exit criteria
(#465) - Cohort editor - restrict records with the same visit_occurrence_id

Demo at http://ohdsi.org/web/ATLAS

Complementary evidence to inform the patient journey

Clinical characterization:
What happened to them?

observation

Patient-level prediction:
What will happen to me?

inference

Population-level effect estimation:
What are the causal effects?

causal inference

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ohdsi

239 results

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G Hripcsak, JD Duke, NH Shah, CG Reich... - Studies in health ..., 2015 - ncbi.nlm.nih.gov
Abstract The vision of creating accessible, reliable clinical evidence by accessing the clinical experience of hundreds of millions of patients across the globe is a reality. The Observational Health Data Sciences and Informatics (**OHDSI**) has built on learnings from the
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Characterizing treatment pathways at scale using the **OHDSI** network
G Hripcsak, PB Ryan, JD Duke... - Proceedings of the ..., 2016 - National Acad Sciences
Abstract Observational research promises to complement experimental research by providing large, diverse populations that would be infeasible for an experiment. Observational research can test its own clinical hypotheses, and observational studies also
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[HTML] Similarity-Based Modeling Applied to Signal Detection in Pharmacovigilance
S Vilar, PB Ryan, D Madigan, PE Stang... - CPT: ..., 2014 - Wiley Online Library
... Similarity-Based Modeling Applied to Signal Detection in Pharmacovigilance. Authors. S Vilar,. Department of Biomedical Informatics, Columbia University, New York, New York, USA; Observational Health Data Sciences and Informatics (**OHDSI**), New York, New York, USA. ...
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Birth month affects lifetime disease risk: a phenome-wide method
MR Boland, Z Shahn, D Madigan... - Journal of the ..., 2015 - academic.oup.com
... Choice. Birth month affects lifetime disease risk: a phenome-wide method. Mary Regina Boland Mary Regina Boland. 1. Department of Biomedical Informatics. 2. Observational Health Data Sciences and Informatics (**OHDSI**). Search ...
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[HTML] oup.com

[PDF] Converting the data in the US CMS Virtual Research Data Center to the **OHDSI** Common Data Model version 5
F Kury, V Huser - **OHDSI** Symposium, October 2015, 2015 - researchgate.net
Abstract The data made available by the US Centers for Medicare & Medicaid Services (CMS) through the Virtual Research Data Center (VRDC) represent a considerable portion of the total US population and spending on healthcare. The volume of the data, and the
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Characterizing treatment pathways at scale using the OHDSI network
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Abstract Observational research promises to complement experimental research by
providing large, diverse populations that would be infeasible for an experiment.
Observational research can test its own clinical hypotheses, and observational studies also
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[HTML] pnas.org

[HTML] 132 Tracking the Opioid Epidemic Through the OHDSI Collaborative
BH Slovis, AJ Averitt, DK Vawdrey... - Annals of Emergency ..., 2017 - annemergmed.com
Study Objectives Emergency departments in the United States (US) are in the midst of an
opioid epidemic (OE), with more than half of overdose deaths in 2014 attributable to opioids.
The US consumes 80% of the world's supply, and contributes to growing concern of an
☆ 🙶 All 2 versions

[HTML] annemergmed.com

[HTML] Electronic phenotyping with APHRODITE and the Observational Health Sciences and Informatics (OHDSI) data network
JM Banda, Y Halpern, D Sontag... - AMIA Summits on ..., 2017 - ncbi.nlm.nih.gov
Abstract The widespread usage of electronic health records (EHRs) for clinical research has
produced multiple electronic phenotyping approaches. Methods for electronic phenotyping
range from those needing extensive specialized medical expert supervision to those based
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[HTML] nih.gov

[HTML] Robust empirical calibration of p-values using observational data
MJ Schuemie, G Hripcsak, PB Ryan... - Statistics in ..., 2016 - Wiley Online Library
... Martijn J. Schuemie,. Corresponding author: ORCID:orcid.org/0000-0002-0817-5361. Janssen
Research and Development LLC, Titusville, NJ, USA; Observational Health Data Sciences and
Informatics (OHDSI). ... E-mail: schuemie@ohdsi.org. Search for more papers by this author ...
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[HTML] Sharing Clinical Big Data While Protecting Confidentiality and Security: Observational Health Data Sciences and Informatics
RW Park - Healthcare informatics research, 2017 - synapse.koreamed.org
... Recently, distributed research networks (DRNs), such as Observational Health Data and
Informatics (OHDSI, pronounced "Odyssey"), the National Patient Centered Clinical Research
Network (PICORNET), or Sentinel Initiatives have gained popularity among clinical data ...
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[HTML] Uncovering exposures responsible for birth season–disease effects: a global study
MR Boland, P Parhi, L Li, R Miotto... - Journal of the ..., 2017 - academic.oup.com
AbstractObjective. Birth month and climate impact lifetime disease risk, while the underlying

[HTML] oup.com

Your journey through today

Time	Description
8:30 – 9:30am	YOU ARE HERE
9:30 – 11:30am	**Journey Through Clinical Characterization** Large-Scale Honest Incidence Speaker: George Hripcsak, MD, MS, Columbia University
	Journey Through Population-Level Estimation Safety Surveillance for the Risk of Angioedema Associated with Levetiracetam Speaker: Jon Duke, MD, MS, Georgia Tech
	Comparative Effectiveness of Alendronate and Raloxifene in Reducing the Risk of Hip Fracture Speakers: Yeesuk Kim, MD, PhD, Hanyang University Marc Suchard, MD, PhD, University of California, Los Angeles
	A Journey Through Patient-Level Prediction Improving Palliative Care Using Patient Level Prediction Speaker: Nigam Shah, MBBS, PhD, Stanford University (webcast)
	Precision Medicine through Patient-Level Prediction of Adverse Events Speaker: Jenna Reps, PhD, Janssen Research & Development

Your journey through today

Time	Description
11:30am-12:30pm	OHDSI Morning Collaborator Showcase – Session 1 Grand Ballroom Foyer Visit the *odd* numbered posters and software demonstrations
12:30pm-1:00pm	Buffet Lunch in Grand Ballroom
1:00pm-2:00pm	OHDSI Showcase: Lightning Talks Moderator: Melanie Philofsky, RN, MS, University of Colorado Speakers: Martin Sedlmayr, Friedrich-Alexander-University Erlangen-Nürnberg, Germany Maxim Moinat, The Hyve, Netherlands Nicole Pratt, PhD, University of South Australia Mehr Kashyap, MD Candidate, Stanford University, USA Mary Regina Boland, MA, MPhil, PhD, University of Pennsylvania, USA Rohit Vashisht, PhD, Stanford University, USA Seng Chan You, PhD Candidate, Ajou University, South Korea
2:00pm-3:00pm	OHDSI Morning Collaborator Showcase – Session 2 Grand Ballroom Foyer Visit the *even* numbered posters and software demonstrations

Vote for the best OHDSI collaborator contributions!

This vote is much too important to allow for undue Russian influence

Your vote counts!!!
Winners will be announced during OHDSI community reaction panel

Your journey through today

| Time	Description
3:00-3:45pm	OHDSI Community Reactions A fun and interactive session to elicit thoughts and future directions from the entire OHDSI community, **charge up those smartphones!** Jon Duke, MD, Georgia Tech Clair Blacketer, MPH, PMP, Janssen Research & Development Peter Rijnbeek, PhD, Erasmus University Medical Center Andrew Williams, PhD, Maine Medical Center Research Institute Marc Suchard, MD, PhD, University of California, Los Angeles Frank DeFalco, Epidemiology Analytics, Janssen Research & Development
3:45-4:15pm	Break
4:15-5:15pm	Panel Discussion: Stakeholder Perspectives On The Journey Ahead Moderator: Kristin Feeney, MPH, ConvergeHEALTH by Deloitte Panelists: Karthik Natarajan, PhD, Columbia University Nasser Al-Qahtani, MSc, MBA, PhD, Saudi Food & Drug Authority Gowtham Rao, MD, PhD, Blue Cross Blue Shield of South Carolina Ming Jack Po, MD, PhD, Google Medical Brain and Google Cloud
5:15-6:00pm	A surprise journey to end the day!
6:00-7:30pm	Networking reception

A journey through the rest of the symposium

Thursday, October 19	9:00am – 5:00pm
	OMOP Common Data Model and Standardized Vocabularies
	Population-Level Estimation

Friday, October 20	9:00am – 5:00pm
	Patient-level prediction
	OHDSI Development Architecture

Thank you tutorial faculty

OMOP Common Data Model and Standardized Vocabularies:
George Hripcsak, Christian Reich, Erica Voss, Karthik Natarajan, Mui Van Zandt,
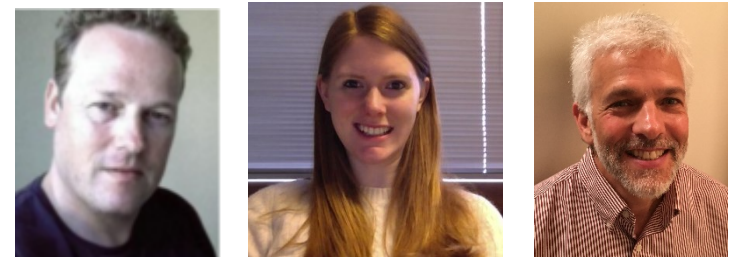Rimma Belenkaya, Clair Blacketer, Don O'Hara, Don Torok
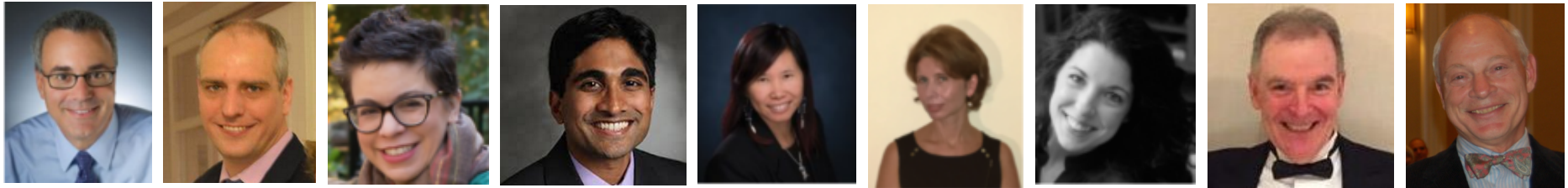
Population-Level Estimation:
Martijn Schuemie, Marc Suchard,
Christophe Lambert

Patient-level prediction:
Peter Rijnbeek, Jenna Reps, Joel Swerdel

OHDSI Development Architecture :
Frank DeFalco, Greg Klebanov,
Lee Evans, Sigfried Gold

Thank you the community!

We're all in this journey together...