

OMOP Common Data Model: Journey Towards Singapore's National Data Standardisation for Real-World Evidence Generation

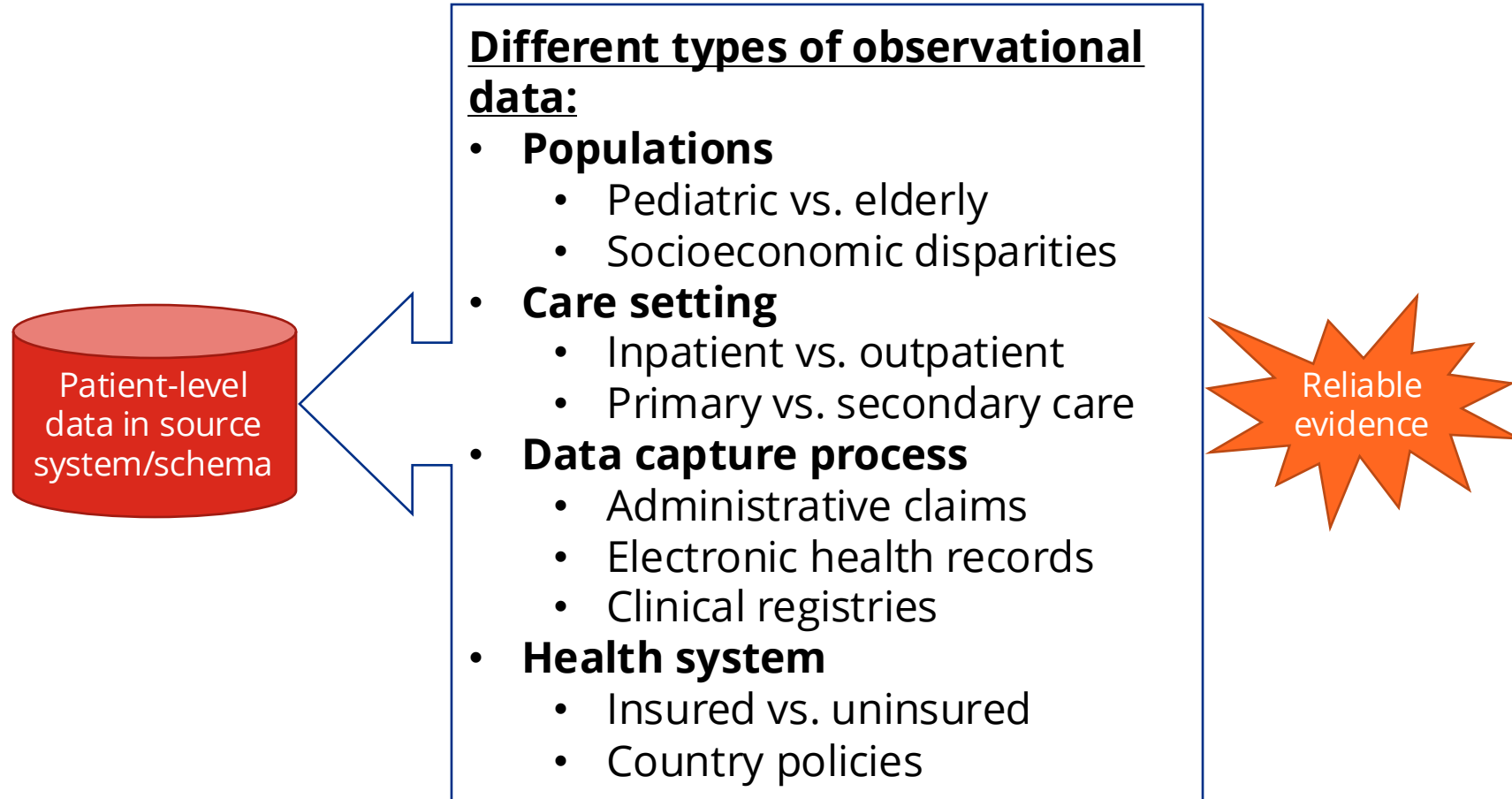
Dr Mukkesh Kumar

Head of Data Management Platform

Agency for Science, Technology and Research (A*STAR)

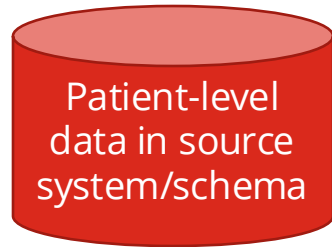
6 December 2024

The Journey To Real-World Evidence



Source:
OHDSI Coordinating Centre

The Journey To Real-World Evidence



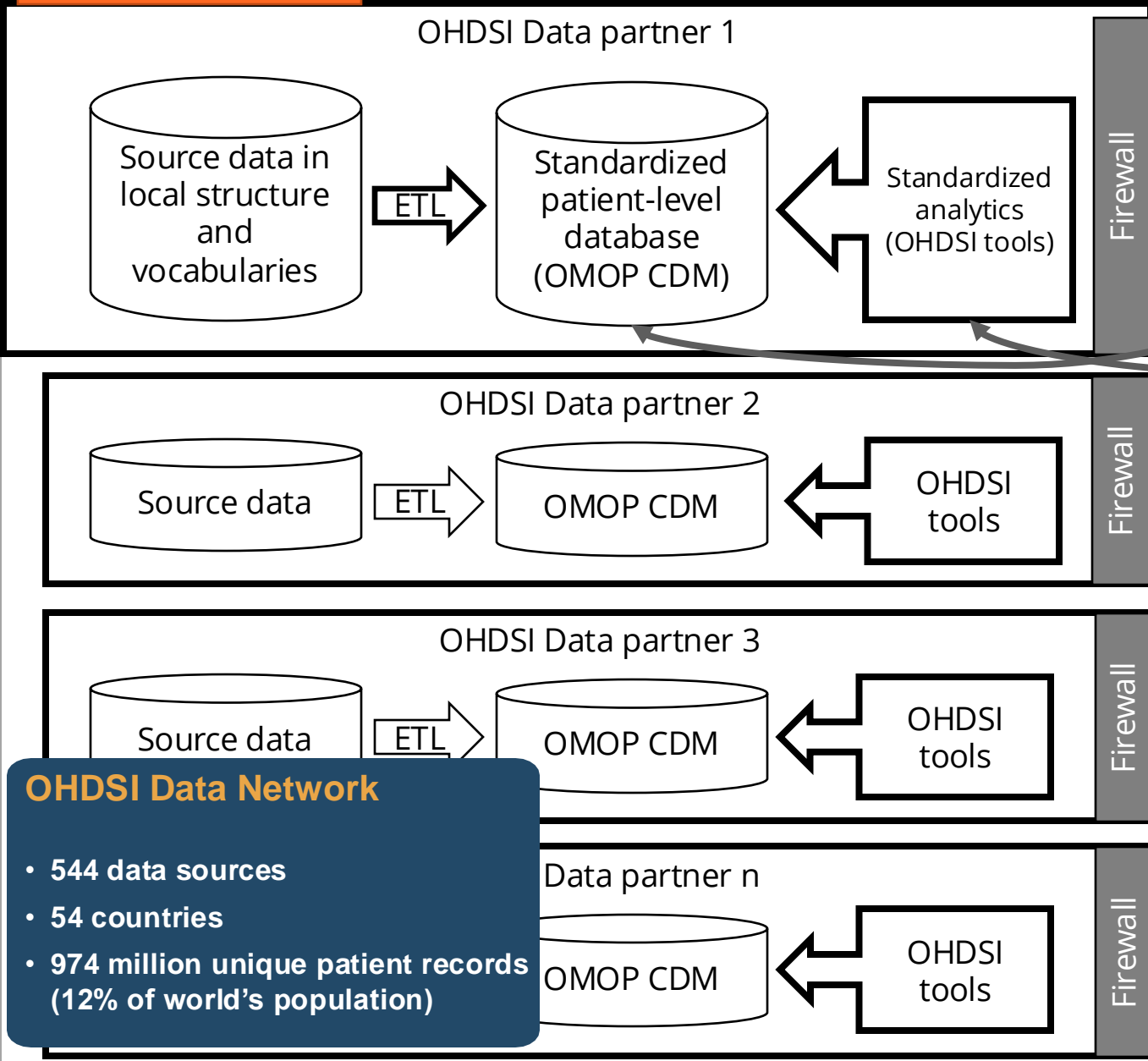
Types of evidence desired:

- **Clinical characterization**
 - Clinical trial feasibility
 - Treatment utilization
 - Disease natural history
 - Quality improvement
- **Population-level effect estimation**
 - Safety surveillance
 - Comparative effectiveness
- **Patient-level prediction**
 - Precision medicine
 - Disease interception

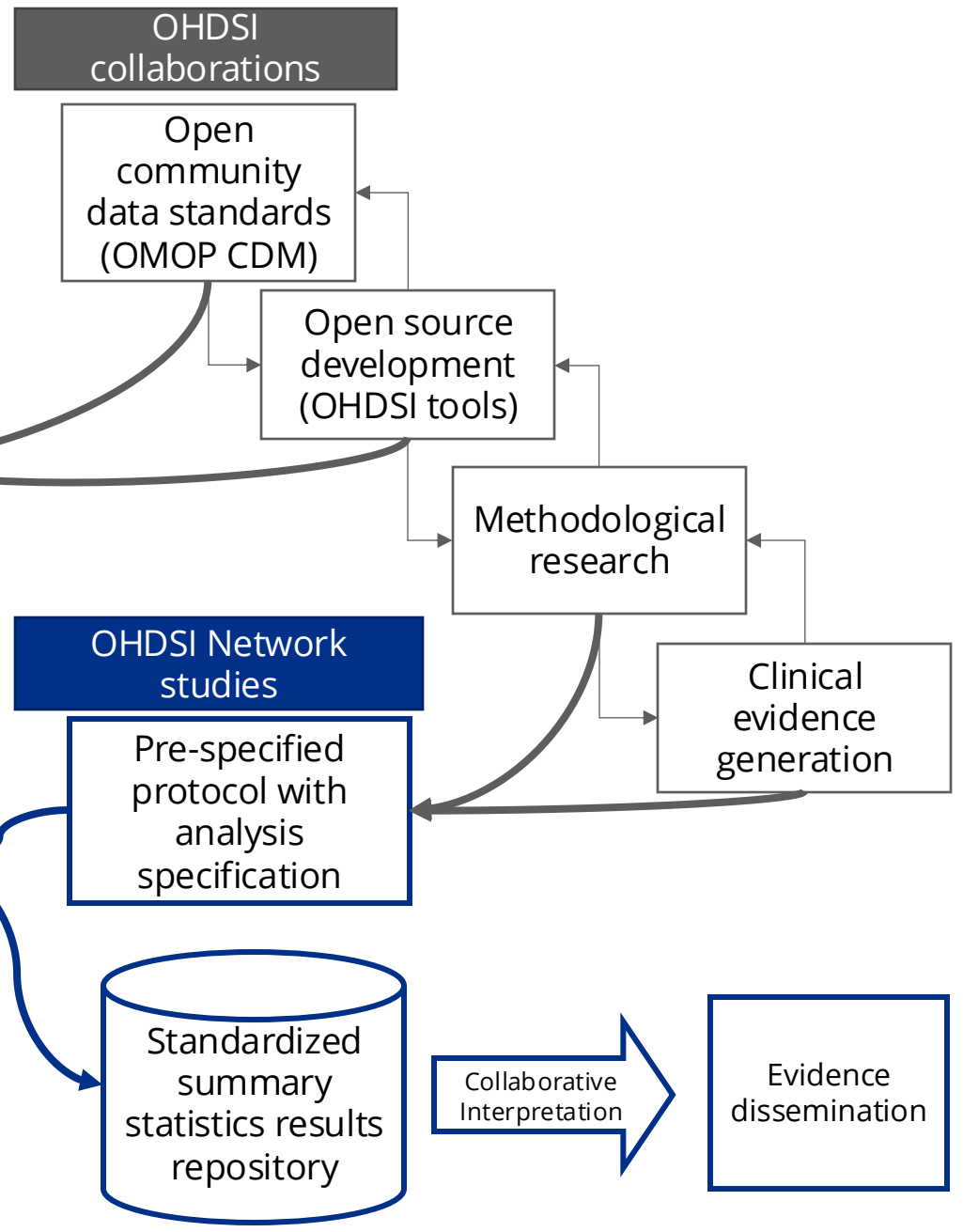


Source:
OHDSI Coordinating Centre

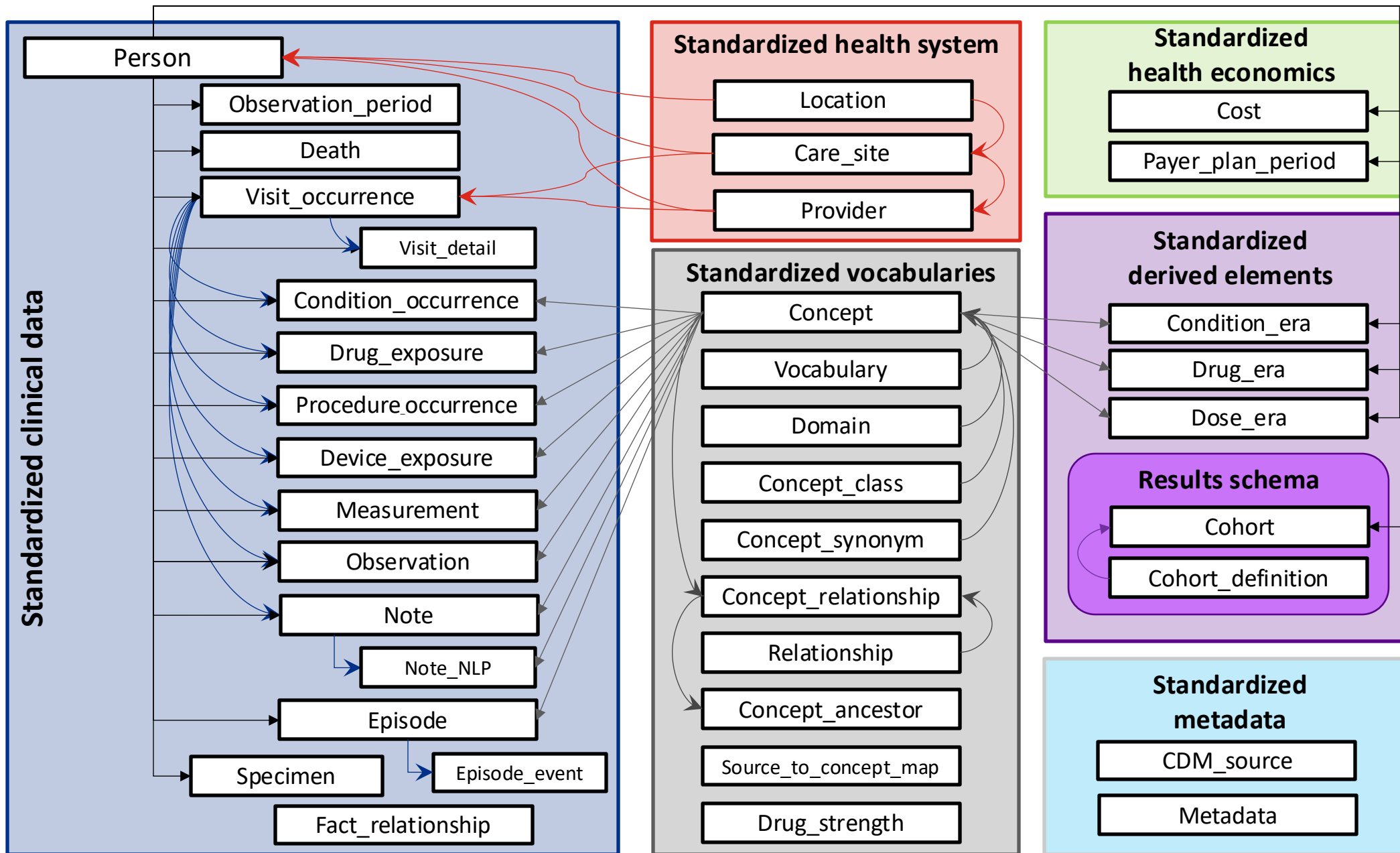
OHDSI data network



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



OMOP Common Data Model v5.4



Source:
Book of OHDSI (<https://ohdsi.github.io/TheBookOfOhdsi/>)

Singapore's National OMOP Data Curation (Since 2022)



GUSTO
(Maternal and Child Health)



ATTRaCT
(Cardiovascular Health)



SingCloud
(Cardiovascular Health)



STCC
(Oncology)



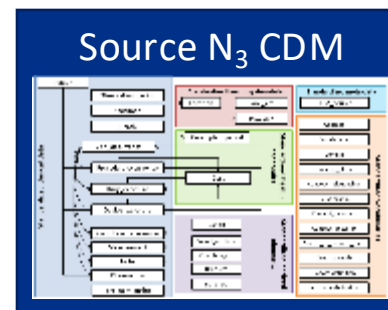
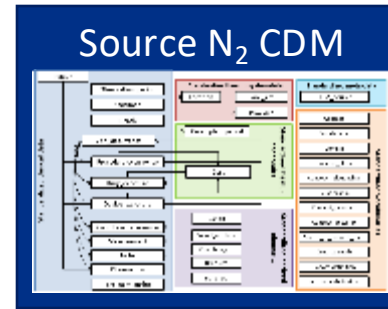
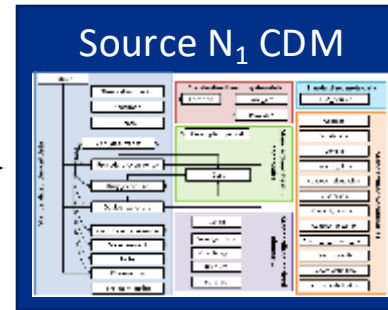
PRECISE
(Population-Scale Genomics)



MOH
(National Electronic Health Records)



Transformation to common data model



OMOP Data Catalogue - 'Best Community Contribution' Award at the 2023 OHDSI Global Symposium, New Jersey, USA

Technological Excellence & Achievements



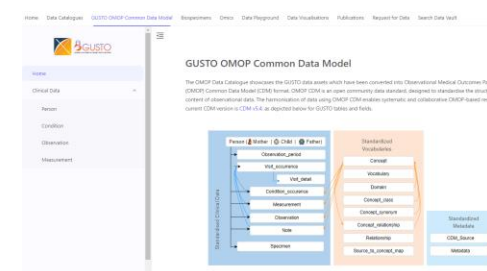
A*STAR Data Vault's OMOP Data Catalogue won the **Best Community Contribution Award** (determined through the peer review evaluation by the OHDSI Scientific Review Committee and community voting, based on the **quality** and **importance of contribution**).



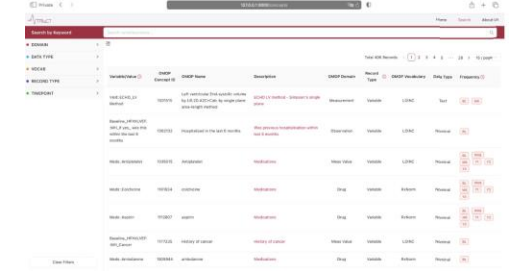
Full Demo Video Link:
<https://www.ohdsi.org/wp-content/uploads/2023/10/407-CindyHo-FullVideo-Cindy-Ho.mp4>

GUSTO OMOP Data Catalogue Link:
<https://gustodatavault.sg/omop/>

ATTRaCT OMOP Data Catalogue Link:
<https://cvd-datavault.org/concepts>



GUSTO OMOP Data Catalogue



ATTRaCT OMOP Data Catalogue

Best Community Contribution Honorees!

Open-Source
Development

GUSTO OMOP Data Catalogue lays the foundations for developing cross-study OMOP Data Catalogues expanded across APAC and global OHDSI data partners, enabling database level characterizations.

GUSTO Data Vault: Laying the foundations for an open science system with OMOP Data Catalogue (Cindy Ho, Li Ting Ang, Maisie Ng, Hang Png, Shuen Lin Tan, Estella Ye, Sunil Kumar Raja, Mengling Feng, Johan G Eriksson, Mukkesh Kumar)

OHDSI
www.ohdsi.org
#JoinTheJourney
ohdsi

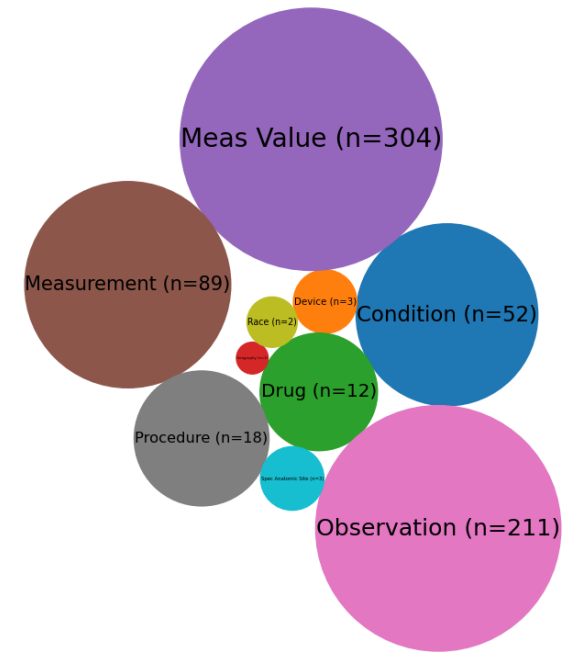
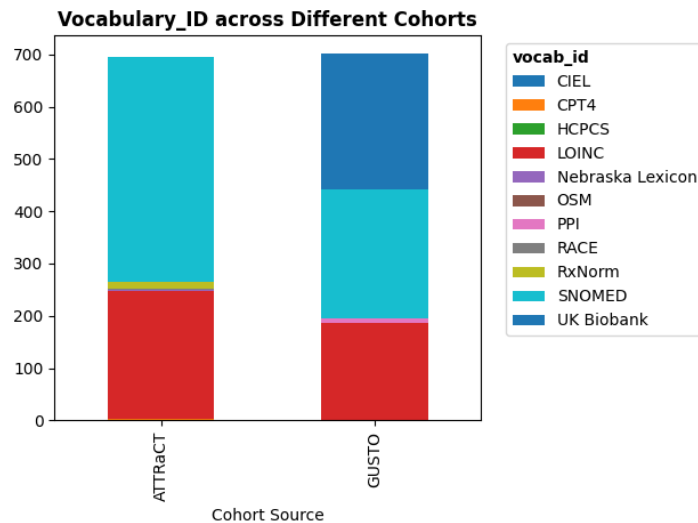
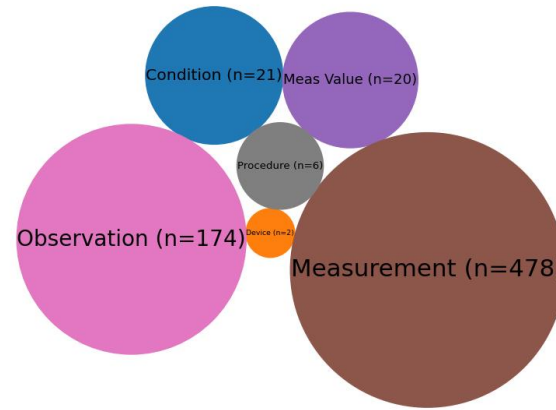
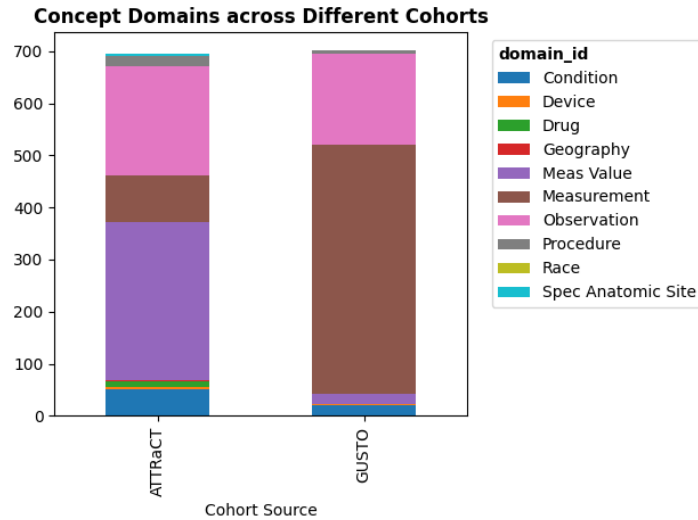
Future plans in contributing towards the **OMOP data catalogues** in **OHDSI Evidence Network**, supporting the **global OHDSI community**.



Mapping to OMOP Standardised Vocabularies

ATTRaCT

GUSTO

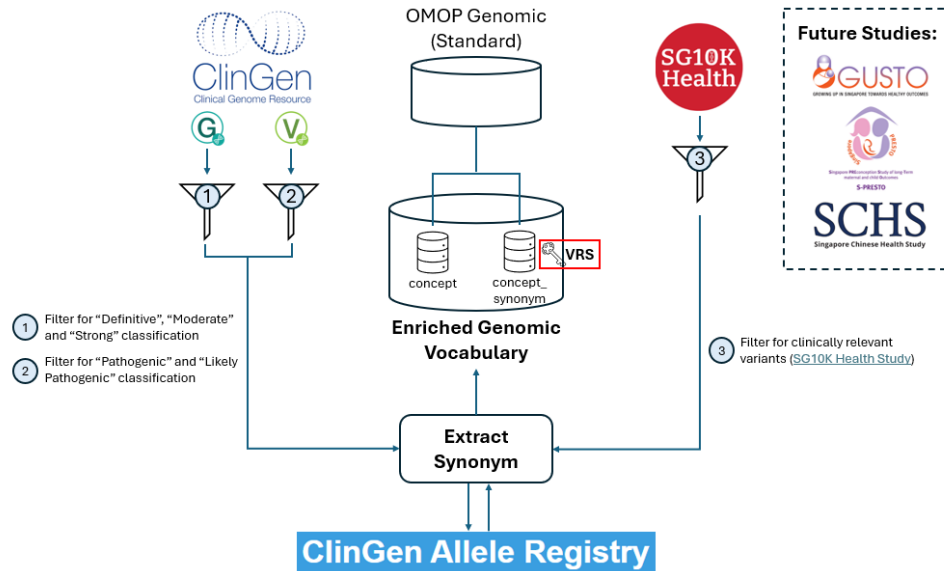


- Total mapped standard concepts:
 - GUSTO = 701
 - ATTRaCT = 695

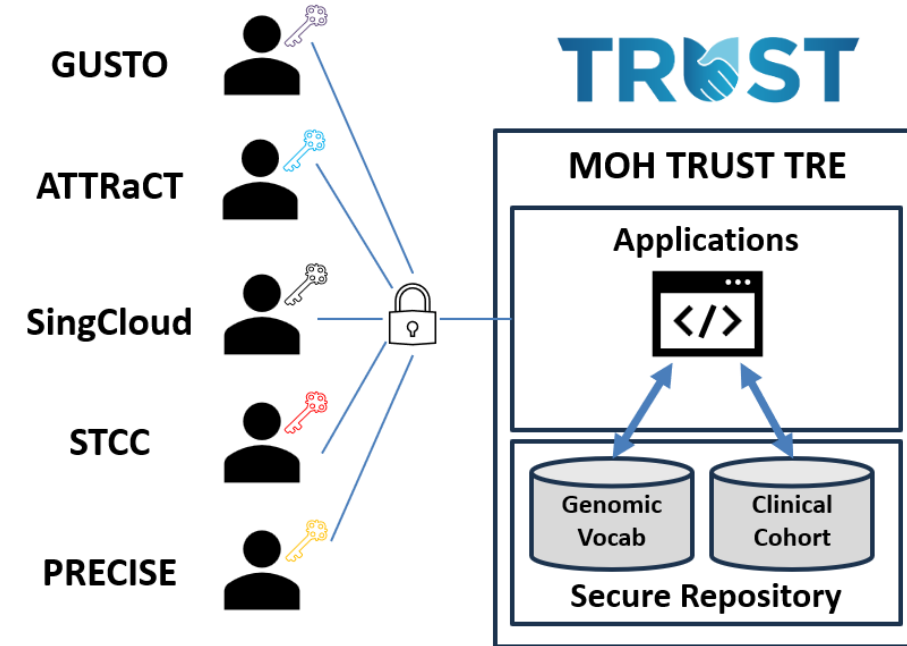
Gearing Towards OHDSI Network Studies for Real-World Evidence

Analytic use case	Type	Example
Clinical characterization	Disease Natural History	Amongst patients with Hypercholesteromia , what are their demographics (age, gender), prior conditions, medications, and health service utilization behaviors?
	Treatment utilization	Amongst patients with Heart Failure , which treatments were patients exposed to amongst Ace inhibitors and Beta blockers and in which sequence?
	Outcome incidence	Amongst patients who were diagnosed with Gestational Diabetes Mellitus during pregnancy, how many patients progressed to Type 2 Diabetes within 12 year of post-delivery ?
Population-level effect estimation	Safety surveillance	Does exposure to ACE inhibitor increase the risk of experiencing Hyperkalemia within 1 month after exposure start ?
	Comparative effectiveness	Does exposure to ACE inhibitor have a different risk of experiencing Acute Myocardial Infarction while on treatment , relative to Beta blocker ?
Patient level prediction	Disease onset and progression	For a given patient who is diagnosed with Gestational Diabetes Mellitus during pregnancy, what is the probability that they will progress to Type 2 Diabetes in next 12 years post-delivery ?
	Treatment response	For a given patient with Type 2 Diabetes Mellitus 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 Metformin , what is the probability that they will have Hypoglycaemia in 1 year ?

Establishing Value of Real-World Evidence for Precision Medicine



Genomic Data Harmonisation in OMOP CDM



MOH TRUST TRE as the central TRE to host the OMOP CDM enriched genomic vocabulary and sensitive clinical cohorts which can only be accessible by the trusted users.

Aligning towards the OHDSI vision of **deploying** the **AI models** trained using OMOP framework in **real world settings**.



Precision Medicine Study Mission with Enterprise Singapore to OHDSI Coordinating Centre, New York City, 19 September 2024



Acknowledgements

Global OHDSI Team



- Prof George Hripcsak
- Dr Patrick Ryan
- Mui Van Zandt

Singapore OHDSI Chapter

- Prof Ngiam Kee Yuan
- Dr Feng Mengling

MOH TRUST Singapore



- Koh Mingshi
- Anil Kumar
- Yeo Zhenxuan

Enterprise Singapore



- Khor Aik Lam
- Celine Tan
- Saravanan Rajendran



THANK YOU

www.a-star.edu.sg