

# TRUST

IMPROVING HEALTH OUTCOMES THROUGH TRUSTED DATA EXCHANGE

[trustplatform.sg](https://trustplatform.sg)

*“Trusted Research and Real world-data Utilisation and Sharing Tech”*

**Koh Mingshi**  
Director, TRUST Office, MOHT

**SCRI Clinical Trial Symposium, 31 Jul 2024**

Jointly developed by:



# Agenda

- What is TRUST?
- How we enable safe and efficient data linkage and analytics
- What is on the horizon
- Supporting clinical trials design and research



IMPROVING HEALTH OUTCOMES THROUGH TRUSTED DATA EXCHANGE

The background is a solid dark blue. It is decorated with various white geometric elements: small circles, larger circles, and interconnected lines forming a network or molecular structure. These elements are scattered across the frame, with some appearing more prominent than others.

# What is TRUST

'Trusted Research and Real world-data Utilisation and Sharing Tech'

# How TRUST addresses key data challenges faced by researchers

UNCLEAR DATA ACCESS RULES



CLARIFY PERMISSIBILITY OF USE;  
OPEN UP ACCESS

- Data permissibility rules and governance for key datasets has been clarified.
- Streamlined **pre-agreements** with data custodians and users.
- Established **central Data Access Committee** for streamlined and efficient data approval.

VARIED DATA SECURITY &  
INFRASTRUCTURE



NATIONAL DATA-EXCHANGE  
PLATFORM

- Established **secure environment on Government Commercial Cloud** for data linkage, access and analysis
- Established **Trusted Third Party to enable linkages across datasets** and anonymisation tool according to MOH anonymisation standards.

LACK DATA STANDARDS



DATA CATALOGUE &  
INTEROPERABILITY

- Adopted **internationally recognised data standard** (e.g. OMOP\*).
- A central data curation team has been set up and OMOP mapping work is ongoing.

\*Observational Medical Outcomes Partnership (OMOP)

OFFICIAL (CLOSED) – NON-SENSITIVE

# TRUST is a data framework and platform to enable health analytics across datasets



One stop to request, access and analyse data

# TRUST

IMPROVING HEALTH OUTCOMES THROUGH TRUSTED DATA EXCHANGE

Secure cloud analytical environment within Government Commercial Cloud

Anonymised  
and transfer

Real-World Data  
in Vault or Govt agencies'  
repository

Real-World Data

Strategic Research Data

Anonymised  
and transfer

Strategic Research Data  
in their own repositories or data  
aggregators e.g. A\*STAR  
BiomedAR

Anonymised linked datasets for analysis

***“Trusted Research and Real world-data Utilisation and Sharing Tech” Platform***



# TRUST have enabled high value health-data analytics research

## Project #1: Linkage of Genomic-phenotypic-clinical data for Precision Medicine studies



Support development of analytical pipelines to enable next phase of Precision Medicine studies in diseases such as cardiovascular, metabolic, neurological, psychiatric, ophthalmologic, as well as rare diseases.

## Project #2: Linkage of Clinical-lifestyle-social data for better understanding of the social determinants of health to improve cardiovascular health outcomes



Generate new insights into determinants that influence cardiovascular health and equity, to better design interventions for impactful and sustainable cardiovascular outcomes.

## Project #3: Linkage of clinical-lifestyle data for transforming Chronic Care for Diabetes, Hypertension & Hyperlipidemia (DHL)

JARVIS

Reduce complication rate in DHL patients by 20% over 5 years through AI models that are built on local real-world data, develop preventive measures and treatment optimization.

## Project #4: Linkage of Genomic-clinical data for COVID-19 genomic risk factor study

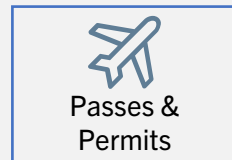
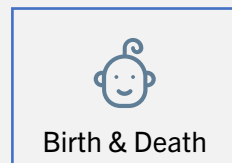


Assess the prevalence and allele frequencies of host genetic variants determining the susceptibility and severity of SARS-CoV-2 infections in Singapore residents.

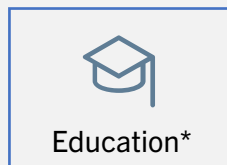
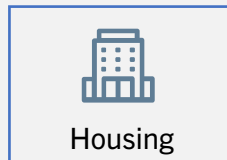
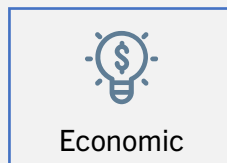
# Currently, TRUST offers ~40 datasets across the following domains

List updated as of July 2024

## Population

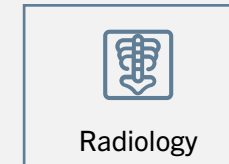
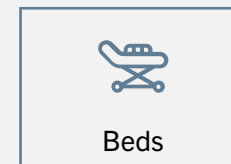
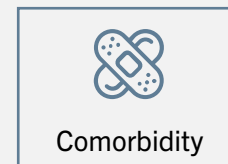
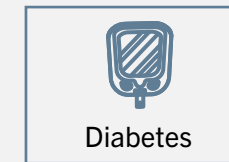
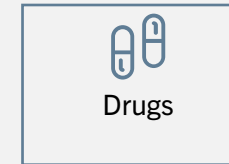
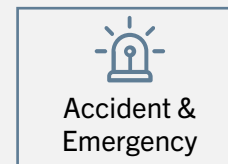
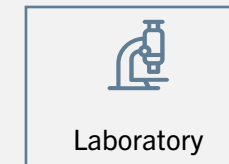
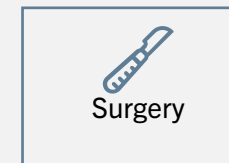
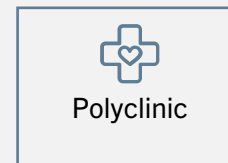


## Social

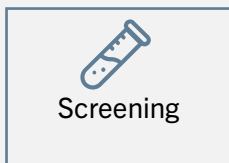
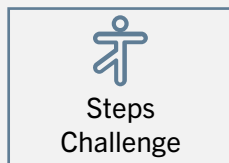
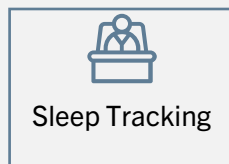
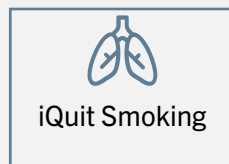


\*subject to MOE approval

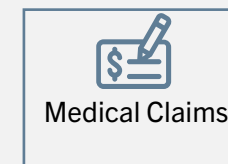
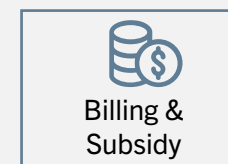
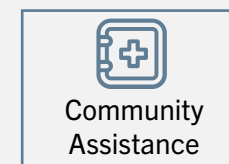
## Health



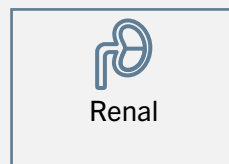
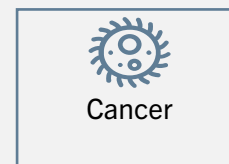
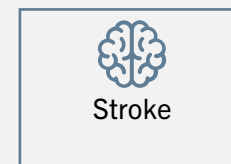
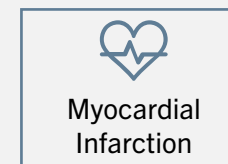
## Lifestyle / Preventive Care



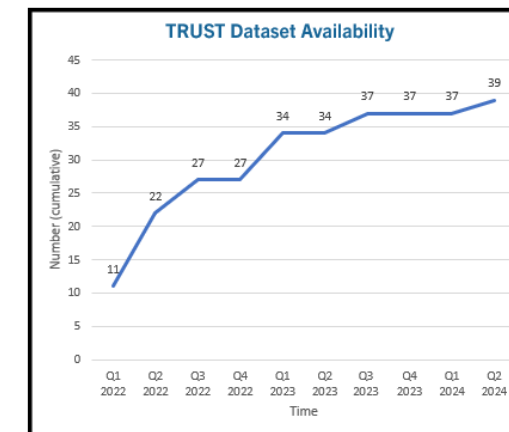
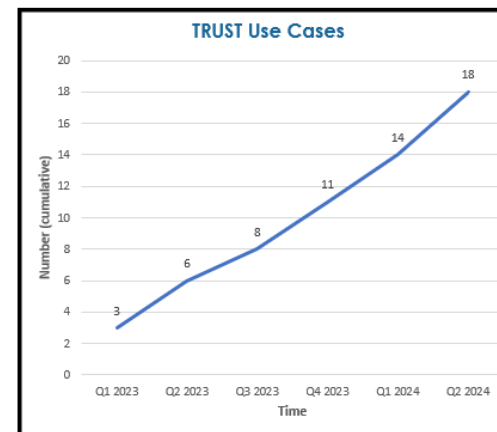
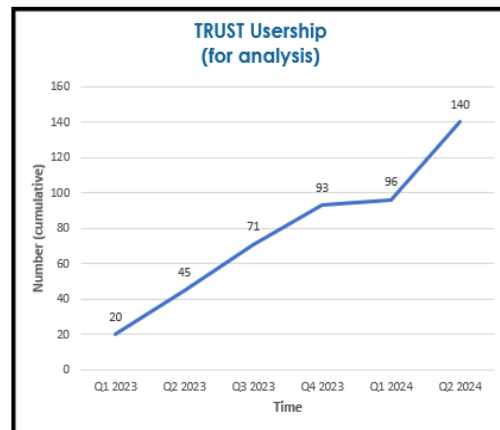
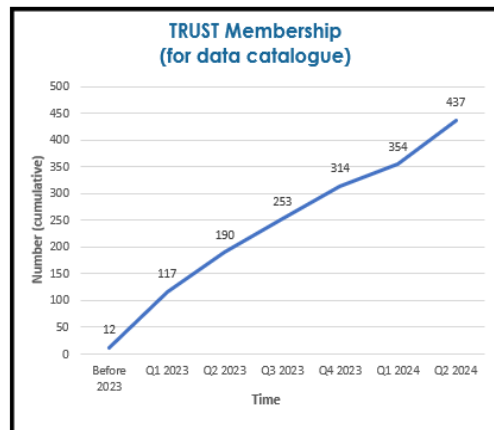
## Health Finance



## Disease Registry



# TRUST growing usership



- For access to data catalogue, training materials and TRUST data request application forms
- TRUST Membership grew with an average of **~65 new members each quarter** in 2023
- Q2 2024 data up to 7 June 2024
- Does not include TRUST staff and deactivated accounts

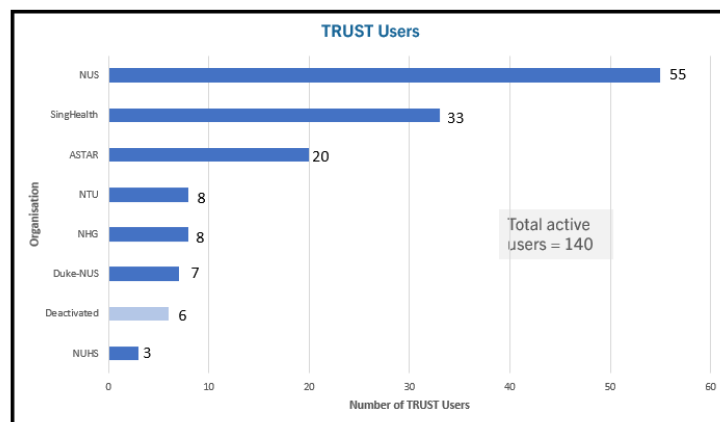
- For access to data analytics portal based on approved TRUST Data Request by TRUST DAC
- TRUST Usership grew with an average of **~24 new users each quarter** in 2023 and **had the highest jump of 44 users** from Q1 to Q2 2024
- Q2 2024 data up to 7 June 2024

- TRUST use cases grew with an average of **~3 new use cases each quarter** in 2023
- Q2 2024 data up to 7 June 2024

- Available TRUST datasets grew most significantly in **2022 by 20 datasets** when TRUST was gearing up for operation.
- Data up to 7 June 2024

## 3. TRUST Usership

Breakdown of usership by institution



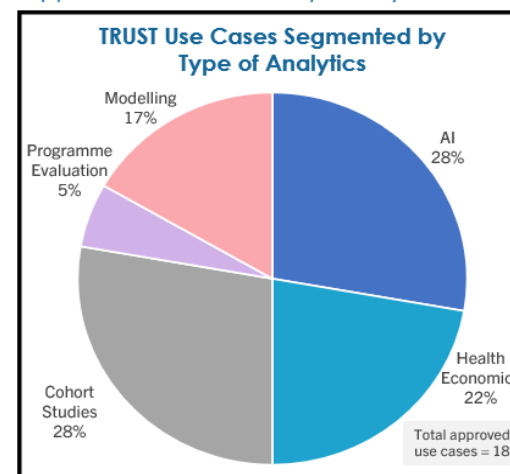
- Majority of TRUST Users come from **NUS (39%)**
- Data is accurate up to 7 June 2024

Notes:

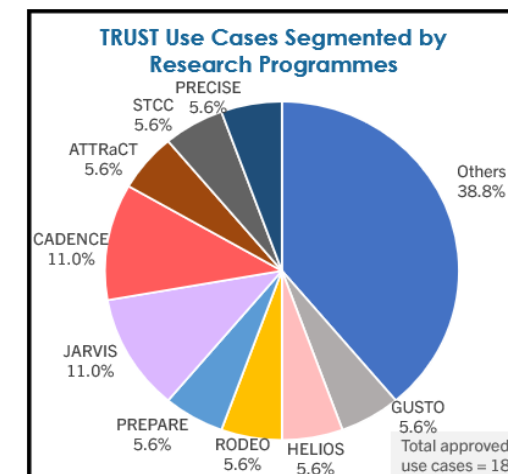
- Does not include TRUST staff
- Deactivated accounts are due to staff resignations from Organisation

## TRUST Use Cases

Approved TRUST Data Requests by TRUST DAC



- Majority of TRUST Use Cases support analytics for **health economics, data-driven health management and AI**



- Majority of TRUST Use Cases come from **large national research programmes**

# Key highlights in current phase of development to facilitate data access and sharing

Promulgated data sharing principles and best practices

TRUST

DATA SECURITY

DO'S AND DON'TS

DO

✓

Do read through and familiarise yourself with the TRUST Personal Undertaking and TRUST Terms of Use & reach out to the TRUST Data Concierge if you have any questions

Do safeguard the safety & integrity of TRUST datasets, including accessing the platform itself only at approved locations\* within your organisation's premises  
\*Examples include individual staff rooms & isolated workspaces with privacy screens

Do notify both TRUST & your institution's IT team immediately of any security or data breaches (even suspected ones!)

For the full obligations of TRUST

DON'T

✗

Don't

Don't

Don't

TRUST

WELCOME ONBOARD TRUST! We are looking forward to working with you.

The following outlines the process for researchers from Public Research Organisations who have signed the Data Request Agreement to join as a TRUST Member and submit data access requests for datasets through the platform.

As always, the TRUST Support team is on hand to assist (TRUST.Support@mh.gov.sg)

STEP 1

**Sign Up for a TRUST Member Account**  
Applications must first be approved by the research institution. Once approved, you can use the account to access the Member's Portal, from which you can view TRUST platform training materials, browse available data sets, submit data access requests and more.  
Member Accounts take around five working days to approve from date of submission.

STEP 2

**Submit Data Access Request**  
Data access is dependent on approval by TRUST Data Access Committee (DAC) based on public interest and social value. IRB approval (or a waiver) must be received before submitting a request. The request form is available in the Member's Portal under Request TRUST Data.  
The DAC meets once a month (including December) and researchers who wish to submit a request should do so by the last Friday of the month for review in the following month. Data Access Requests typically take between four to six weeks to approve. In exceptional circumstances, more time may be required for sensitive data or sensitive purpose of use.

STEP 3

**Data is prepared / provisioned by TRUST**  
Access to requested datasets is granted to TRUST approved users under the DAC request, through a TRUST User Account (this is separate from the Member Account) & is tagged to the specific data request. Preparation of the approved datasets takes between two and six weeks after DAC approval, depending on the complexity of the data requested for.  
Approved users can access and analyse the dataset & request to export the analytical output (aggregated data). TRUST will set the output according to the parameters approved by the DAC (around seven working days turnaround).

MINISTRY OF HEALTH

SMART NATION

GOVTECH

SINGAPORE

Established pre-agreements with 12 Public Research Organisations to enable expeditious data access (af 22 April 2024)

Initiated National level effort to harmonise data standard

- ~60% clinical data mapped to OMOP CDM\*
- Established national partnerships and curation team on OMOP mapping

OFFICIAL (CLOSED) – NON-SENSITIVE

\*Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM)

9



How do we enable safe and  
efficient data linkage and analytics

# TRUST's core features are built on the 5 Safes Framework, ensuring safe data access



## SAFE PURPOSE

All data requests will be reviewed by TRUST Data Access Committee to ensure that purpose of use fulfils public interest and social value.



## SAFE PEOPLE

TRUST users must have appropriate credentials for access to TRUST and the approved data for research.



## SAFE SETTINGS

TRUST is hosted in a secure environment with government-standard security measures.



## SAFE DATA

All data accessed on TRUST are anonymised to government standards to reduce re-identification risks.



## SAFE OUTPUT

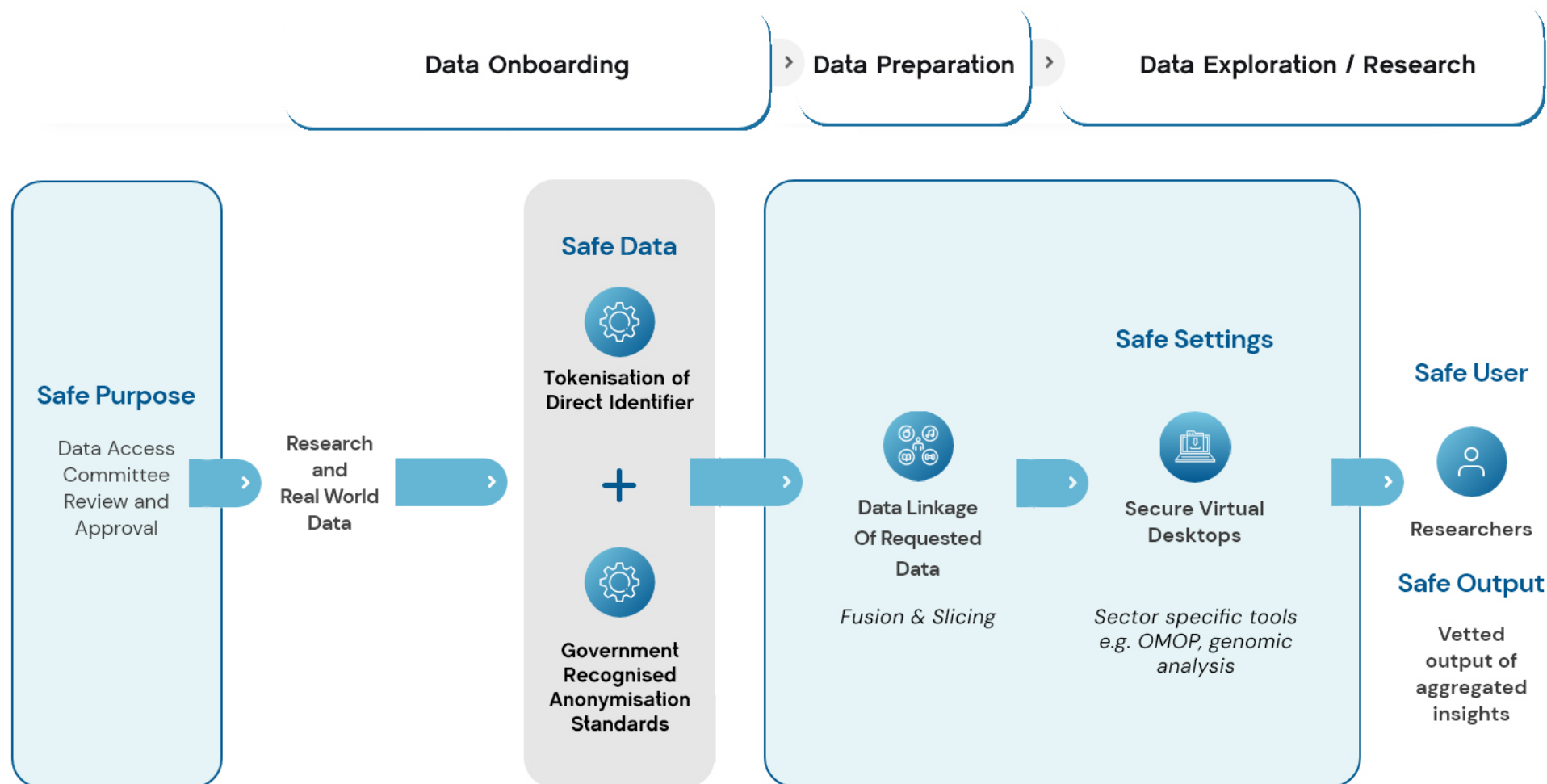
Only verified aggregate data and insights with low re-identification risk can be output.

Deploy synergistic policy and technical solutions across the data lifecycle

Balance privacy & public interest with safe use of data

Improved health outcomes & better care delivery

# TRUST adopts the Five Safes Framework



# TRUST DAC



Mr Philip Ong (Chair)  
DS (Development), MOH



Mr Lai Kai Bin  
DD, GDO, SNDGO



Ms Lim Yi Ding  
D, DOS/TC



A/Prof Yeo Khung Keong  
Dy GCMIO (Research), SHS



A/Prof Ngiam Kee Yuan  
GCTO, NUHS



A/Prof Tan Cher Heng  
GCRO, NHG



Prof Chng Wee Joo  
Vice President (Biomedical  
Science Research), NUS



Prof. Roger Vaughan  
D, CQM & CSSD, Duke-NUS



Dr Sebastian Maurer-Stroh  
Executive Director, BII, A\*STAR



Prof John Chambers  
Prof, CVD Epi, NTU  
CSO, PRECISE



Prof Julian Savulescu  
D, Centre for Biomedical Ethics  
(Ethics Domain)



Prof Simon Chesterman  
Vice Provost (Educational  
Innovation), NUS (Legal Domain)

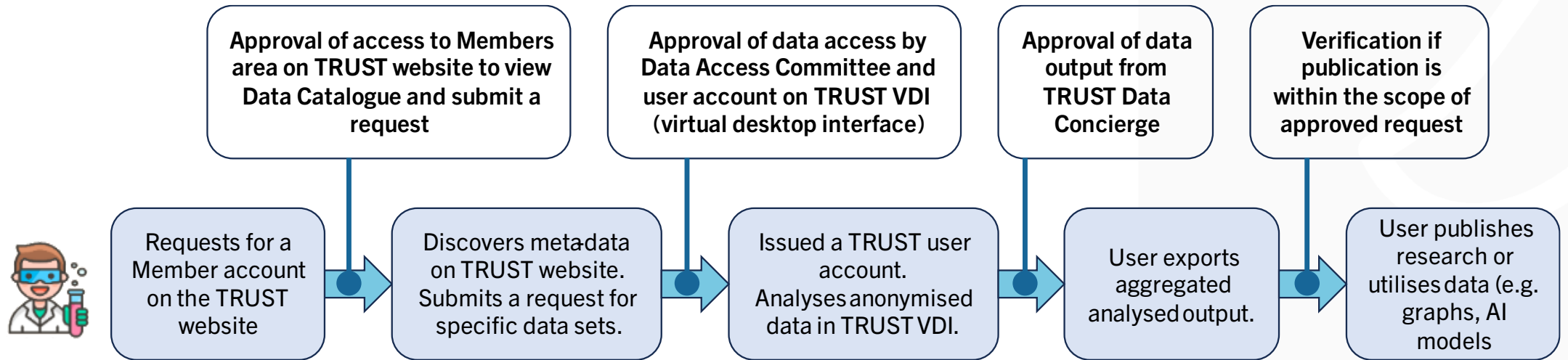


Ms Ai Ling Sim-Devadas  
DD (Advocacy & Engagement),  
LKCSOM, NTU



Mr Rajakanth Raman  
ED, Rainbow Across Borders

# Ensuring Data User's expeditious and safe access

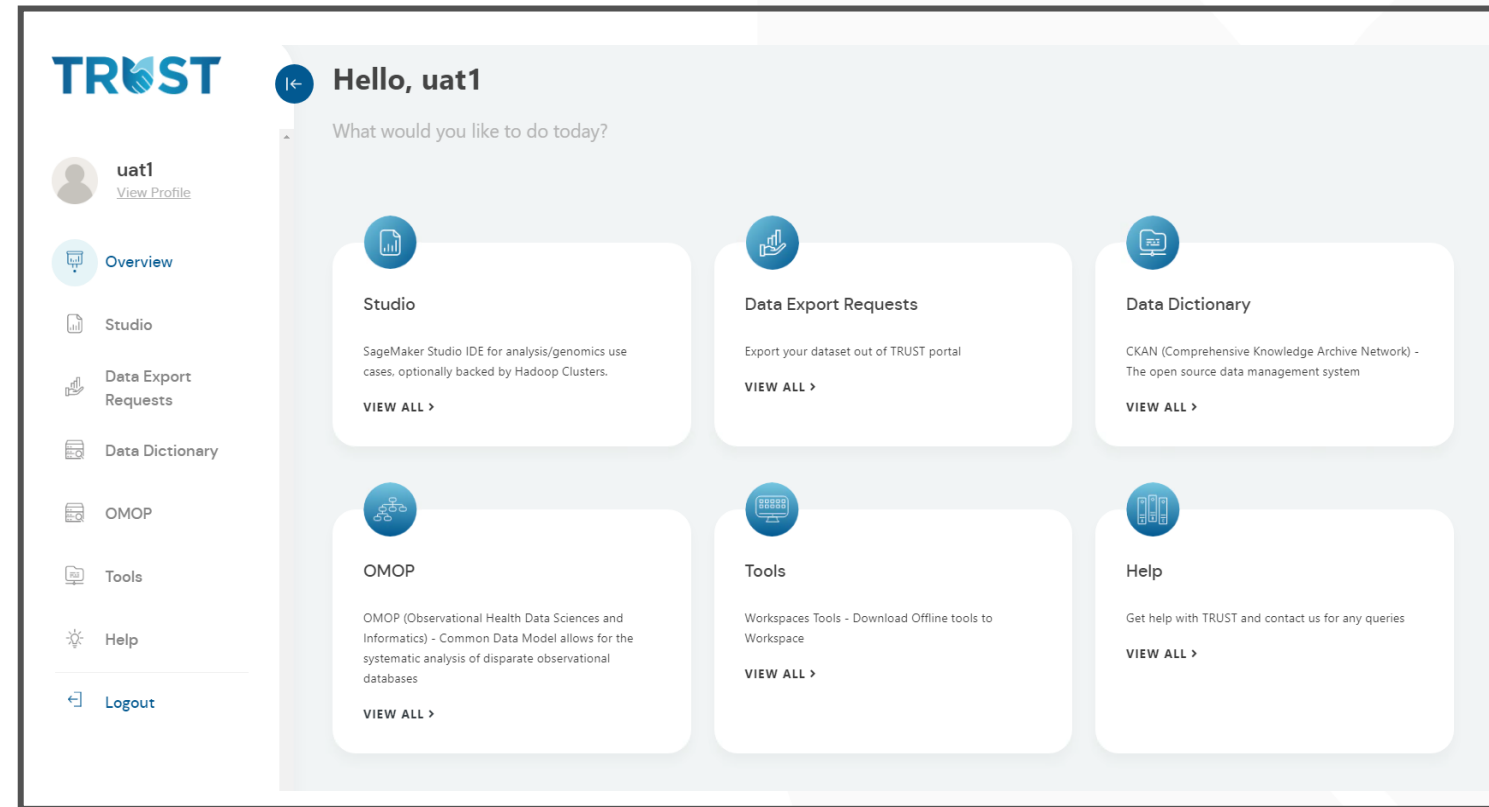


- a. Approval of data output by TRUST Data Concierge.
  - All output must comply with TRUST's output policy, which states that **these must be aggregated/de-identified, generated based on data from at least 5 individuals.**
- b. Verification that public release of analysis is within scope of approved request.
  - Researchers who wish to publish insights generated from their research on TRUST are required to **submit their publications to TRUST DAC secretariat for pre-publication review.**

# TRUST portal as launch point for user to access various features and functions

## Key Features and Function

- Access to Jupyter Lab via Sagemaker Studio
  - Support on Python, R, Pyspark, and SparkR
- Genomic Tools (2H 2024)
  - Hail in Sagemaker Studio
  - Lifebit genomic platform
    - Cohort Browser for minimal code experience
    - Genomic analysis pipelines
- Export analytical insights and findings with just a few clicks
- Send your enquiries from within the portal



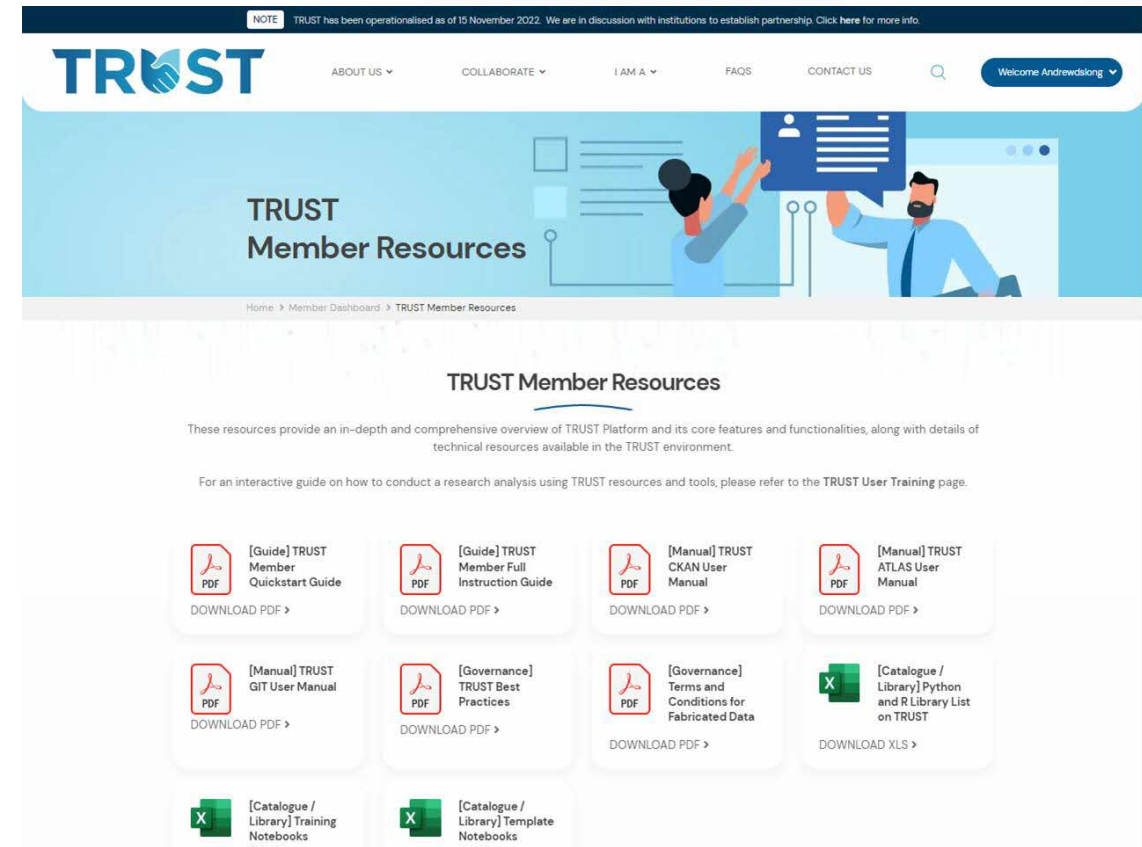
# User Onboarding, Training and Support

- Since launched, TRUST has made available **~40 datasets**, approved **~20 data requests** and supported approximately **~150 users** on their research analytics.
- We are actively engaging researchers to understand their research questions and to support their data needs.
- Users are supported with an onboarding programme by the TRUST team, augmented with additional resources available through the TRUST portal
  - User guides and Onboarding sessions
  - Step-by-step video tutorials
  - Community / peer forum\*

\*to be launched in 2H 2024

A *TRUST Data Concierge* team supports users throughout their journey

*"We are extremely grateful towards the TRUST Support team for their generous support and great responsiveness and guidance, thank you!"*  
- Dr Chen Wenjia, SSHSPH, NUS (first batch of TRUST users)





**Whats on the horizon**

# New opportunities

## Increasing Impact



- Enable unstructured data (e.g., free text clinical notes, retinal images) and broaden data types (e.g. geospatial)
- Support strategic industry partners

- Future-proof with Privacy Preserving Tech (e.g. federated analysis)
- Enhance interoperability with other Trusted Research Environments local and internationally

## Increasing Interoperability



## Enhancing experience



- Scaling and automation (e.g. output checking)
- Enable self-serve (e.g. data exploration & visualisation)
- Develop “TRUST academy” training programmes (e.g. data governance, best practices for data sharing and management)

# Further interoperability with the wider ecosystem to further health data innovations



The background is a deep blue gradient. It features abstract patterns of glowing blue circles and interconnected white lines, resembling a molecular structure or a network diagram. The circles vary in size and opacity, some appearing as bright white dots while others are faint blue halos. The lines are thin and white, connecting the dots in a complex, web-like fashion, particularly concentrated in the upper right and lower right areas.

**Supporting clinical trials design and  
research**

# Supporting clinical trials design and research with real world data

- **Support hypothesis generation –**

- Identify trends to inform the design of new trials e.g. uncover patterns of treatment responses or adverse effects based on multi-modal datasets
- Refine the inclusion/exclusion criteria, ensuring the trial is more focused and relevant.
- Historical data can provide a baseline comparison for new trial results, helping to establish benchmarks and norms.

- **Support more efficient and effective clinical trials -**

- Analysis of past anonymized data can highlight potential risks and adverse effects, allowing for better mitigation strategies in the trial design.
- Support simulations and power analyses to determine the optimal clinical trial sample size needed to detect a meaningful effect, optimizing resource allocation.
- Track participants longitudinally without compromising their privacy to observe health outcomes and treatment effects.

## Using real world data with care

- Trial and real-world populations are different, should be cognizant of the efficacy-effectiveness gap;
- Confounding factors influencing the outcome need to be minimized e.g. careful study design or through data analysis.
- Selection biases may be introduced e.g. when the observed subgroup of patients is not representative of the broader population of interest and need to be adequately dealt with.

The background is a deep blue gradient. It features several abstract white geometric patterns. On the left, there are faint, overlapping circles. On the right, there are more complex, interconnected line structures resembling molecular models or network diagrams. The overall aesthetic is clean, modern, and technological.

**Thank you**

Questions?

[www.trustplatform.sg](http://www.trustplatform.sg)