Organising Analytics For Future

Introduction

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Agenda

- Transforming Care Delivery – What IT can do
- Building up Analytics Capabilities
- Summary and Moving Forward

Transforming Care Delivery, IT need to support the following four (4) key functions:

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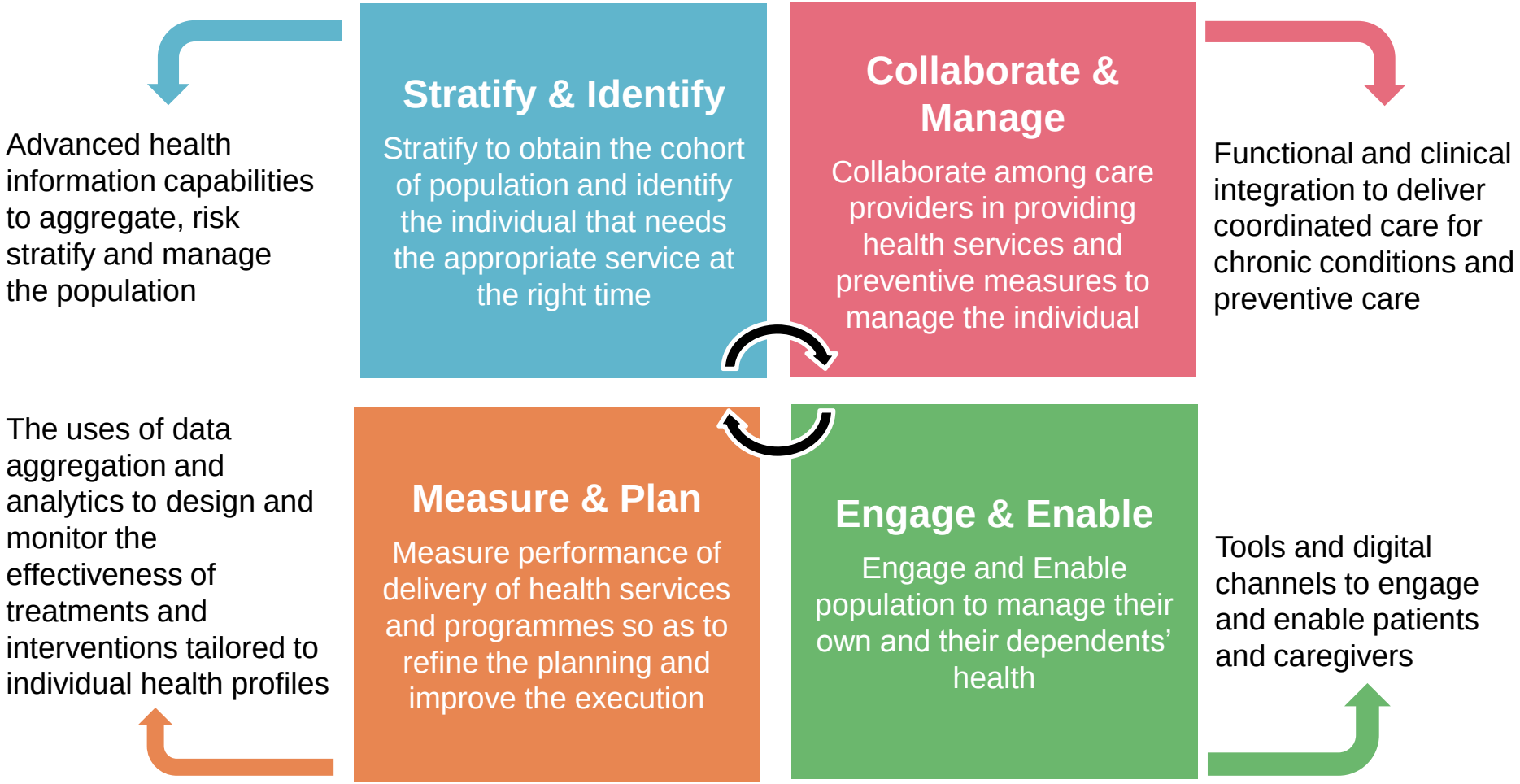
Population Health Management



Advanced health information capabilities to aggregate, risk stratify and manage the population

Functional and clinical integration to deliver coordinated care for chronic conditions and preventive care

Tools and digital channels to engage and enable patients and caregivers

The uses of data aggregation and analytics to design and monitor the effectiveness of treatments and interventions tailored to individual health profiles

Challenges of Healthcare Analytics Landscape

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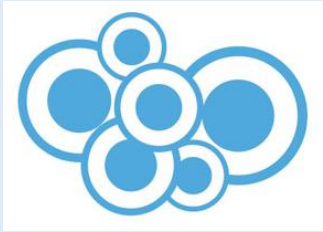
National / RHS / Institution



Different focus areas

Large volume of queries

Overlapping requests for data

Department / Team Level

Limited access to sample size of sufficient quantity

Cumbersome data acquisition

Inconsistent data format

Security and patient confidentiality issues

Difficulty in conducting cross-disease, cross institution analysis

BRAIN - Business Research Analytics Insights Network

The National Data Analytics Foundational Platform running on H-cloud will be continuously improved to meet the needs for healthcare analytics

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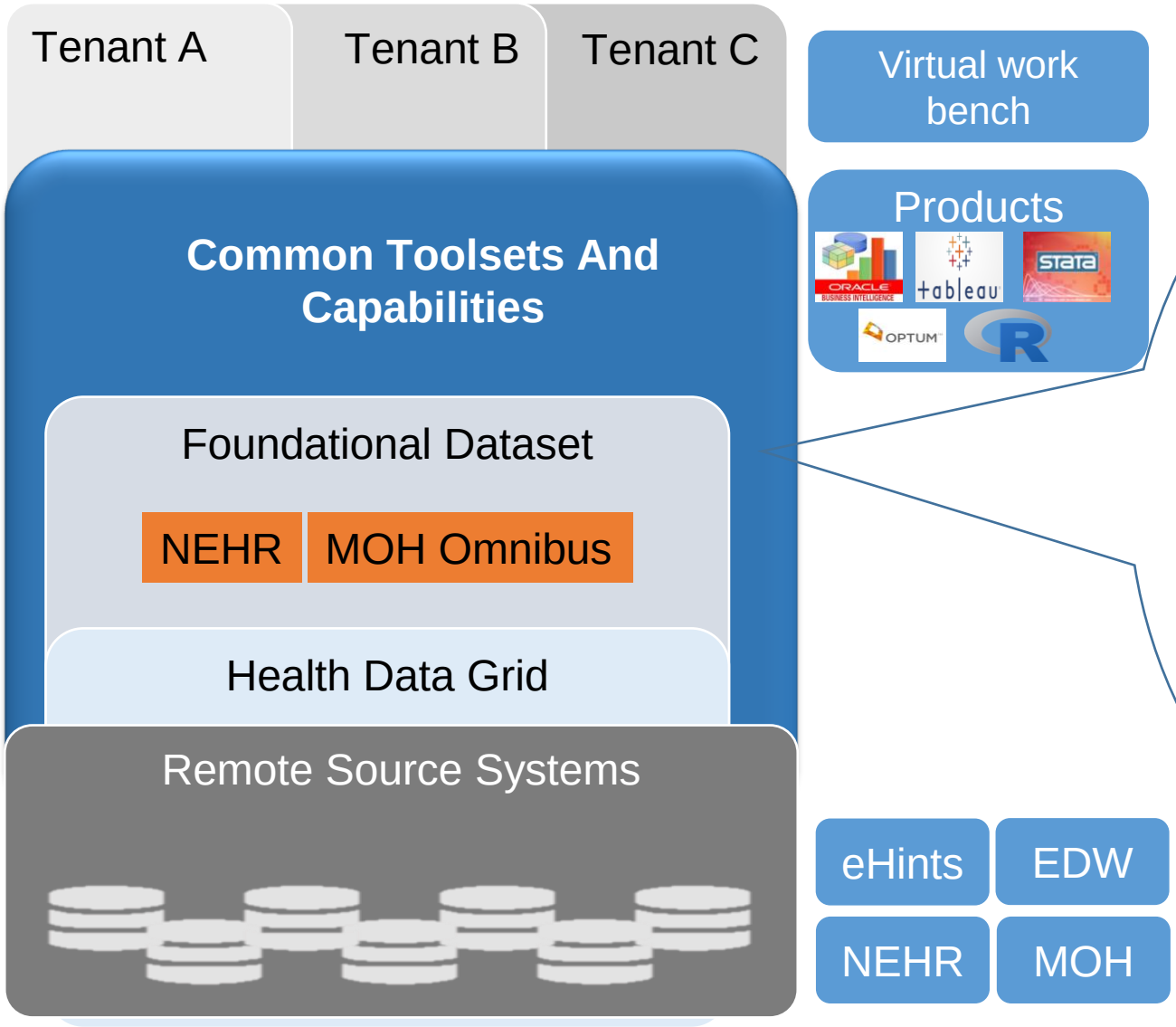

Virtual work bench

Products

eHints | EDW

NEHR | MOH

- **Analytical tools and capabilities** enable analysts to easily collaborate and deliver consistent insights via self-help dashboards and advanced modelling tools.
- **Access to foundational dataset** which is made up of anonymised, harmonised and linked patient records from multiple sources to support hypothesis validation and national-level analysis.
- **Linkage to data sources via health data grid infrastructure** (co-related and anonymised) across MOH, PHIs, other ministries, statutory boards and agencies.

Current Use Cases Enabled by BRAIN

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Engaging Stakeholders on National Priorities and Programmes

#1 – RHS Dashboard

- Support the planning of RHS services for population within the geographical region, leveraging Foundational Dataset
- Enable self-serviced exploratory work prior to full scale analysis
- Audience
  - RHS Planning Teams
  - MOH

#2 – Diabetes Dashboard

- Facilitate sharing of clinical information to improve diagnosis, treatment and safety for good diabetes prevention and care
- Provide periodic analytics on care delivery, outcomes and cost to streamline processes
- Audience
  - Diabetes Registry Workgroup
  - MOH

Research and Clinical Quality Improvement

#3 – SingCLOUD Study

- Investigate the long term clinical outcomes, quality of care and overall medical cost of care in patients with suspected or proven coronary artery disease (CAD) or congestive heart failure (CAF) admitted to restructured hospitals
- Audience
  - Clinical researchers from NHCS, NUHS, SHGP, SGH, CGH, KTPH, NTFGH, TTSH, NHGP
  - MOH

#4 – Diabetes Registry

- Support diabetes care and research, via linkage of diabetes-related databases across PHIs and development of common data glossary for diabetes
- Facilitate collaboration between MOH and PHIs to define questions/topics for analysis to be performed
- Audience
  - Diabetes Registry Workgroup
  - MOH

How BRAIN Works

Feedback from Prof Yeo Khung Keong (Principal Investigator): "*The biggest value is having access to national level data via proper infrastructure and platform for data sharing, with security and privacy issues addressed. As data volume is HUGE, project should seek improvement via automation in further data preparation for analysis.*"

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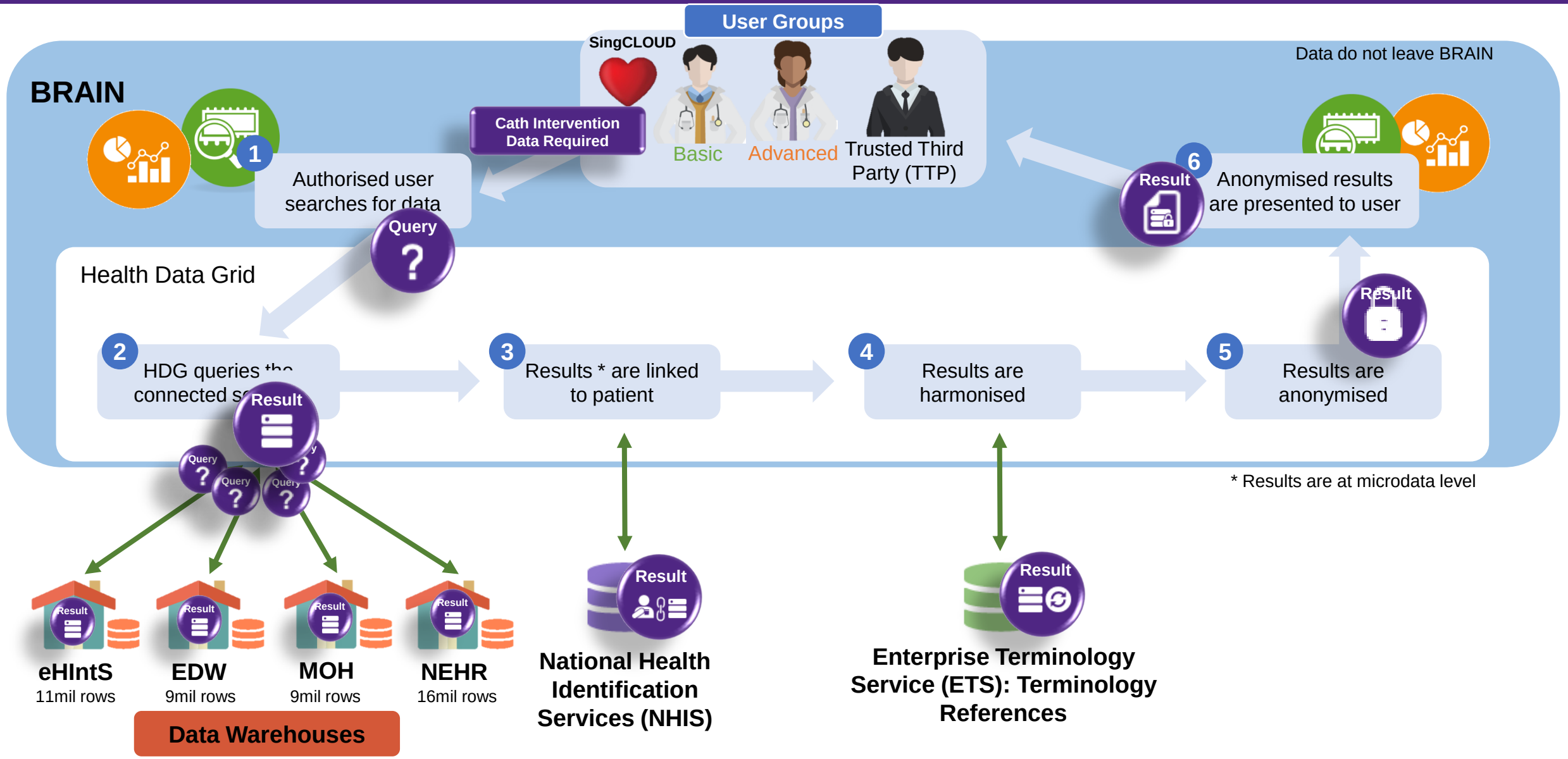

Key Strengths

Secure

- Data remains within BRAIN environment
- Data is anonymised with linkages preserved
- Data resides with the sources

Scalable Multi-Tenancy Platform

- Easily onboard new projects and/or new use cases
- Add on new data sources and new data types

Direct “On the Fly” Query to Data Sources

- BRAIN provides a semantically unified view on an abstract data model that is linked directly to actual data sources
- Data returned by queries is directly from source systems; Data is always current

Cost Effective

- Enables latent use of available data across healthcare ecosystem repeatedly
- No need to replicate data staging areas

Best of Breed Multi-Product Solution

- Provides flexibility to swap for better products in the still fast evolving analytics products market while allowing healthcare to learn the fundamentals of a data federation

Risk Assessment Outcome – Low Risk

- Feedback from IDA ARIES*: Assessment after attacks using US HIPAA Safe Harbour = low risk, Record Linkage (Brute Force) = low risk.
  - Compliant to HIPAA Safe Harbor Privacy Rules
  - Record Linkage Attack Model:
    - Two types of risk are considered: Re-ID and sensitive value disclosure.
    - Proper assumption of the attacker's knowledge is important for Re-ID risk assessment.
    - Due to the small size (< 3k), the UAT data contain mostly unique records, leading to high risk in the worst case assumption (insider attack model).
    - However, risk of re-id is rather low if applied on relaxed condition (i.e whole nation population, entire study cohort as attack base).

**Assessing The Risk Of Re Identification System (ARIES)*: IDA capability to help data owners assess the risks of re-identification within their datasets and recommend the suitable anonymisation and mitigating measures accordingly – see annex for details
HIPAA Safe Harbour: Set of rules set out as part of The Health Insurance Portability and Accountability Act of 1996 to de-identify patient data

Summary

- National level effort to enable public healthcare institutions with analytics.
- Tenant-based, scalable and secure national/ common analytics platform to support new analytics initiatives and collaborations.
- Next steps:
  - Organise analytics across public healthcare to maximise support for policy/ programme planning and population health analytics.
  - Work with MOH and public healthcare institutions to deploy analytics solutions centrally to answer key questions.
  - Continue to improve and evolve analytics platform to bring in more technologies and capabilities to support population health.

Thank You!

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