Real-World Data Usage at the Queensland Digital Health Centre

Queensland Data Linkage Symposium November 2023

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Acknowledgment of **Country**

The University of Queensland (UQ) acknowledges the Traditional Owners and their custodianship of the lands on which we meet.

We pay our respects to their Ancestors and their descendants, who continue cultural and spiritual connections to Country.

We recognise their valuable contributions to Australian and global society.

Presentation Overview

- QDHeC Overview

- Smart Hub

- Real-World Data and Clinical Trials

- Federated Learning

QDHeC Overview

- ➤ The Queensland Digital Health Centre (QDHeC) is the engine room of our digital healthcare future.

- ➤ An enduring, world-class virtual facility with a self-sustaining group of high-quality researchers.

- ➤ Generating new research and innovation and speeding up translation of new knowledge into improved digital healthcare.

- ➤ Funded through The University of Queensland's Vice-Chancellor's Health Research Accelerator (HeRA) initiative.

Queensland Digital Health Centre

Vice-Chancellor's Health Research Accelerator (HERA) initiative

Funded for five years across a seven-year project cycle (2022-2029)

Researchers from all UQ faculties:

Medicine

Humanities, Arts and Social Sciences

Science

Business, Economics and Law

Health and Behavioural Sciences

Engineering, Architecture and Information Technology

Key Component of QDHeC is Industry Partnership

Our Partners

QDHeC Vision

The vision is a digitally enabled Learning Health System delivering on the Quadruple Aim of healthcare
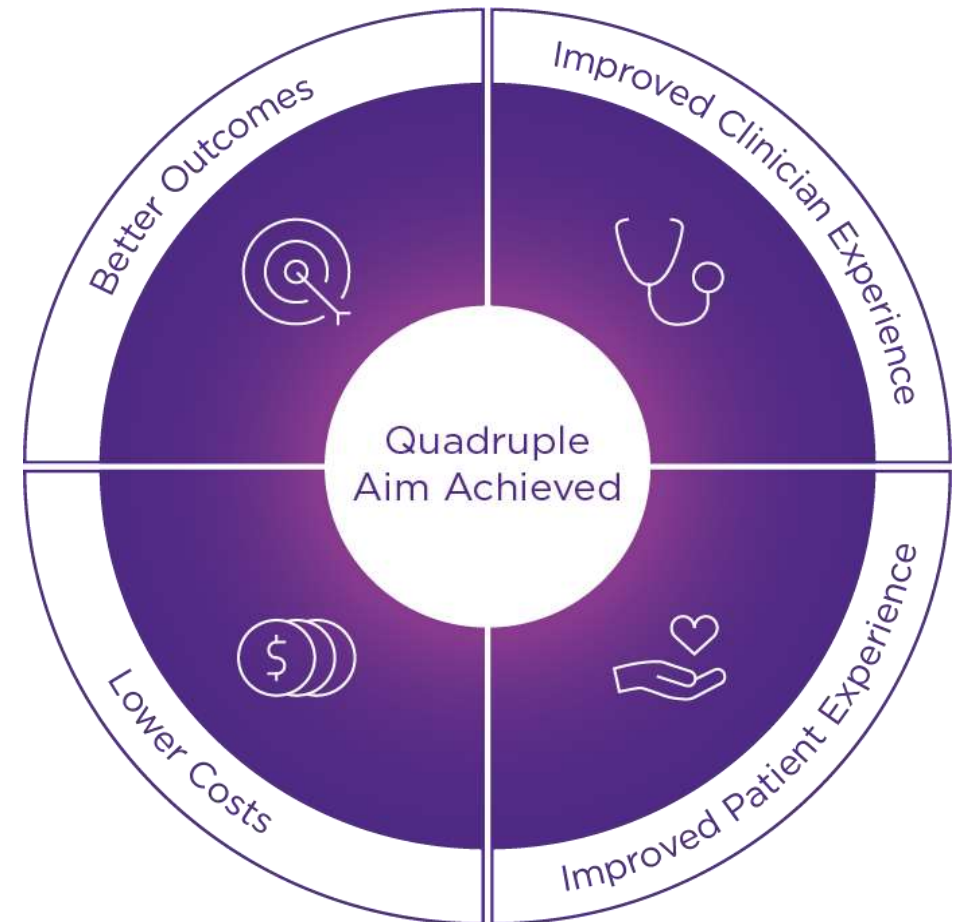
➢ Data at it's core

➢ Easily accessible data for
  ➢ Clinical care delivery
  ➢ Planning and policy development
  ➢ Research and innovation

Quadruple Aim

The Quadruple Aim of health is a globally-recognised framework to optimise healthcare.

It seeks:

➢ improved clinician experience

➢ improved patient experience

➢ lower costs & improved value

➢ better outcomes

QDHeC includes:

- **One-UQ Approach - Researchers from across UQ**

- **Smart Hub Management and support staff**

- **CLARA Systems Administration and Specialty support Services Team**

- **KeyPoint Systems Administration and Speciality Support Services Team**

- **Quantum Technologies for Digital Health**

"The biggest obstacle to using advanced data analysis isn't skill base or technology; it's plain old access to the data."

-Edd Wilder-James, Harvard Business Review
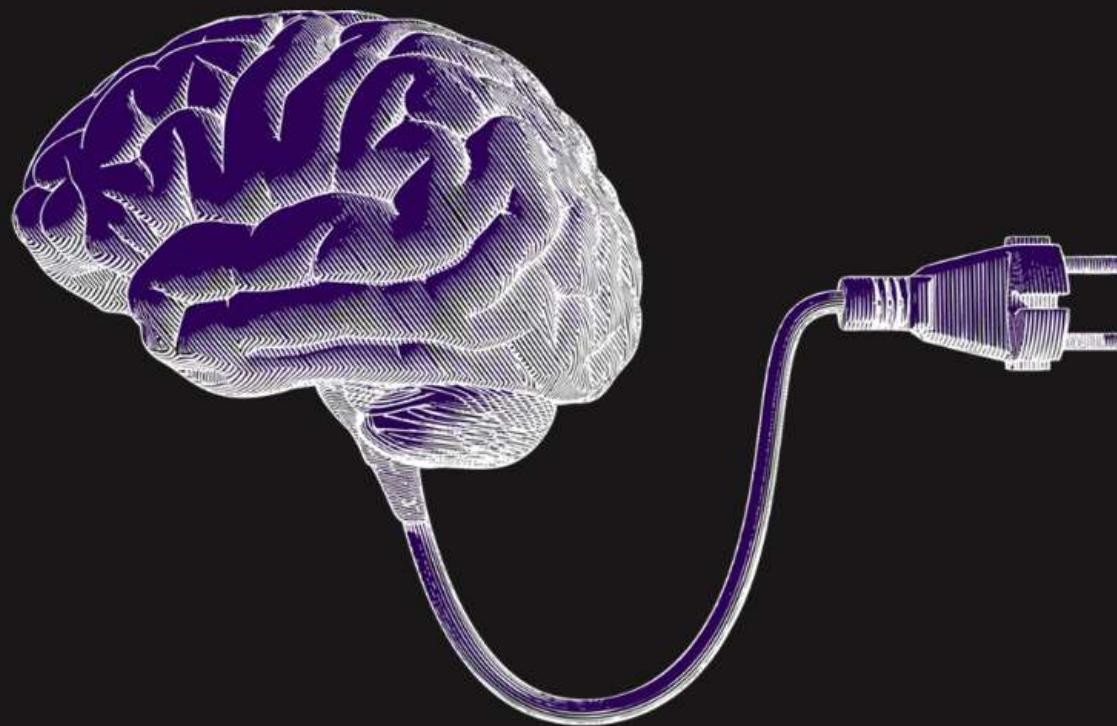
Clinical Informatics Team

- **Operational Unit Lead by Jodi Austin**
  - Team comprises
    - clinical staff with front line experience (pharmacist, nurses)
    - technical staff (software developers, computer programmers, data managers)
  - Creates standard operating procedures for accessing iEMR data
  - Works one-on-one with researchers requesting data
    - Identifies/clarifies data availability
    - Supports governance process

Real-World Data & Clinical Trials

Real-World Data & Clinical Trials

RESOLVE – Validation of Clinical Trial Outcomes Using Hospital Administrative Data and Electronic Medical Records: A Data Linkage Methodology Project using the RESOLVE Trial

- international pragmatic, cluster-randomised, comparative effectiveness trial

- effect of default dialysate sodium levels on the rates of cardiovascular (CV) events

- Comparing CV outcomes via Real-World data and iEMR vs traditional RA collection
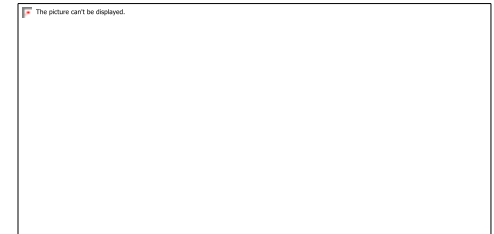
IMPEDE-PKD - Implementation of Metformin theraPy to Ease Decline of kidney function in Polycystic Kidney Disease: A Randomised Placebo-Controlled Trial

- prospective, multi-centre, placebo controlled, double-blind RCT

- effect of metformin on slowing rate of disease progression among PDK patients

- development of iEMR algorithms to identify potentially eligible subject

Background

Australia has a data problem.

- Data is siloed and isolated geographically (across different states) and across the care continuum (primary and hospital care).
- Most current initiatives focus on creating centralized repositories for developing AI/ML based approaches.
- Legislative barriers restrict data access
    - making extraction, linkage and use of data almost impossible.

Solution

- Don't fight legislative issues or sidestep
- Accept existing ethical, legislation and privacy barriers
- Develop innovative technology and infrastructure that can operate within these constraints.
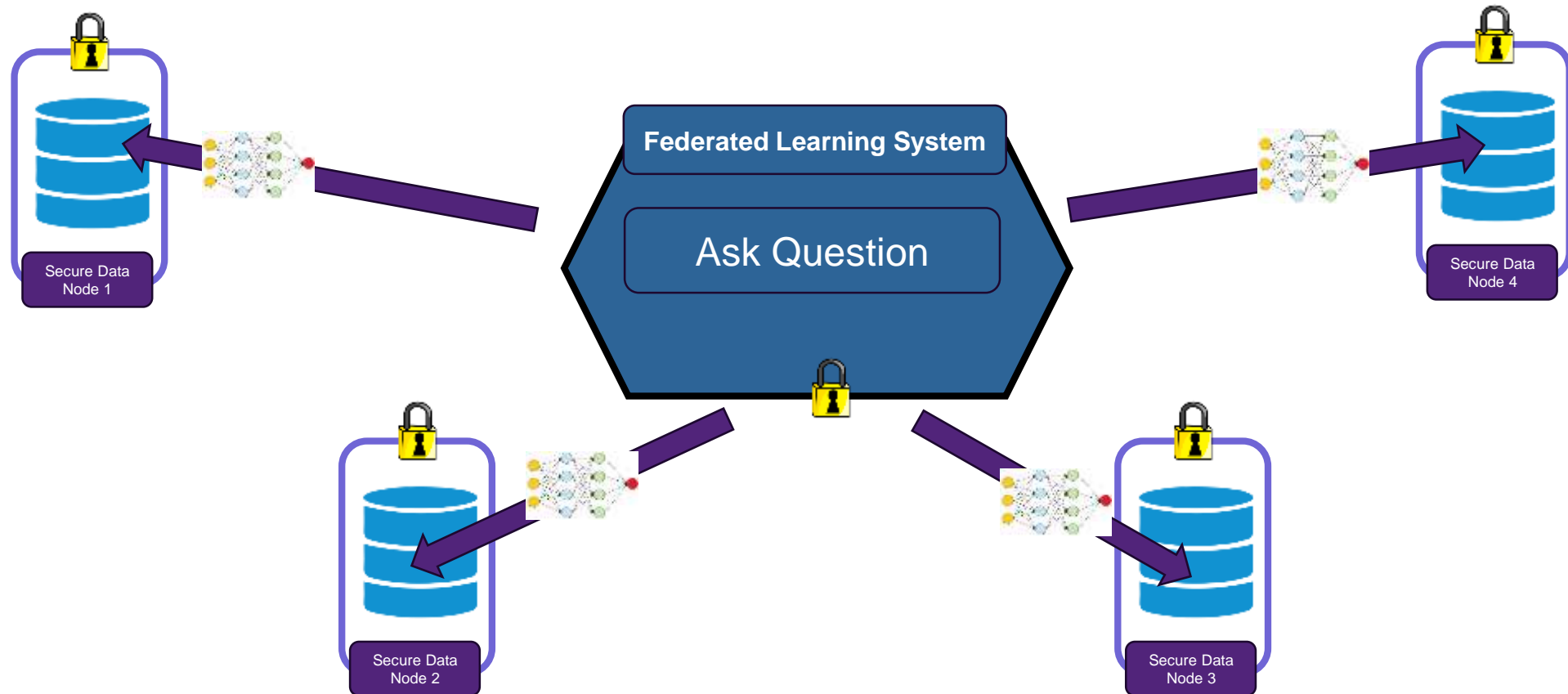
NINA, a *"first of its kind"* national capability and infrastructure network enabling federated learning in Australia.
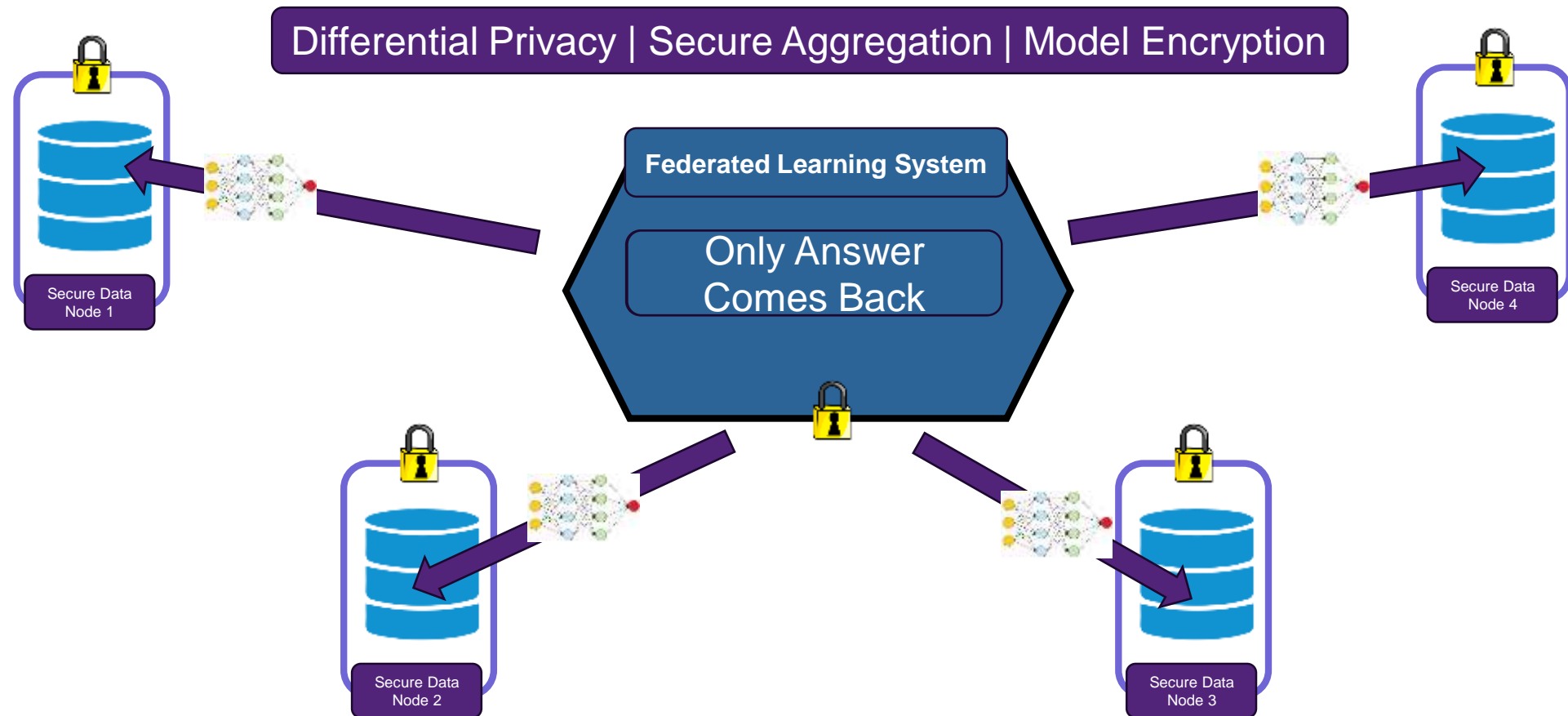
Research Question

Can we use disruptive, cutting-edge federated learning technology to address the critical need for integrated data to enable research for improving chronic disease outcomes?

1 in 2 Australians experience ongoing burden from one of the 10 major chronic diseases which are associated with 9 in 10 deaths. Prominent amongst this burden are diabetes, rheumatoid arthritis, osteoarthritis and cancer—our selected use cases for evaluating NINA

What is federated learning?

What is federated learning?

Differential Privacy | Secure Aggregation | Model Encryption

Federated Learning System

Only Answer Comes Back

Secure Data Node 1

Secure Data Node 2

Secure Data Node 3

Secure Data Node 4

NINA Partners

A3BC	Amazon	Ansen Innovation	Aus Research Council	Aus Research Data Commons	ARM Hub
BioGrid	Cancer Alliance QLD	ClearBridge Foundation	CSIRO AeHRC	Department of Environment and Science	Google Cloud
Health Translation QLD	Macquarie University	Microba	Monash Health	Monash University	Medical Software Industry Association
	QLD Cyber Infrastructure Foundation	QLD Health	QUT	Stryker	Vic Institute of Forensic Medicine

Thank you

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