

Queensland Digital Health Centre

2024 Symposium

7 November 2024

Customs House, Brisbane

Acknowledgement 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.

*The Brisbane River pattern from A Guidance Through Time
by Casey Coolwell and Kyra Mancktelow.*



Agenda

Welcome and introductions

Acknowledgement of Traditional Owners

Prof Jason Pole, Deputy-Director – Research, QDHeC

QDHeC's Year in Review

Prof Clair Sullivan, Director, QDHeC

The future of digital health - a connector between the health system and research and system improvement

Dr Tanya Kelly, Acting Deputy Director-General eHealth Queensland

Expert Panel discussion

Challenges and Opportunities in Healthcare using AI

- Moderator: Prof Jason Pole, Deputy-Director – Research, QDHeC
- Associate Prof Sebastiano Barbieri – Principal Research Fellow, QDHeC
 - Dr Tanya Kelly, Acting Deputy Director-General eHealth Queensland
 - Meg Jeppesen (consumer)
 - Dr Michael Lawley, Research Group Leader, Australian eHealth Research Centre, CSIRO

Morning Tea (10.30 – 11.00am)

Agenda

Indigenous data sovereignty – working with community

Assoc Prof Thelma Parker, Associate Dean Indigenous Engagement, Faculty of Medicine, UQ

Introduced by Prof Jason Ferris, Director of Research and Statistical Support Services (RASSS), UQ

Expert panel discussion

Healthcare digital workforce readiness

Moderator: Prof Andrew Burton-Jones, UQ Business School

- Dr Lee Woods, Senior Researcher, QDHeC
- Simon Townsend, Lead Clinical Consultant Digital Health, Metro South Health
- Dr Jason Dowling, Principal Research Scientist, CSIRO
- Shelley Behen, Senior Business Analyst, Sparked CSIRO

Shifting from break fix to predict prevent - how digital technology may help us achieve this step change

Ms Judy Nean, Senior Director Health Promotion, Health and Wellbeing Queensland

Lunch (12:30pm -1:15pm)

Agenda

Expert panel discussion

The use of real-world data for research

Moderator: Prof Jason Pole

- Dr Jodie Austin, Director Clinical Informatics, QDHeC
- Benjamin Reid, Senior Director, eHealth Queensland
- Anton van der Vegt, Advanced Qld Industry Research Fellow
- Keren Pointon (consumer)
- Dr David Hansen, CEO eHealth Research Centre, CSIRO

Leading excellence in Digital Health in Queensland

HDR presentations

Moderator: Dr Rebekah Eden, Senior Research Fellow, QDHeC

- Samantha Robertson
- Graeme Mattison
- Alan Robertson
- Michael Draheim, Chief Clinical Information Officer APAC Oracle Health

DigiHDR presentations

Moderator: Prof Jason Pole

- Danyang Dai
- Hannah O'Connor
- Jaze Wang
- Monica Noselli
- Quita Olsen
- Teyl Engstrom
- Titus Kirwa
- Tuan Duong

Panel feedback:

- Dr David Hansen
- Prof Clair Sullivan

Refreshments (3:30pm – 4:30pm)

Housekeeping

Rest Rooms

The restrooms are located on each level of the building. On this Queen Street level, they are located at the end of the corridor, on the right-hand side, just past the staircase. A PWD bathroom is located one level down on the River Level of the venue. Access is via the lift located in the Queen Street corridor.

Evacuation Procedures

The assembly point is located on the Queen Street footpath. In case of emergency, the fire exits are the double doors at the rear of the room leading to the front entrance and the door at the front of the room.

The fire alarm is a constant beep. We will only evacuate on the sound of the Evacuation Alarm, which is a whooping sound OR at the Supervisor's request PA announcements will be made asking guests to evacuate and Managers or Supervisors will assist guests to evacuate the building.

No Smoking

The nearest designated outdoor smoking area is outside the front entrance down the stairs onto Queen Street.

Queensland Digital Health Centre

Year in Review

Professor Clair Sullivan, Director Queensland Digital Health Centre

QDHeC's Vision and Mission

What is the problem we are trying to solve?

Healthcare, as it is currently delivered, is not sustainable.

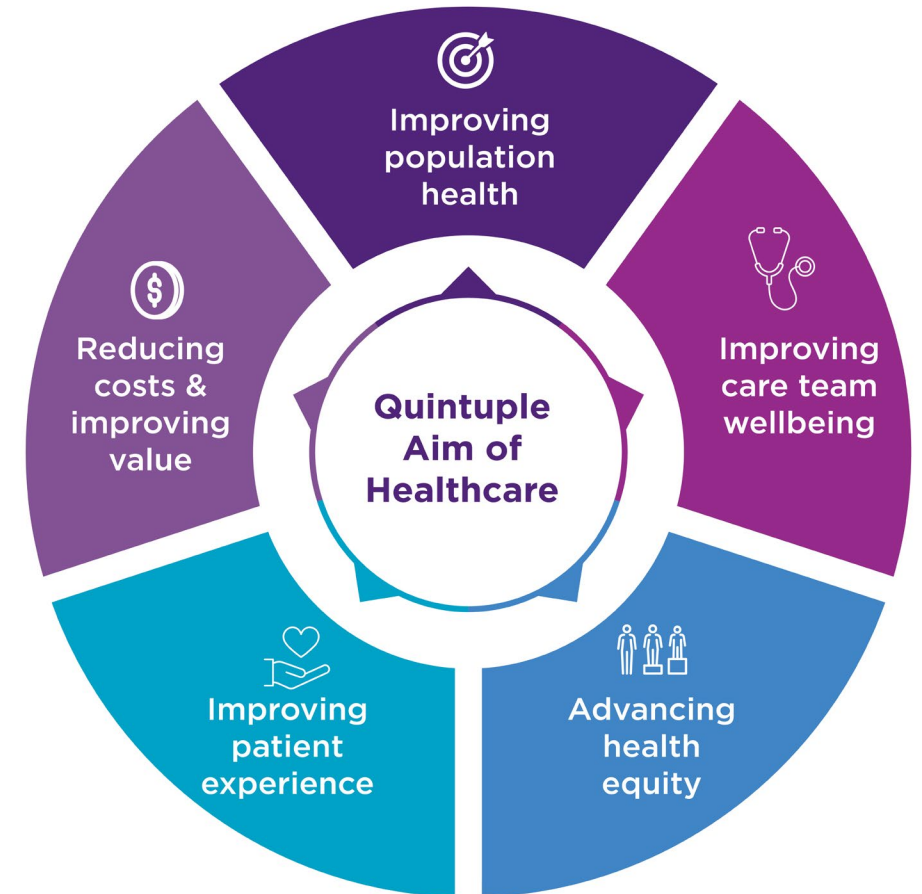
Health research lacks the capability and capacity to translate data into knowledge that can rapidly transform the healthcare system and improve healthcare outcomes.

OUR VISION

To be the catalyst for achieving the Quintuple Aim of Healthcare.

OUR MISSION

To engage and partner to create a digitally enabled learning health system.



Research program highlights

Since being established in 2022, QDHeC researchers and collaborators have attracted over \$46million in funding. These include:

- \$3 million from MRFF and \$2.4million in kind for Life and Health after Childhood Cancer (LACE) project
- \$3 million from MRFF for National infrastructure for real-time clinical AI trials (NASCENT) project
- \$13.7 million for the MRFF and partner-funded National Infrastructure for Federated Learning in Digital Health (NINA) project
- \$3 million from MRFF for the Digital Infrastructure For improving First Nations Maternal and Child Health (DIFFERENCE) project
- \$15 million as part of UQ's Health Research Accelerator (HeRA) program

In 2024, QDHeC has produced +125 research outputs, including book chapters, journal articles and conference papers.

2024 academic outputs from across QDHeC

- Impact of digital health on the quadruple aims of healthcare: a correlational and longitudinal study - *International Journal of Medical Informatics* – led by Dr Lee Woods and Dr Rebekah Eden
- Indigenous data governance approaches applied in research using routinely collected health data: a scoping review– *NPJ Digital Medicine* – led by Teyl Engstrom and Dr Elton Lobo
- Neurodesk: an accessible, flexible and portable data analysis environment for reproducible neuroimaging – *Nature Methods* – led by Dr Steffen Bollmann
- Encoding a magic state with beyond break-even fidelity – *Nature* – led by Dr Riddhi Gupta
- Patient flow in emergency departments: a comprehensive umbrella review of solutions and challenges across the health system – *BMC Health Services Research*– led by Dr Mahnaz Samadbeik
- A configurational theory of digital disruption - *Information Systems Journal* – led by Prof Andrew Burton-Jones
- Artificial intelligence for diabetes in the hospital – book chapter authored by Dr Benjamin Sly and A/Prof Sally Shrapnel
- The new paradigm in machine learning – foundation models, large language models and beyond: a primer for physicians – *Internal Medicine Journal* – led by Prof Guido Zuccon

Awards highlights

Nov 24 eHealth Qld Staff Awards – SMART Hub a finalist (Awards on 21 November)

Nov 24 UQ Excellence Awards – QDHeC a finalist (Awards on 18 November)

Centre for Health Services Research Awards:
- Jonaa Eva (Rising Star of the Year – Professional), Professor Jason Ferris (Health Service Paper Impact Award), Dr Lee Woods (Commendation, Mentor of the Year) and Tim Saul (Commendation, Professional Staff Member of the Year)

Dec 23 Faculty of Medicine Excellence Awards:
- QDHeC ‘Collaborators of the Year’

Nov 23 UQ Excellence Awards:
- KeyPoint ‘Excellence in Innovation’

Nov 23 Metro South Health Ambitious Innovation Award
- Dr Anish Menon and the REMODEL Research and Clinical Team

Nov 23 ANZ Chapter of the International Society for Magnetic Resonance in Medicine
- Dr Kerstin Pannek won first prize for her presentation



Collaborating to improve population health

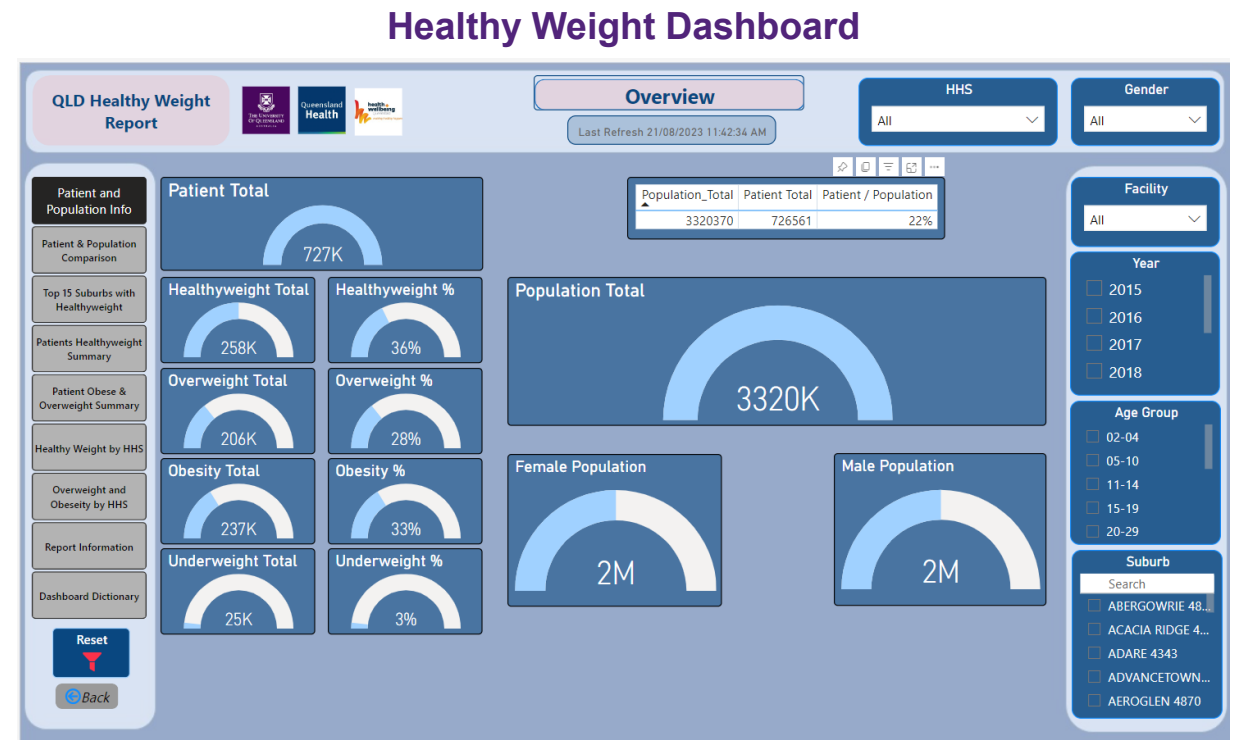
Ongoing population health projects with Health and Wellbeing Queensland include:

A Better Choice: Healthcare Project data and analytics solution (ABCDA)

An annual review and assessment of food and beverage availability at Queensland Hospital and Health Services

Healthy Weight Dashboard

This analytics tool can inform policy and decision making by users from Health and Wellbeing Queensland



Note: this dashboard is presenting synthetic data and no real patient data is being presented.

Collaborating to improve patient experience

Hidradenitis Suppurativa Digital Algorithm Project

With sponsorship from Novartis, an algorithm to identify patients with dermatological condition, hidradenitis suppurativa, earlier than traditional methods.

This work was completed using electronic medical record patient data from Metro South Health and Townville HHS.

The Rethinking Model of Outpatient Diabetes Care Using eHealth (REMODeL) Clinical Trial

Funded by Australian Centre for Accelerating Diabetes Innovations, this trial aims to improve outcomes for millions of people living with type 2 diabetes using digital technology.



Collaborating to improve care team wellbeing

Synthetic CT 3-month Pilot Project

Exploring the feasibility of using MRI scans instead of CT scans to support navigation and guidance for spine surgery.

Project delivered in partnership with Stryker, as a means for the Stryker Q-Guidance image intraoperative guidance system.



Health Research Digital Ecosystem Project

The Health Research Digital Ecosystem Capability Statement, enables stakeholders to understand how they can navigate the digital ecosystem to share and access relevant research materials, to improve health care for Queenslanders.

This will drive health care value by supporting collaboration and data sharing between health and research organisations.



Collaborating to advance health equity

Digital Infrastructure For improving First Nations Maternal and Child Health (DIFFERENCE)

- Utilising cutting edge informatics and technology to deliver better outcomes for First nations pregnancies through:
- Standardising digital workflows in clinical information systems that are geographically boundless and aligned with best-practice First Nations data
- Delivering a consumer centred information flow agnostic of setting.
- Deliver real-time exchange of information for consenting people
- Develop culturally appropriate processes for de-identified data for precision medicine using AI and ML techniques.
- Redesigning healthcare through integrating digital workflows



Collaborating to improve value

In 2024, SMART Hub formally established with the embedding of conjoint positions in eHealth Queensland (eHQ).

QDHeC and eHQ collaborating to develop methods for accessing real-world data for research:

- Fulfil research requests for Queensland Health (QH) ieMR data
- Map the QH ieMR to the Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM) in the production environment.
- Generation of QH ieMR representative synthetic dataset

SMART Hub have been listed ad finalists in upcoming eHQ Staff Excellence Awards – ‘Ambitious Innovation’ category

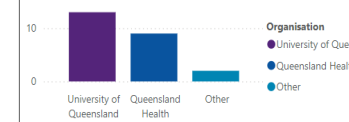
OCCLIOUQ Research Request Pathway Dashboard
OPERATIONAL OVERVIEW

Research Request Dashboard

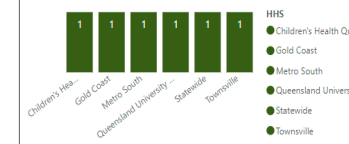
Data Request



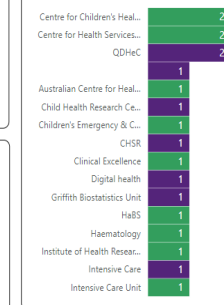
Requesting Organisation (all status)



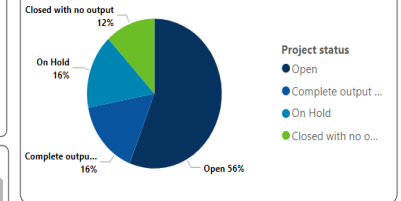
Requesting HHS (all status)



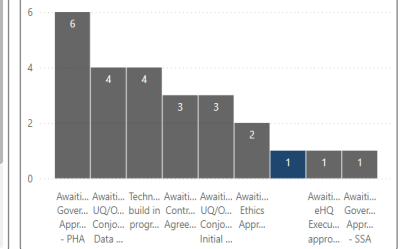
Requesting Department (all status)



Open/Closed request



Request waiting reason (open requests only)



Snapshot of SMART Hub research request management dashboard

Help researchers leverage this extensive and valuable ieMR data, to drive healthcare research solutions and innovation.

Collaborating on secure use research data

QCIF continues to support by providing and maintaining existing KeyPoint vaults, to ensure sensitive research data is managed in a scalable, fully governed, and highly secure environment.

Listed below are projects with vaults set-up to securely manage sensitive research data:

- Digital Infrastructure for improving First Nations Maternal and Child Health (DIFFERENCE)
- National Infrastructure for federated learning in DigitAI health to generate new models of care for chronic diseases (NINA)
- SMART Hub



Using AI to automate Medical Systematic Reviews

- The QDHeC AI in healthcare team have developed new AI that makes systematic review creation faster and cheaper
- Partnership with Bond University to have methods available to medical researchers
- Funded by the Australian Research Council (ARC)
- Integration into SRA/TERA tools: <https://tera-tools.com/>

<p>250k+</p> <p>Users have utilised the tools in the SRA/TERA</p>	<p>1.2 million+</p> <p>Site visits have occurred in the SRA/TERA</p>	<table border="1"> <thead> <tr> <th rowspan="2">Role</th> <th rowspan="2">Workflow</th> <th colspan="2">LLM Interaction Level</th> </tr> <tr> <th>Low support</th> <th>High support</th> </tr> </thead> <tbody> <tr> <td>Pre-reviewer Pre-screens studies with automated scoring and reasoning [5,16,3,7]</td> <td></td> <td> Show results upon requested</td> <td> Reveal results along with studies</td> </tr> <tr> <td>Co-reviewer Provides live assistance during human screening [8,9,1]</td> <td></td> <td> Predefined task help options only</td> <td> In addition to options, enable chat</td> </tr> <tr> <td>Post-reviewer Reviews human decisions and processes remaining studies [13,9]</td> <td></td> <td> Show LLM decisions for comparison</td> <td> Check potential incorrect decisions, enable chat</td> </tr> </tbody> </table>	Role	Workflow	LLM Interaction Level		Low support	High support	Pre-reviewer Pre-screens studies with automated scoring and reasoning [5,16,3,7]		Show results upon requested	Reveal results along with studies	Co-reviewer Provides live assistance during human screening [8,9,1]		Predefined task help options only	In addition to options, enable chat	Post-reviewer Reviews human decisions and processes remaining studies [13,9]		Show LLM decisions for comparison	Check potential incorrect decisions, enable chat
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<p>120+</p> <p>Countries have had researchers visit the SRA/TERA</p>	<p>2 times</p> <p>Increase in research speed from novice users, experienced users can see greater increases</p>																			

Dr ChatGPT

Dr ChatGPT, tell me what I want to hear!

Research questions

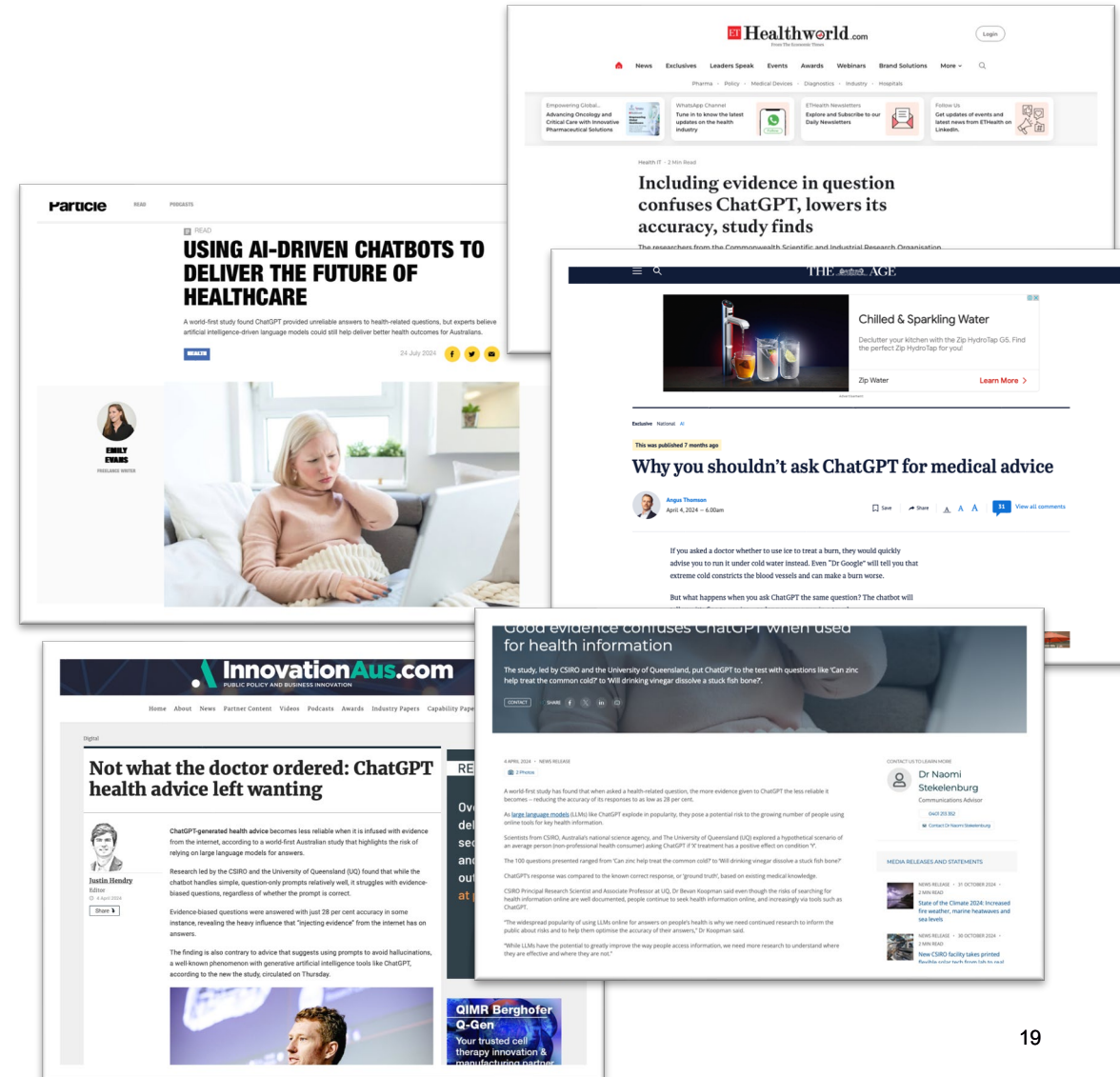
- How effective is ChatGPT at answering health questions?
- Does prompting with evidence influence answer correctness?

What we found:

- ChatGPT can be effective (80%) but...
- Sensitive to the type of question
- Providing evidence in the prompt (Retrieval Augmented Generation) is not a silver bullet

Impact

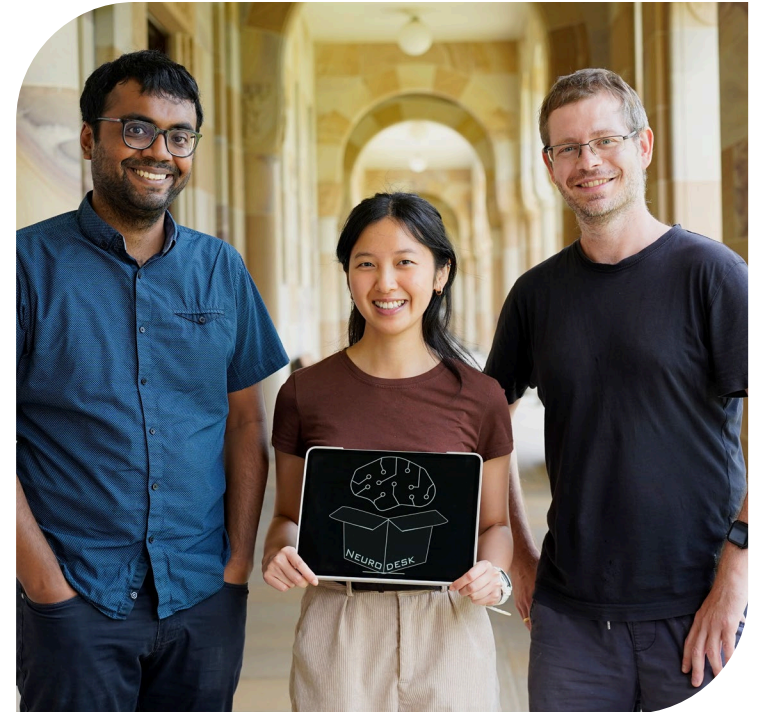
- Published in EMNLP, leading AI venue; ~70 citations in 1 year
- Substantial press attention
- Covered by 48 outlets and 5 live interviews Exclusive in Sydney Morning Herald



Neurodesk

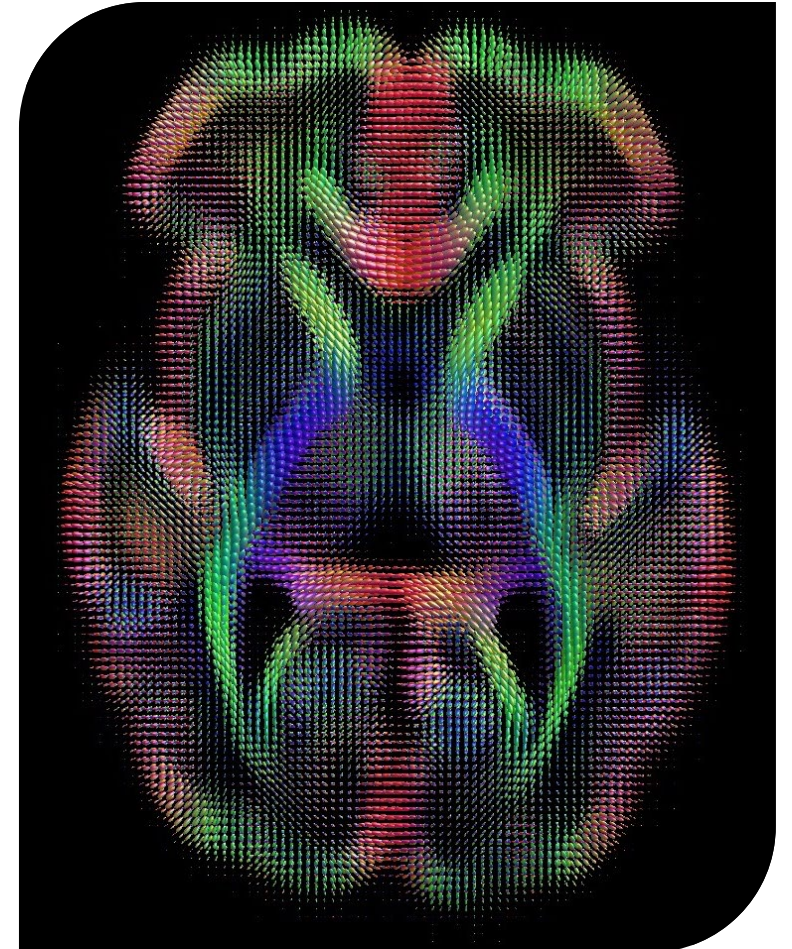
Neurodesk is powering the world's Neuroimaging analyses by providing containerised data analysis environment to facilitate reproducible analysis of neuroimaging data.

- Nature Methods Paper in January 2024
- More than 1000 monthly users from over 60 countries
- More than 16 000 downloads
- Currently used in 3 university courses with more than 100 students (UQ, Wollongong and University of South Carolina)
- Used in workshops with more than 50 simultaneous users (e.g. SNIRP 24, VSS 24, MGH Boston 23, CMRR Minnesota 23, Technion Israel 23)
- 600k AUD funding through Wellcome and CZI



Neonatal and Paediatric Brain MRI

- 16 abstracts at 3 national / international conferences
- 2 papers accepted/published
- 3 papers submitted, 4 in advanced draft
- 2 NHMRC grants under review (1 Ideas, 1 Investigator)
- 1 NHMRC grant in preparation (CRE)
- ISMRM-ANZ Best Platform Presentation Award 2023
- CSIRO Health and Biosecurity Science and Engineering Excellence Award 2023
- Herston Health Precinct Symposium Highly Commended Best Clinical Research Award 2024
- OHBM-Australia Emerging Leadership Award 2024



Capacity building – Quantum machine learning

Analyse the operational robustness of quantum machine learning, with an eye to digital health use-case discovery and testing.

To continue to develop the quantum machine learning research program co-leads A/ Prof Sally Shrapnel and Dr Riddhi Gupta have:

- Attended the *Quantum Meets Health* event as expert panel members, organised by Australian Chief Scientist Cathy Foley.
- Debated the benefits and disbenefits of Quantum for Health at *Something Digital* conference with Prof Warwick Bowen, Director of CoE QUBIC
- Developed partnerships with the Institute for Advanced Study, Princeton to discuss policy and digital health innovation.



Capacity building – Information systems

Focused on improving the value attained from investments in digital health

Key capabilities and activities for the information system research program:

- performing impact and maturity assessments across Queensland, with actionable recommendations to improve how health systems are used and governed;
- facilitate the transformation of the healthcare industry into a sustainable learning healthcare system by evaluating the impacts and maturity of digital health to identify areas for improvement;
- understanding and improving how digital health is used;
- how effectively health information systems and their data are used;
- developing governance structures to support digital health transformation.

Digital Health Education

Digital Health Students

Undergraduate pathways

- MEDI7200: Workshops to Year 2 Medical students on Data & Analytics in Healthcare, as part of the Personal Learning Stream

Post-graduate pathways

- Graduate Certificate Clinical Informatics and Digital Health
 - 122 students enrolled since program started in 2022

QDHeC continue to support, manage and onboard HDR students



Digital Health Education

Industry

Metro South Executive Education program

- 9-month program delivered ~3 face-to-face days per month
- Modules focussed on applying in principles and frameworks to a Metro South Health strategic project

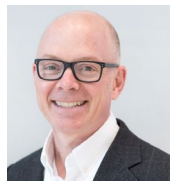
Mindray Digital Hospitals Program

- Invited 27 professionals from five Chinese hospitals to attend a 3-day training and education workshop
- Delivered with the support of Metro North Health



Digital Health Education

Workforce



The Digital Health Education series aims to:

- bring clinicians, academics, researchers and industry together
- update on the latest developments in research
- learn how health informatics is translating to inform and impact clinical care and patient outcomes.

For Digital Health Grand Rounds and Journal Club in 2024, 15 events have been held with each session averaging ~60 attendees.

If you're interested in attending either of the last two sessions for 2024 or future events, please contact QDHeC@uq.edu.au.

Thank you to all our wonderful speakers!

Australian Council of Senior Academic Leaders Digital Health

- Established by the Digital Health Cooperative Research Centre
- Launched at HIC2024

Foster and harness digital health scholarship, education, research and translation through collegiate collaboration, critical dialog and collective action on matters of common interest to Australian universities.



What has been tough



What has been tough



What has been tough



**Ethics and governance
procedures**



Funding

What has been fabulous



What has been fabulous



What has been fabulous



Our people



Our partners

QDHeC in 2025



Partnership with
Townsville Hospital and
Health Service to
leverage unique data
science and engineer
expertise



Development of a
joint Public Health
Research program,
with the School of
Public Health



Identification of
opportunities for
continued growth of
education offerings

We know true collaboration happens when the idea can no longer be traced to one person.

Simon Sinek



The future of digital health

A connector between the health
system and research, and
system improvement

Dr Tanya Kelly
Acting Deputy Director-General eHealth Queensland

The future of digital health – a connector between the health system and research and system improvement

Dr Tanya Kelly

A/Deputy Director-General, eHealth Queensland



Queensland
Government



Acknowledgement
of **Country**



Setting the scene

Queensland Health Strategic Direction



HealthQ32



Maximise wellbeing
Improve the health and wellbeing of Queenslanders



Care in the community
Strengthen access to care in the community and closer to home



Care in hospital
Optimise delivery of safe, appropriate and timely hospital care

- Reform
- First Nations
- Workforce
- Consumer Safety and Quality
- Health Services
- Public Policy
- Research



Digital Health 2031

Improving healthcare outcomes for all Queenslanders through digital innovation



Empowered consumers



Digitally-enabled population health



Connected and insight-enabled workforce



Health service modernisation for sustainability

- Digital Hospitals
- Virtual Healthcare
- Rural & Remote Digital Healthcare
- Healthcare Insights & Data Sharing
- Clinical Systems at Risk
- Capital Expansions
- Digital Foundations

Capability themes

- Smart Campus Enablement
- Digital Innovation
- Consumer Experience and Citizen Engagement
- Digitally Connected Care
- Mobile-optimised Workforce
- Biomedical Technology Enablement
- Care Closer to Home

Queensland Health Technology Strategy

Platform based approach for the technology-related delivery of the Queensland Health Digital Health 2031 strategic vision.

Digital safety and foundations

Providing highly secure, stable and sustainable ICT systems and infrastructure across Queensland Health to enable patient care and health service delivery.

Focus areas for eHealth Queensland



Safety and Quality



Access to data



First Nations health



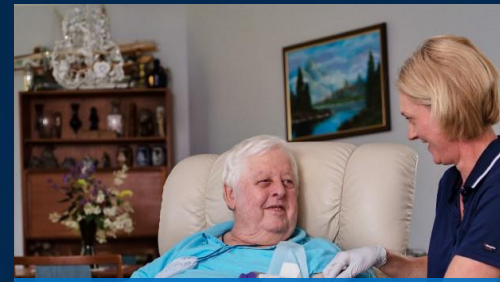
Consumer empowerment and experience



Access and patient flow



Workforce shortage



Care closer to home



Intersectoral collaboration

Emerging priorities

Artificial intelligence

Biomedical technology and smart campuses

Genomics and precision medicine

Climate change

**Why is research
in digital health
important?**



Horizon One: digital basics

- Software systems will be intuitive (e.g. minimal logins and voice recognition)
- Mobility is enabled as appropriate (e.g. Follow Me desktop, BYOD)
- Clinical results reporting is governed and transparent
- There is a standardised approach to data entry with consistent data definitions and workflows across all sites
- All clinical and administrative information is coded using national standards
- Closed loop medication management is enabled
- Clinical decision support is
 - Evidence based and regulated for consistency
 - Customisable for maximum impact and to minimise alert fatigue

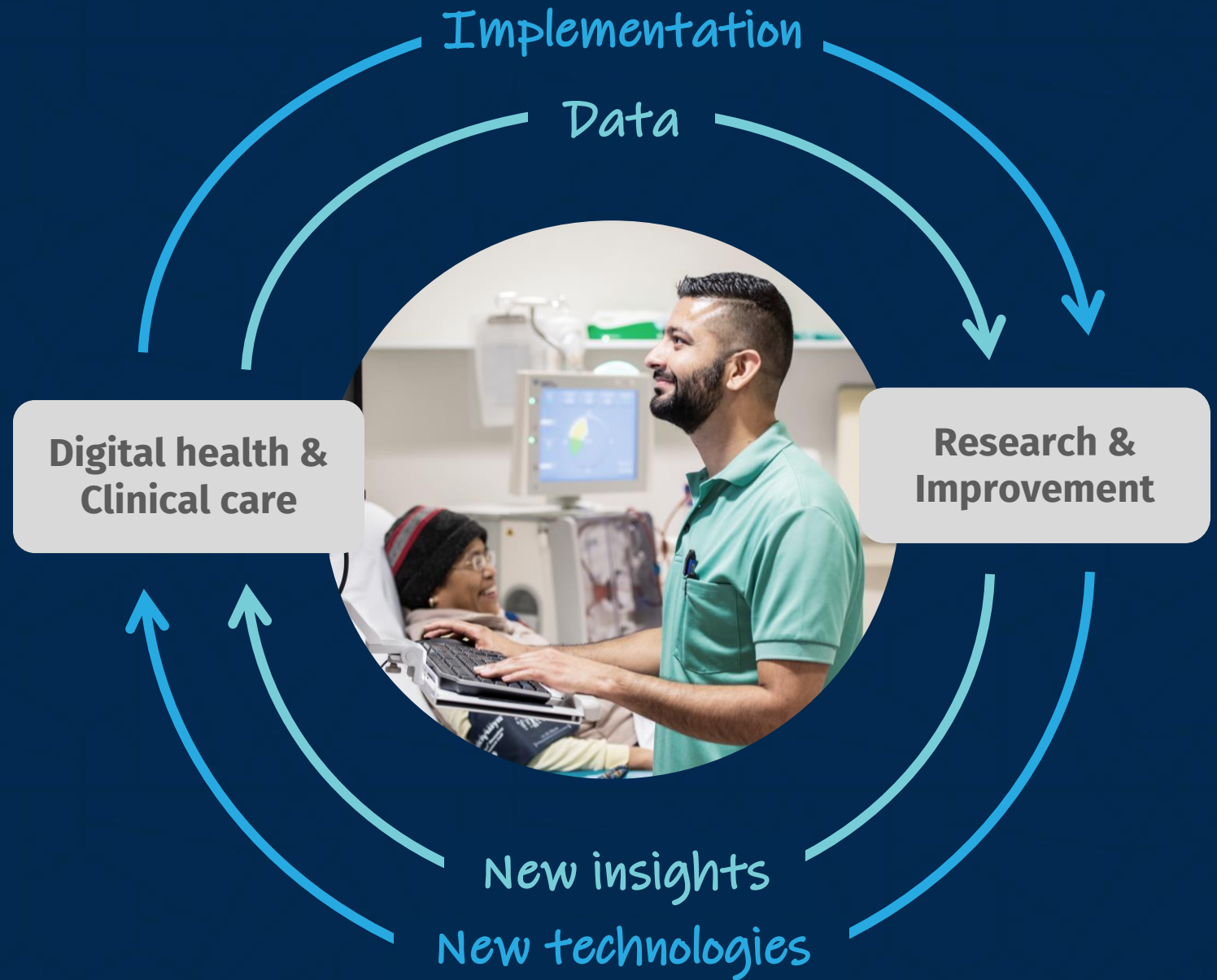
Horizon Two: leveraging digital data for the clinical teams caring for the patients

- There is development of a clinical informatics workforce skilled in all stages of the data cycle
- Appropriate data is collected as part of routine clinical care without additional effort required
- Systems and solutions can be integrated real-time to facilitate data analytics and business intelligence supporting intelligence-driven decision-making
- Development and monitoring of quality metrics including patient reported outcomes and experiences (PROMS and PREMS respectively)
- All systems have inbuilt end user query tools for reporting
- Analytics is an integral part of software rollout
- A streamlined appropriate consent for data to be used in clinical research is developed
- Information is appropriately managed and governed
- There is a greater level of access to, and transparency of personal health records supporting enhanced individual health literacy and greater patient involvement

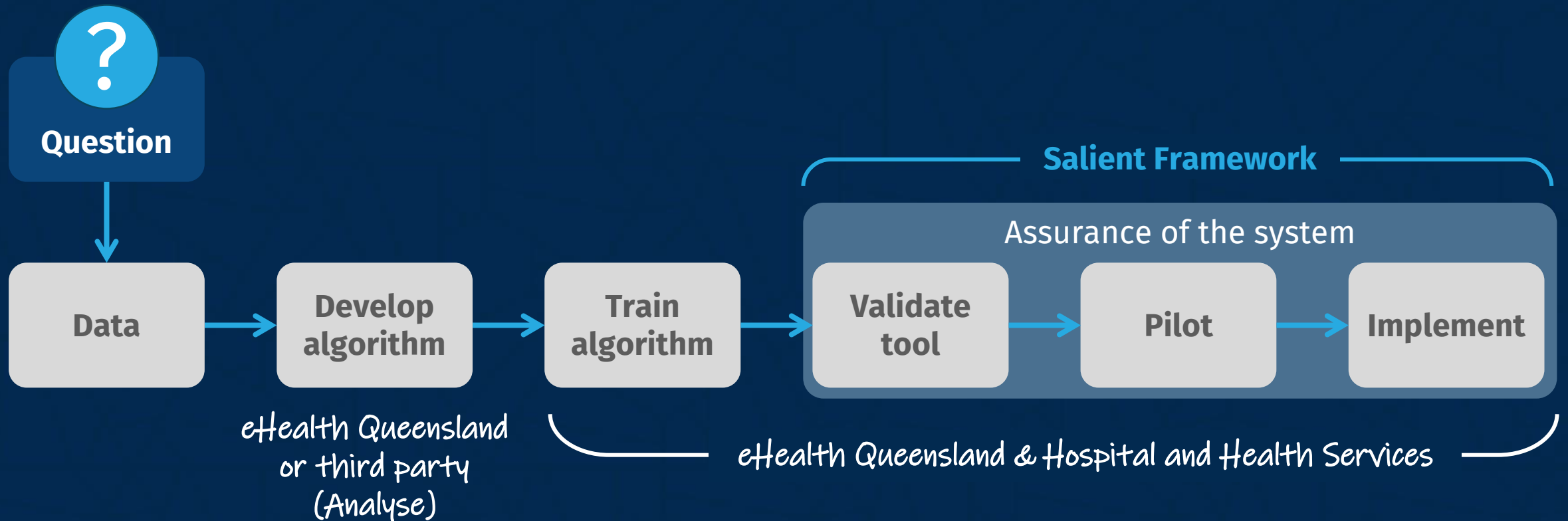
Horizon Three: new models of care

- Our workforce is ready and skilled for new models of care
- Virtual interaction between clinicians and patients is enabled, facilitating equivalent clinical experience for both clinician and patient regardless of modality
- There is a focus on large data sets informing the care of individuals
- Analytics moves from descriptive to predictive to prescriptive and the model of care moves from break/fix towards predict/prevent
- Artificial intelligence is an iterative, transparent tool to support patient care and improve outcomes
- New hardware such as wearables, smart devices, drones and robotics are harnessed to achieve our clinical aims
- True clinical outcomes improvement is more important than innovation

Link between digital health, clinical care and research



Implementation of artificial intelligence

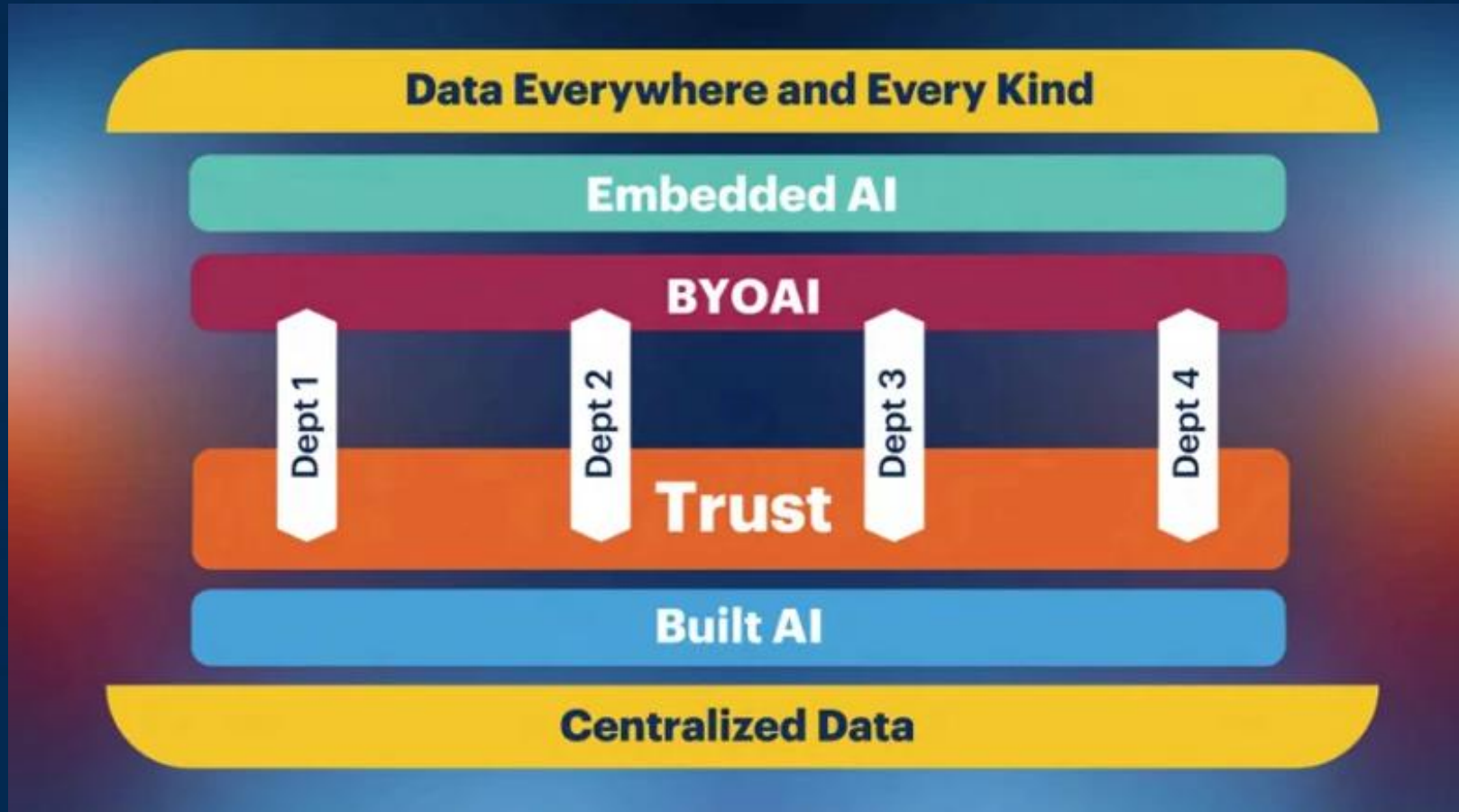




eHealth Queensland's focus

- Foundation elements
- Data quality
- Data availability
- Good processes to validate data
- Assurance of the system

Working in a two-speed environment



Enablers for future digital health



Social licence



Safety and
assurance



Compute



Partnerships



SMART Hub

- UQ and eHealth Queensland research conjoint appointments
- SMART Hub – PowerPlans Study



eHealth Queensland Research Governance



Adjustment in research
governance



Established the Digital Health
Research and Advisory Group

Thank you



Expert Panel

Challenges and opportunities in healthcare using AI

Assoc Prof Sebastiano Barbieri

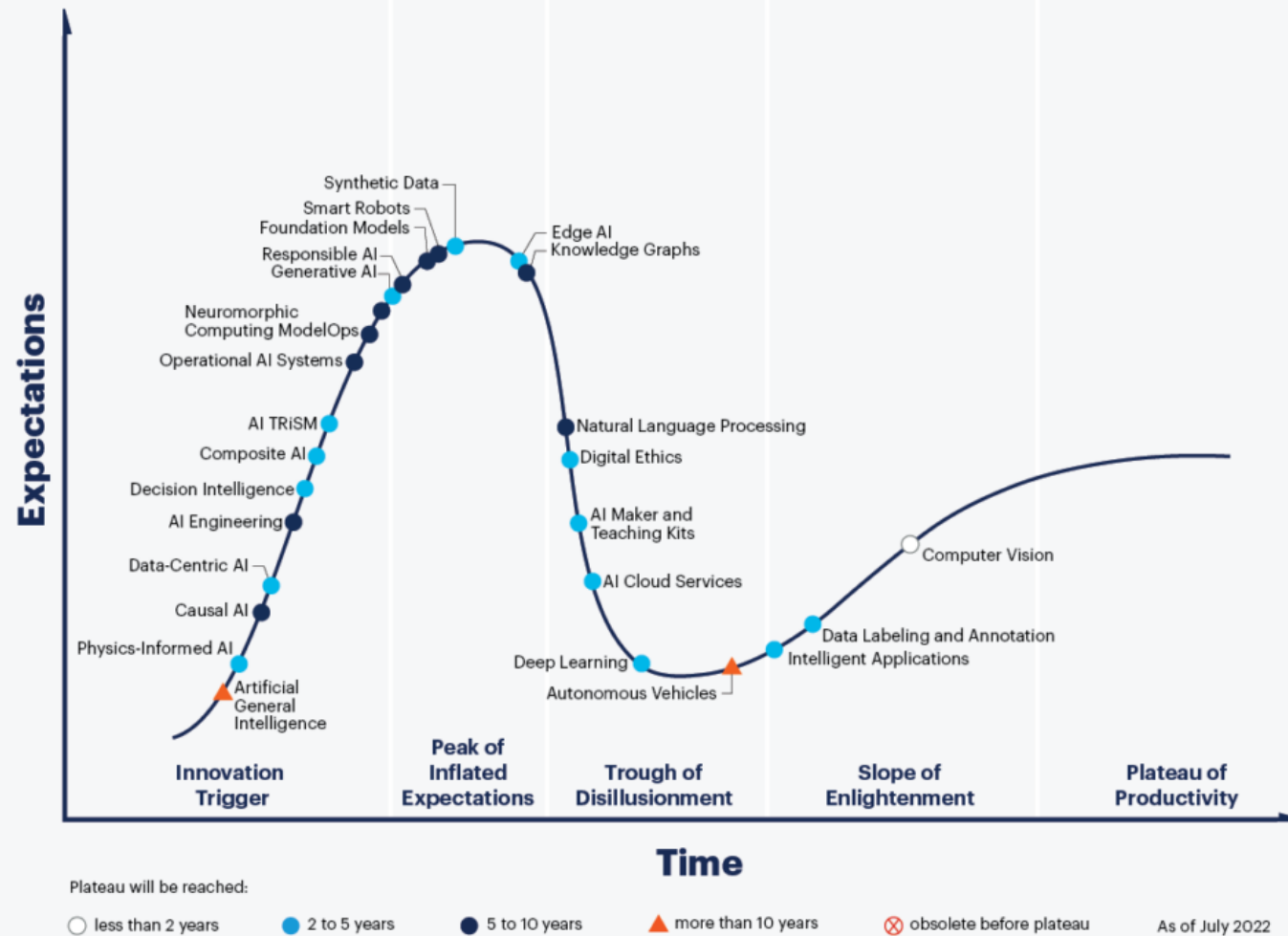
Dr Tanya Kelly

Meg Jeppesen

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Moderator: Prof Jason Pole

Hype Cycle for Artificial Intelligence, 2022



gartner.com

Expert Panel

Challenges and opportunities in healthcare using AI

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Moderator: Prof Jason Pole

Morning tea

10:30am – 11:00am