



Australia's National
Science Agency

Enabling digital health in Australia and the world

Our Australian e-Health Research Centre is leading the way in interoperability, virtual care, and precision health – all underpinned by the power of artificial intelligence.

Two decades of digital health solutions

The Australian e-Health Research Centre (AEHRC) is the digital health program of Australia's National science agency, CSIRO. For the past two decades we have delivered digital solutions to Australia's greatest health challenges.

Our scientists conduct research and develop scalable, real-world products and services to support industry, governments, and clinicians to deliver efficient and effective healthcare and health systems.

We are recognised by health systems in Australia and across the globe as leaders in digital health research, tool and platform development and implementation. Our software is used in around the world including the UK, Europe, Asia, and the US.

The pillars of digital health

We recognise the digital transformation of healthcare depends on the development of three broad areas or pillars of digital health:

- virtual care
- precision health
- interoperability.

All our technology in this area is underpinned by the analytical and predictive power of artificial intelligence.



Interoperability

The quality of information in healthcare is critical to the delivery of safe and effective health care.

Data quality is essential for healthcare organisations to make informed decisions and provide patients with the best possible care. Our technologies enable interoperability, advanced and effective use of data captured in electronic medical records, through the development of products and services to support use of clinical terminologies such as SNOMED CT and interoperability standards such as Fast Healthcare Interoperability Resources (FHIR).

Ontoserver

Our clinical terminology and FHIR® enabled products are used globally to support the advanced use of SNOMED CT, management of value sets and maps and syndication of clinical terminologies.

Ontoserver provides the foundation of the Australian Digital Health Agency's (ADHA) National Clinical Terminology Service (NCTS) and the UK NHS Clinical Terminology Service.

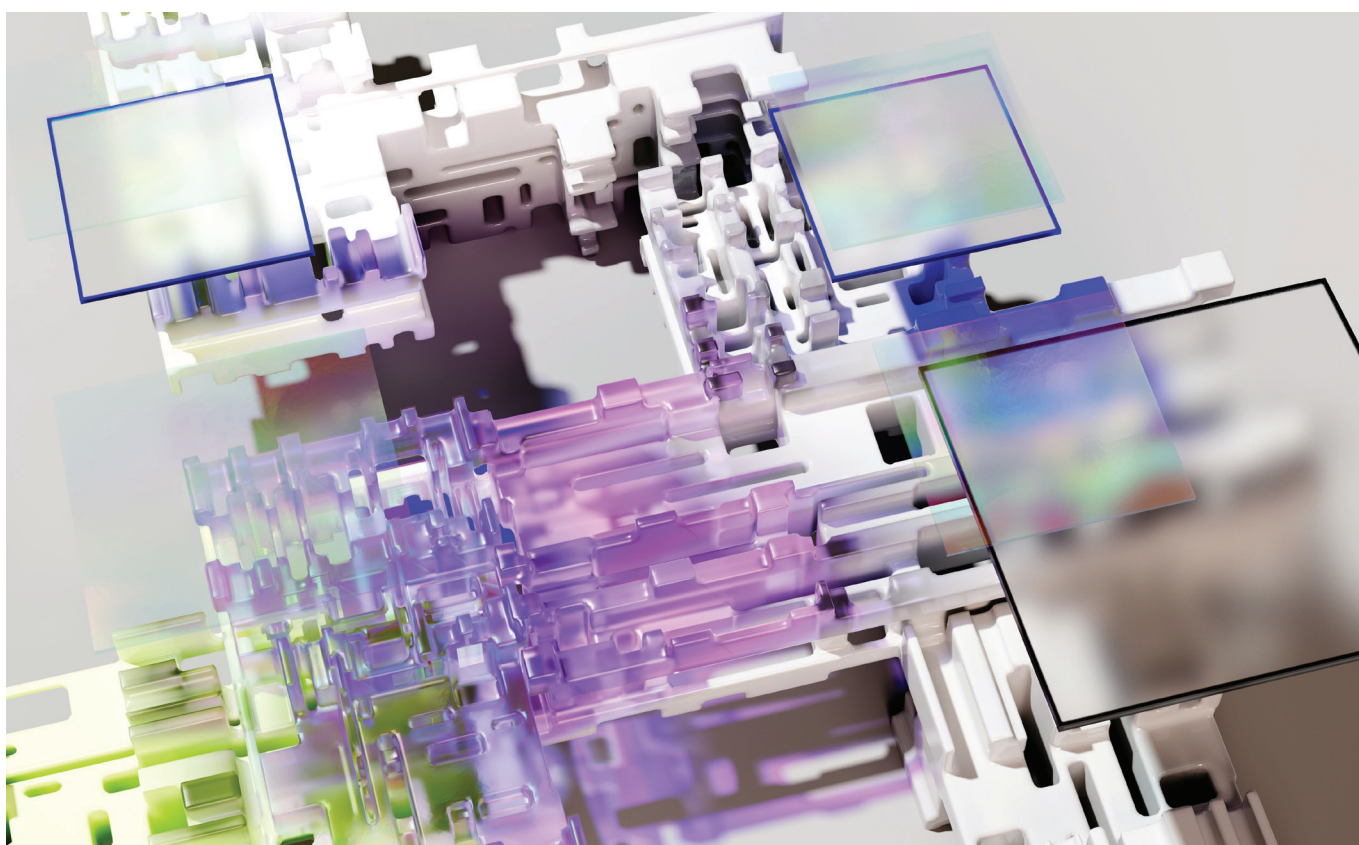
The NCTS provides state of the art terminology services that promote implementation and adoption of national clinical terminologies in Australia.

As part of the NCTS, a licensing agreement between the ADHA and CSIRO enables public and private health sectors to access Ontoserver for free in Australia.

Sharing data, not documents

We have worked with government and industry stakeholders over a number of years to agree on a Fast Healthcare Interoperability Resources (FHIR) Implementation Guide for primary care practice to practice exchange of health records.

Building on this work, as part of the 2023–24 Federal health budget, CSIRO was funded to support the Department of Health and Aged Care, Australian Digital Health Agency and HL7au to provide coordination and subject matter expertise to accelerate the development of national FHIR standards. Through a collaborative FHIR Community Process CSIRO will develop an Australian (AU) Core FHIR Implementation Guide and eRequest FHIR Implementation Guides to support the use of FHIR in an Australian context.



Virtual care

Access to virtual care depends upon technology based on broadband and mobile technology. We deliver innovative technology to overcome the burden on health services and consumers.

Our expertise includes mobile technology, home monitoring, telemedicine in rural and remote areas and wellbeing and behavioural change.

We are testing technologies to improve health services for people living in various settings, and from various backgrounds and life experiences.

Mobile platform for gestational diabetes support

We've developed and trialled a mobile health platform to help women and clinicians better monitor and manage gestational diabetes mellitus (GDM).

The platform, called M♡THER, replaces a traditional paper-based diary system. Women can record information in a smartphone app such as blood sugar levels, blood pressure, weight, diet and exercise.

Information is uploaded by women to the linked clinician portal, so their dietitian, diabetes educator, midwife and obstetrician can monitor their progress in real time and intervene if required.

Leveraging technological know-how with next-gen sensors

Harnessing the rapid development of sensor technology, we are currently exploring a range of emerging smart and intelligent sensors, sensors, sensing architectures, and machine learning approaches that can be pervasively integrated with digital care programs, resulting in targeted data collection and remote health monitoring while preserving the privacy of users.



Implementing our science

We take a systematic approach to identifying barriers and enablers to the implementation of virtual care interventions. Our rigorous and scientific approach to demonstrate the effectiveness of our implementation methods.

We frequently conduct co-design workshops where we take theory informed recommendations and bring them to life in the relevant context with facility input. This process encourages buy in and collaboration, which we turn into successful outputs, outcomes and impacts such as increased uptake of virtual care interventions and practice change.

Precision health

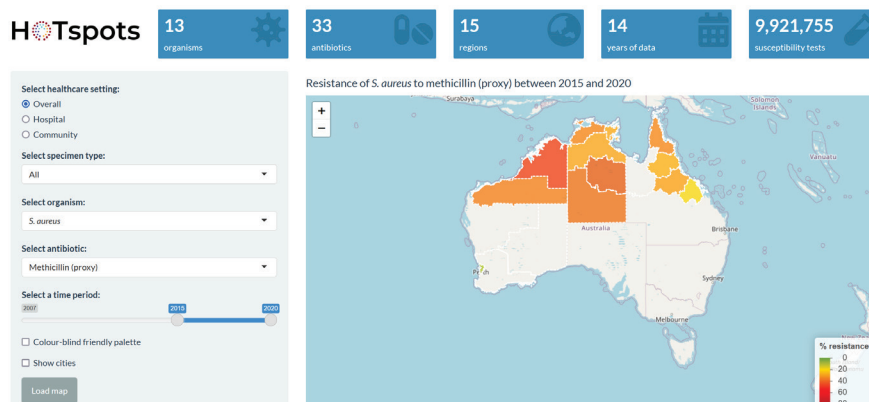
Traditional modes of prevention and treatment focus on the best outcome for the largest groups of people, which usually results in at the least a small failure rate. With precision medicine, treatments are determined by personalised information about the individual, often at the genetic level.

Precision medicine allows us to know about the patients first before we treat them.

We don't drive innovation alone. We partner with governments and industry to drive scalability via cloud computing; machine learning to analyse big data sets and using hardware together with algorithms to find the answer to our collaborators' specific questions.

HOTspots

The HOTspots team uses disease surveillance data and artificial intelligence to predict risk of antimicrobial resistance across One Health sectors. One Health combines information about microbial populations in human, animal and environmental hosts. This technology will permit a deeper understanding of the spatial and temporal risk of AMR in Australia and provide insights into new and innovative strategies to mitigate the AMR threat across human and animal populations and the environment.



Newborn screening

Together with gene testing lab Genepath and Pathology Queensland, we analysed data from 3958 people with cystic fibrosis.

The aim was to reveal whether current guidelines for carrier screening require changes due to shifts in the ethnicity of Australia's population.

We found that people of East Asian ethnicity are disproportionately affected by limitations in testing guidelines which recommend testing a small number of high frequency variants.

AI and Alzheimer's disease

We support Australia's Alzheimer's disease (AD) research cohorts analysing longitudinal imaging, biomarker and clinical data analytics of over 2000 patients. Through AI and machine learning, we support researchers and clinicians in diagnosis and early intervention management of Alzheimer's disease. Current diagnosis of pre-clinical AD is difficult because there are very few biological markers with high accuracy.

We are developing key technologies for in vivo quantitative assessment of tau and amyloid- β (A β) deposition. There are suspected to be early markers of AD. With this work, we've shown that A β starts to accumulate in the brain 20 years before the onset of the clinical symptoms of AD, providing a broad window where potential interventions can be performed.

As Australia's national science agency, CSIRO is solving the greatest challenges through innovative science and technology. CSIRO. Unlocking a better future for everyone.

Operational and clinical decision support

Our research in explainable clinical decision support has produced an algorithm for reducing unplanned hospitalisations that has been deployed for a national trial across over 170 general practice clinics and is now embedded in a popular commercial general practice software. We have also developed algorithms for near-real-time identification of hospital patients at risk of adverse outcomes such as deterioration or unplanned rehospitalisation. We are also working with the Westmead Neonatal Intensive Care Unit to predict the risk of deterioration and adverse outcomes in premature infants.

Artificial intelligence

Artificial intelligence is set of tools and techniques that we can use to help health services, clinicians and researchers deliver improved healthcare.

AI tools are critical to healthcare because they can be used to improve the safety, quality, efficiency and accessibility of Australia's healthcare system. Our digital technology is underpinned by AI, which offers data analytic capability, clinical decision support and improved health system efficiency.

From genomic engineering to independent living, AEHRC is using artificial intelligence techniques and machine learning approaches now to overcome the challenges facing the healthcare system of the future.

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