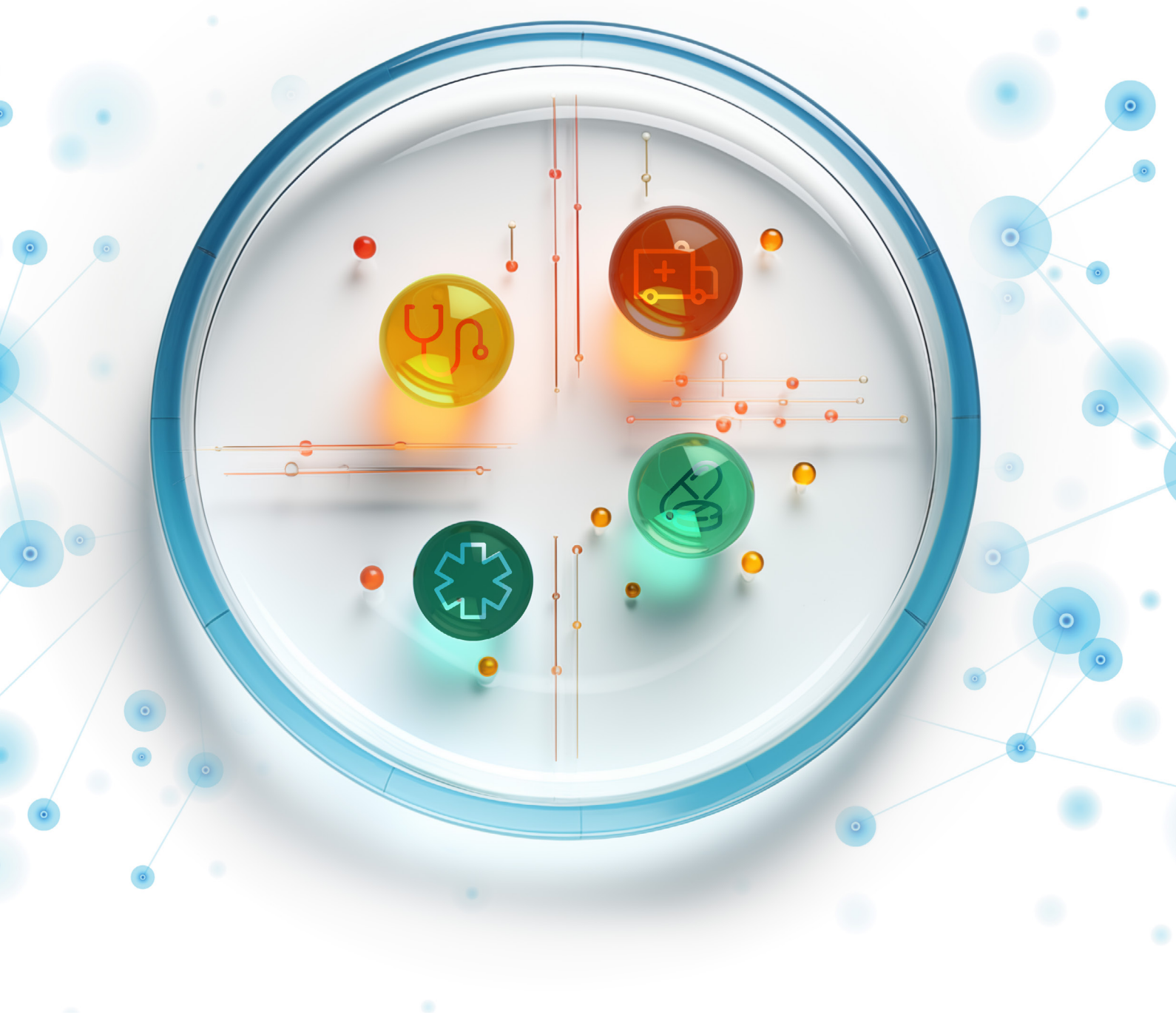
Deloitte.

In association with **Google Cloud**



Healthcare breakthrough
AI's game-changing prescription

Contents

Executive summary

Artificial intelligence (AI) and digital technology are revolutionising the way we approach healthcare – and the impact is only set to grow.

For the last 15 to 20 years investments in information technology within the healthcare sector have been focused on key building blocks that generate vast quantities of rich valuable health data.

As AI solutions continue to streamline medical diagnostics, treatments, and patient care, and reduce the burden of administrative tasks, the scope to further redefine and personalise people's medical experiences is immense. With the emergence of new digital health and generative AI solutions, such innovation will be particularly welcome within a health system that is experiencing clinical workforce

shortages, funding constraints, and ever-increasing patient demands. Looking ahead, the potential for AI and digital technology to transform healthcare is truly exciting.

Fully realising the potential benefits from technology will require governments, regulators, health professionals and patients to join forces as they explore opportunities and navigate pressing issues – such as patients' data privacy and the ethical use of AI.

> Healthcare is a universal aspect that touches all our lives yet is increasingly strained by the complexities of an ever-changing world. I view the role of AI in revolutionising healthcare as more than just a possibility but an imperative towards a healthier global community.
>
> **Kellie Nuttall, Deloitte Strategy and AI Lead Partner**

While buy-in from political leaders will help drive improvements, an AI-driven transformation of public health requires a combined effort from across the health and social care ecosystem. Rapid innovation is required and clinicians, innovators and leaders – partnering with progressive medical institutions and healthcare providers – have the knowledge, ingenuity and passion to take the lead.

What will help fast-track reform is that families and patients are demanding change, too. As Deloitte Lead Healthcare Partner Luke Baxby notes: "Consumers are asking for a different health experience. So, it's not like we need to ask, 'I wonder if consumers are up for this?' They are. They moved to virtual and telehealth during COVID-19 at a rapid rate and they want more."

In this report, we make the case for why the system needs to embrace AI in healthcare, highlight challenges facing the sector, and put the spotlight on some innovative digital health solutions. We also acknowledge the alliance between Deloitte health and technology experts, and peers from Google Cloud as we explore the ways in which AI and digital technology are redefining healthcare.

Deloitte's proven ability to design, implement and review healthcare programs, in tandem with Google's commitment to "help everyone, everywhere to be healthier" is a powerful combination.

Perhaps most importantly, this report contributes to the ongoing discussion about the role of technology in the healthcare space and, in so doing, helps maintain the momentum for meaningful change.

Doctors, nurses, and patients need to find a better way – and AI and digital health strategies provide an opportunity to do just that as Australia seeks to ensure that its world-class health system remains fit for purpose.

Definitions

What is generative AI? This refers to the next generation of artificial intelligence in relation to deep-learning models that can generate high-quality text, images and other content based on the data sets it is trained on.

What is digital health? This refers to non-face-to-face clinical care that is enabled through digital mechanisms such as telemedicine and telehealth, and the use of apps and digital devices.

Healthier outcomes

This report identifies four broad ways to improve digital health solutions.

1. **The 'Time to Act' is now!** – AI momentum needs to be driven holistically across the entire health ecosystem by like-minded providers, technology pioneers, researchers and health professionals working together with government, regulators, and administrators.
2. **Build digital thinking into your strategy** – hospital and healthcare executives should incorporate technology designs into their operational frameworks, rather than treating them as an add-on.
3. **Understand the digital opportunity** – better communication of the advantages of AI and digital technology is required, including how it can improve the experience of healthcare practitioners and let them spend more time in direct patient care.
4. **Encourage more digital health partnerships** – combining the strengths of technology innovators in the health sector with risk-management and health-financing experts promises to smooth the way for smart, ethical healthcare advances.

Why now? The case for an urgent embrace of AI

> We're not simply going to be able to build more hospitals in order to face up to rising healthcare demands. You can build them, but you can't staff them. And even if we could, it's the wrong answer. We're already seeing that happening now, so we need to think disruptively about the operating model.
>
> **Luke Baxby, Deloitte Lead Healthcare Partner**

Like many of its global counterparts, Australia's healthcare system is at a crossroads.

There is a critical shortage of medical practitioners, emergency departments are overflowing, many patients in remote and rural areas have limited access to modern imaging and diagnostic tools, and healthcare providers are struggling to meet escalating demands, including within the aged care cohort and in regional and remote communities.

These factors, and more, are at the heart of calls for governments, health institutions and professional healthcare groups to move quickly to incorporate more digital technology solutions that can enable superior care outcomes. Although the health sector has had to deal with a myriad of challenges in the past, it is now experiencing a perfect storm of challenges.

The pain points

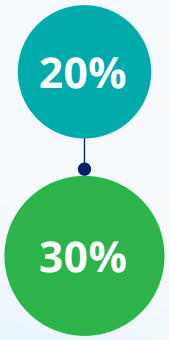
Demand-side pressures

An ageing population, population growth and the increasing incidence of chronic disease are exacerbating the pressure on all aspects of health activity across the country. The burden on the nation's healthcare system is unsustainable, with Deloitte modelling of public and private hospital-bed requirements from 2016 to 2036 showing that Australia must build a 375 acute-bed hospital every month for about 15 years to keep pace with demand and replace ageing stock[1].

Supply-side constraints

While the demand drivers of AI in healthcare are well understood, supply-side factors in traditional health settings are also experiencing disruption. These include a rising vacancy rate for healthcare workers, higher operational costs and funding limits, leaving governments without the means they previously relied upon to stabilise the system.

Old versus new healthcare infrastructure



Tension between traditional healthcare infrastructure and digital technology is a point of frustration for clinicians. Deloitte research indicates that 20% to 30% of the time spent by clinicians is on duties that they see as being of low or no value. Working in a dense paper-based environment and subject to strict regulations, their productivity is in decline.

Baxby says the current operating model needs fixing. "The issues that health has faced over many decades are not going to be solved in the way they have been in the past because we don't have the workforce, we don't have the dollars, and we don't have the infrastructure. Digital is part of the pathway through that."

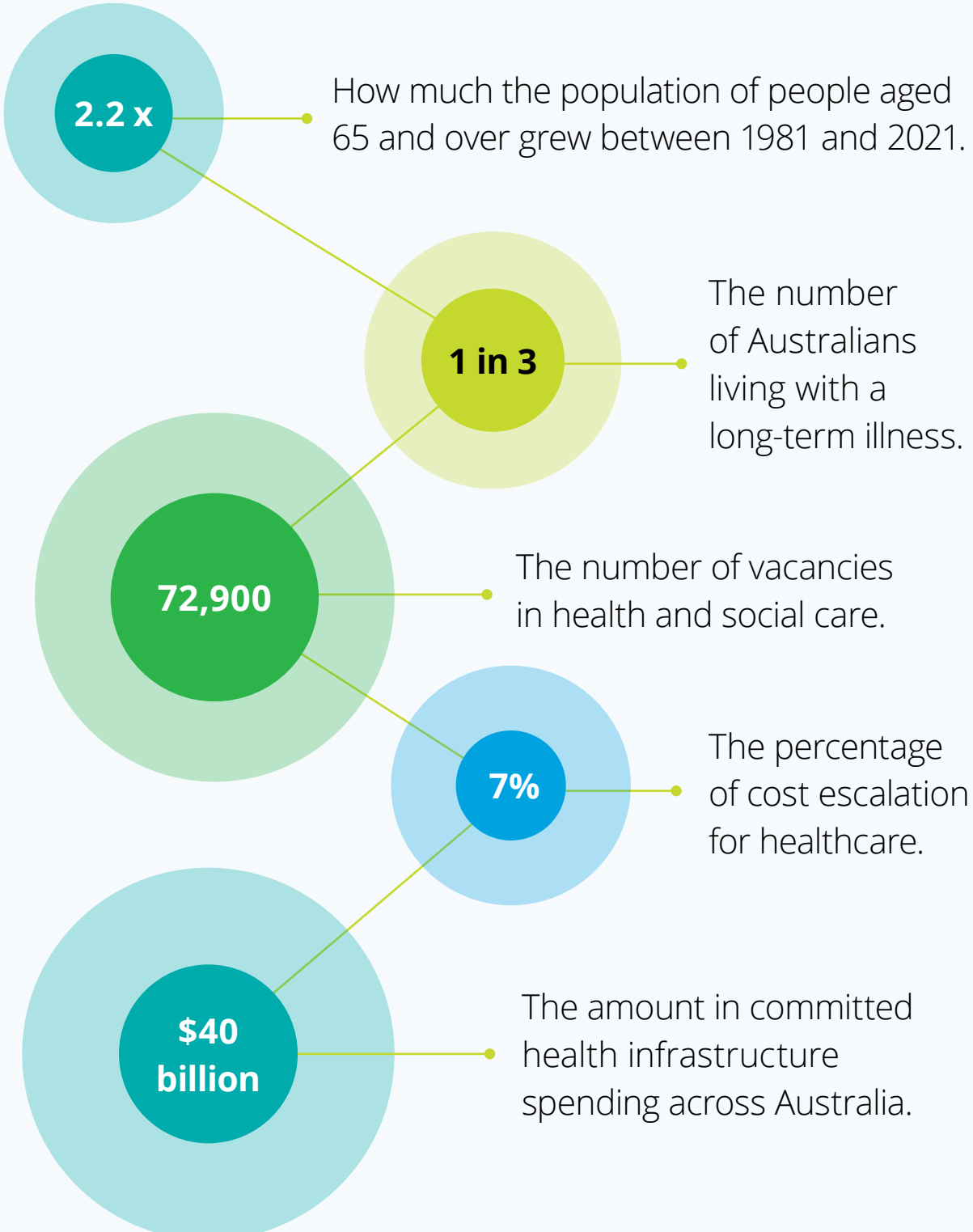
Promisingly, AI and digital technology are already contributing to a new era of patient-centric care. With advancements in machine learning, deep learning and natural language processing, digital technology is helping healthcare professionals diagnose diseases, personalise treatment plans and improve operational efficiencies.

Dr Gareth Kennedy, Specialist Director, Deloitte Data & AI team, says digital tools can be especially helpful in assisting the growing number of elderly people requiring care.

> "With an ageing population, we're going to need more people looking after patients in aged care homes, and we simply don't have enough people to do this. I see AI as a tool with massive potential to aid our healthcare staff to deal with this increasing demand."

Deloitte and Google Cloud – drawing on their skills around actuarial services and technology innovation, respectively – recognise the urgency of AI adoption in healthcare and are at the forefront of innovations using digital technology to problem-solve. More such partnerships will be required in the Australian market for the healthcare sector to gain maximum benefit from the adoption of digital technology.

By the numbers – a health system under stress[2]



Google Cloud's digital goal

As part of Google's goal to help billions of people around the world become healthier, Google Cloud has become a key player in the deployment of digital healthcare ventures.

The tech giant's innovations include improving documentation and workflow for clinicians, accelerating the development of new pharmaceutical products, and streamlining data management for healthcare providers.

These breakthroughs notwithstanding, more innovation and more technology advances are required. Citing just one example, Scott Thomson, Head of Innovation, Customer Engineering at Google Cloud, says the medical industry has a "lack of interpreters" of health information that is compromising in-ward care and leading to makeshift solutions involving translation cards and family members.

Machine translation tools are starting to fill the void as hospitals turn to AI to supplement their communication between ward staff and patients.

Thomson says the case for adopting AI tools in Australia and elsewhere is clear because they "help you plan, help you reduce toil, and help you scale talent".

The verdict from consumers

Consumers appear to be ready for a different health experience, based on findings in the Reimagining Healthcare Consumer Survey, conducted by the Consumers Health Forum of Australia[3]. The research provides consumer insights into people's experiences and expectations of digital healthcare, including:

71% Agreed or strongly agreed that sharing access to their health information would improve communication with healthcare providers.

83% Were at least somewhat interested in being able to access their own health records.

72% Agreed or strongly agreed that telehealth outcomes were the same as they would have been face to face.

65% Would consider using more advanced home-based technologies to help identify and diagnose health conditions.

Data and ethics – navigating the digital health landscape

> AI can help you but you're dealing with very sensitive information, so you need to worry about consent, privacy, who sees the information and how you ethically automate decision-making because you're dealing with people's lives.
>
> **Dr Gareth Kennedy, Specialist Director, Data & AI, Deloitte**

The collection and analysis of data represents one of the great strengths – and challenges – of AI technology.

With patients' lives and wellbeing on the line, there is little room for error. Three of the most discussed risks related to the rollout of AI tools in healthcare settings are:

- **Data privacy** – the use of vast amounts of patient data for AI training and analysis raises concerns about data security and the need to protect information from threats such as unauthorised access and cybersecurity attacks.
- **Demographic bias** – an AI algorithm that is trained on data that reflects demographic biases (such as race, gender, and socioeconomically disadvantaged groups) may prejudice the treatment of some people, notably those in marginalised communities.
- **Regulation and governance** – a lack of clear guidelines for the use of AI can complicate decisions within healthcare organisations about how to use the technology responsibly.

George Lamaris, Principal, Healthcare Technology Advisory at Deloitte, says attention to detail when training AI systems – and getting ethical, governance and data foundations right – is crucial. "All of those enablers are needed to make the AI healthcare vision happen," Lamaris says.

With the technology and regulatory rules still evolving around the use of AI, the role of actuarial and health specialists such as Deloitte to review AI healthcare programs becomes ever-more important. Deloitte's Gareth Kennedy advises implementing a model drawing from "AI insight, but with human oversight".

"You must make sure the guard rails are in place," he says.

Kennedy says Deloitte has applied similar checks and balances for clients in the insurance sector to ensure there is no racial discrimination with setting premium prices. In the case of AI in healthcare, the need to minimise a range of threats will require multiple risk-management specialists to advise clients.

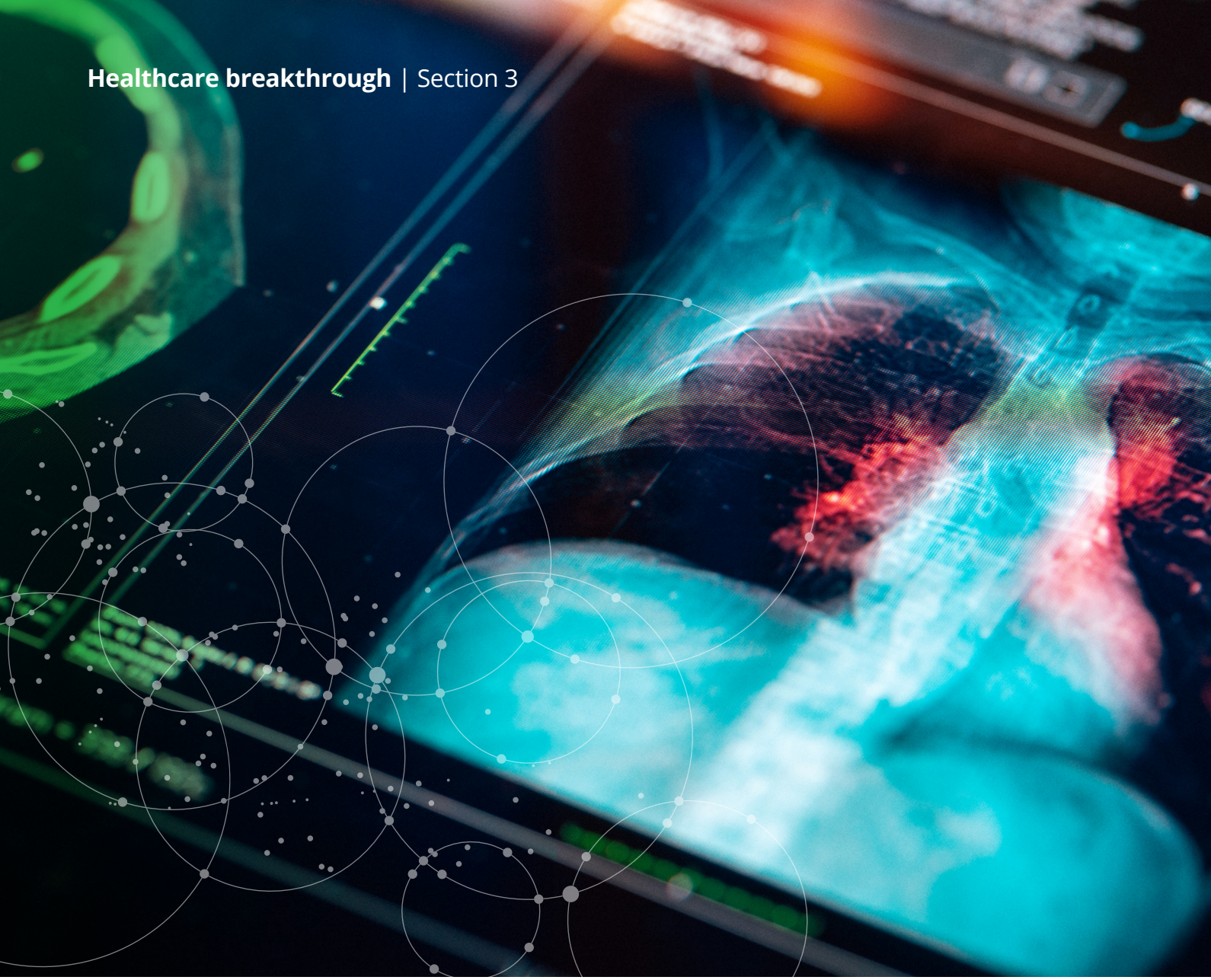
Dr Elea Wurth, Risk Advisory Partner, Trustworthy AI Lead at Deloitte explains: "We have a holistic approach to AI risk management, drawing on expertise in healthcare, regulation, AI risk and governance, and leading edge technology. With this foundation of global expertise we work with our clients to ensure their AI ecosystems are ethical, lawful and technically robust".

The smart use of data in healthcare settings

- Give all stakeholders a role in digesting complex data to ensure confidence around improving early interventions among high-risk patients, which in turn can reduce demand on hospitals.
- Use data to create healthcare insights around aspects such as possible disease progression and the next best action for care.
- Ensure openness and transparency of healthcare decision-making and do not abdicate control to AI algorithms at the expense of humans.

The breakthroughs – where AI will make a difference

> We have a saying at Google Cloud that your ambitions are a glass ceiling on what you're going to achieve. If you set the bar too low, you'll not achieve much at all.
>
> **Scott Thomson, Head of Innovation, Customer Engineering at Google Cloud**



AI in healthcare offers the prospect of transforming the way we diagnose, treat and prevent diseases. Without question, diagnostics represents one of the most significant areas of progress to date.

Digital tools can predict coronary artery disease risks from scans, machine learning has been applied to detect dementia-related diseases, and AI-powered medical imaging systems are aiding radiologists as they identify health anomalies in X-rays, MRIs and CT scans.

AI can also analyse electronic health records and other patient data to predict which patients are at risk of developing certain illnesses, or detect early signs of conditions such as cancer and osteoporosis. This may help doctors to intervene early and improve patient outcomes.

The strength of machine-learning algorithms, when trained on datasets of medical images and patient records, can often outperform human experts in detecting and diagnosing diseases. They can also be used to guide medical procedures, such as data-driven robots being used in minimally-invasive surgery.

AI is also assisting in the following areas:

- **Treatment plans** – machine-learning models can analyse patient data to tailor treatment plans and predict patient responses to therapies.
- **Patient care** – chatbots and virtual assistants are providing patients with information, scheduling appointments and answering some medical queries, thereby reducing administrative overheads and improving the patient experience.
- **Administrative tasks** – natural language processing and speech recognition technologies are being used to transcribe medical notes and streamline documentation, saving physicians valuable time.

Deloitte experts have identified additional use cases for generative AI that have the potential to transform care and improve patient outcomes, including in areas such as:

- **Cancer treatments** – using cancer anthologies from clinical notes to improve care pathways and support.
- **Hospital networks** – facilitating emergency departments to assess, triage and identify and stream cases to improve patient engagement.
- **Dialysis services** – generating user stories, acceptance criteria and test cases for product enhancements based on user queries.
- **Pharmaceuticals** – querying and analysing regulatory data sources to provide answers from multiple resources.
- **Non-profit health system** – generating health insurance letters based on payers' medical policies.

Alongside Deloitte, Google is at the forefront of efforts to improve healthcare through AI and automation. The company's clinicians, researchers and engineers are collaborating to create technology breakthroughs.

AI tools such as Med-PaLM 2[4] – a large language model (LLM) that uses generative AI to provide high-quality answers to medical questions – are helping healthcare operators improve administrative and operational processes. Med-PaLM 2 is the first AI system to beat the pass mark on US Medical License Exam (USMLE)-style questions, with the latest iteration of the technology achieving an accuracy rate of 86.5%.

Google Cloud's Scott Thomson says industry-tailored tools such as Med-PaLM 2 can significantly enhance healthcare experiences. He urges patience, though. "While this is exciting progress, there's still a lot of work to be done to make sure this technology can work in real-world settings," he says.

More broadly, Google has been successfully using AI to advance healthcare processes globally, with the following examples receiving acclaim.

Case studies

Mobile ultrasounds

Google is deploying a low-cost, battery-operated handheld ultrasound device that can be used in rural areas in countries such as India to reduce maternal deaths. Ideal for remote

areas with limited access to hospitals and health services, the device's images are uploaded onto a smartphone for AI to quickly interpret gestational age and fetal position of the unborn child. With maternal mortality costing the lives of up to 300,000 women a year around the world, this simple initiative has the potential to dramatically reduce preventable deaths related to pregnancy and childbirth[5].

Some additional advances include:

- **Radiotherapy treatment**
  Google Cloud has partnered with the Mayo Clinic in the United States to explore how AI can support the time-consuming process of planning for radiotherapy treatments[6,7]
- **Drug discovery**
  Google Cloud announced two new AI-powered life sciences solutions to accelerate drug discovery and precision medicine for biotech companies, pharmaceutical firms, and public sector organisations. Thomson cites the example of Google's DeepMind lab AlphaFold project, which provides open access to over 200 million protein structure predictions to accelerate scientific research. "We open-source almost all our healthcare research because we believe there is a greater social good at play."[8,9]

Thomson says collaboration between entities such as Google Cloud, Deloitte, medical researchers and health organisations will be the key to delivering digital technology advances and helping communities.

Rethinking healthcare

The following are two practical ways AI and automation can make a difference.

The problem: a shortage of nurses

The solution: There is increasing discussion around the opportunity with AI and digital technology to provide nurses and patients with a digital assistant. In the absence of enough nursing staff, this tech support can help nurses cover more patients, and consumers navigate their individual health journey and make better healthcare decisions.

The problem: a lack of time and productivity among medical practitioners

The solution: Returning time to care is crucial in an era when many healthcare workers are burnt out. With AI tools, there is scope to let technology take care of paperwork and menial tasks while allowing doctors and other medical staff to focus on patient care and support work.

From fax to digital technology

The shift from a paper-based working environment to the latest digital technologies cannot come quickly enough for Kate Renzenbrink, Digital Health Nurse and former Chief Nursing and Midwifery Information Officer.

During a recent Deloitte-Google Cloud webinar – titled "From Bleeding Edge to Leading Edge: Is Now the Time to Mainstream AI in Healthcare?" – she made the case for digital transformation in nursing and midwifery services, noting that clinicians have for too long been tied up with tedious paperwork. "We still fax from department to department," Renzenbrink says.

She adds that a lack of data integration can contribute to impaired follow-up care with patients after hospitalisation and high readmission rates. "We've got this tension between old infrastructure and access to the funding needed to transform what we are doing."

Quality nursing and midwifery data can give nurses and midwives insights about how to manage clinical variation and provide better continuity of care, while a comprehensive switch to digital technologies will save time now spent on transferring paper-based patient data to electronic medical platforms.

"This is where AI really is going to transform what we do," Renzenbrink says.

What's next? Putting Australia on the path to a digital health future

> Technology is not the inhibitor, it's imagination – so the future is about conveying the art of the possible that the technology enables.
>
> **Alan Eckstein, Deloitte Lead Healthcare Technology Partner**

The prospect of truly transforming Australian healthcare using AI and digital technology now seems within reach.

With the COVID-19 pandemic having provided crucial momentum for digital health advances, the challenge is to sustain progress, according to Deloitte's Gareth Kennedy. "I want to get across the urgency of this."

Google Cloud's Scott Thomson agrees that swift action is required, especially given the pressures on the healthcare system and its workers. "We're not that far from breaking point," he says.

In the spirit of collaboration, both Deloitte and Google Cloud are eager to "have a conversation" about technology with other interested players in the healthcare market. Thompson says, "We're very keen to solve these problems with the government, with regulators, and with care providers."

To that end, attention to the following factors will help Australia progress on its AI healthcare journey:

- **Vision** – develop a purposeful set of objectives for the health system, including addressing health inequity.
- **Purpose** – integrate primary, secondary and tertiary healthcare entities and governments to provide people-centred, digitally enabled care.
- **Data** – build governance frameworks to support patient data sharing and privacy.
- **Infrastructure** – establish minimum standards for integrated digital and physical health infrastructure.
- **Interoperability** – requires data to be available for patients to engage with and share with whom they choose.
- **Investment** – rethink government and other funders' investment in digital health as part of the scaled adoption of emerging technologies.

For organisations considering engaging in the AI healthcare space, Deloitte recommends some tactical steps they can take without over-committing financially in the short-term. "There are lots of things healthcare providers can do to progress their AI journey," Deloitte's Luke Baxby says.

For example, ideation labs are a logical place in which to create and test digital strategies as a starting point. Engagement in clinical trials is another option, while digital health point-of-care (POC) testing can be used to improve patient access to diagnostic services and overall patient management.

Baxby says in a healthcare sector dealing with "large, complex data sets without insight" and a complicated operating environment, AI is the way of the future. "AI is the perfect technology to be able to ingest and understand that environment and leapfrog forward." It also promises to ease the load on medical practitioners amid research that shows

health workers will need to deliver four times their current service level to meet forecasted needs in 2050 based on health workforce projections[3].

As he contemplates the future of AI advances in healthcare, Deloitte's Alan Eckstein does not want to see industry leaders "going down pedestrian paths". They should be ambitious, forward-thinking and be willing to drive change.

Eckstein concludes: "The breadth of opportunity and application of AI, generative AI, and data and automation is phenomenal. There's hardly an area within the value chain that cannot be supported in the future."

The to-do list for the AI healthcare sector

- Train more data scientists, data engineers, and data analysts to work in healthcare.
- Re-tool health services to incorporate AI and digital technology.
- Transform healthcare-related workflows to include AI and digital factors.
- Leverage AI for medical research and clinical trials.
- Digitise with purpose in areas that make a real difference to health and wellbeing, including image scanning, diagnostics and remote health programs.

What we must avoid doing is digitising old ways of working.

Deloitte

Deloitte is using its experienced actuarial and health specialists to design, implement and review healthcare programs, while working with strategic alliance partners to strengthen community and national health outcomes.

Visit Health Care | Deloitte Australia

Google Cloud

Google Cloud for healthcare and life sciences seeks to empower data-driven innovation, transform the patient and caregiver experience, and enable operational efficiencies. Overall, Google seeks to help everyone, everywhere be healthier through technology products and services that connect and bring meaning to health information.

Visit Google Cloud for healthcare and life sciences

Footnotes

[1] Rethinking digital-enabled healthcare in a post-pandemic Australia, Deloitte Digital. Deloitte Touche Tohmatsu, 2023.

[2] Australia's Health Reimagined, Illustrative summary, March 2022.

[3] Baxby et al., Australia's Health Reimagined (Deloitte, Digital Health Cooperative Research Centre, Consumers Health Forum of Australia and Curtin University, March 2022), p12.

[4] Healthcare advances with AI (including Med-PaLM2), https://blog.google/technology/health/ai-llm-medpalm-research-thecheckup/

[5] Mobile-optimized artificial intelligence for ultrasound, https://www.nature.com/articles/s43856-022-00194-5

[6] Google Cloud and Mayo Clinic, https://cloud.google.com/blog/topics/customers/how-google-and-mayo-clinic-will-transform-the-future-of-healthcare

[7] Google Cloud, Mayo Clinic and Radiotherapy, https://blog.google/technology/health/exploring-ai-radiotherapy-planning-mayo-clinic/

[8] Google DeepMind AlphaFold, https://www.deepmind.com/research/highlighted-research/alphafold

[9] AlphaFold protein structure database, https://alphafold.ebi.ac.uk/

Contact us

Luke Baxby
AU National Healthcare Leader
Health and Human Services
lbaxby@deloitte.com.au

Dr. Kellie Nuttall
Partner, Consulting
Strategy and AI Practice
knuttall@deloitte.com.au

Alan Eckstein
Deloitte Lead Healthcare
Technology Partner
aleckstein@deloitte.com.au

Dr. Gareth Kennedy
Specialist Director
Deloitte Consulting
gkennedy@deloitte.com.au

Scott Thomson
Head of Innovation Customer
Engineering
scottyt@google.com

Dr. Elea Wurth
Partner, Risk Advisory
Deloitte
ewurth@deloitte.com.au

Huge thanks to our contributors:

Kate Renzenbrink, James Allan, Selena Rollason, Dominique Bainy, Erica Dodd, Suzana Bozic, Brad Erickson, Jarred Mailer-Lyons and The Agency.

Deloitte.

1236669476_Designed and produced by The Agency | Deloitte Australia_01/24