A New Chapter —showcase

This document, prepared by the Queensland Government's Department of Environment and Science (DES), contains a short description and case study for each of the nine emerging knowledge seed industries identified in the report entitled *A New Chapter: Opportunities to seed new industries for Queensland over the coming decade*. The report, produced by CSIRO and the Queensland University of Technology's Centre for Future Enterprise, was commissioned by DES.

The businesses selected to demonstrate each industry sector are either based in Queensland or have benefited from Queensland grants and/or research. The case studies supplement the report by showing real-world examples of the industry sectors identified in the report. Inclusion in this document does not indicate Queensland Government endorsement of the organisations featured.

Case study content current as at July 2022.

Emerging knowledge-driven seed industry

Additive biomanufacturing
Using additive manufacturing processes for medical applications to provide highly customised body parts, scaffolds or medical devices

AI-enabled healthcare
Leveraging growing capabilities in artificial intelligence (AI) and electronic medical records to improve health outcomes and system efficiencies

Green metal manufacturing
Creating new value in the manufacturing and mining sectors by taking advantage of the state's abundant clean energy and mineral resources

Resource recovery technologies
Transforming existing waste streams into higher-value products, diverting waste from landfill, and reducing demand on virgin materials

Microalgal and macroalgal resources
Contributing to solving significant global food, water, and emissions challenges by using natural resources and local expertise to grow algae

Agricultural sensors and automation
Applying robotics, sensors, and other automation technologies to boost the productivity and global competitiveness of the agricultural sector

Supply chain provenance technologies
Building trust and increasing the value of exports by using technologies to improve the traceability, transparency and authenticity of supply chains
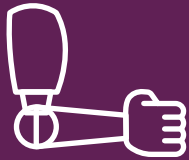
Disaster resilience and response technologies
Translating existing capabilities in robotics, autonomous systems and data analytics to improve preparedness and resilience to disasters

Construction technologies
Reducing safety risks in the construction sector by using assistive technologies and maximising off-site automated processing

Additive biomanufacturing

Using additive manufacturing processes for medical applications to provide highly customised body parts, scaffolds or medical devices.

Stryker

Stryker, a major adopter of advanced manufacturing for implants production, is establishing a new medical research and development laboratory (R&D Lab) in Queensland. Building on existing partnerships with hospitals, researchers, universities, and local governments, the facility will transform research into viable, precision medical device technology. Stryker's new Digital, Robotics, and Enabling Technologies organisation and its South Pacific team have partnered with, and received a research grant from, the Queensland Government. The grant is being used to develop the R&D Lab that will focus on data science, robotics, disease and infection control, and advanced manufacturing research.

Collaborating with Australian universities, hospital systems and clinicians, the R&D lab will be operated virtually by a team of engineers, scientists, clinical researchers, and data analysts until the physical facility opens at the Royal Brisbane and Women's Hospital campus around the end of 2022.

Stryker engineers demonstrating new software features for the Mako SmartRobotics™ System
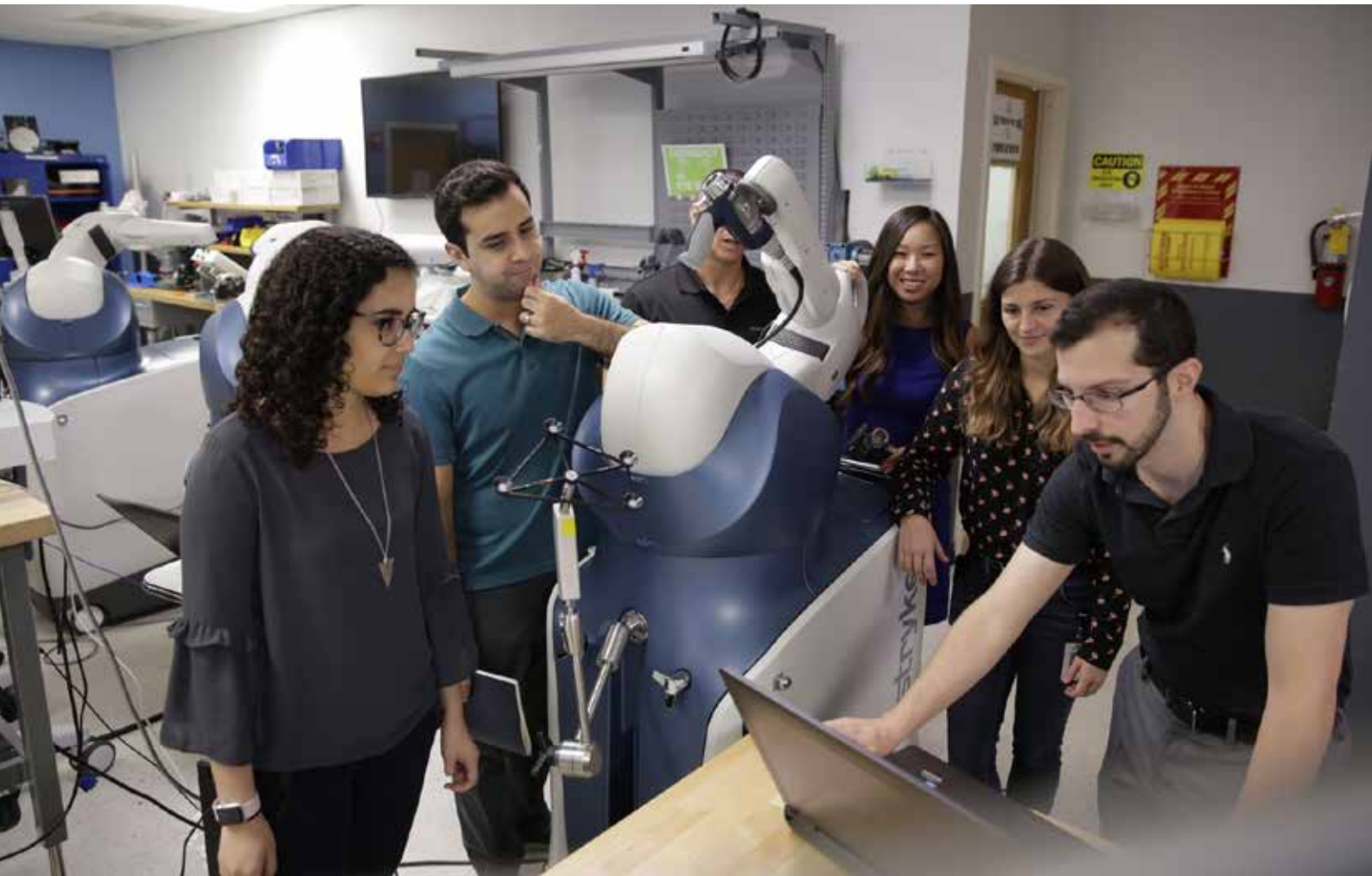
AI-enabled healthcare

Leveraging growing capabilities in artificial intelligence (AI) and electronic medical records to improve health outcomes and system efficiencies.

Datarwe

Datarwe, a Gold Coast-based data-driven technology company, developed a precision medicine data platform, named Clinical Data Nexus, that could revolutionise innovations in health care around the world. The company was established in early 2019 as a public-private partnership with the aim of collaborating with government, industry, and healthcare providers to develop the world's most comprehensive acute care medical research data platform. Datarwe received $1.5 million in Advance Queensland funding to support its collaboration with Griffith University and to fund five PhD industry top-up scholarships.

The Clinical Data Nexus de-identifies, links and enriches patient data from hospitals state-wide, creating a rich, multimodal data environment that includes data from monitoring devices and clinical notes. Access to this platform reduces the time and economic costs for clinical, academic and commercial med-tech/life-science collaborators to conduct research and translation of their medical and technological innovations. Previously, such data was either not collected, or was not readily available for clinicians to use in the development of critical new medical therapies. With the Clinical Data Nexus platform in place, clinicians and medical researchers can readily access and rapidly collaborate in the development and delivery of AI-based clinical diagnostic tools and technologies, bringing immediate and measurable benefits directly to the patient bedside.

Datarwe's decision to base its headquarters in the Gold Coast Health and Knowledge Precinct will play a pivotal role in providing new career pathways and local opportunities in emerging industry roles within AI, cognitive technology, and automation.

Dr Stephanie Chaousis, Partnership Manager at Datarwe

Green metal manufacturing

Creating new value in the manufacturing and mining sectors by taking advantage of the state's abundant clean energy and mineral resources.

Sun Metals Corporation

Sun Metals Corporation has been a pillar of the Townsville community for over 20 years and, with a 450-strong team, is the city's largest private-sector employer. The company is currently undertaking a $455 million refinery expansion, a $7 million robotics project, and developing an integrated solar farm and a new green hydrogen facility. Developing the hydrogen project will leverage the company's existing 143MWAC solar farm, helping to meet its commitment to obtaining 100% of its energy from renewables by 2040, as part of the global RE100 initiative.

In June 2020, the Queensland Government awarded a $5 million grant to support the Sun Metals Hydrogen Queensland SunHQ project, which involves the construction of a renewable hydrogen facility at the Sun Metals refinery. The company will use cutting-edge robotics technology to increase zinc recovery to 97% and production to 300,000 tonnes, placing it in the world's top 10 zinc refineries, and making it one of the most environmentally friendly of these facilities.

Sun Metals Corporation zinc refinery and solar farm, Townsville

Resource recovery technologies

Transforming existing waste streams into higher-value products, diverting waste from landfill, and reducing demand on virgin materials.

BlockTexx

BlockTexx is an Australian clean technology start-up unlocking the value of textile waste. Developed in Queensland, the company has created a patent-pending process that combines chemical recovery technology and advanced manufacturing to produce high-quality recycled materials made from PET pellets and cellulose powder, suitable for use in textiles, packaging, and building products. The process, developed in collaboration with Queensland University of Technology researchers—called S.O.F.T. (separation of fibre technology)—is noteworthy because it is designed to handle hybrid fabrics. The recovered resources will be available for export and remanufacturing, helping the fashion industry to achieve its sustainability goals.

BlockTexx is now scaling up its technology thanks to a capital injection of $5.5 million, from a mix of private investment and grant funds from three tiers of government, including a $997,617 commitment from the Australian Government, $155,000 from Logan City Council and $600,000 from the Queensland Government.

The new textile recycling facility being built in Loganholme, South East Queensland, will recycle around 4,000 tonnes of textiles in its first year. BlockTexx will create up to 30 new full-time jobs and contribute up to $43 million in economic benefits to the local area. Over the next four years, BlockTexx anticipates the creation of more than 140 jobs, processing more than 50,000 tonnes of unwanted textiles, and producing a total CO_2 offset of 1,250,000 tonnes (based on annualised amounts).

BlockTexx co-founders Graham Ross (left) and Adrian Jones inside their Australian first, commercial scale textile recovery facility

Pacific Bio

Pacific Bio, based in Ayr in far north Queensland, is currently forging an international reputation for its work in enabling the growth of sustainable onshore aquaculture. The company has developed an innovative way to turn nitrogen-rich wastewater from aquaculture into nutrient-rich livestock and soil products. By partnering with scientists and aquaculture researchers at James Cook University in Townsville, Pacific Bio is making positive steps towards achieving its bio-remediation vision.

Pacific Bio's world-first technology, RegenAqua, uses macroalgae to strip wastewater of environmentally harmful pollutants created by municipal wastewater treatment plants and aquaculture farms, before it enters the ecosystem. This breakthrough technology returns nutrients back into Australia's first green biostimulant called PlantJuice that improves the health of plants and reduces the use of costly, energy intensive nitrogen, phosphorous and potassium fertilisers.

Pacific Bio also produces ReefAsta, a leading microalgae-based nutraceutical supplement containing astaxanthin, one of nature's most powerful antioxidants, to help support human health.

RegenAqua high-rate algal ponds in operation at Alva Beach, North Queensland
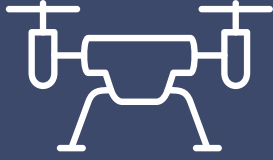
Agricultural sensors and automation

Applying robotics, sensors, and other automation technologies to boost the productivity and global competitiveness of the agricultural sector.

SwarmFarm Robotics

SwarmFarm Robotics, a start-up based in Emerald, Queensland, is one of only a handful of companies globally to have developed farm robots from start to commercial finish. Founded in 2012, the company has since raised $4.5 million in a funding round led by local venture capital firm, Tenacious Ventures and Artesian, with the support of the Queensland Business Development Fund. Further, the company was awarded a $250,000 grant by the Queensland Government as part of the Rural Economic Development grants program in 2019. The project evolved from a partnership with the robotics teams at the Australian Centre for Field Robotics at the University of Sydney and the Farm Robotics Unit at Queensland University of Technology.

The company is taking a platform approach to scaling agriculture by partnering high-tech robotics with new farming practices that can increase productivity and reduce the environmental impact of farming. Central to this offering is the SwarmConnect ecosystem, similar to an application programming interface (API), that 'opens' the SwarmFarm platform and enables developers, farmers, and partner organisations to program robots to suit their needs.

The SwarmFarm business model has two components: the SwarmBot platform and the SwarmConnect ecosystem. SwarmBot is the autonomous vehicle platform designed to carry out tasks such as spraying, weeding, and thinning. SwarmConnect is an ecosystem that enables third party developers to build applications to run on the SwarmBot. Together (think App store and iPhone), SwarmBot and SwarmConnect provide the digital equivalent of the three-point linkage—one system that can be put to many different uses.

(L–R) Andrew Bate, Tom Holcombe and Jocie Bate from SwarmFarm with 'Juliet' SwarmBot 5

Supply chain provenance technologies

Building trust and increasing the value of exports by using technologies to improve the traceability, transparency and authenticity of supply chains.

BeefLedger

BeefLedger is a Queensland-based project which is developing and commercialising an integrated provenance blockchain security and payments platform for the Australian beef industry. The platform seeks to provide greater transparency in the beef supply chain as a counter to beef fraud while also streamlining supply chain transactions. It allows consumers to validate the credentials of the product they are purchasing and seeks to harness a diverse range of product provenance information (e.g. product source, chain of custody and quality assurance certification), as a basis for improved payments and confidence among supply chain participants.

The provenance platform project was developed as part of the award-winning Export Smart Contracts Project (2018–2019). It was funded jointly by BeefLedger, Queensland University of Technology (QUT), and the Food Agility CRC. The team behind BeefLedger, at Smart Trade Networks, has expanded on this project to apply the provenance technologies to domestic and global supply chains. The company continues to collaborate with the Future Systems CRC and QUT through the Smart Food Hubs project (2020 and ongoing).

BeefLedger is now a global company operating in the Americas and Africa and trading as Smart Trade Networks in Australia. The work conducted in Queensland has informed the application of blockchain technology in the Australian beef industry.

Cattle in the feedlot in Dalby, Queensland

Disaster resilience and response technologies

Translating existing capabilities in robotics, autonomous systems and data analytics to improve preparedness and resilience to disasters.

exci

The Sunshine Coast is home to a growing network of start-ups focused on commercialising technologies to address natural disasters. Examples include exci, which uses satellites and sensor technologies to quickly and accurately detect fires close to the point of ignition. exci evolved from research conducted by the University of Southern Queensland and University of California, Berkley. The company had been contracted by a consortium in California in a $14.4 million deal to use their early wildfire detection technology analysing data obtained by ground-based cameras and space-based satellite technologies with a sophisticated artificial intelligence system. During the 2021 California fire season, exci processed over one billion images from ground-based cameras and analysed more than 500,000 satellite images (30 GB per day). The system monitored over 125 million acres around the clock—from Mexico to Canada—covering California, Nevada, Oregon, Idaho, and Washington. Reports from California indicated that the system detected 66% of fires within a minute, 95% within five minutes, and 99.99% within 10 minutes, with a near-zero rate of false positives.

exci's early fire detection system enables firefighters to gain control quickly with early and more aggressive attacks. In the future, exci aims to develop a system that will map the whole of Australia within five minutes, using a 160 m ground sample. The company's growth was supported by a $500,000 Accelerating Commercialisation Grant from the Australian Government.

The exci system in action: Fires on the Sunshine Coast detected with exci's Queensland system
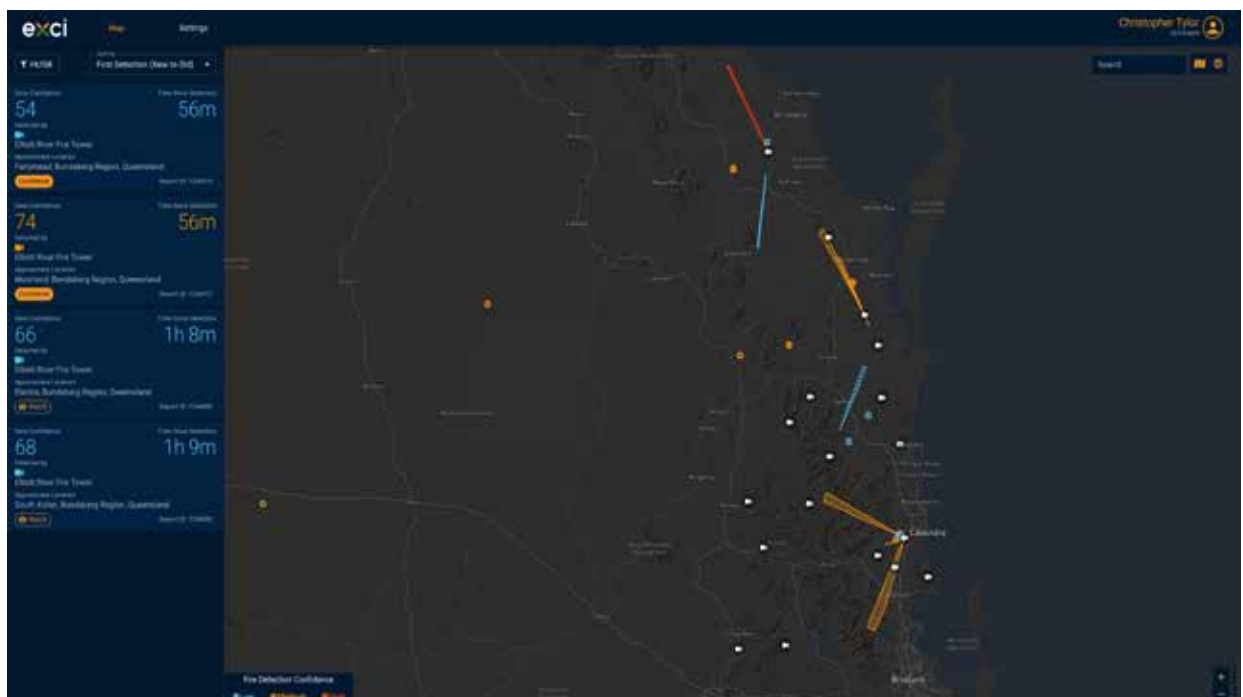
Construction technologies

Reducing safety risks in the construction sector by using assistive technologies and maximising off-site automated processing.

Hindsite industries

Hindsite Industries is a Brisbane-based proptech company championing the shift away from traditional learning environments towards a digitised, real-time knowledge exchange. The company's knowledge management platform is delivered via wearable, speech-driven technologies enabling users to participate in live remote mentoring and access transferrable micro-learnings. The platform can capture intrinsic organisational knowledge, preserve biometric data of hands-on skills, and enable new starters or the next generation of workers to be on the job working faster, smarter, and safer.

The company has gone from strength to strength since launching in 2017 and now operates across several disciplines including construction, utilities, manufacturing, healthcare, and field services. Hindsite Industries had its most profitable year in 2020, onboarding a slew of businesses—particularly in mining and construction services. In recognition of its acceleration and adoption achievements, the company was named a finalist in the 2020 Brisbane Lord Mayor's Business Awards for the High-Growth Business Start Up award.

Worker using the RealWear handsfree wearable device that connects to real-time information and expertise to help complete job tasks