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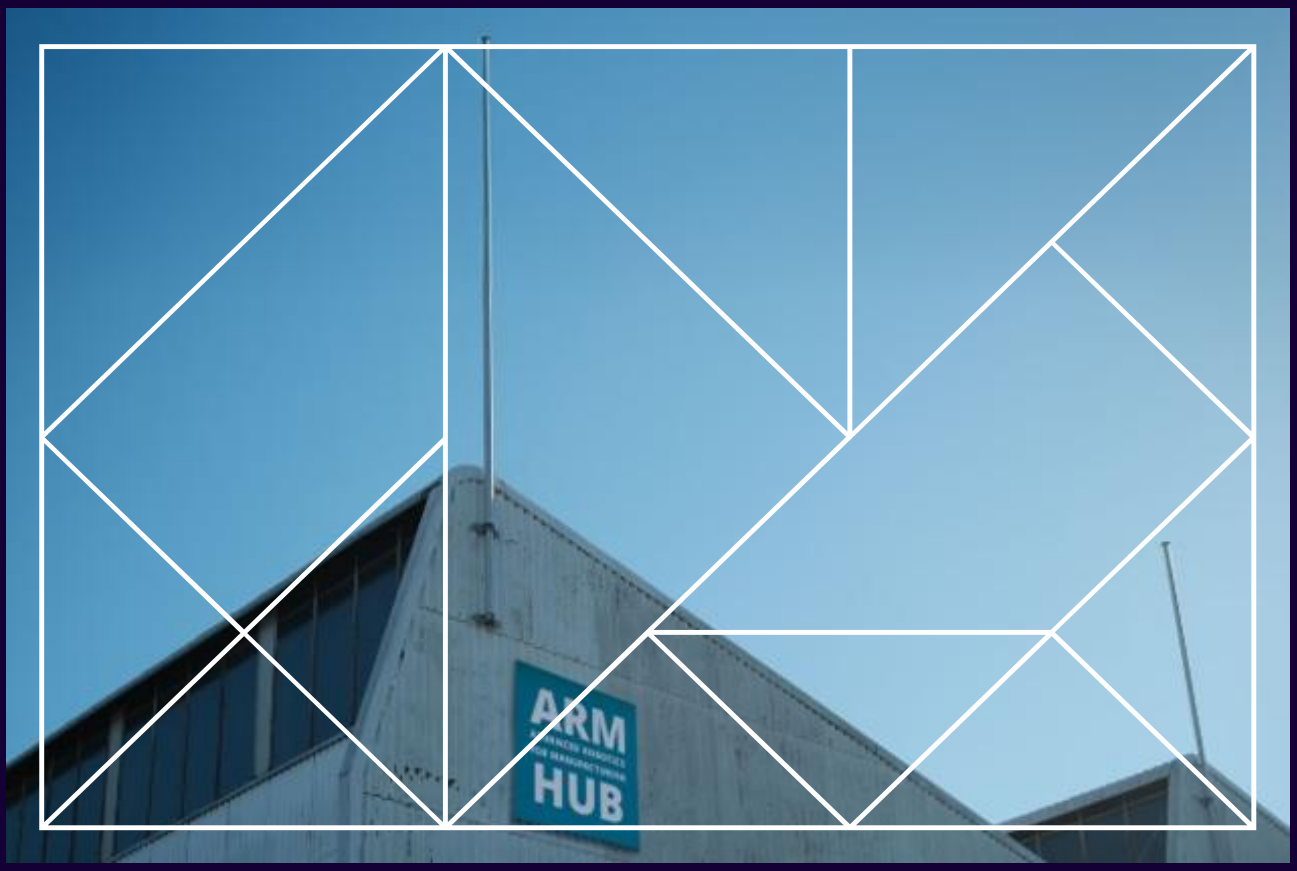
Impact Assessment of ARM Hub

Final Report

12 October 2026



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Report to:

ARM Hub

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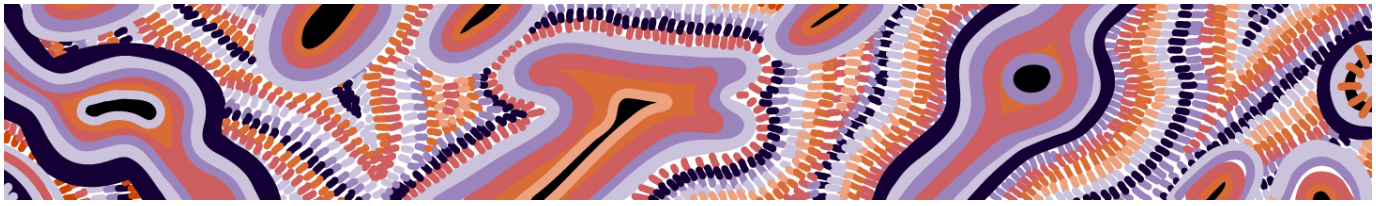

Goomup, by Jarni McGuire

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Glossary

Abbreviations	Definitions
ABS	Australian Bureau of Statistics
AER	Australian Energy Regulator
AI	Artificial Intelligence
AMCA	Air-conditioning and Mechanical Contractors Association
ANZSCO	Australian and New Zealand Standard Classification of Occupations
AR	Augmented Reality
ARC	Australian Research Council
ARM Hub	Advanced Robotics for Manufacturing Hub
BASA	Biomedical AI Sprints Accelerator
Base Case	The reference scenario in economic modelling represents projected economic conditions in the absence of the intervention being assessed
BAU	Business as Usual
BCR	Benefit-Cost Ratio
CAD	Computer-Aided Design
CAGR	Compound Annual Growth Rate
CBA	Cost-Benefit Analysis
CGE	Computable General Equilibrium
CO_2	Carbon Dioxide
Cobot	A collaborative robot designed to work alongside humans in a shared workspace, rather than operating in isolation behind safety barriers
Computer vision	A field of artificial intelligence that enables machines to interpret and respond to visual information, such as the shape, position, or surface condition of an object
Counterfactual	The hypothetical scenario used as a comparison point in impact assessment – in this report, a scenario in which ARM Hub did not exist and its funding was allocated to general government expenditure
CRC	Cooperative Research Centres
CRESH	Constant Ratios of Elasticities of Substitution, Homothetic
CRM	Customer Relationship Management
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAC	Direct Air Capture
Data lakehouse	A data architecture that combines features of a data lake (large-scale raw data storage) and a data warehouse (structured, query-ready data), enabling AI and analytics applications across unified data sources
Databricks	A cloud-based data and AI platform used by ARM Hub as the technical foundation for its Data and AI-as-a-Service offering
Dead-weight loss	The economic inefficiency that arises when a market outcome is not at the optimal equilibrium, for example, the economic cost of taxation that discourages otherwise beneficial activity
Digital twin	A virtual replica of a physical object, process, or system built from real-world data, used to simulate and test processes before committing to physical build
Discount rate	A rate used to convert future costs and benefits to their present value, reflecting the greater value placed on money received today versus in the future
ERP	Enterprise Resource Planning

Abbreviations	Definitions
FTE	Full-Time Equivalent
GDP	Gross Domestic Product
Gompertz curve	An S-shaped mathematical function used to model adoption or growth processes that accelerate initially then slow as they approach a maximum
HVAC	Heating, Ventilation and Air Conditioning
ICT	Information and Communications Technology
IMCRC	Innovative Manufacturing Cooperative Research Centre
Impact pathway	A structured framework that maps the logical chain from inputs through activities and outputs to outcomes and broader impacts, also called a program logic or theory of change
Industry 4.0	The fourth industrial revolution, characterised by the integration of digital technologies, including robotics, IoT, AI, and data analytics, into manufacturing and industrial processes
Industry 5.0	An evolution beyond Industry 4.0 emphasising collaboration between humans and machines, sustainability, and resilience, rather than pure automation and efficiency
Input-output table	A statistical table showing how the output of each industry in an economy is used as an input by other industries and by final consumers, forming the database foundation of CGE models
IoT	Internet of Things
NCG	National Competitive Grants
Neurorehabilitation	Therapy aimed at helping patients recover neurological function following events such as stroke, brain injury, or neurological disease
NPV	Net Present Value
OHS	Occupational Health and Safety
OIA	Commonwealth's Office of Impact Assessment
PFCs	Perfluorocarbons
R&D	Research and Development
RBA	Reserve Bank of Australia
Recursively dynamic model	A type of dynamic economic model in which the solution for each period is computed sequentially using the previous period's outcomes as the starting point
ROI	Return on Investment
ROR	Rate of return, the annual gain or loss on an investment expressed as a percentage of the initial investment; in R&D impact assessment, the social rate of return refers to the economy-wide benefit generated per dollar invested
Sensitivity analysis	A technique used to test how robust the results of a model or analysis are to changes in key assumptions
SF6	Sulfur Hexafluoride
SME	Small and Medium Enterprise
STEM	Science, Technology, Engineering and Mathematics
SWMS	Safe Work Method Statement
Tasman Global	ACIL Allen's proprietary large-scale dynamic CGE model of the global economy
Terms of trade	The ratio of a country's export prices to its import prices; an improvement means a nation can purchase more imports for the same volume of exports
TEU	Twenty-Foot Equivalent Unit, the standard measure of shipping container capacity, based on the dimensions of a 20-foot container

Abbreviations	Definitions
TRL	Technology Readiness Level, a scale from 1 to 9 used to assess the maturity of a technology from basic research (TRL 1) through to full commercial deployment (TRL 9)
UAP	Urban Art Projects
VLY	Value of statistical life year
VR	Virtual Reality
VSL	Value of statistical life
Whole-of-economy modelling	Economic analysis that captures the full range of direct, indirect, and induced effects of an intervention across all sectors of the economy
YGCC	Young Guns Container Crew

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Summary Report

Executive summary

ARM Hub

The AI and Robotics for Manufacturing Hub (ARM Hub or the Hub) is an independent, not-for-profit organisation focused on artificial intelligence, robotics and design-led manufacturing. Headquartered in Brisbane, Queensland, it operates as a technology accelerator that connects industry, research institutions and government to support digital transformation and commercialisation in manufacturing.

ARM Hub's mission is to accelerate the creation and adoption of next-generation technologies by Australian manufacturers. This mission aligns with Queensland's advanced manufacturing strategy and the Australian Government's Future Made in Australia agenda.

In pursuing this mission, ARM Hub supports companies, particularly manufacturers, in addressing technology needs, identifying investment pathways, and developing commercialisation strategies, with a focus on robotics and autonomous systems, data, AI and computer vision, cyber-physical systems, and advanced manufacturing processes.

This impact assessment

ACIL Allen was engaged by ARM Hub to undertake an independent impact assessment of ARM Hub's work. The purpose of the assessment is to provide insight into the outcomes and impact of the work that ARM Hub has undertaken with workers, businesses and organisations that have engaged with it.

The core objectives of the assessment are to:

- assess, and where possible, quantify the economic impact of ARM Hub's activities, including but not necessarily limited to jobs created and growth of the Queensland and Australian economies
- assess the contribution of ARM Hub to the Queensland and Australian robotics and AI industry
- assess the social, cultural, and environmental benefits provided by ARM Hub
- explore the impact of ARM Hub through 2 deep-dive case studies.

Key findings

This report demonstrates that ARM Hub has delivered significant economic, social, and industrial capability benefits to Queensland and Australian businesses over the course of its operations, relative to the funding it has received. The report shows how ARM Hub's model has enabled firms to experiment with and adopt Industry 4.0 and 5.0 technologies, improve competitiveness, and create high-value jobs onshore.

The report illustrates how ARM Hub has strengthened Australia's advanced manufacturing sector by educating the workforce, de-risking technology adoption, building local supply chains, and accelerating the commercialisation of solutions and scaling of manufacturing output. Evidence for this assessment draws on ARM Hub company data, stakeholder consultation, detailed case studies, and several vignettes illustrating exceptional outcomes for Australia. This evidence is analysed through a program-logic-based pathway to impact, which considers the relationships between ARM Hub's funding and services, development activities, industry outcomes, and, ultimately, the economic and capability impacts discussed in this report.

Economic impact

ACIL Allen's in-house Computable General Equilibrium (CGE) model has been used to estimate the Australian economy-wide impacts of ARM Hub-supported projects and activities over the period 2019-2026. The CGE model is a leading large-scale, dynamic model of the world economy, developed in-house by ACIL Allen. The model enables economic analysis at the regional, state, national, and global levels, with results relative to a counterfactual scenario in which funds allocated to ARM Hub would have been allocated to general government expenditure.

ARM Hub's work spans diverse areas and generates impacts across economic, social, environmental and capability domains. Many of these impacts are challenging to quantify or assign a monetary value to. The economic analysis presented in this report captures only the direct and indirect economic effects of ARM Hub-supported activities and industry engagements. Social, environmental, and capability impacts have been evaluated qualitatively through case studies and stakeholder interviews, as well as by drawing on ARM Hub's own impact studies. When these and other unquantified benefits are factored in, the overall value delivered by ARM Hub is likely to exceed the estimates outlined in this report.

The figure below (Figure ES 1) highlights the key findings from the economic modelling, with more detail and methodology available in Section 2 and Appendix C.

ARM Hub's activities between 2019 and 2026 are projected to increase Australia's real GDP by a cumulative total of $498 million over 2019–2038 (in 2026 dollars, undiscounted). In present value terms, this is equivalent to a one-off increase in GDP of $196 million in 2019, using a 7% real discount rate. Queensland is the largest beneficiary among the states and territories.

To put this in perspective, the $196 million present value increase in GDP is equivalent to:

— more than the annual value added by the Fuel Retailing sector[1] or by the Water Transport sector[2] in the City of Brisbane in 2019-20

— around half the annual value added by the Primary Metal and Metal Product Manufacturing sector[3] in the City of Brisbane in 2019–20

— around a quarter of the annual value added by the Transport Equipment Manufacturing sector[4] in the City of Brisbane in 2019–20.

The benefits generated by ARM Hub's activities substantially exceed its committed funding between 2019 and 2026[5] from the Queensland Government, the Commonwealth Government, and co-contributors. As at the end of 2025-26 financial year, the Queensland Government provided ARM Hub with $13.4 million (37% of total funding) in operational funding, and $4.5 million (12%) in other cash and in-kind funding. An additional $3.8 million (10%) from the State Government is due to be received in the future. The Commonwealth also provided ARM Hub with $7.4 million (20% of total funding), and other contributors had provided $5.5 million (15%) in cash and $2.1 million (6%) in in-kind.

For every $1 of this funding, regardless of source, Australia's GDP is projected to be $6.48 higher (in present value terms, at a 7% real discount rate) than if that $1 had been allocated to general government

[1] The value added by the Fuel Retailing Sector in the City of Brisbane in 2019/20 was $162.3 million in 2023/24 base year dollar terms, which converted to 2026-dollar terms is equal to $175.3 million. (Source: National Institute of Economic and Industry Research (NIEIR) 2026. Compiled and presented in economy.id by .id (informed decisions).

[2] The value added by the Water Transport Sector in the City of Brisbane in 2019/20 was $174.7million in 2023/24 base year dollar terms, which converted to 2026-dollar terms is equal to $188.7 million. (Source: Ibid).

[3] The value added by the Primary Metal and Metal Product Manufacturing Sector in the City of Brisbane in 2019/20 was $343.3 million in 2023/24 base year dollar terms, which converted to 2026-dollar terms is equal to $370.8million. (Source: Ibid).

[4] The value added by the Transport Equipment Manufacturing Sector in the City of Brisbane in 2019/20 was $755.2 million in 2023/24 base year dollar terms, which converted to 2026-dollar terms is equal to $815.6 million. (Source: Ibid).

[5] As at 2026, ARM Hub has agreement to receive funding to 2029. The figures include this agreed future funding amount.

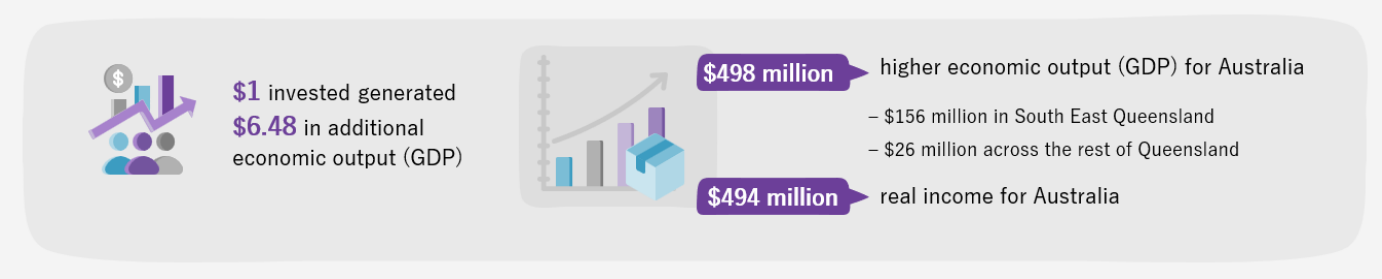
expenditure. In other words, **each dollar invested in ARM Hub is projected to generate $6.48 in additional economic activity across Australia**.

ARM Hub also contributes to employment outcomes across a range of advanced manufacturing, robotics, and AI sectors. These sectors encompass activities primarily captured in Specialised Machinery and Equipment Manufacturing, Electrical Equipment Manufacturing, and Computer and Electronic Equipment Manufacturing, with additional relevant activities potentially captured in other machinery and equipment manufacturing industrial classes.[6] Combined, these sectors account for around 6.7% of total manufacturing employment in 2026, according to Jobs and Skills Australia, implying around 58,000 jobs nationally across these sectors.

Our modelling of ARM Hub's activities in these sectors suggests it will generate a net increase in employment of approximately 455 employee years[7] over 2019-2038, including direct and indirect effects, with most of this employment generated in Queensland. This is equivalent to an average of around 23 additional Full-Time Equivalent (FTE) jobs in high-value Australian industries each year.[8]

As a net, economy-wide measure, this estimate does not capture the broader reach of ARM Hub's engagement with industry. As an indication of this reach, ARM Hub's activities are estimated to have supported many manufacturing businesses and employed approximately 4,050 people.[9] This indicates the size of the workforce that has potentially benefited from ARM Hub's support.[10] The data covers only some of the firms with which ARM Hub has engaged, so the total workforce across all firms engaged is likely larger.

Figure ES 1 Summary of the economic impacts of ARM Hub (2019-2038)



Source: ACIL Allen

Contribution to industry

At its core, ARM Hub translates research into commercial outcomes, supports SMEs in adopting advanced technologies, builds cutting-edge technology platforms to better serve SMEs, and builds the domestic capability required for a competitive, resilient manufacturing sector.

[6] https://cdn.prod.website-files.com/6487f1bc522a23d0343e6c29/64ab7ad6a4fd064ea704c473_Robotics-Australia-Group-Submission-to-National-Robotics-Strategy.pdf
https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8166.0.80.0012013-14?OpenDocument

[7] One employee year is equivalent to one FTE job for one year. For example, it could be one full-time worker for a year, or one half-time worker for two years.

[8] While this aspect of ARM Hub's net contribution may appear modest, it stems mainly from small increases in real wages that encourage more people to join the workforce and existing workers to work more hours. This is typical of an economy operating close to full employment, where the benefits of ARM Hub's work show up mainly as higher output and incomes rather than as additional jobs.

[9] Based on internal data of a subset of 135 companies that engaged with ARM Hub. These companies have a median of 30 employees.

[10] This figure does not represent jobs created by ARM Hub and should not be added to the modelled employment results.

Several features distinguish ARM Hub as an effective delivery mechanism for these goals. Unlike research centres that prioritise publications or incubators focused on start-up formation, ARM Hub is oriented toward commercialisation and addressing industry-led manufacturing challenges to improve performance and productivity. ARM Hub's engagements start with real business problems and end with working prototypes, validated processes, or deployable solutions. This means that ARM Hub has directed R&D activity toward outcomes that matter to industry, including productivity gains, cost reductions, and new revenue streams, rather than mere theoretical advances.

ARM Hub operates as a not-for-profit organisation that is operationally independent while maintaining strong connections to both government and academia. This positioning has enabled ARM Hub to act as a neutral broker, trusted by workers and businesses as a partner and by government and universities as a credible channel for translating policy and research into practice. On a promising note, the establishment of ARM Hub's AI Adopt Centre in 2024 has helped manufacturers 'put AI to work, with hands-on engineering support, expert guidance, and proven roadmaps'.[11] Users consistently report that this support, expertise and independence make ARM Hub easier to work with than traditional government programs or commercial providers, with less bureaucracy, more flexibility, and a personal, collaborative approach that has lowered the barrier to engagement, particularly critical for SMEs lacking resources to navigate complex procurement or grant processes.

ARM Hub's in-house expertise and dedicated physical space have been critical enablers of its impact. ARM Hub's team of engineers and designers has worked directly with businesses to identify, design, build, and test bespoke solutions, while its Brisbane-based facilities, equipped with advanced manufacturing tools, robotics systems, and testing infrastructure, have enabled companies to prototype, iterate, and validate solutions in a controlled environment with real-time expert support.

Through this model, ARM Hub has derisked R&D investment and accelerated adoption among manufacturers by providing easy access to innovation capabilities that are either unavailable in the industry or not easily accessible. This includes access to a common-user facility, support for technology adoption, and advanced manufacturing expertise and infrastructure, such as equipment and facilities that would otherwise be prohibitively expensive. As a result, companies better understand their needs before scaling. ARM Hub also provides a wide range of educational events and workshops for individuals, as well as services that are priced to be accessible to small and medium enterprises. In this way, ARM Hub addresses a gap in support available from government innovation programs, grant-delivery bodies or advisory organisations.

ARM Hub has built lasting capability within participating manufacturers while serving as a hub for collaboration and networking, strengthening connections across Queensland and Australia's fragmented robotics and advanced manufacturing ecosystem. ARM Hub has formal multi-year relationships with multiple universities, has facilitated closer alignment between academic research and real-world industry needs, and has enabled face-to-face collaboration and informal knowledge exchange that have generated flow-on benefits across the sector.

ARM Hub's team has played an active role in advocacy and thought leadership, representing Australian AI and advanced manufacturing on international stages. Its leadership has regularly presented at global conferences and participated in high-level panels, positioning Australia as a serious contributor to the advanced manufacturing conversation while acting as a trusted voice to government and policymakers in Australia.

This role includes supporting the development of an AI and robotics ecosystem that attracts also large firms and significant research partnerships. These partnerships provide local SMEs with opportunities to participate in high-value supply chains, and access opportunities that drive productivity and growth.

[11] https://aiadopt.ai/

Collectively, these outcomes support a more productive, sustainable, and technologically advanced manufacturing sector in Queensland and across Australia.

Social, cultural and environmental impacts

While not its primary function, ARM Hub's activities have generated substantial social, cultural and environmental impacts that extend well beyond the economic metrics considered in this report.

The case studies, vignettes, and stakeholder consultations demonstrate that, with ARM Hub's assistance, businesses have enhanced workplace safety, health outcomes, and workforce inclusion, addressing challenges in road worker protection, occupational health compliance, and regional healthcare access. With ARM Hub's support, environmental sustainability has been advanced through carbon capture technology, battery recycling solutions, herbicide-free weed management, and textile waste automation.

Critically, through ARM Hub's ecosystem, a stronger culture of technology adoption has been fostered in Australian manufacturing. Historical barriers for women and First Nations entrepreneurs have been challenged, and a cultural identity has emerged that extends beyond resources and agriculture into high-value-added sectors such as advanced manufacturing, creative industries, and space technology.

Case studies of impact

Two deep-dive case studies were selected to highlight the breadth and depth of impacts from ARM Hub's work. These examples demonstrate significant benefits to Queensland and Australia and are summarised below, with fuller details in sections 6 and 7.

Young Guns Container Crew

The Young Guns Container Crew (YGCC) case study shows how ARM Hub assistance enabled a First Nations-founded logistics company to develop automation technology for container unpacking. The ARM Hub team co-designed a sophisticated digital twin and prototype device that integrates robotic equipment, AI-driven data capture, and enhanced safety systems with the existing manual workforce.

The solution will deliver significant productivity savings, create new skilled roles in maintenance and analytics, and support YGCC's expansion across Australia and internationally while transforming traditionally unskilled supply chain work into highly engaged, technology-enabled employment.

Urban Art Projects

The Urban Art Projects (UAP) case study shows how a Brisbane-founded public art fabrication company used ARM Hub support to transform from labour-intensive, traditional methods to a globally competitive, advanced manufacturer. Through a multi-phase collaboration spanning robotics, robotic vision, augmented reality and Data and AI-as-a-Service, UAP codified tacit craft knowledge into algorithms, embedded AR tools, and developed a data roadmap to consolidate fragmented global systems.

The project enabled UAP to meet tighter delivery timelines, retain more work in Australia, improve workshop safety during hazardous tasks such as polishing, and build a structured pathway for AI-enabled decision-making across its international studios.

Closing remarks

ARM Hub has delivered meaningful outcomes for the manufacturing industry since its establishment, supported by a relatively modest level of financial investment. Similar centres internationally and across Australia receive greater levels of funding.

Stakeholders consulted for this assessment have consistently highlighted ARM Hub's agility, responsiveness, networks, facilities, location, and ability to reduce (or solve) the technological and engineering barriers facing manufacturing companies as reasons why they engage with the Hub. These are also characteristics that ACIL Allen has observed in some of the highest-performing and most valued hubs of this kind globally, such as the Catapult Centres in the UK, the Network of Manufacturing Institutes in the USA, A-Star in Singapore, Canadian Clusters, and Germany's Fraunhofer Network.

There is clear potential to further amplify ARM Hub's impact across Queensland and, more broadly, Australia. Realising this potential will require investment to support the continued development of its physical facilities and the growth of its team and capabilities.

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Main Report

1 Introduction

This section provides an overview of ARM Hub and the scope of this impact assessment.

1.1 ARM Hub

The AI and Robotics for Manufacturing Hub (ARM Hub) is an independent, Queensland-based not-for-profit organisation focused on artificial intelligence, robotics and design-led manufacturing. Headquartered in Northgate, Brisbane, it operates as a technology accelerator that connects industry, research institutions, and government to support digital transformation and commercialisation in manufacturing.

ARM Hub was formally established in December 2019 following a Queensland Government initiative to create an advanced robotics for manufacturing hub, backed by an initial 4-year investment of about $16 million, including contributions from Queensland University of Technology (QUT), Urban Art Projects (UAP) and other partners. The founding partners were QUT and UAP, with further investment from the Queensland Government, CSIRO and the Innovative Manufacturing Cooperative Research Centre (IMCRC).

ARM Hub's mission is to accelerate the creation and adoption of next-generation technologies by Australian manufacturers. Through this mission, it assists companies, particularly manufacturers, with technology needs, investment pathways, and commercialisation strategies, with a focus on robotics and autonomous systems; data, AI, and computer vision; cyber-physical systems; and advanced manufacturing processes.

ARM Hub's mission and activities are consistent with Queensland's advanced manufacturing strategy, *Transforming Queensland Manufacturing Strategy 2025-30*. The strategy sets out the objectives and priorities that will drive government investment that supports a 'globally competitive and future-ready manufacturing industry over the next 5 years and beyond'.

By 2023, ARM Hub had exceeded its original 4-year funding target of $47 million, reaching $54 million in secured funds through projects and industry-led research and development. By 2026, the Hub had worked with more than 360 businesses, raising $138 million in project funding and leveraging more than $500 million in additional investment through manufacturing partnerships (see Figure 1.1 below).

Figure 1.1 ARM Hub's 6-year report card



Source: ARM Hub

Operational model

ARM Hub's operational model stands unique in the Australian context, and is aligned with better practice innovation and commercialisation hubs around the world.[12] Rather than offering only advisory support, which many of its comparator Hubs do, ARM Hub has an in-house technical team of roboticists, data and AI engineers, designers, and project specialists capable of delivering commercial outcomes directly.
ARM Hub's 3 broad operating streams are:

— **Industry engagement,** which includes education programs, co-design workshops with SMEs and tech demonstrator platforms that aim to uplift Australian manufacturing digital capability and bring firms into the innovation pipeline

— **Commercial solutions**, which aim to convert technical or operational problems into useful products, systems, or processes

— **Research and development,** which aims to de-risk technology adoption and advanced manufacturing through grants, partnerships, and university collaboration.

Across these streams, ARM Hub delivers 3 core but interrelated services:

1. Data Lakehouse and AI-as-a-Service, which unifies fragmented data across a business's operations, builds natural language AI Bots, and provides access to an Agentic AI engine that drives further targeted productivity gains.
2. Scale-up Manufacturing Service, which develops, tests and deploys new Industry 4.0 and 5.0 technologies and processes, including robotics, IoT, and new materials.
3. Accelerator Programs, which help businesses innovate, test, scale and go to market. All ARM Hub accelerators provide hands-on mentorship, rapid prototyping, market testing opportunities and connection to customers and investment channels.

ARM Hub also actively supports participating businesses through a series of targeted education and training activities that aim to advance the professional development of its collaborators and strengthen their capabilities and capacities within the sectors in which they operate.

Members and partners

ARM Hub operates a structured membership and partnership model that supports ongoing collaboration with industry, research institutions and other organisations. Members join under defined categories and tiers, with specified cash and in-kind contributions that provide access to facilities, technical expertise and project support. The model is designed to support repeat engagement rather than one-off transactions, creating a framework for joint projects, technology trials and capability development.

ARM Hub's partners include universities, government agencies, industry bodies and selected international organisations. These partners typically contribute strategic funding, research capabilities or access to broader networks, and, in return, participate in governance, joint initiatives and longer-term programs. In practice, this combination of members and partners makes ARM Hub a central point for coordinated activity in robotics, AI and advanced manufacturing, with membership and partnership arrangements acting as the mechanisms through which organisations participate in and influence its work.

[12] ACIL Allen (2026). Securing Prosperity: Unlocking Australia's Robotics Potential. https://acilallen.com.au/uploads/projects/1122/Securing-Prosperity---Unlocking-Australia%27s-Robotics-Potential.pdf

1.2 This impact assessment

In early 2026, ACIL Allen was engaged by ARM Hub to undertake an independent impact assessment of ARM Hub's activities. The purpose of the assessment was to provide insight into the outcomes and impacts of the work ARM Hub had undertaken with workers, businesses and organisations.

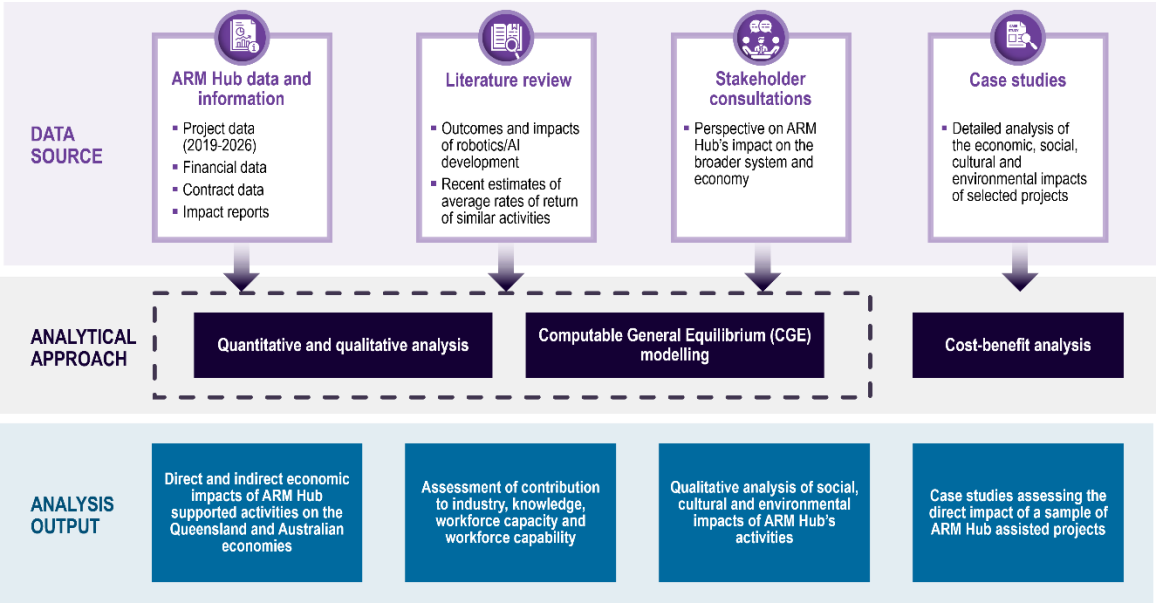
The core objectives of the assessment were to:

- assess, and where possible, quantify the economic impact of ARM Hub's activities, including but not necessarily limited to jobs created, and growth of the Queensland and Australian economies
- assess the contribution of ARM Hub to the Queensland and Australian robotics and AI industry
- assess the social, cultural, and environmental benefits provided by ARM Hub
- explore the impact of ARM Hub through 2 deep-dive case studies.

Our assessment of these impacts is based on a mixed methods approach to gather and analyse qualitative and quantitative data (see Figure 1.2).

The analysis contained in this report maps the relationship between inputs, activities, outputs, outcomes and impacts, which are economic, industry capacity, social, environmental and cultural in nature. In doing so, ACIL Allen has considered the benefits distributed, attribution issues, and the counterfactual. For the economy-wide Computable General Equilibrium (CGE) modelling, these benefits are defined as those delivered to their respective industries, whereas for the case studies, they are those delivered to intermediate and end users. The assessment considered all activities commenced by ARM Hub through to June 2026. The methodology used for the assessment is further explained in section 2.

Figure 1.2 Summary of impact assessment approach



Source: ACIL Allen

1.3 Report structure

Following a discussion of our impact assessment methodology in the next section, the remainder of this report is structured to address the assessment's core objectives as outlined above.

- Section 2 explains the approach to impact assessment.
- Section 3 examines the whole-of-economy impacts of ARM Hub.
- Section 4 examines the broader impact on industry, as well as the social, cultural, and environmental benefits of ARM Hub's work.
- Section 5 summarises our findings from the impact assessment, and provides some concluding remarks
- Sections 6 and 7 include the case studies developed to support the impact assessment. These showcase the exceptional impact of ARM Hub's work and are also included, where relevant, alongside the impacts we have assessed in the earlier sections.
- The Appendices provide the additional or supporting information that allows the reader to understand the impact assessment methodology and outcomes.

2 Approach to measuring ARM Hub's impacts

This section outlines ACIL Allen's approach to assessing ARM Hub's impacts and the core data and evidence used. A more fulsome description of our methodology is provided in the Appendices.

2.1 Impact pathway: a framework for understanding ARM Hub's contribution

A program logic framework was used as the starting point for understanding ARM Hub's value, and a simplified impact pathway was developed to illustrate how each of ARM Hub's services drives impact. This pathway was subsequently refined through consultations with the ARM Hub team.

Service 1: Data and AI as a service

Figure 2.1 illustrates how ARM Hub's Strategic Service 1 (Data and AI-as-a-Service) drives value for manufacturing businesses.

ARM Hub identified that AI adoption in Australian manufacturing is constrained by a set of barriers that individual firms (particularly SMEs) often cannot address efficiently on their own. These include:

- fragmented data across information technology (IT) and operational technology (OT) systems
- limited access to specialised data science and AI capability
- compliance, cybersecurity and responsible-AI risks
- legacy software systems that capture and manage data but do not enable firms to act on it
- the difficulty of processing complex trial and production data at scale.

Collectively, these constraints delay or prevent AI adoption, limiting productivity improvements, increasing regulatory and operational risk, and reducing firms' ability to develop new data-driven products, services and business models.

In 2024, through securing a competitively funded Federal Government AI Adopt Centre grant, ARM Hub has been addressing these market and capability gaps by acting as a connector and integrator between manufacturers, data, AI technologies and specialist expertise. Its support combines:

- a Data Lakehouse to consolidate and make fragmented data usable
- an AI-as-a-Service capability that reduces the need for firms to build specialist capability in-house
- access to an Agentic AI engine, which is the foundation software platform for building a range of AI tools
- natural-language AI Bots that make organisational data more accessible to non-specialists
- responsible-AI frameworks informed by standards and regulatory requirements, including ISO 27001, US National Institute of Standards and Technology (NIST) and the European Artificial Intelligence Act (EU AI Act)
- tailored AI roadmaps co-designed with each client to identify and prioritise commercially relevant use cases

— insurances for ARM Hub to deliver professional advice and provide commercial solutions and products to consumers.

These interventions benefit participating firms by reducing cost, capability, and risk barriers that would otherwise prevent manufacturers from adopting AI. At the firm level, strategic service 1 supports results in AI-ready data infrastructure and AI productivity improvements without requiring firms to immediately recruit scarce specialist talent, thereby achieving more secure and auditable AI-enabled operations and increasing capacity to develop data-driven products and services. These outcomes can strengthen firms' productivity, resilience, and competitiveness, including firms' ability to meet data, AI, and cybersecurity assurance requirements, as well as other regulatory compliance requirements associated with participation in global markets.

At the system level, the benefits of this service extend beyond individual firms. ARM Hub's activities contribute to workforce upskilling and the diffusion of AI capability across the manufacturing sector, helping reduce the capability gap between smaller and larger firms. By lowering barriers to adoption and enabling broader access to data and AI expertise, ARM Hub supports more inclusive productivity growth and reduces the risk of AI adoption being concentrated among firms that already possess significant digital capabilities. Over time, this contributes to a more mature national data and AI capability base, strengthening Australia's capacity to develop and deploy embodied AI in advanced manufacturing and capture the associated productivity and innovation benefits.

Service 2: Scale-up manufacturing

Figure 2.2 illustrates how ARM Hub's scale-up manufacturing service drives value for manufacturing businesses.

ARM Hub identified the following key challenges hindering scale-up activities for manufacturing businesses:

— ageing factory equipment and underinvestment in productive infrastructure
— limited adoption of lean manufacturing practices
— workforce retention and attraction, workforce skill development
— workplace health and safety risks associated with unsafe manual and repetitive processes
— the absence of off-the-shelf robotic solutions, requiring bespoke engineering for each application
— the work undertaken by Australian manufacturing is typically low volume, high mix, which requires bespoke technical solutions and access to skilled personnel
— lengthy and costly testing and validation cycles
— limited domestic capability and capacity to plan for and deliver scaled production outcomes.

Collectively, these constraints contribute to low productivity, worker injury and liability exposure, staff attraction and retention challenges, delayed investment and technology adoption, and cost overruns arising from missed contract deadlines and production delays.

ARM Hub addresses these challenges by acting as a connector and integrator, helping manufacturers and their workforce translate emerging technologies into commercially viable, scalable production systems. Its support includes:

— standardised assessment and implementation frameworks using technology, manufacturing and commercial readiness levels
— technology-readiness roadmaps tailored to individual manufacturing contexts
— AI-enabled lean manufacturing implementation
— cobots and Industry 5.0 human-centred robotics designed to augment workers and improve safety and productivity

— digital twin simulation to develop, test and validate production systems before physical deployment
— compliance with industry regulations and auditing processes.

This intervention provides benefits for participating firms by reducing the technical, financial and operational risks associated with manufacturing scale-up. At the firm level, Strategic Service 2 supports contribute to:

— better-informed and de-risked investment decisions, improved access to finance
— productivity gains through digitisation and process optimisation
— safer workplaces, lower defect and rework costs
— faster product development and commercialisation
— enhanced workforce quality and acceptance through improved attraction and retention, compliance and skill developments
— better product-market-fit or workplace acceptance rates.

By enabling firms to demonstrate production readiness and validate investment decisions before committing to full-scale deployment, ARM Hub also helps reduce the cost and uncertainty associated with scaling new technologies.

At the system level, these benefits support Australia's competitiveness in high-value global supply chains by increasing the number and capability of domestic manufacturers that can meet demanding production, quality, and delivery requirements. They also contribute to workforce capability and upskilling, including developing the skills required to work effectively alongside advanced robotics and digital manufacturing technologies. Over time, this supports the development of sovereign manufacturing capability and strengthens Australia's capacity to capture more value from emerging advanced manufacturing opportunities.

Service 3: Accelerator programs

Figure 2.3 illustrates how ARM Hub's accelerator programs generate value for businesses and the economy.

ARM Hub identified that key barriers that constrain technology commercialisation and business growth include:

— unclear product-market fit and the absence of structured go-to-market strategies
— isolated innovation with limited access to global networks, mentors and customers
— barriers to capital and finance
— equity and inclusion gaps that can limit participation by female and underrepresented founders
— trade and market-access barriers, preventing access due to regulatory, legislative and other complexities (e.g. Defence)
— Australian manufacturers generally undertake low-volume, high-mix production, requiring customised technical solutions and access to specialist expertise
— limited access to testing, prototyping and validation infrastructure.

These constraints can result in failed or delayed commercialisation, limited scale potential that confines innovative businesses to domestic markets, stalled business growth, loss of talent and innovation capability, and gaps in sovereign capability across strategically important sectors such as defence, energy and medical manufacturing.

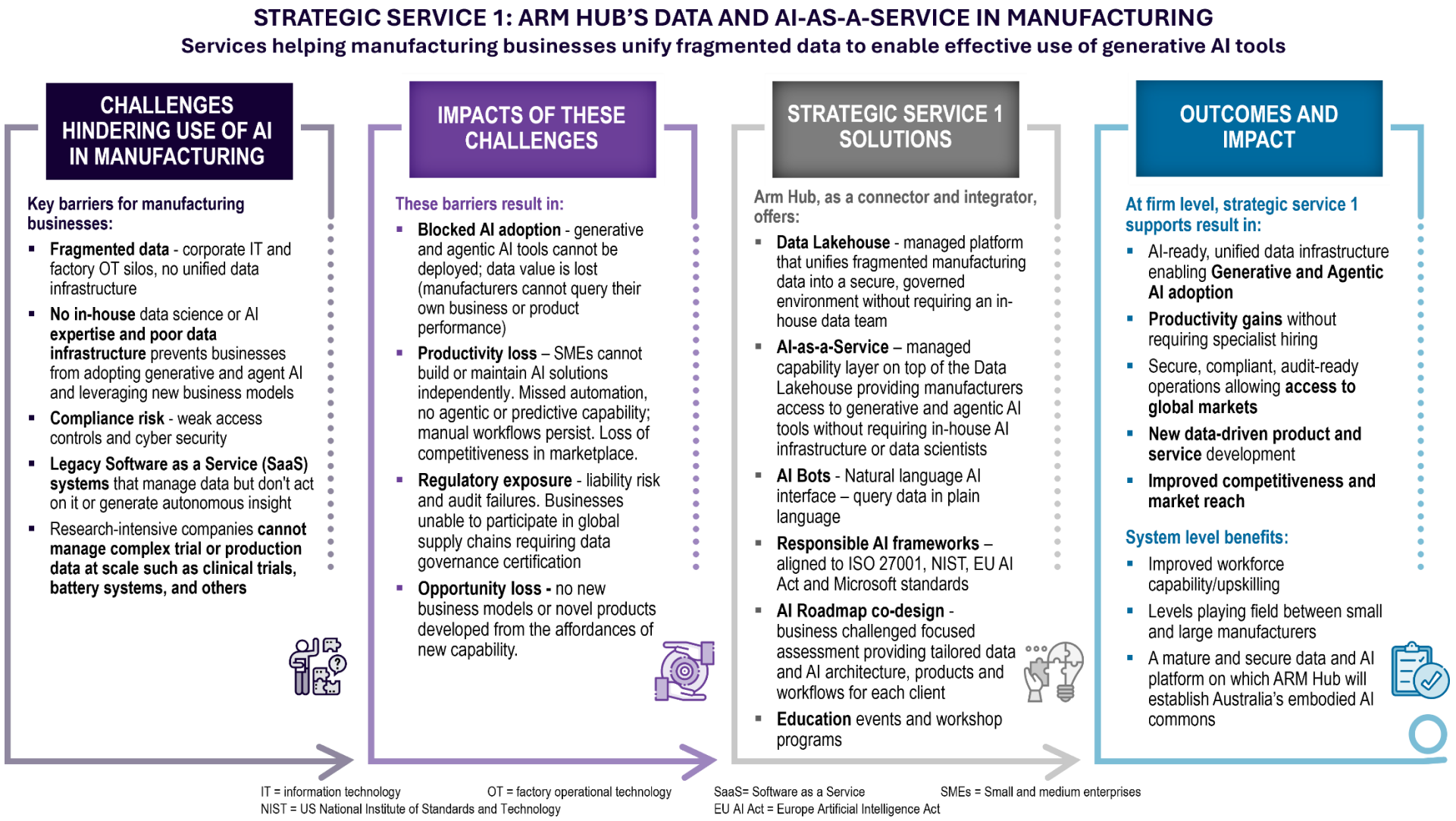
ARM Hub addresses these challenges by acting as a connector between Australian technology businesses and the expertise, capital, infrastructure and markets required to commercialise and scale. Its accelerator and sprint programs connect companies with technology providers, investors, global markets, professional services, compliance and certification expertise, and talent. Participants receive practical support to validate

their markets through real-world testing, develop go-to-market strategies, prototype and refine their technologies, strengthen their business models, and become investment-ready. This is complemented by partnerships with leading global accelerators and specialist scale-up programs, including MassRobotics, which provide participants with access to international networks, capital, and markets.

This service provides additional benefits for participating businesses by reducing the capability, market and financing barriers that can prevent promising technologies from progressing from research or prototype to commercial scale. Strategic Service 3 supports that contribute to increased revenue from businesses entering new and international markets, greater access to customers, venture capital, loans, grants, and R&D funding, stronger commercial and management capabilities, and more inclusive participation in advanced manufacturing entrepreneurship. Connecting Australian IP and technology with customers, investors and global partners, ARM Hub also increases the likelihood that promising technologies and solutions are retained, developed and commercialised in Australia.

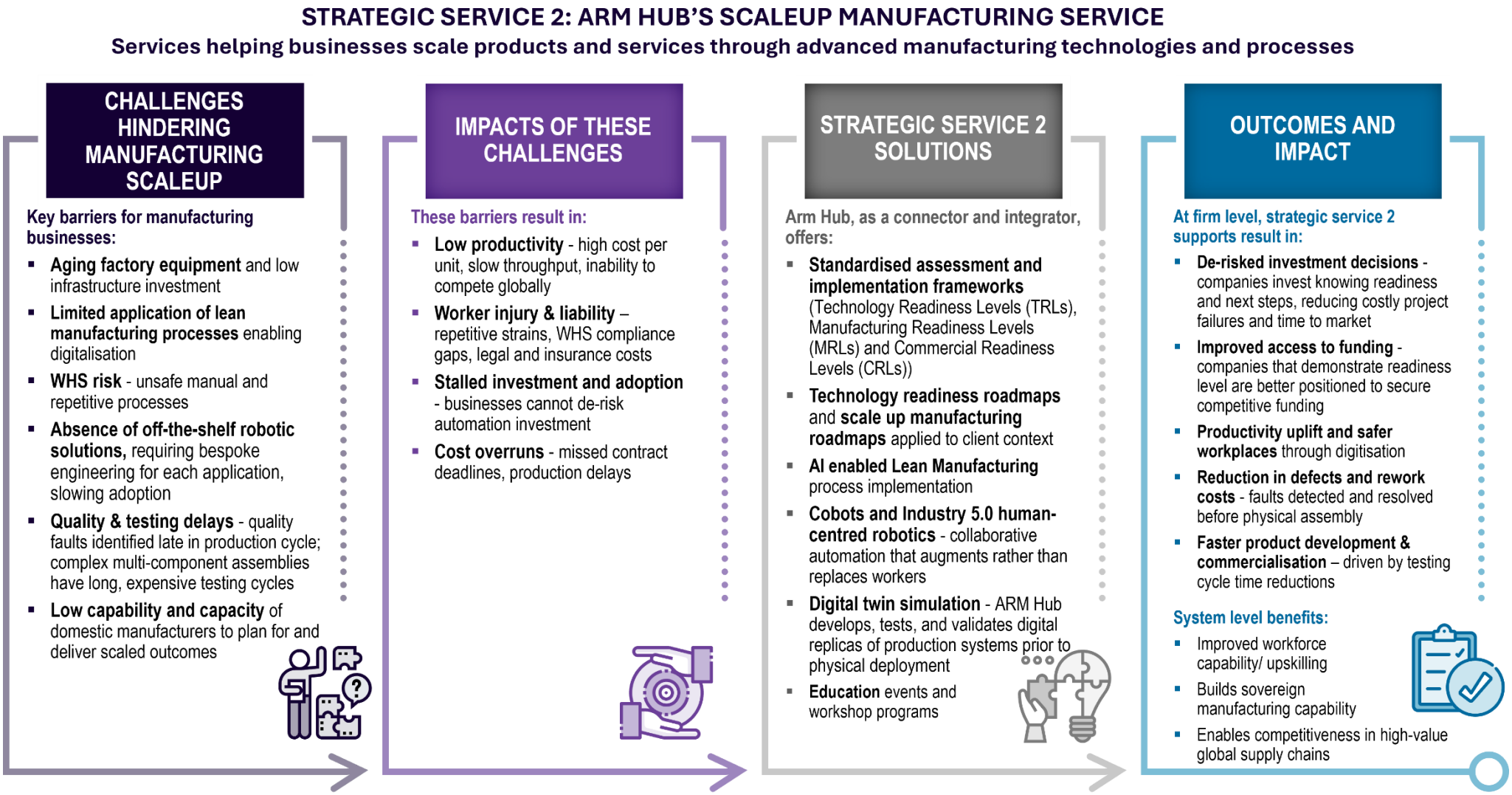
At the system level, these outcomes support improved conversion of Australian research and innovation into commercial activity, increased domestic and international investment in advanced manufacturing, and stronger connections between Australian IP and global value chains. They also contribute to the expansion and diversification of Australia's sovereign industrial base, particularly in strategically important sectors such as defence, energy and medical manufacturing. By broadening participation in technology entrepreneurship and scale-up, the programs further support a more diverse advanced manufacturing workforce and help build the entrepreneurial and commercial capability required for Australia's long-term productivity growth.

Figure 2.1 High-level program logic for ARM Hub's Strategic Service 1 – ARM Hub's data and AI-as-a-service in manufacturing



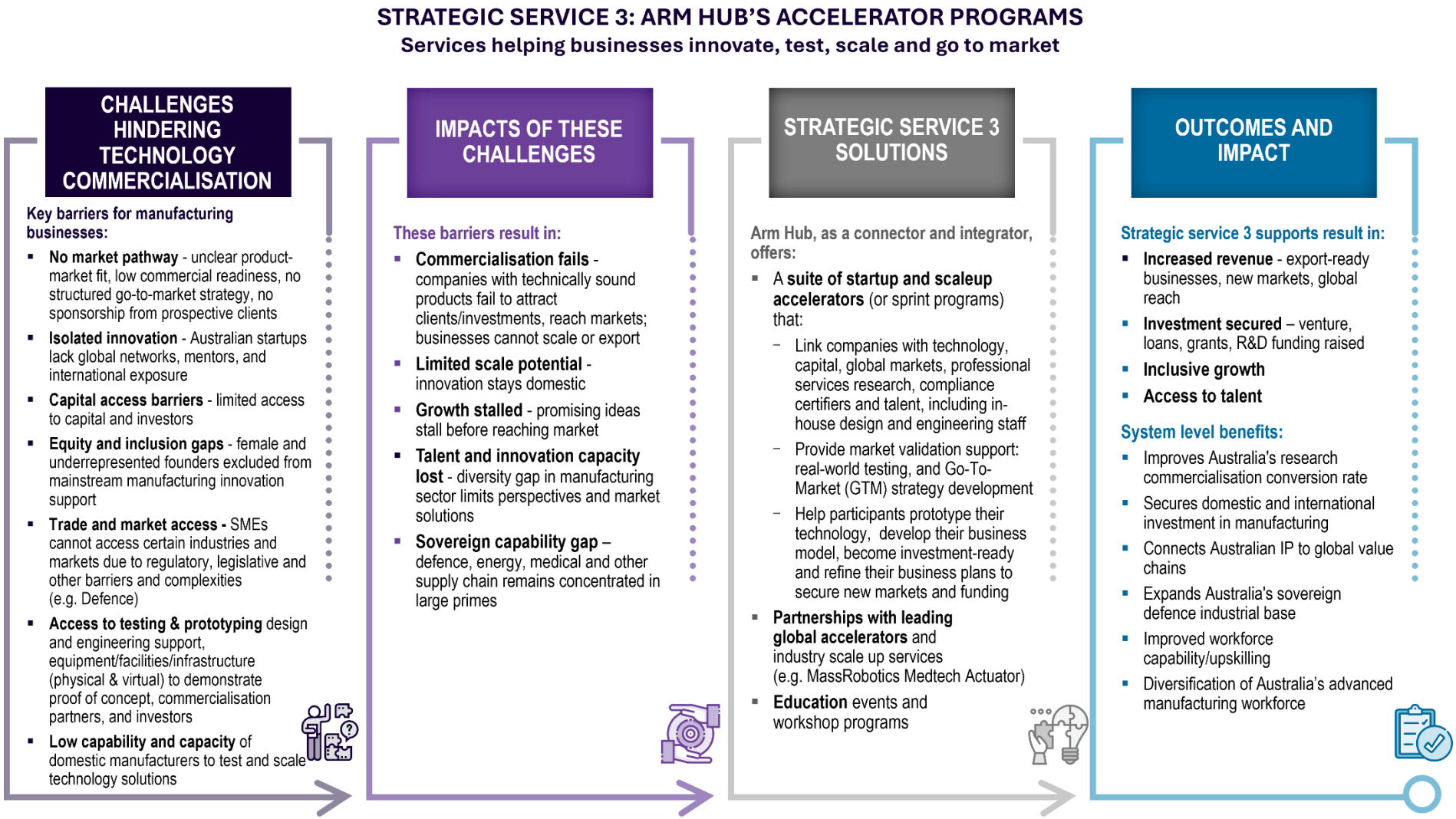
Source: ACIL Allen

Figure 2.2 High-level program logic for ARM Hub's Strategic Service 2 – ARM Hub's scale-up manufacturing service



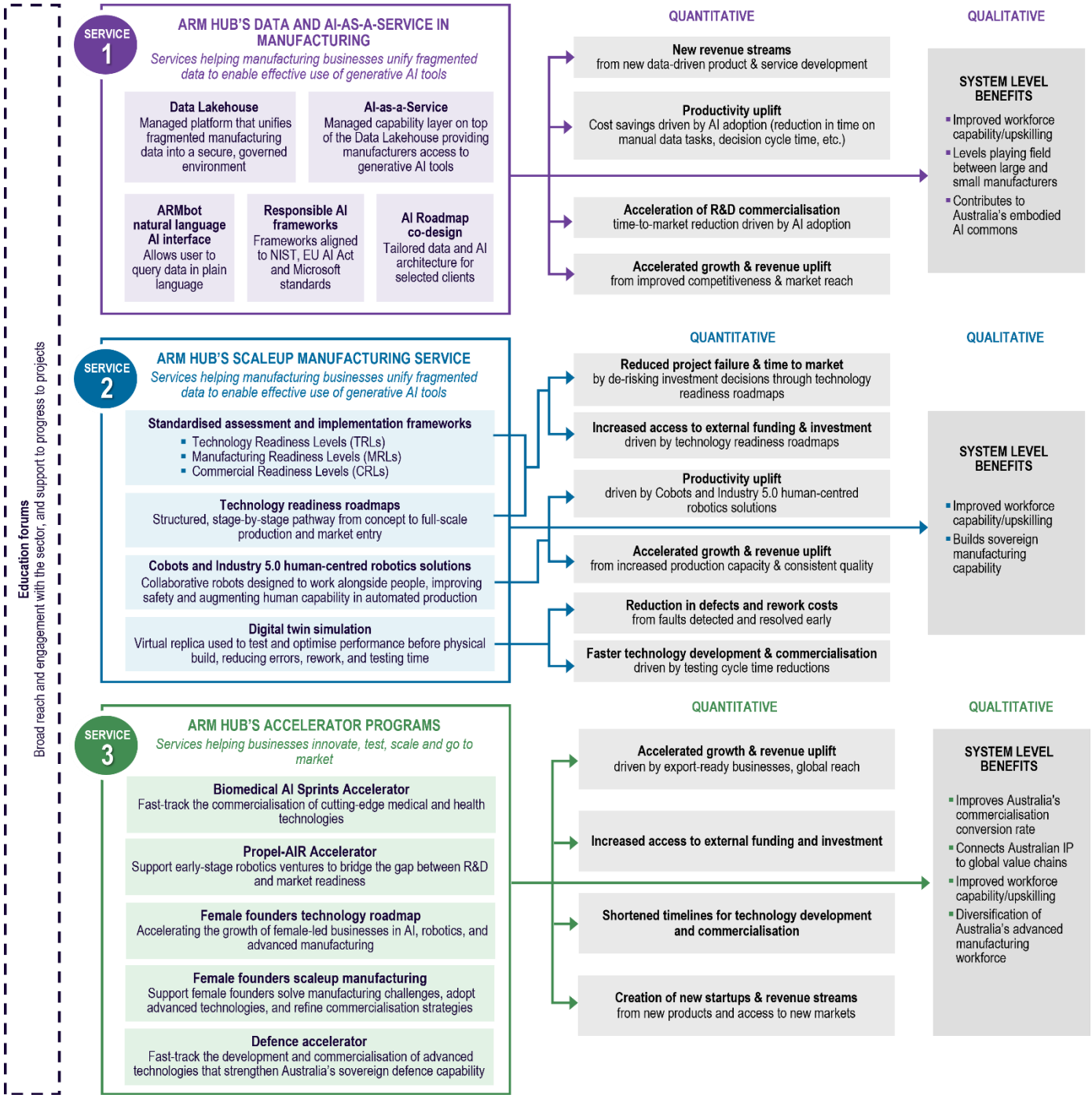
Source: ACIL Allen

Figure 2.3 High-level program logic for ARM Hub's Strategic Service 3 – ARM Hub's accelerator programs



Source: ACIL Allen

Figure 2.4 Summary of direct benefits from ARM Hub's services



Source: ACIL Allen

2.2 Analytical framework for the impact analysis

The methodology comprised 4 components:

— Direct impact assessment: estimating the costs and benefits of ARM Hub's services using a Cost Benefit Analysis (CBA) framework.

— Economy-wide impact modelling: estimating the broader impacts on the Australian economy using a CGE model (Tasman Global).

— Case studies assessing 2 examples of exceptional impact chosen to demonstrate the diversity of impact types, beneficiaries, disciplines and businesses participating in ARM Hub programs, noting that 2 case studies cannot illustrate the full diversity of ARM Hub's activities and its impacts. These case studies illustrate the pathways to impact and highlight the diversity of impact delivered by ARM Hub.
— Qualitative analysis examining the broader impact on industry, as well as the social, cultural, and environmental benefits of ARM Hub's work.

ARM Hub's direct impact framework

The direct benefits attributable to ARM Hub's 3 services were quantified using the approach outlined in the following sections. Additional details about the methodology, assumptions and parameters used to estimate these direct benefits are provided in Appendix 0.

Broadly, there are 2 main ways in which the direct impacts of ARM Hub's services on firms could be calculated:

— *A bottom-up approach* – this approach would entail identifying the inputs and outputs directly generated by projects facilitated or enabled by ARM Hub and assessing how much of these projects' benefits can be attributed to the support provided by ARM Hub.
— *A top-down approach* – this approach quantifies the benefits of ARM Hub by applying the average impact on manufacturing businesses that have used its services. For each service category, this involves identifying an appropriate outcome metric (such as incremental revenue, cost savings, or access to additional funding for commercialisation), establishing a baseline or counterfactual representing the expected position of an average firm in the absence of ARM Hub's support, and using this to estimate the returns for an average firm accessing each service. These average returns are then multiplied by the number of companies that have accessed each service to estimate a total direct benefit per service.

Using a bottom-up approach would have required collecting a significant amount of information on the inputs and outputs of each firm that has accessed ARM Hub's services, so their direct impacts could be quantified. This would be a complex task (as an indication, ARM Hub has supported over 367 companies since its creation[13]).

As such, this study used a top-down approach to quantify the direct benefits of ARM Hub's 3 services, applying the metrics and assumptions set out in the sections that follow and Appendix 0. An exception to this is 2 deep-dive case studies conducted on companies that have accessed ARM Hub's services, for which specific benefits have been estimated directly. To avoid double-counting, these 2 companies were excluded from the top-down calculation of benefits (and costs), with the case-study-specific costs and benefits then added back to arrive at an overall figure for the direct costs and benefits of ARM Hub.

The direct benefits have been calculated for all companies that have worked with ARM Hub up until mid-2026. This also included companies that have contractual agreements with ARM Hub made before mid-2026.

[13] ARM Hub's home webpage (https://www.armhub.com.au/).

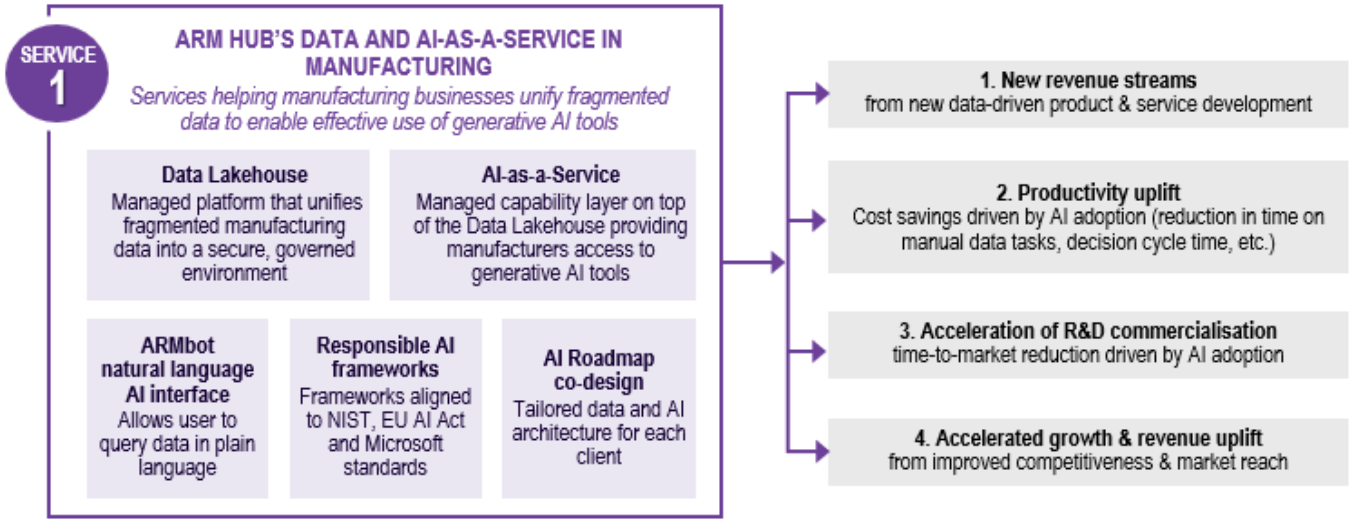
Data Lakehouse and AI-as-a-Service

To quantify the direct firm-level benefits of ARM Hub's Data and AI-as-a-Service offering (the Data Lakehouse, AI-as-a-Service capability layer, ARMbot natural language interface, responsible AI frameworks, and AI roadmap co-design), were mapped to 4 benefit streams expected to arise from use of the service (see Figure 2.5):

1. **New revenue from data-driven products and services:** these estimates reflect the value of new data-driven products and services that firms are able to develop once their data is unified, accessible and suitable for generative AI and Agentic AI applications. This captures incremental revenue from offerings that would not otherwise have been feasible without a governed, AI-ready data environment.
2. **Productivity uplift:** these estimates reflect the cost savings generated through AI adoption, primarily from reduced time spent on manual data-related tasks and faster decision-making. These efficiency gains arise where employees can directly query, analyse and act on organisational data (for example, through the ARMbot interface) rather than relying on manual data extraction and analysis.
3. **Accelerated R&D commercialisation:** these estimates reflect reductions in the time required to bring new products and services to market, reflecting how integrated data and AI capabilities can shorten the pathway from research and development through to testing, deployment and commercialisation.
4. **Accelerated growth and revenue uplift:** these estimates capture broader competitiveness and market-access gains enabled by improved data and AI capability, including incremental revenue from firms being better positioned to compete, scale and access new markets as their data and AI maturity increases.

For each benefit stream, the assessment identified an appropriate outcome metric (such as incremental revenue, cost savings or time reduction) and established a baseline or counterfactual representing the expected position of firms in the absence of ARM Hub support. Relevant assumptions were then applied, informed by stakeholder consultations and available industry benchmarks, to estimate the incremental benefits attributable to Strategic Service 1. This approach provides a consistent basis for estimating the economic value generated by ARM Hub's support while accounting for the outcomes that may have occurred in the absence of the intervention.

Figure 2.5 Direct firm-level benefits of ARM Hub's Data and AI-as-a-service



Source: ACIL Allen

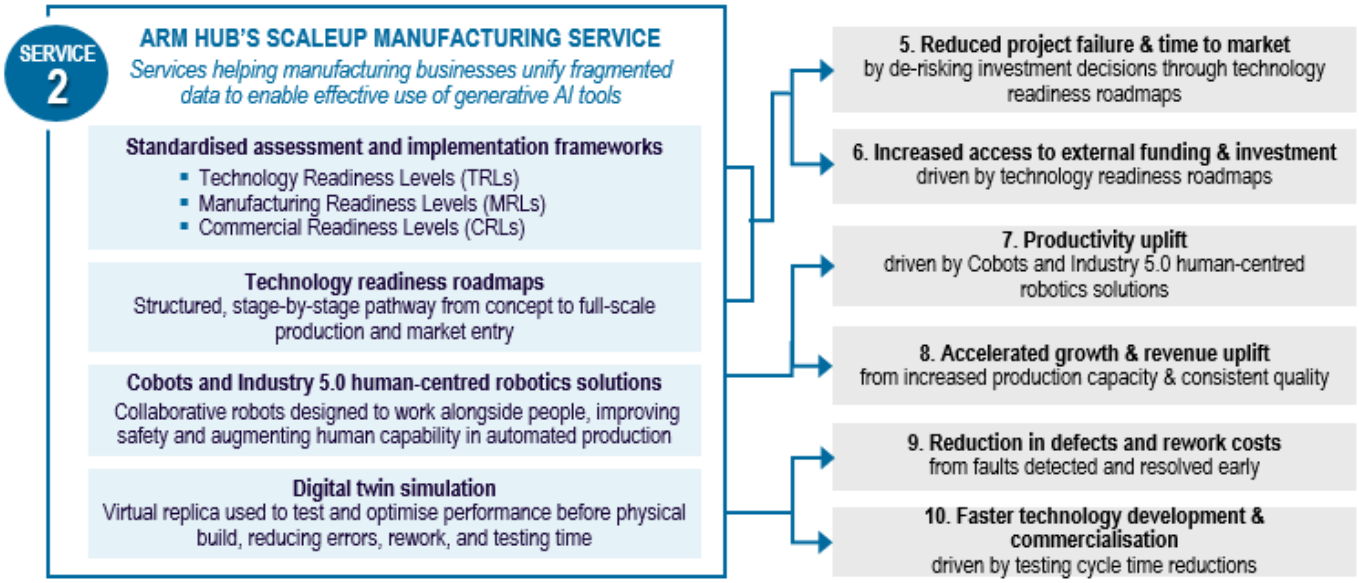
Scale-up Manufacturing Service

To quantify the firm-level benefits of Strategic Service 2, the components of ARM Hub's Scale-up Manufacturing Service (standardised assessment and implementation frameworks, technology readiness roadmaps, cobots and Industry 5.0 human-centred robotics, and digital twin simulation) were mapped to 6 benefit streams expected to arise from adoption of the service (see Figure 2.6).

1. **Reduced project failure and time to market:** these estimates capture the value of avoided project failures and time savings enabled by technology readiness roadmaps. These benefits arise from a structured, stage-by-stage pathway from concept through to full-scale production, reducing the risks and inefficiencies associated with unstructured or trial-and-error approaches.
2. **Increased access to external funding and investment:** estimates capture incremental funding or investment secured by firms as a result of demonstrating a credible technology readiness roadmap. This reflects the increased confidence of external funders when firms have clearly benchmarked TRLs, MRLs and CRLs.
3. **Productivity uplift:** estimates capture efficiency gains from the adoption of cobots and Industry 5.0 human-centred robotics, workforce training and development, including increased output per worker and reduced manual and repetitive task burdens as automation augments human capability.
4. **Accelerated growth and revenue uplift:** estimates capture additional revenue enabled by increased production capacity and more consistent quality through robotics and readiness frameworks. This reflects firms' ability to produce greater volumes more reliably than prior to adoption.
5. **Reduction in defects and rework costs:** estimates capture cost savings from identifying and resolving faults earlier in the production cycle, primarily through digital twin simulation, which enables potential issues to be identified and addressed virtually before physical production.
6. **Faster technology development and commercialisation:** estimates capture reductions in testing and development cycle times enabled by digital twin simulation. These time savings arise from the ability to test, optimise and validate performance virtually, reducing reliance on physical prototyping and repeated iterations.

For each benefit stream, the assessment identified an appropriate outcome metric (e.g. cost savings, time reductions, incremental revenue or additional funding) and established a baseline or counterfactual representing the expected position of firms in the absence of ARM Hub support. Relevant assumptions were then applied, informed by stakeholder consultations and available industry benchmarks, to estimate the incremental benefits attributable to this service.

Figure 2.6 Direct firm-level benefits of ARM Hub's scale-up manufacturing service



Source: ACIL Allen

Accelerator Programs

To quantify the firm-level benefits of Strategic Service 3, the components of ARM Hub's Accelerator Programs (the Biomedical AI Sprints Accelerator (BASA), female founders' technology roadmap and scale-up manufacturing accelerators, and Defence Accelerator), and Propel-AIR were mapped to 4 benefit streams expected to arise from participation in these programs (see Figure 2.7).

These programs are designed to build sovereign capability, commercial readiness and international competitiveness in priority sectors, rather than provide short-term mentoring alone. BASA, delivered nationally with MTPConnect, combines matched funding of $33,000 to $50,000 with tailored data and AI roadmaps, training, access to AI-as-a-Service and data platforms, and technical and business mentoring to address capability gaps in managing biomedical and clinical data. Propel-Air is designed to help Australian startups, SMEs, and innovators refine their products and introduce them to a global market. It involves a partnership with MassRobotics in Boston, as well as collaborations with large companies such as NVIDIA. To date, Propel-AIR has provided residency opportunities in the US for the winners of its sprint competition and has supported another 7 shortlisted companies through thorough business readiness, pitch preparation, and product-market fit activities with experts.[14] The female founders' programs combine an initial roadmap accelerator focused on robotics, AI, and data-driven technology adoption, product development, and commercial capability with a subsequent scale-up accelerator that provides technical support, pilot manufacturing infrastructure, and workshops to support the transition to manufacturing. The Defence Accelerator supports SMEs seeking to enter defence supply chains through technology readiness and compliance support, engagement with the Australian Defence Force (ADF) and prime contractors, and access to a collaborative government-research-industry platform.

1. **Accelerated growth and revenue uplift:** estimates capture additional revenue generated as participants become export-ready and access global markets. These gains reflect the combined effect of matched funding, access to technology and manufacturing platforms, and commercial mentoring in

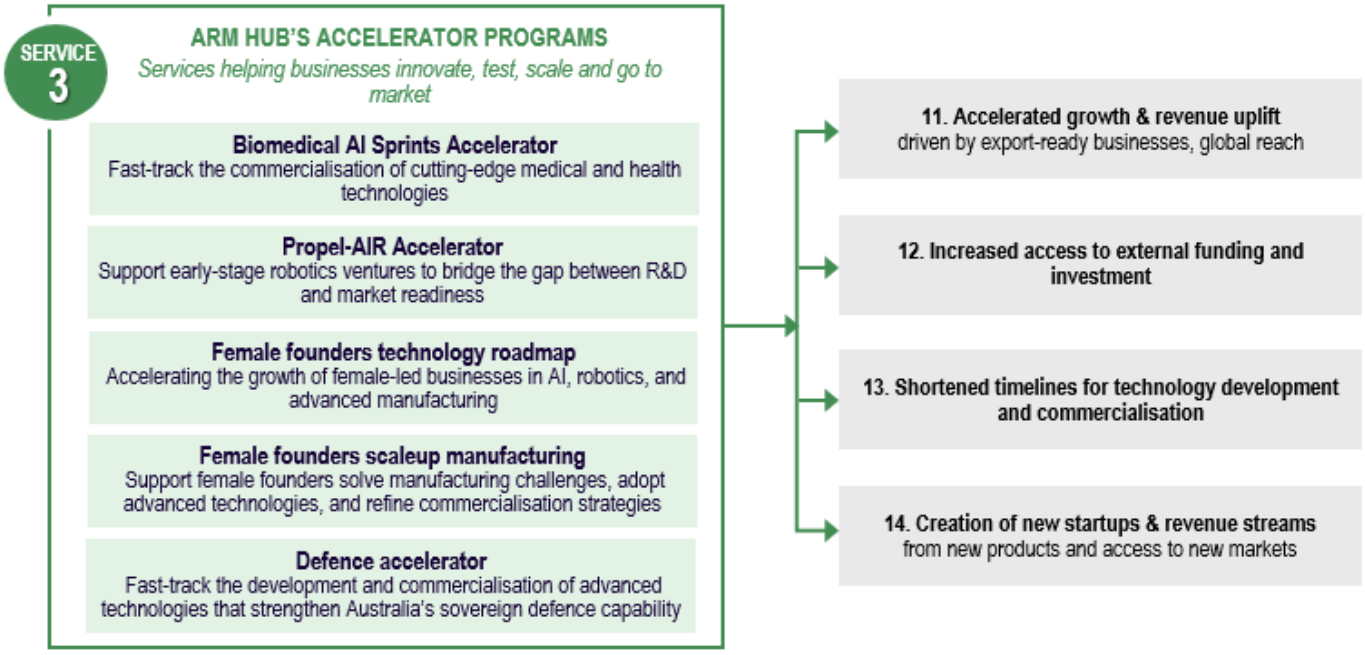
[14] https://aiadopt.ai/propel-air

reducing the risks associated with technology adoption and advanced manufacturing, and enabling firms to scale beyond their initial customer base.

2. **Increased access to external funding and investment:** estimates capture additional venture capital, grants and other funding secured by participants. This reflects how sector-specific mentoring, structured roadmaps and demonstrated technology readiness can strengthen firms' investment readiness and credibility with external funders.
3. **Shortened timelines for technology development and commercialisation:** estimates capture reductions in time to market enabled by tailored roadmaps, training and access to testing, prototyping and manufacturing infrastructure. These capabilities allow firms to validate technologies more efficiently and progress towards commercial deployment faster than would otherwise be possible.
4. **Creation of new startups and revenue streams:** estimates capture the number and value of new businesses, products, services or markets generated through program participation. This represents additional commercial activity that would not otherwise have occurred or would have been delayed or undertaken at a smaller scale, in the absence of ARM Hub support.

For each benefit stream, the assessment identified an appropriate outcome metric (e.g. revenue growth, funding secured, time reductions, or new revenue from the creation of new products, businesses or markets) and established a baseline or counterfactual representing participants' expected position in the absence of accelerator support. Relevant assumptions were then applied, informed by stakeholder consultations and available program and industry data, to estimate the incremental benefits attributable to the accelerator programs.

Figure 2.7 Direct firm-level benefits of ARM Hub's Accelerator programs



Source: ACIL Allen

ARM Hub's costs

ARM Hub's costs include those contractually agreed upon until mid-2026. ARM Hub's total cash investment amounts to $31.5 million in nominal terms. This is made up of:

— $25.9 million in government grants and funding (83%), of which $18.5 million was provided by the Queensland Government and $7.4 million by the Commonwealth Government, the largest amount of approximately $5 million is allocated to the AI Adopt Centre that commenced in 2024.

— $5.5 million in partnership and industry contributions (17%).

Additionally, ARM Hub has received $5.3 million in in-kind contributions. In total, ARM Hub has received $36.7 million (or $30.1 million discounted at 7% in $2026) in support.

Table 2.1 below summaries the funding provided by ARM Hub's contributors. As at the end of 2025-26 financial year, the Queensland Government provided ARM Hub with $13.4 million in nominal value (37% of total funding) in operational funding, and $4.5 million (12%) in other cash and in-kind funding. An additional $3.8 million (10%) from the State Government is due to be received in the future. The Commonwealth also provided ARM Hub with $7.4 million (20% of total funding), and other contributors had provided $5.5 million (15%) in cash and $2.1 million (6%) in in-kind.

Table 2.1 ARM Hub's costs, cash and in-kind (2026 dollars, $m)

	Annual average (2019-2027) [a]	Total (2019-2029) [a]	Net present value (2019-2038)			Proportion (Nominal)
			4%	7%	10%	
Queensland Government operation funding	1.85	18.46	15.9	14.3	13.0	46%
Queensland Government other cash and in-kind funding	0.58	5.84	5.0	4.5	4.1	14%
Total Queensland Government	**2.43**	**24.30**	**20.9**	**18.8**	**17.1**	**60%**
Commonwealth Government grants and cash funding	0.77	7.66	6.0	5.0	4.2	19%
Total Commonwealth Government	**0.77**	**7.66**	**6.0**	**5.0**	**4.2**	**19%**
Other contributions [b]	0.84	8.43	7.1	6.3	5.6	21%
Total all funding	**4.04**	**40.38**	**34.0**	**30.1**	**27.0**	**100%**

[a] Only funding **agreed** upon as of 2026 has been included in this analysis. ARM Hub has contractual arrangements to receive funding until 2029

[b] Other contributions include partnerships with government bodies, and private cash and in-kind contributions

Source: ACIL Allen

Computable General Equilibrium (CGE) modelling

The direct economic activity associated with ARM Hub's programs generates broader economy-wide effects through supply chain linkages and income re-spending. These second-round and subsequent impacts are captured through CGE modelling, enabling the model to capture the full economic impact of ARM Hub.

ACIL Allen's in-house CGE model of the global economy, Tasman Global, was used to estimate the average economy-wide impacts of ARM Hub over the period 2019-2038 on the Queensland and Australian economies. Tasman Global is a leading large-scale, dynamic CGE model of the world economy, developed in-house by ACIL Allen, that enables economic analysis at the regional, state, national, and global levels. This model is routinely used to capture impact across public and private investment, including whole-of-economy research programs and institutes, and has been used in the past for initiatives such as the

Australian Research Council's (ARC) National Competitive Grants (NCG) Scheme, the Australian Cooperative Research Centres (CRC) Program, the Australian Institute for Molecular Bioscience, the Australian Defence Industry Trailblazer Program, and Robotics development and adoption in Australia.

CGE models mimic the workings of the economy through a system of interdependent behavioural and accounting equations linked to an input-output database. These models provide a representation of the whole economy, set in a national and international trading context, starting with individual markets, producers, and consumers, and building up the system by modelling demand and production at each level. When an economic shock is applied to the model, each market adjusts according to the set of behavioural parameters, which are underpinned by economic theory. An economic shock refers to any significant change that affects economic activity, for example, a major trade disruption (like new tariffs on key exports), a policy change (such as a carbon tax), a natural disaster, or an organisation like ARM Hub. These shocks ripple through the economy, affecting prices, employment, production, and trade patterns.

The following scenarios were simulated in Tasman Global to measure the impacts of ARM Hub's work on the Australian economy:

— Base Case scenario: This scenario represents the projected path of the economy under BAU assumptions regarding macroeconomic conditions and structural trends. It reflects the actual observed environment and serves as the reference point against which the alternative scenario is assessed.

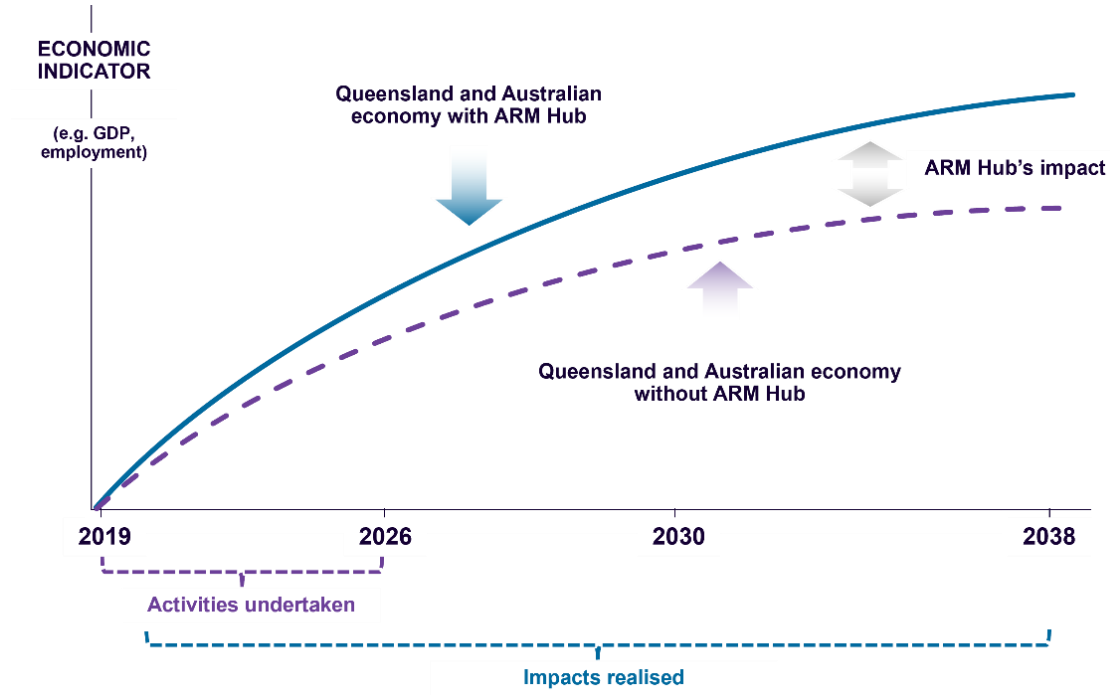
— Counterfactual scenario: This scenario models a hypothetical case in which ARM Hub did not exist.

The 2 scenarios give projections of the economy, and the net impact of the change is then calculated as deviations from the Base Case (see Figure 2.8).

The direct impact results were used as inputs to the CGE modelling.

Additional details of *Tasman Global* and the economy-wide modelling results are provided in Appendix C.

Figure 2.8 Illustrative scenario analysis using Tasman Global



Note: In reality, impacts could be negative, positive, neutral or a mixture.

Source: ACIL Allen

Case studies

As mentioned above, the analysis includes 2 case studies to illustrate the impact and value of ARM Hub's services. This approach has been used for a large number of similar assessments of other research organisations.

These case studies provide plausible, defensible lower-bound estimates of the returns to ARM Hub's services, while acknowledging that 2 case studies cannot capture the full diversity of ARM Hub's activities and impacts.

The case studies have been undertaken using an impact pathway. This framework is underpinned by a model that seeks to determine the relationships among the research inputs (resources), research activities, research outputs, research outcomes, and the potential economic, social, and environmental impacts generated by the research (see Figure 2.9). ACIL Allen has used this framework to evaluate the impact and value of research conducted by numerous similar organisations.[15]

An impact pathway consists of:

— **Inputs:** the resources used/invested in the project to implement it and deliver the intended results, including financial resources (project funding), human resources (personnel) and organisational resources

— **Activities:** the actions taken, or work performed, that are associated with delivering the project goals (what the project does with the inputs)

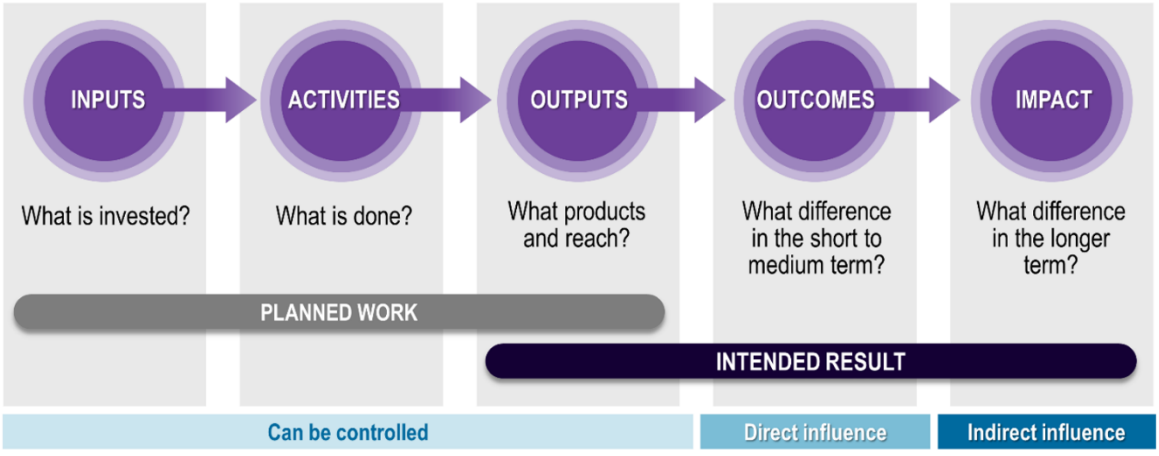
— **Outputs**: the products, services, capacities and/or solutions that result from the completion of activities within a project (i.e. the direct results of project activities)

— **Outcomes:** what the project has achieved (or is intended to achieve) in the short to medium term from the delivery of the program outputs

— **Impacts:** the long-term consequences (positive or negative) of a project on the economy, environment or society.

In general terms, a project's inputs, activities and outputs can be controlled, while outcomes and impacts can only be influenced (directly or indirectly) through the project's activities and outputs.

Figure 2.9 Impact pathway



Source: ACIL Allen

[15] The approach is based on that outlined in the CSIRO Impact Evaluation Guide. The most recent version of the guide can be seen at: https://www.csiro.au/en/about/Corporate-governance/Ensuring-our-impact/Evaluating-our-impact.

The case studies involved desktop research, analysis and consultation with companies and end-users and included an in-depth assessment of the value delivered by these case studies using a CBA approach comparing the costs and benefits of the selected case studies.

The direct costs for the services provided by ARM Hub are mainly borne by government (Table 2.1). The direct monetary benefits accrue to ARM Hub's industry/government partners and the Australian community overall (e.g., through increased tax revenues and reduced environmental damage).

As with any attempt to project potential future benefits, a number of assumptions are necessary. We have been transparent about those assumptions and have sought to ensure they are well-informed, while adopting a conservative approach to our assumptions.

The data collected to demonstrate ARM Hub's impact pathway has informed the quantitative CBA for each project. The CBA for each case study includes 2 summary measures to distil the results of the analysis, as described in Table 2.2.

Table 2.2 Summary of measures included in the CBA

Summary measure	Description	Success measurement	Comparative ability
Net present value (NPV)	Sum of discounted annual net benefits (benefits minus costs)	Project is beneficial to society if NPV is greater than zero	Provides the ability to compare the projects analysed according to the total economic return of each
Benefit-cost ratio (BCR)	Ratio of the present value of total benefits to the present value of total costs	Project is beneficial to society if BCR is greater than one	Provides the ability to compare the projects analysed to the degree to which benefits outweigh costs for each

Source: ACIL Allen

The case studies are provided in sections 6 and 7 and overviewed below:

— **Young Guns Container Crew**, for whom ARM Hub helped develop a prototype unloading-system designed to augment human teams in container operations

— **Urban Art Projects**, with whom ARM Hub worked to develop new robotic capabilities in UAP's workshop, and to prepare UAP for AI integration through a Data Roadmap Strategy.

Non-quantifiable impacts

Significant non-quantifiable impacts have also been identified, which are important to consider alongside the economic modelling results and have therefore been included separately in section 4 and the case studies.

2.3 Interpreting the outcomes of the impact assessment

This report is an impact assessment exercise based on economic modelling, impact tracing through case studies and consultations with selected participants. Many parts of the analysis rely on assumptions and the best available data. As such, the results of this assessment should be interpreted as an illustration of the types and nature of the impacts delivered over time.

As modelled and analysed, the results are not strictly comparable to other modelling undertaken for the innovation sector or even other sectors that receive public funding. This is because the assumptions and

data used in this report (based on best practices and the best available information) are unique to the assessment of ARM Hub.

A small sample of 2 deep-dive case studies was selected. While the case studies and their underlying methodology are consistent with international best practice evaluation of research and innovation, they are not representative of the breadth of activity undertaken by ARM Hub. Due to the nature of the impacts generated by some projects, it was neither appropriate nor possible to quantify certain benefits. Where this occurs, impacts have been discussed qualitatively.

In addition, as with any modelling exercise, there are some broader limitations to the analysis, as follows:

- The social, cultural, environmental and other impacts associated with ARM Hub activities have not been monetised or included in the economic modelling. As a result, the economic impacts described in this report **understate** the ARM Hub's overall impact.
- The economic modelling makes a series of assumptions for the economic returns from ARM Hub's activities. Potentially, these may be higher or lower for some pieces of work we have considered in this assessment. Accurate estimation of rates of return for all ARM Hub projects would require a detailed, lengthy analysis of each firm and its work over the 2019-2026 period, which is beyond the reasonable scope of this assignment.
- The findings in this report are subject to unavoidable statistical variation. While all care has been taken to minimise statistical variation, caution is advised when using this information. This report considers information provided by ARM Hub up to the middle of 2026. The findings may be affected by new information collected after this date.

3 Economic impacts

This section details the estimated direct and indirect economic impacts generated by ARM Hub since its inception.

3.1 Direct impacts

The total direct impacts of ARM Hub are summarised in the table below. The economic impacts presented here reflect the additional benefits to the economy arising from ARM Hub's funding and activities. They are not measures of ARM Hub's outcomes or outputs with companies. Notably, as discussed in section 2.2, these include the case study-specific costs and benefits, which are summarised in the section below and provided in full in sections 6 and 7.

Based on these estimates, the increased revenue and productivity benefits from businesses participating in Scale-up Manufacturing services and the Accelerators generate the most direct impact over the period 2019-2038, quantified and monetised at $26.6 million and $30.1 million, respectively (discounted at 7%, these figures present the monetary value of ARM Hub's direct impacts). Notably, ARM Hub only commenced its data and AI services in 2024. As these services are relatively new, their growing uptake reflects increasing demand from industry, with benefits expected to build over time. In total, the gross direct benefits delivered by ARM Hub are estimated at $99.6 million in 2026 dollars at a 7% discount rate.

Against total costs, ARM Hub delivers a net benefit of $69.5 million. The BCR is estimated at 3.31, meaning that for every dollar invested, ARM Hub generates $3.31 in direct economic benefits.

These results demonstrate that ARM Hub is expected to drive revenue growth for both start-ups and established firms. They also indicate that investments in ARM Hub are likely to yield commercial returns and broader productivity gains for the economy.

Table 3.1 Summary of direct impacts of ARM Hub (2019-2038, $million, 2026 dollars)

	Impact	Total	NPV – 4%	NPV – 7%	NPV 10%
Benefits					
Service 1 Data & AI	Impacts 1,2,3,4	$67.3	$37.4	$24.7	$16.6
Service 2 Scale-up	Impacts 5, 7, 8, 10	$68.5	$39.2	$26.6	$18.5
Service 2 Scale-up	Impact 6	$36.3	$19.8	$12.9	$8.6
Service 3 Accelerators	Impacts 11, 13	$89.2	$47.3	$30.1	$19.5
Service 3 Accelerators	Impacts 12, 14	$15.4	$8.1	$5.1	$3.3
Non-specific	Student impact	$0.5	$0.3	$0.2	$0.2
Total benefits		**$277.2**	**$152.2**	**$99.6**	**$66.7**
Costs					
ARM Hub		$40.4	$34.0	$30.1	$27.0
Results					
NPV		**$236.8**	**$118.2**	**$69.5**	**$39.7**
BCR		**6.86**	**4.48**	**3.31**	**2.47**

Source: ACIL Allen

Case studies of projects delivering direct quantifiable impacts

The case studies demonstrate the economic benefits achieved through selected ARM Hub assisted projects. These examples show how specific projects or programmes can generate economic returns that often significantly exceed their funding costs. These case examples align directly with the goals of the Transforming Queensland Manufacturing Strategy and a Future Made in Australia by driving innovation and productivity growth and supporting a skilled and inclusive workforce.

Key CBA findings for these case studies are outlined in Table 3.2. Across both case studies, NPVs were positive, and BCRs exceeded 1. These represent only a small sample of the impacts of ARM Hub's activities over the last 6 years, but demonstrate the potential of support for industry-led project delivery to generate excellent innovation, technology adoption, and advanced manufacturing, ultimately delivering benefits that exceed the cost of funding.

Table 3.2 Summary of case study CBAs (NPV and BCR at the 7% discount rate in 2026, 2026 dollars)

Case study	PV of Costs ($m)	PV of Benefits ($m)	NPV ($m)	BCR (ratio)
Young Guns Container Crew	Commercial-in-confidence	Commercial-in-confidence	Commercial-in-confidence	7.78
Urban Art Projects	$4.44	$7.85	$3.42	1.77

Source: ACIL Allen

3.2 Economy-wide impacts

When assessing the impacts of ARM Hub's activities on the economy, a range of key macroeconomic variables are commonly evaluated, including the following.

- **Gross Domestic Product (GDP), Gross State Product (GSP) and Gross Regional Product (GRP)**: Real GDP/GSP/GRP measures the value of goods and services produced within Australia, adjusted for inflation. This indicator captures changes in aggregate economic output attributable to ARM Hub's activities. The term 'economic output' has been used in the discussion of the relevant results presented in this report.
- **Real income:** Measures changes in national economic welfare by capturing the purchasing power of income after accounting for price effects.
- **Employment:** Reflects the **net** change in employment attributable to ARM Hub's activities, including direct and indirect effects.

The sections below discuss the impacts of ARM Hub on these key macroeconomic variables for the Queensland and Australian economies.

All of the economic impacts in this section are reported in Australian dollars (in 2026 dollars unless noted), and the NPVs are calculated over the period (2019-2038) using a central 7% real discount rate (with sensitivity analysis for a lower 4% rate and higher 10% discount rate presented in tables). This is aligned with the Queensland Government's guidance on CBAs.[16]

[16] Queensland Government (2021). Cost Benefit Analysis Guide. Accessed at: https://www.statedevelopment.qld.gov.au/infrastructure/governance-and-resources/business-case-development-framework

Economic output

ARM Hub increases economic activity through a series of effects that extend well beyond its initial activities. In the short term, funding flows directly into the economy through wages, equipment and material procurement, and operational expenditure. This spending supports activity across supply chains and generates additional household spending.

The more significant and enduring impacts arise over time through productivity improvements. As new knowledge, technologies, and methods are developed and adopted by firms, industries can produce more output with the same level of inputs. This lifts the economy's productive capacity and lowers production costs. Over time, these efficiency gains are passed through to consumers in the form of lower prices and higher real incomes, generating increased economic activity across the wider economy.

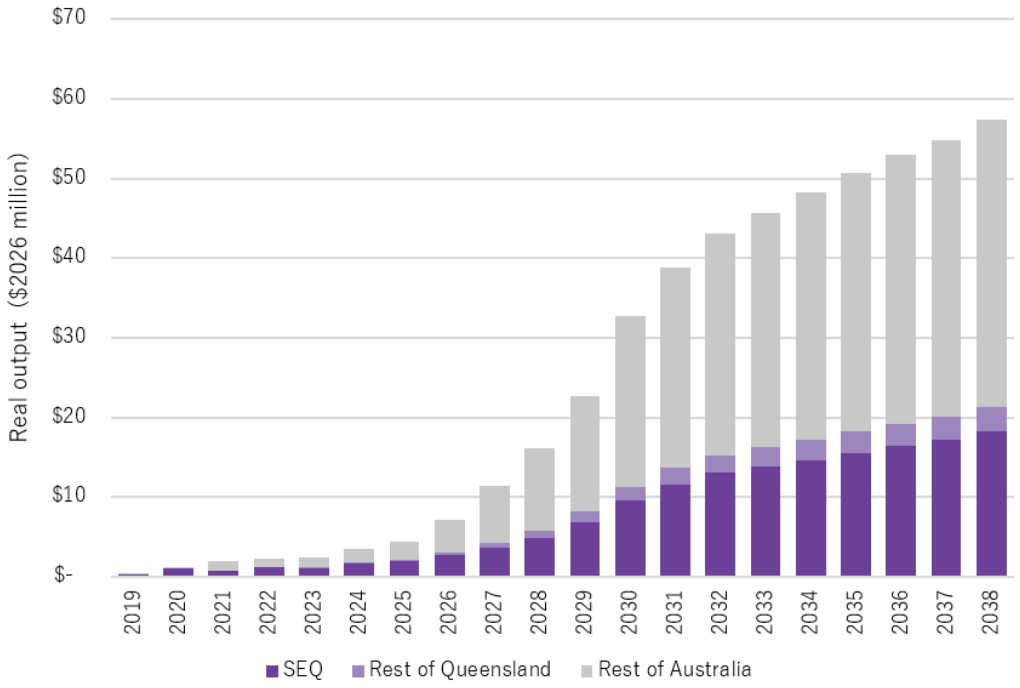
Figure 3.1 shows the impact of ARM Hub on the real economic output of Queensland and Australia overall. The figure reflects the combined impact of ARM Hub's funding, memberships and co-contributions associated with activities between 2019 and 2026, with the associated benefits continuing through to 2038, as outlined in section 2.1. South East Queensland experiences a significant share of the state's impact. This is due to 2 factors: ARM Hub's delivery model is industry-led, and Queensland's manufacturing economy is heavily concentrated in the South East, where 75% of the state's manufacturing GVA comes from.[17]

As shown in Figure 3.1, the benefits from ARM Hub's activities do not materialise immediately. There is typically a lag between innovations being created, technologies being adopted or advanced manufacturing solutions being developed, and the point at which they are translated into commercially relevant applications. Once realised, however, the impacts tend to be both substantial and long-lasting. ARM Hub's services contribute to new products, more efficient production processes and improved business models, as firms adopt unified data and AI capabilities, advanced manufacturing technologies, and structured pathways to commercialisation. At the same time, ARM Hub's activities strengthen the economy's stock of human capital (by building the skills of the manufacturing workforce and supporting graduates and specialists who move into industry) and help develop broader capabilities, collaboration networks, and new methodologies that enable further advances across the sector.

Consistent with this lag, the benefits of working with ARM Hub take time to translate into measurable economic activity. After the initial years of the modelling period, however, impacts increase substantially as earlier investment in ARM Hub's data, AI and advanced manufacturing services begins to translate into higher productive capacity across the economy. As productivity improves, GDP rises relative to the counterfactual, reflecting the additional economic activity generated by this uplift in firms' and sectors' capabilities. Over the longer term, productivity gains in key industries flow through to lower prices for goods and services, freeing up resources for use elsewhere in the economy and allowing total production to increase. Lower prices, combined with stronger productive capacity, drive higher real private consumption and higher overall economic activity.

[17] Measured as real GVA in 2023-24. ACIL Allen analysis, based on Queensland Government Statistician Office (August 2026). *Economic activity, State accounts*. https://www.qgso.qld.gov.au/statistics/theme/economy/economic-activity/state-accounts

Figure 3.1 Estimated change in real output associated with ARM Hub's activities between 2019 and 2026, relative to the counterfactual (2026 dollars)



Source: ACIL Allen

Table 3.3 summarises the estimated change in real economic output resulting from ARM Hub's activities in both cumulative and NPV terms. The table also compares the investment (costs) with the projected increase in economic output.

As shown in this table, ARM Hub's activities between 2019 and 2026 are projected to increase Australia's GDP by a cumulative total of $498 million over 2019-2038 relative to the counterfactual over the life of the benefits. This is equivalent to a one-off increase of $196 million in 2019 (in 2026 dollars, using a 7% real discount rate). Queensland is the largest state/territory beneficiary of these gains.

To put this in perspective, the $196 million present value increase in GDP is equivalent to:

— more than the annual value added by the Fuel Retailing sector[18] or by the Water Transport sector[19] in the City of Brisbane in 2019-20

— around half the annual value added by the Primary Metal and Metal Product Manufacturing sector[20] in the City of Brisbane in 2019–20

— around a quarter of the annual value added by the Transport Equipment Manufacturing sector[21] in the City of Brisbane in 2019–20.

The modelling also shows that the benefits generated by ARM Hub's activities substantially exceed the costs of government grants and contributions to ARM Hub between 2019 and 2026.

[18] The value added by the Fuel Retailing Sector in the City of Brisbane in 2019/20 was $162.3 million in 2023/24 base year dollar terms, which converted to 2026-dollar terms is equal to $175.3 million. (Source: National Institute of Economic and Industry Research (NIEIR) 2026. Compiled and presented in economy.id by .id (informed decisions).

[19] The value added by the Water Transport Sector in the City of Brisbane in 2019/20 was $174.7million in 2023/24 base year dollar terms, which converted to 2026-dollar terms is equal to $188.7 million. (Source: Ibid).

[20] The value added by the Primary Metal and Metal Product Manufacturing Sector in the City of Brisbane in 2019/20 was $343.3 million in 2023/24 base year dollar terms, which converted to 2026-dollar terms is equal to $370.8million. (Source: Ibid).

[21] The value added by the Transport Equipment Manufacturing Sector in the City of Brisbane in 2019/20 was $755.2 million in 2023/24 base year dollar terms, which converted to 2026-dollar terms is equal to $815.6 million. (Source: Ibid).

- Total funding for ARM Hub over this period is $36.7 million in nominal terms ($30.1 million in $2026 at 2019 using 7% discount rate).
- It is estimated that for every $1 invested by the Queensland Government, Commonwealth Government and co-contributors in ARM Hub between 2019 and 2026, GDP is cumulative $6.48 higher (on a 7% real discounted basis) for the period of 2019-2038 than it would have been had that $1 instead been allocated to general government expenditure. **That is, for every dollar invested in ARM Hub, $6.48 in economic activity was generated across Australia.** This means that, based on the proportion of investments, the Queensland Government achieved a $121 million GDP impact from its $18.6 million investment through ARM Hub (in discounted real terms). Similarly, the Commonwealth Government generated $33 million from its $5 million investment, and industry generated $41.5 million from its $6.4 million investment in discounted real terms.
- For the period of 2019 to 2026, the economic activity generated by investments in ARM Hub had reached $16.7 million cumulatively (7% discounted), of which $8.2 million was realised in Queensland and $8.4 million in the rest of Australia.

These returns reflect not only the direct outputs of ARM Hub's projects and services, but also the broader role that ARM Hub plays as an enabler for innovative manufacturing businesses (unifying manufacturing data, de-risking technology adoption and helping firms scale and commercialise) in supporting **productivity growth** and long-term economic performance across the sector.

Importantly, as discussed in section 2.2, ARM Hub's work generates a wide range of additional benefits that are not captured in the quantified modelling results. These include building industry capacity, upskilling students, and broader industry advocacy. Once these additional benefits are considered, the overall value of ARM Hub is likely to be higher than the quantified estimates presented here.

Table 3.3 Estimated change in real output associated with ARM Hub's activities between 2019 and 2026, relative to the counterfactual (2026 dollars, $m)

	Annual average (2019-2029) [a]	Total (2019-2038)	Net present value (2019-2038)		
			4%	7%	10%
Real output					
South East Queensland	2.37	156	91	63	44
Rest of Queensland	0.30	26	15	10	7
Total Queensland	**2.67**	**182**	**106**	**72**	**51**
Rest of Australia	3.99	316	182	123	85
Total Australia	**6.66**	**498**	**287**	**196**	**136**
ARM Hub funding					
Queensland Government grants and cash funding	2.07	20.7	17.6	15.7	14.2
Total Queensland Government	**2.43**	**24.3**	**20.8**	**18.7**	**16.9**
Commonwealth Government grants and cash funding	0.74	7.4	5.8	4.9	4.2
Total Commonwealth Government	**0.74**	**7.4**	**5.8**	**4.9**	**4.2**
Other contributions	0.84	8	7	6	6
Total all funding	**4.04**	**40**	**34**	**30**	**27**
Ratio of total increase in GDP to total funding	**1.65**	**12.33**	**8.45**	**6.48**	**5.05**

[a] Only funding **agreed** upon until 2026 has been included in this analysis. ARM Hub has contractual arrangements in place to receive funding until 2029.

[b] Other contributions include partnerships with government bodies, and private cash and in-kind contributions.

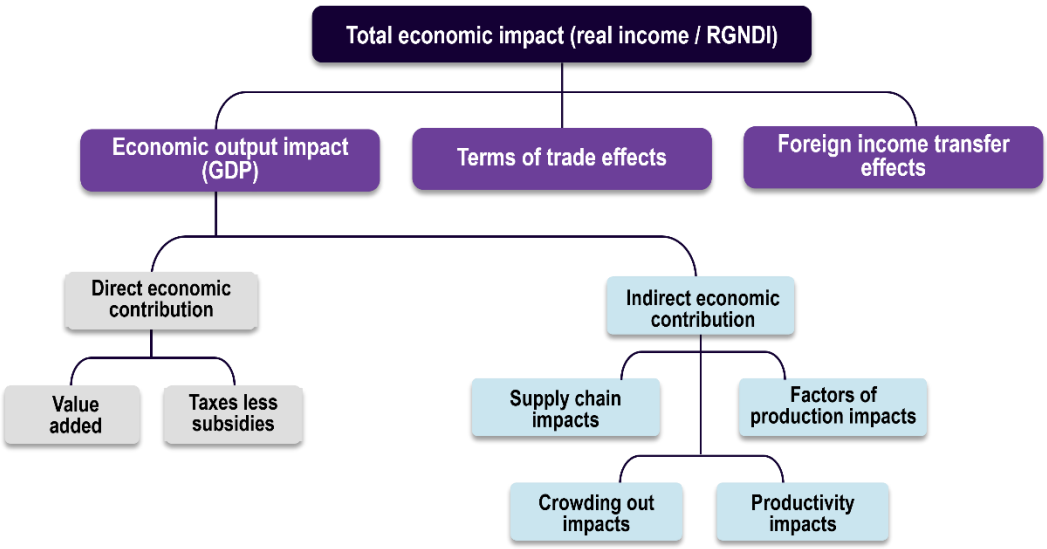
Source: ACIL Allen

Real income impact

While GDP measures the level of economic activity, it does not fully capture changes in economic wellbeing, as reflected in household purchasing power. It is possible for output to increase without a corresponding improvement in wellbeing. For this reason, real income is often considered a more informative measure of welfare.

Real income reflects the purchasing power of households and businesses, adjusted for inflation. The change in real income is equal to the change in real economic output (real GDP) plus the change in international income transfers, plus the change in the nation's terms of trade (which measures the purchasing power of the nation's exports relative to its imports) (see Figure 3.2). An increase in real income indicates greater capacity for consumption and savings, and therefore an improvement in economic welfare.

Figure 3.2 Impact of a program or policy on real income



Source: ACIL Allen

Figure 3.3 shows the projected changes in real income associated with ARM Hub services. It highlights that the pattern of income changes is similar to that of output changes, but income gains are slightly lower than the change in economic output. As shown in the chart, from 2019 to 2038, ARM Hub's work is projected to increase the real income of Australia as a whole by a cumulative total of $493 million relative to the counterfactual. **This is equivalent to a one-off increase in real income of $196 million in 2019** (in 2026 dollars, using a 7% real discount rate).

From 2019 to 2026, it is estimated that ARM Hub had increased real income by $20 million, of which $11 million was from Queensland and $9 million from the rest of Australia (using 7% real discount rate).

These results indicate that the additional economic activity associated with ARM Hub translates into measurable gains in purchasing power for Australians, rather than simply higher gross output.

These income gains also have implications for Australia's productivity performance. Over the past several decades, labour productivity growth in Australia has slowed markedly relative to comparable advanced economies, contributing to a widening gap in GDP per hour worked between Australia and its international peers.[22] While some drivers of this gap are structural (such as geographic remoteness, a relatively small

[22] RBA (2026). Submission to Senate Select Committee on Productivity in Australia. Accessed at: https://www.rba.gov.au/publications/submissions/labour-market-and-inflation/productivity-in-australia-02-2026/

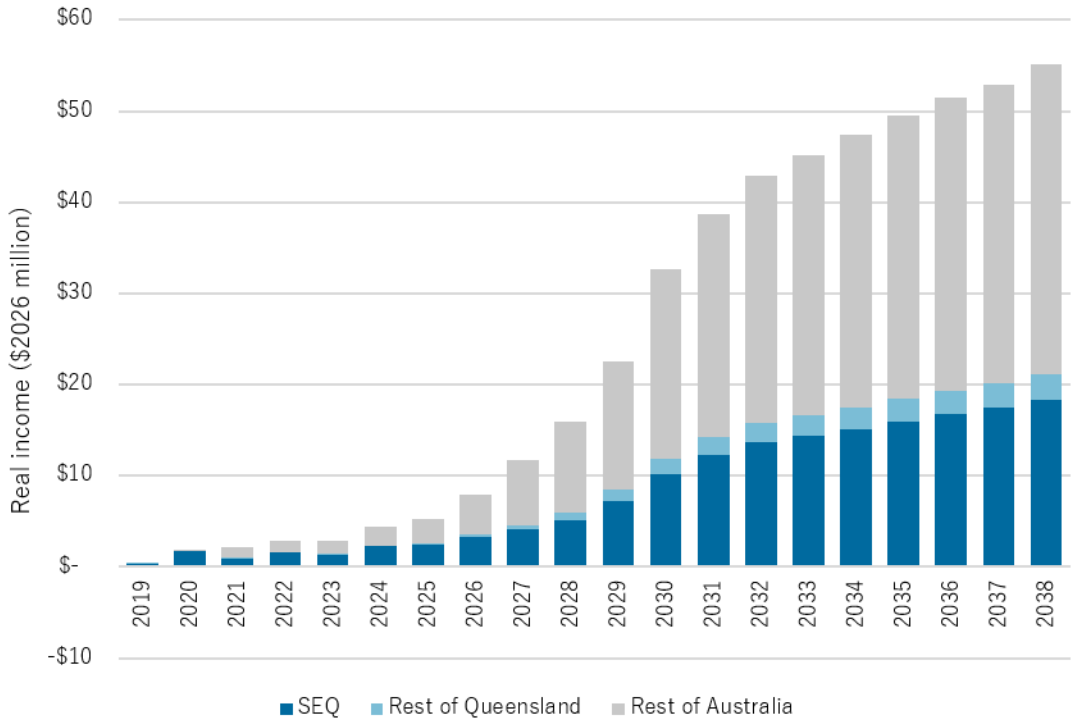
domestic market, and industry composition), the weak productivity performance also reflects underlying costs and incentives affecting investment, innovation and competition (as discussed in section 4.1).

ARM Hub is explicitly designed to address this innovation, technology adoption, advanced manufacturing and productivity gap by supporting industry-led project delivery. Through its AI Adopt Centre and work with the manufacturing industry and associations, ARM Hub expands the usable stock of knowledge and strengthens linkages between research, advanced manufacturing capability and end users. Over time, this improves the efficiency of capital-labour combinations and accelerates the adoption and adaptation of new technologies, lifting productivity at the firm and sector level.

The income gains estimated in this report can accordingly be interpreted as a partial indicator of the productivity-related benefits associated with ARM Hub's activities, which reflect incremental improvements in the performance of the firms it supports and, in turn, contribute to Australia's aggregate productivity trajectory.

Table 3.4 Table 3.4 also shows that for every $1 invested by the Queensland and Commonwealth governments and co-contributors in ARM Hub, cumulative income over 2019-2038 is estimated to be $6.51 higher (on a 7% real discounted basis) than it would have been if the funding had been allocated elsewhere.

Figure 3.3 Estimated change in real income associated with ARM Hub's activities from 2019 to 2026, relative to the counterfactual (2026 dollars)



Source: ACIL Allen

Table 3.4 Estimated change in real income associated with ARM Hub's activities from 2019 to 2026, relative to the counterfactual (2026 dollars, $m)

	Annual average (2019-2029) [a]	Total (2019-2038)	Net present value (2019-2038)		
			4%	7%	10%
Real income					
South East Queensland	2.76	164	97	67	48
Rest of Queensland	0.30	25	14	10	7
Total Queensland	**3.07**	**189**	**111**	**77**	**54**
Rest of Australia	4.01	305	34	23	16
Total Australia	**7.08**	**494**	**287**	**196**	**138**
ARM Hub funding					
Queensland Government operational funding	2.07	20.7	17.6	15.7	14.2
Total Queensland Government	**2.43**	**24.3**	**20.8**	**18.7**	**16.9**
Commonwealth Government grants and cash funding	0.74	7.4	5.8	4.9	4.2
Total Commonwealth Government	**0.74**	**7.4**	**5.8**	**4.9**	**4.2**
Other contributions	0.84	8	7	6	6
Total all funding	**4.04**	**40**	**34**	**30**	**27**
Ratio of the total increase in Australia's real income to total funding	**1.75**	**12.22**	**8.43**	**6.51**	**5.10**

[a] Only signed contracts to 2026 have been included in this analysis. ARM Hub has contractual arrangements to receive some funding until 2029

[b] Other contributions include partnerships with government bodies, and private cash and in-kind contributions

Source: ACIL Allen

Estimated employment impacts

For an individual firm, employment is closely linked with economic activity and investment. As demand for its goods increases, a firm can expand its operations, invest in additional capital and hire more workers. However, across the economy, employment is limited by the availability of labour. A key consideration in estimating employment impacts is therefore how the labour market adjusts.[23] Additional demand for labour can be met through 3 main channels:

— increased migration

— higher participation rates and/or average hours worked

— reductions in the unemployment rate.

Within the modelling framework, changes in real wages primarily drive the first 2 mechanisms. The third reflects the extent to which previously unemployed workers are absorbed by additional labour demand. The analysis does not assume any change in net overseas migration attributable to ARM Hub's work, so the employment impacts in this section reflect domestic labour market adjustments only.

[23] As with other CGE models, the standard assumption within Tasman Global is that all markets clear (i.e. demand equals supply) at the start and end of each time period, including the labour market. CGE models place explicit limits on the availability of factors, and the nature of these constraints can substantially affect the size and nature of the results. In contrast, most other tools used to assess economic impacts, including input–output (I-O) multiplier analysis, do not constrain the availability of factors. Consequently, non-CGE methods tend to overestimate the impacts of a project or policy.

The unemployment rate is assumed to remain relatively low over the projection period. As a result, most of the additional workers needed by firms benefiting from ARM Hub's support (and by their supply chains) are drawn from other parts of the economy, rather than from people who would otherwise be unemployed. The skills involved reinforce this. ARM Hub and advanced manufacturing activities are assumed to require highly skilled workers, who may not be immediately available. The analysis assumes labour is mobile across industries, regions and occupations, but subject to frictions reflecting differences in skill requirements. Meeting this demand, therefore, requires adjustments in wages and employment across industries and regions.

Consequently, the **net** increase in employment is modest. It comes mainly from small rises in real wages that encourage more people to join the workforce and existing workers to work more hours. This is typical of an economy operating close to full employment, where **the benefits of ARM Hub's work show up mainly as higher output and incomes rather than as additional jobs**.

ARM Hub also makes a valuable contribution to employment outcomes across a range of advanced manufacturing, robotics, and AI sectors rather than a single industry. These industries encompass activities primarily captured in Specialised Machinery and Equipment Manufacturing, Electrical Equipment Manufacturing, and Computer and Electronic Equipment Manufacturing, with additional relevant activities potentially captured in other machinery and equipment manufacturing industrial classes.[24] Combined, these sectors account for around 6.7% of total manufacturing employment in 2026, according to Jobs and Skills Australia, implying around 58,000 jobs nationally across these sectors.

Our modelling of ARM Hub's activities suggests that it will generate a net increase in employment of approximately 455 employee years[25] over 2019-2038, including direct and indirect effects, with most of this employment generated in Queensland. This is equivalent to an average of around 23 additional Full-Time Equivalent (FTE) jobs each year (see Table 3.5).

As a net, economy-wide measure, this estimate does not capture the broader reach of ARM Hub's engagement with industry. As an indication of this reach, ARM Hub's activities are estimated to have supported around 135 businesses employing approximately 4,050 people.[26] This indicates the size of the workforce that has benefited from ARM Hub's support.[27] The data cover only some of the firms with which ARM Hub has engaged, so the total workforce across all engaged firms is likely to be larger.

Table 3.5 Estimated impacts of ARM Hub's activities on employment from 2019 to 2038 (relative to the counterfactual scenario)

	Annual average (2019-2038)	Total (2019-2038)
	FTE	Employee years
South East Queensland	7	148
Rest of Queensland	1	21
Total Queensland	**9**	**169**
Rest of Australia	14	286
Total Australia	**23**	**455**

Source: ACIL Allen

[24] https://cdn.prod.website-files.com/6487f1bc522a23d0343e6c29/64ab7ad6a4fd064ea704c473_Robotics-Australia-Group-Submission-to-National-Robotics-Strategy.pdf
https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8166.0.80.0012013-14?OpenDocument

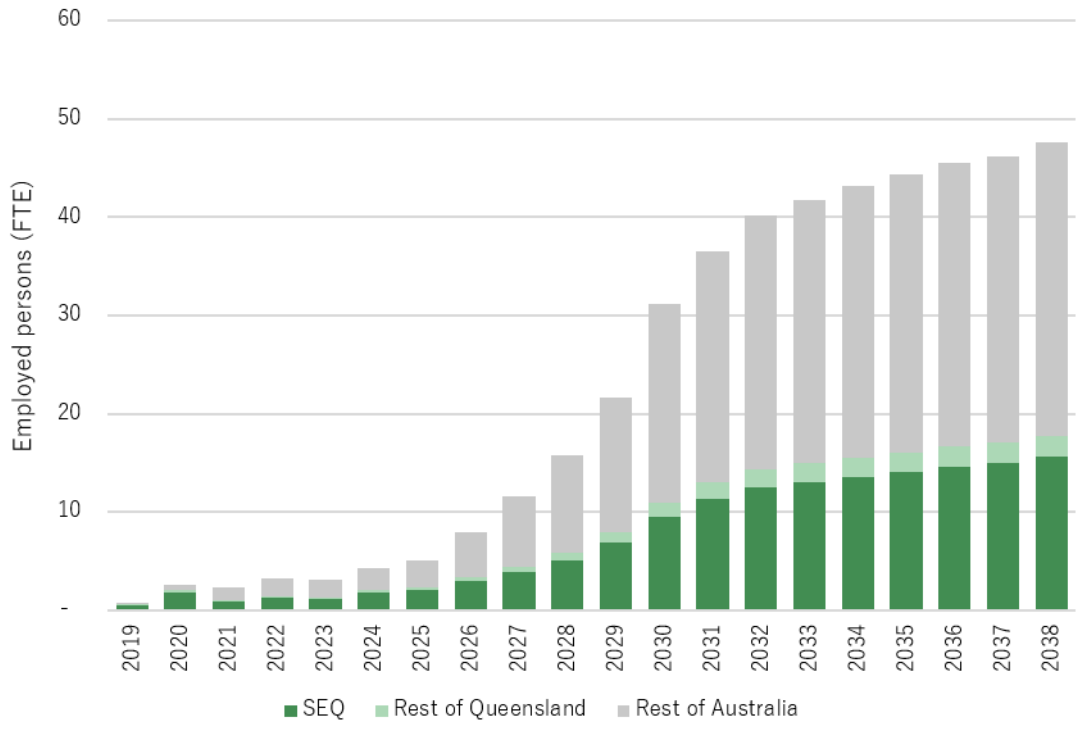
[25] One employee year is equivalent to one FTE job for one year. For example, it could be one full-time worker for a year, or one half-time worker for two years.

[26] Based on internal data of a subset of 135 companies that engaged with ARM Hub. These companies have a median of 30 employees.

[27] This figure does not represent jobs created by ARM Hub and should not be added to the modelled employment results.

Figure 3.4 illustrates the profile of total additional employment in Australia under the ARM Hub scenario. As shown in this figure, employment across Australia is projected to increase steadily over the assessment period, rising from a low base of around 1 FTE in 2019 to approximately 8 FTEs by 2026. Growth then accelerates through the late 2020s and early 2030s, reaching around 31 FTEs by 2030 and 48 FTEs by 2038. Employment gains are shared between Queensland and the rest of Australia, with Queensland accounting for a growing but consistently smaller share of total jobs across the period. This reflects the nature of high-skilled manufacturing jobs, which are typically concentrated in large urban areas, such as those in South East Queensland.

Figure 3.4 Projected change in total employment associated with ARM Hub activities from 2019 to 2026 (relative to the counterfactual, employed persons)



Source: ACIL Allen

Manufacturing and professional services, particularly ICT and data-related sectors (reflecting the digital-heavy nature of ARM Hub's data, AI and advanced manufacturing services), are expected to benefit most from ARM Hub's activities, reflecting the downstream industry impacts of unifying manufacturing data, enabling AI adoption, and supporting the uptake of robotics and advanced production technologies. These are concentrated high-skill, high-value roles in sectors aligned with Queensland's advanced manufacturing base. Importantly, the jobs supported through ARM Hub's activities are characterised by high skill levels and strong transferability across other strategically important sectors of the Australian economy. This reflects the advanced technical expertise developed through ARM Hub's data, AI and robotics services, which have broad applications in areas such as advanced manufacturing, biomedical technology, defence supply chains and critical technologies. As such, the employment impacts extend beyond any single sector, contributing to the development of a highly skilled workforce with long-term value to Australia's broader industrial and innovation base.

Labour market sensitivity

As discussed above, ARM Hub's projected employment impacts depend on the level of labour assumed to be available in the economy. In the central scenario, labour supply adjusts relative to the base case through changes in participation rates, hours worked and unemployment, in line with the standard labour market assumptions in Tasman Global. Because the labour market is assumed to be tight, most of the additional labour required is drawn from elsewhere in the economy, and the net employment gain is modest.

This may understate ARM Hub's contribution to employment. ARM Hub is small relative to the Queensland and Australian economies, so the additional labour required by its activities is also small. Demand of this scale could plausibly be met without the economy-wide wage pressures and crowding out implied by the central scenario.

To test this, we modelled an alternative scenario in which labour supply is more responsive. Under this assumption, the additional labour needed by firms benefiting from ARM Hub's support, and by their supply chains, is met mainly through an increase in overall labour supply rather than by drawing workers from other industries.

In this scenario, ARM Hub's activities are estimated to generate an average of 96 additional FTE jobs per year across Australia, of which 9 are in Queensland. This is equivalent to nearly 2,000 employee years over 2019–2038, compared with around 455 in the central scenario (see Table 3.6).

These results show how the employment impacts change when labour constraints are relaxed. They are best read as an upper bound rather than an alternative central estimate, because the scenario assumes suitable workers are readily available. In practice, ARM Hub and advanced manufacturing activities require highly skilled labour that may not be easily accessible. The central scenario remains the preferred estimate, and together the 2 scenarios give an indicative range for ARM Hub's employment impact.

Table 3.6 Estimated impacts of ARM Hub's activities on employment from 2019 to 2038 (relative to the counterfactual scenario) – Flexible labour market

	Annual average (2019-2038)	Total (2019-2038)
	FTE	Employee years
South East Queensland	32	646
Rest of Queensland	4	83
Total Queensland	**9**	**729**
Rest of Australia	59	1,184
Total Australia	**96**	**1,913**

Source: ACIL Allen

4 Broader impacts

This section presents the broader impacts of ARM Hub's services across industry development, social and environmental outcomes.

4.1 Contribution to industry development

Robotics and AI technologies represent a significant economic opportunity, with productivity gains translating into cost reductions, greater output, and higher quality products across a range of industries. Beyond firm-level benefits, broader adoption supports economic growth by driving technology adoption and advanced manufacturing, generating new sources of wealth throughout the economy, and creating skilled, high-value jobs.

Despite a strong domestic research base in robotics, Australia has been slower than many comparable nations to translate this into production capability and widespread industry adoption. Relative to global leaders, Australia underperforms across several dimensions, including the number of jobs in robotics-related fields, the economic contribution of automation, the depth of domestic development capabilities, and the pace at which businesses integrate these technologies.

Strategic alignment: National and State priorities

ARM Hub operates within a policy environment that explicitly prioritises the revitalisation of Australian manufacturing and the adoption of advanced technologies. Two key strategies frame this context – the Australian Government's Future Made in Australia strategy and the *Transforming Queensland Manufacturing Strategy 2025-30*. (as previously mentioned in section 1).

At the national level, Future Made in Australia aims to decarbonise the economy, create secure jobs, and increase economic resilience by expanding local manufacturing capability. A central pillar of this agenda is the adoption of automation and robotics to address structural labour shortages and improve productivity. The strategy emphasises the need to move beyond raw material extraction toward higher-value processing and advanced manufacturing, which requires significant investment in innovation infrastructure to support SMEs in making this transition.

At the state level, *Transforming Queensland Manufacturing Strategy 2025-30*. sets a vision for a more productive, sustainable, and technologically advanced manufacturing sector. It identifies robotics, automation, and digital transformation as critical enablers for Queensland manufacturers to compete globally. The strategy calls for stronger collaboration between industry and research institutions, and for targeted support to help SMEs overcome barriers to technology adoption.

ARM Hub contributes directly to the objectives of both strategies. By providing accessible, high-quality engineering support and advanced manufacturing infrastructure, the Hub enables manufacturers, and particularly SMEs, to undertake the kind of R&D and technology integration that these policies seek to encourage.

Barriers to realising potential

Recent reports[28] have identified several reasons for Australia not fully realising its robotics and AI potential, including:

- capital constraints: smaller firms with limited domestic markets often cannot absorb the upfront costs required to bring innovations to market, while larger firms tend to either develop solutions internally or acquire proven technology from overseas, bypassing the domestic pipeline
- Legacy equipment and infrastructure: companies typically lack access to the technical equipment, infrastructure and prototyping facilities (underpinned by access to engineering advice and business support strategies) which limit scale up and commercialisation opportunities[29]
- disconnected research and industry: where business and research sectors operate in silos, R&D activity may not be directed toward the practical challenges that firms have actually identified, reducing its commercial relevance
- commercialisation barriers: even where strong R&D exists, translating it into a market-ready product is difficult, with many innovations stalling due to inadequate access to the prototyping, testing, and scale-up facilities needed to bridge the gap between the lab and the market
- in consultation with ARM Hub users, stakeholders noted that the Hub helps address many of these barriers, particularly in providing derisking for SMEs and bridging the gap between research and industry.

> *"When I started building my prototype, that's where ARM Hub came in, because I needed a place where I could build physically, where I could build a presence and get started. I had a limited budget... so ARM Hub was crucial for me to get started."*
>
> *ARM Hub user*

Solutions development

ARM Hub's primary impact on participating businesses is the development of bespoke, implementable solutions to their problems. Unlike many innovation hubs that focus on commercialising pre-existing technologies or incubating start-ups, ARM Hub also operates as a working engineering partner that can directly support industry-led project delivery, technology adoption and advanced manufacturing capability. The Hub has an in-house team of engineers and designers that can bring specialised expertise directly to the problems businesses face, collaborating with them to identify, design, and test answers to specific challenges. This provides users with supportive capacity and expertise that are otherwise unavailable (or not readily accessible) through other avenues.

This is a fundamentally different model from advisory or research-focused organisations, and a point of difference from other government-funded initiatives, such as the Queensland Government's Network of Manufacturing Hubs, the Queensland AI Hub or The Precinct, and the Australian Government's Co-operative Research Centres or its Industry Growth Program.[30] ARM Hub does not just offer planning advice, recommended actions or theoretical analysis. Instead, it works on the ground with companies to build and validate the actual machinery, systems, and processes that solve their problems without taking an equity stake in the solution or the IP generated by ARM Hub's support. While other stakeholders (researchers,

[28] ACIL Allen (2026). Securing Prosperity: Unlocking Australia's Robotics Potential. https://acilallen.com.au/uploads/projects/1122/Securing-Prosperity---Unlocking-Australia%27s-Robotics-Potential.pdf
Robotics Australia (2025). Robotics Roadmap 2025. Accessed at: https://www.roboausnet.com.au/robotics-roadmap-2025

[29] ARM Hub (2026) 'Submission: Strategic Examination of Research and Development, ARM Hub, Brisbane.

[30] Queensland Government (2026). Hubs and Centres. Accessed at: https://innovation.qld.gov.au/innovation-in-queensland/hubs-and-centers.
Department of Industry, Science and Resources (n.d.). Industry Growth Program. Accessed at: https://www.industry.gov.au/science-technology-and-innovation/industry-innovation/industry-growth-program.

investors, and commercial partners) play important roles in the broader innovation ecosystem, ARM Hub occupies the critical piece of the puzzle where ideas are translated into working prototypes and deployable solutions.

> *"They didn't come in and say we can do this, we can do that… they said, 'Walk us around, and help us understand where you have challenges.'"*
>
> *ARM Hub user*

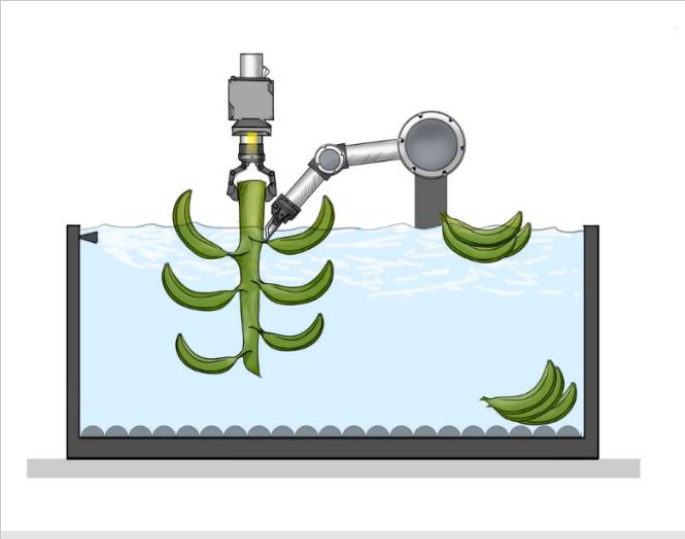
The users consulted for this assessment have emphasised that this hands-on approach is central to the Hub's value. By engaging directly with the technical work, from conceptual design through to prototyping and testing, ARM Hub ensures that solutions are practically viable. This capability allows businesses, particularly SMEs, to move beyond hypothetical problem-solving and into the realm of demonstrable, functional outcomes that can be scaled and commercialised with greater confidence.

Vignette 1 Banana de-handing

Context

De-handing is the action of separating the banana hand (fruit) from the bunch stalk (stalk).[31] It is a crucial process on commercial banana farms and is a skilled task, but also manual, repetitive, and labour intensive, relying on being able to hire and train staff.

The ARM Hub is working with Australia's banana industry to use automation to improve processing, including de-handing. Manual banana de-handing involves challenges when dealing with sap and delicate banana skins, as well as risks when using knives or other cutting tools near other staff. In addition, the Australian banana industry has recently faced challenges including natural disasters and working visa reductions. solutions to address these challenges.



Source: https://www.armhub.com.au/press-releases/processing-bananas-using-robotics-and-ai

In 2022, ARM Hub led a project with Hort Innovation, Australian Farm Robotics, Queensland University of Technology (QUT) and the Australian Banana Growers' Council. It investigated the feasibility of automating banana de-handing and informed the industry on what would be required to achieve automation. ARM Hub led the feasibility report and the engineering of the physical system, while QUT led the development of the novel computer vision and cutting trajectory algorithms. The initial feasibility report resulted in a second project to implement its recommendations, in which the ARM Hub team delivered the testing station used to deploy the algorithms that QUT developed.

Outcomes and Impacts

Phase one of the project, led and authored by ARM Hub, explored the feasibility of robotically de-handing bananas in banana processing facilities in North Queensland. The report found that the significant technological advancement in recent years in computer vision, an AI tool that helps robots adapt to natural variation, meant that a robotic solution to the task was now achievable, in contrast to the mechanical approaches taken in the literature.[32] Based on feedback from industry experts, ARM Hub identified several cutting tools and proposed 3 robot cell configurations for consideration:

1. Using 2 robotic arms and a perception package, the robot cuts banana hands from the bunch and places them on the wheel/trough.
2. The bananas are suspended in a tank of water and slowly lifted, with individual hands removed as the bunch is lifted.
3. The banana bunch is angled to a tub of water, and the hands are removed just above the water. Once in the water, the hands are moved away with water jets.[33]

The second stage tested and implemented the feasibility report recommendations.[34] ARM Hub led the design, build and testing of the cell, and QUT led the perception and cutting trajectory work deployed on it. The selected water jet cutting tool met all project requirements, and initial testing indicated it also reduced sap loss from the fruit during cutting. Reduction in sap loss has been shown to increase fruit shelf life. Cell configuration 3 was selected, with 2 main characteristics outperforming approaches 1 and

[31] ARM Hub, Feasibility of Automated Banana De-Handling in Australia, *ARM Hub*, Accessed 10 August 2026, https://www.armhub.com.au/impact-studies/feasibility-of-automated-banana-de-handing-in-australia.

[32] Ibid.

[33] Ibid.

[34] ARM Hub, Processing Bananas Using Robotics and AI, *ARM Hub*, Accessed 11 August 2026, https://www.armhub.com.au/press-releases/processing-bananas-using-robotics-and-ai.

2.[35] By allowing the fruit to be angled, the robot achieved higher success rates in fruit removal; by cutting directly into a water bath, it reduced bruising and immediately washed off sap leakage.

Delivering the testing station was the step that changed the nature of the project. ARM Hub's involvement took the work from a laboratory demonstration to a test in a facility built to represent a commercial banana processing shed, where the cutting method, the cell configuration, and the perception system could be assessed under real-world conditions. During the project, the ARM Hub team also engaged with banana growers from operations of various sizes to develop insights into the banana de-handing process and to understand the challenges associated with it. QUT lead researcher Dr Chris Lehnert said the goal for the project would be to commercialise the outcome, as there is no commercially available solution on the market.[36]

In 2025, the project partners prepared an Australian provisional patent application covering the de-handing system as an integrated whole rather than any single component: the bunch holding bay and feed, the bunch handover mechanism, the bunch manipulation system and stalk grip, the custom banana holding tool, the water jet cutting tool, and the vision system that identifies the cut line on each hand.

[35] Influencing News, On International Banana Day, Australian researchers tackle one of the industry's toughest jobs, *Influencing News*, Accessed 11 August 2026, https://prwire.com.au/pr/127968/on-international-banana-day-australian-researchers-tackle-one-of-the-industry-s-toughest-jobs.

[36] Future Food Systems, Banana industry welcomes research program into creating prototype robot arm for banana de-handing, *Future Food Systems*, Accessed 11 August 2026, https://www.futurefoodsystems.com.au/resource/banana-industry-welcomes-research-program-into-creating-prototype-robot-arm-for-banana-de-handing/.

Derisking for SMEs

Small businesses (defined as those with fewer than 20 employees) make up over 97% of all businesses in Australia, and medium businesses (20-199 employees) make up 2.5%.[37] While there are substantial benefits to R&D investment for small and medium enterprises (SMEs), these businesses tend to invest less in R&D than large businesses. This is primarily due to financial constraints and risk exposure. Many SMEs operate on thin margins, have limited access to capital, and need to prioritise immediate operational needs over uncertain, long-term investments.

R&D activities are inherently costly and iterative, often requiring multiple development pathways, specialised expertise, and extended time horizons before generating returns. For SMEs with constrained cash flow, the risk of sunk costs and delayed or uncertain outcomes can outweigh the potential benefits, discouraging sustained investment in innovation, technology adoption and advanced manufacturing. There is often limited incentive for SMEs to act as a first mover, as businesses can benefit from proven outcomes without bearing initial risks. Capability gaps, such as a lack of in-house technical expertise or dedicated R&D resources, also make it difficult to initiate and manage projects effectively. This means SMEs can be slow adopters of R&D and technologies, constraining productivity and limiting market competitiveness.

ARM Hub plays an important role in mitigating the risks that can constrain SME investment in R&D. More than 350 businesses are participating in or pursuing ARM Hub's services, a significant proportion of which are small or medium-sized businesses. While each business receives varying levels of project support, on average, each firm receives approximately $370,000 in project funding through working with ARM Hub. By offering a low barrier to entry and a common-user technical capability, the Hub provides access to advanced manufacturing expertise, technology, and infrastructure without requiring the significant upfront capital outlay that would otherwise be prohibitive for smaller firms. This model allows SMEs to engage in hands-on engineering, prototyping, testing, and technology integration to explore and validate innovative ideas in a controlled, staged manner. This enables manufacturers to validate requirements before committing to commercial solutions and reduces exposure to high sunk costs. In this way, ARM Hub addresses a gap in support available from government innovation programs, grant-delivery bodies or advisory organisations.

> *"The Hub gave our startup a space to be. It was really hard for us to get commercial space that's flexible enough for us to grow when we need – we didn't want to be tied into a long-term lease, when we didn't know what the business would look like."*
>
> *ARM Hub user*

Users of the Hub's services have noted that this extends to practical access to equipment, with the ability to borrow and trial technology before committing to a purchase, allowing businesses to build genuine confidence in an investment before making it. In effect, ARM Hub allows businesses to de-risk early-stage experimentation and product development, making R&D activity more accessible and commercially viable.

Importantly, ARM Hub is independent and not-for-profit. The Hub is therefore not driven by maximising revenue or promoting predefined technology solutions. Instead, it is incentivised to collaborate with SMEs to identify and develop fit-for-purpose outcomes, even when this requires additional time, iteration, or exploration of alternative approaches.

> *"We would have spent the money anyway… but we probably accelerated our development, in both technology and commercial. We're about a year or two further advanced than we would have been if we didn't have the access to ARM Hub."*
>
> *ARM Hub user*

[37] Australian Small Business and Family Enterprise Ombudsman (2025). Number of small businesses in Australia. https://www.asbfeo.gov.au/small-business-data-portal/number-small-businesses-australia

Stakeholders have highlighted this independence as a significant advantage, contrasting ARM Hub's role and approach with that of commercial vendors. These commercial vendors often seek to apply existing solutions to a client's needs regardless of fit, rather than applying more cutting-edge technologies or developing genuinely tailored ones. Users have noted that ARM Hub's objectivity helps businesses prioritise which technology pathways to pursue, consider the timing and maturity of emerging technologies, and avoid costly missteps that might otherwise erode confidence in future investment in advanced manufacturing capability.

Unlike some industry development intermediaries and commercial accelerators that take equity stakes or require revenue shares, ARM Hub does not take any equity in the projects it supports. For SMEs and startups already operating on thin margins, this ensures that the upside from successful R&D remains with the business, founding team and early investors, rather than being diluted by intermediaries whose returns are tied to ownership rather than project outcomes. ARM Hub therefore lowers the effective cost of capital for industry development and preserves incentives for SMEs to pursue higher-risk, higher-reward R&D pathways that might otherwise be forgone.

Education, training and outreach

Through its programs, ARM Hub has delivered a substantial body of education and training activities that have reached SMEs across Australia. The ARM Hub AI Adopt Centre, for example, has delivered content for 291 events and programs against an original target of 120, engaging over 40,000 SME workers. This complemented the earlier Australian Manufacturing Capability Network (AMCN), which similarly combined one-to-many events with tailored one-to-one engagements to build capability across the manufacturing sector.

More specifically, the AI Adopt Centre delivered 33 Data and AI Tech Talks (against a target of 12), 55 Knowledge Exchange Series events (against a target of 20), and 17 networking events (against a target of 6). These events have spanned a wide range of topics and audiences, from national manufacturing summits and industry conferences to regional workshops in areas such as the Western Downs, Ballarat and the Northern Rivers. The program has also extended internationally, with a Propel-AIR winner undertaking a residency at MassRobotics in Boston.

At the individual business level, the AI Adopt Centre has, to date, delivered 74 Co-Design Workshops and 71 AI Roadmaps. These engagements are designed to equip SMEs with a practical understanding of how AI can be integrated into their specific operations, and to build the internal capability needed to pursue adoption. The AMCN similarly delivered 20 Co-Design Workshop reports and 39 Technical Review reports to SMEs, with a deliberate shift over time toward Co-Design Workshops to deepen engagement and focus on the areas of greatest practical value. Across both programs, this combination of broad outreach and tailored support reflects ARM Hub's approach to building durable AI and technology capability within Australian manufacturing businesses.

Taken together, ARM Hub's education and training activities demonstrate a consistent and maturing capability to engage Australian SMEs at scale, while also delivering the depth of support needed to drive meaningful change at the business level. As AI adoption across Australian industry continues to evolve, ARM Hub's track record across both programs positions it well to continue playing a central role in equipping SMEs with the knowledge and tools needed to compete and grow.

Capability building

A significant proportion of ARM Hub's clients are engaging in structured R&D or advanced manufacturing projects for the first time. Many are small teams without dedicated innovation, technology adoption or advanced manufacturing functions, and often lack familiarity with the processes, tools, and mindsets required to develop and integrate automation or data and AI solutions. In some cases, businesses have not previously considered how emerging technologies might address their operational challenges or create new value.

One of ARM Hub's longer-term impacts is capability development within these businesses. Through the collaborative process of working with the Hub, companies gain a deeper understanding of their own operations, process flows, and constraints. This structured engagement forces a level of operational introspection that many SMEs have not previously undertaken, helping them discover inefficiencies, bottlenecks, and opportunities that were previously invisible.

This means that businesses can solve the immediate problem they brought to the Hub and build the internal knowledge and confidence to identify and address future challenges independently. Stakeholders have noted that this shift in mindset is a critical outcome of the ARM Hub engagement. Companies leave the process not only with a working solution but with a clearer understanding of how to approach R&D, how to evaluate technology options, and how to integrate advanced manufacturing and digital automation into their ongoing operations.

> *"When you're running a small business, it's a very lonely place to be, and the more friends you've got, the easier life gets. That's what ARM Hub has been for us, it's provided advice in particular…they provided mentoring to our own engineers, a sounding board."*
>
> *ARM Hub user*

> *"Our organisation wouldn't have embraced, or had the audacity to even consider [a secondary technology adoption project] had we not been challenged by ARM Hub over the years."*
>
> *ARM Hub user*

Businesses also gain exposure to available technological solutions and the broader ecosystem, including suppliers, research partners, and potential collaborators. These networks can further strengthen their capacity for innovation.

Over time, this contributes to a more resilient and self-reliant SME sector. Rather than remaining dependent on external consultants or vendors for every challenge, businesses that have worked with ARM Hub are better equipped to drive their own technology adoption and build internal capacity. These are the foundations on which Australia's sovereign manufacturing capability is being built.

Collaboration and networking

ARM Hub plays a significant role in strengthening connections across Australia's robotics and advanced manufacturing ecosystem, addressing the fragmentation that has historically limited the translation of research into commercial outcomes.

The Hub facilitates closer alignment between academic research and industry needs. The Hub has formal relationships with 14 universities, including those based in Queensland such as Queensland University of Technology, University of Queensland, Griffith University, University of Southern Queensland, Central Queensland University, and University of the Sunshine Coast. The full list of ARM Hub University partners is shown in Appendix A.

Beyond the AI Adopt Centre program, the Hub's membership and partners include 18 organisations, as well as 367 companies that have completed or are actively pursuing projects with ARM Hub, with 15,000 workers

who have accessed ARM Hub's own dedicated workshop programs, and more than 600 companies have accessed its services. The integration of research expertise into many these companies enables R&D activity that is directly informed by real-world challenges. It also provides SMEs with access to expertise, facilities, and emerging talent that would otherwise be difficult to engage.

ARM Hub's physical presence is also an important enabler of collaboration. Located outside a university environment and in proximity to manufacturing businesses and SMEs in Brisbane, the Hub is an accessible setting, particularly for smaller businesses, which may value face-to-face engagement when exploring unfamiliar technologies, even as digital and virtual forms of collaboration become more common. The Hub's physical facilities provide a shared environment in which participants can demonstrate equipment, examine materials, test concepts and discuss practical challenges together.

For example, ARM Hub's textile aggregation workshop to address the growing issue of textile waste brought industry partners, retailers, researchers, government representatives, and ARM Hub design and engineering specialists together at ARM Hub's industrial facility, where participants could work directly with a physical bale of donated textiles to understand the sorting challenge. These interactions support the informal exchange of knowledge and relationships that are difficult to replicate through virtual meetings alone. They also help build trust, encourage serendipitous connections and create a pathway from initial discussion to collaborative project development. The value of this place-based model is reinforced by ARM Hub's work with Brisbane-based manufacturers such as UAP, where ARM Hub staff worked closely with the company in its operations to identify technology-adoption opportunities and support its transition towards advanced manufacturing (see UAP Case Study in section 7).

> *"It's a multilayer type of support, and proximity had a great deal to do with [choosing to work with ARM Hub]. When you can literally jump in a car and be here within two minutes, bring your guys down, and you can actually start having meaningful discussions with other people who can point you in the right direction, that's extraordinarily valuable."*
>
> *ARM Hub user*

Beyond formal partnerships, ARM Hub actively fosters knowledge exchange through workshops, presentations, and industry engagement activities that bring together businesses, researchers, and technology providers. These forums enable businesses to build awareness of new and emerging technologies, understand practical applications, and learn from the experiences of peers. Stakeholders have noted that this visibility into the activities and progress of other firms is particularly valuable, as it allows businesses to monitor the maturity of solutions and identify opportunities to adopt or integrate technologies at the appropriate time, reducing duplication of effort and improving decision-making.

> *"[The benefit of ARM Hub is that you're] talking to someone who has access to the ecosystem, which is not just technology, but also funding and who to speak to… and they also provide a nurturing capability to start-ups and businesses."*
>
> *ARM Hub user*

The Hub also plays an important convening role through its involvement in broader networks, such as the Australian Academy of Technological Sciences and Engineering, Robotics Australia Group, Industry Capability Network Limited, its own instigated AMCN and AI Adopt Centre, and many other collaborative industry platforms. By connecting SMEs with one another, as well as with larger firms and supply chain partners, ARM Hub helps to generate clustering and agglomeration benefits for the sector and builds a more capable domestic manufacturing ecosystem. These connections help transfer knowledge, support collaboration, reduce costs through shared facilities and create pathways for SMEs to participate in larger, more complex projects than would otherwise be possible, due to individual capacity constraints. This collectively increases productivity.

In addition, ARM Hub's engagement with international partners further enhances its value as a global connector. Relationships with organisations such as MassRobotics, the Medical Technology Enterprise

Consortium in partnership with the US Department of Defence, Bio International Convention, World Health Expo (Arab Nations) and other international networks provide Australian SMEs with exposure to global best practices, technologies, and market opportunities. By linking Australian firms and intellectual property with international partners, customers and supply-chain networks, ARM Hub can help locally developed solutions move beyond domestic demonstration toward participation in global value chains. This creates opportunities for Australian businesses to access larger markets and build export capability.

Ecosystem development

AI and robotics are transformative 'general purpose technologies' that have the potential to deliver significant productivity gains to the Australian economy. However, without a healthy ecosystem that integrates these technologies with infrastructure, skills, institutions, and management capabilities, their gains tend to remain limited and unevenly distributed across the economy.[38]

Recent research published by leading academic researchers at UTS examined 15 models and European locations where industrial AI is being integrated into 'daily production and professional practice'. Amongst other things, the research identified the importance of large research-intensive 'anchor' firms to the strongest innovation ecosystems, the criticality of co-located research, skills, and demand to ecosystem strength, and the 'facilitation' role played by 'translation' institutions (such as ARM Hub).[39]

These findings are similar to the critical success factors of a high-performing hub identified in ACIL Allen's 2026 study on Australian robotics,[40] and a large existing global literature on research/technology parks and innovation precincts.

Through ARM Hub's 3 interrelated services and participation in a vast range of network activities, the organisation has forged several industry-to-innovation partnerships focused on integrating AI, robotics and digital twin technologies into Australia's manufacturing sectors.

For example, ARM Hub has worked with BAE Systems Australia to optimise and modernise manufacturing processes for the Navy's Hunter-class frigate program. By drawing on ARM Hub's expertise in robotics and data pipelines, as well as local relationships, BAE has opportunities to bring SMEs into its high-value global defence supply chains. Other defence partnerships with EM Solutions have resulted in the creation of an AI-powered digital twin designed to accelerate the manufacturing process for the Navy's satellite communication systems, and the eventual awarding of a $150 million contract to upgrade the Navy's systems.[41]

ARM Hub has also worked with Orica, a global leader in commercial explosives and blasting systems for mining, to help them expand into copper mining.[42] Furthermore, it has partnered with the locally headquartered Cook Medical to advance medical device manufacturing in Queensland (in collaboration with the Australian Cobotics Centre at QUT).[43] Likewise, through ARM Hub's participation in Medication Research Future Fund research grant, it has collaborated with Stryker, a global medical technology organisation, to accelerate its R&D initiatives in Australia.

These examples represent just a small selection of the many ways ARM Hub has played a key role in developing an AI and robotics ecosystem that is both locally and nationally focused, while also having international reach and influence. Numerous stakeholders consulted for this study highlighted how valuable

[38] Green, R. and Howard, H. (2026) 'Turning AI into Productivity: The Role of Innovation and Industrial Ecosystems', UTS Research Project, September 2026.

[39] Ibid.

[40] ACIL Allen 2026, 'Securing Prosperity: Unlocking Australia's Robotics Potential A strategic study', A Report Commissioned by Amazon.

[41] https://www.australianmanufacturing.com.au/ai-powered-manufacturing-boosts-defence-systems-for-royal-australian-navy/

[42] https://www.armhub.com.au/newsletters/kawasaki-heavy-industries-visit-arm-hub

[43] https://www.australianmanufacturing.com.au/australian-cobotics-centre-fosters-future-of-manufacturing-floor/

ARM Hub's physical facilities, deep expertise, services, connections and networks are to the health of the State's AI and robotics ecosystem, as they provide opportunities for large organisations, research bodies and SMEs to come together, build relationships and forge meaningful commercial partnerships.

Student skill capacity and capability

ARM Hub has provided hands-on experience for 204 students between 2019 and 2026. The Hub hosts STEM and design interns from TAFE and universities, giving them direct exposure to real-world engineering challenges and the opportunity to work alongside experienced practitioners on live industry projects. The Hub also offers Fellowships for PhD and post-doctoral students to work embedded with clients for 1-2 years at a time, supervised between the ARM Hub and a university.

For many students, this is their first substantive engagement with robotics and automation, commercial data and AI infrastructure, and even opportunities to apply their knowledge in quantum technologies in a professional setting. The advanced manufacturing sector is highly competitive, and opportunities to gain practical experience with cutting-edge technologies are limited, particularly for those still in training. ARM Hub's internship and graduate programs provide an entry point that allows emerging talent to build portfolios, develop technical skills, and form professional networks that would otherwise be inaccessible.

The Hub's close relationships with universities also create pathways for academic collaboration and translation. Researchers and students gain access to ARM Hub's facilities, equipment, and industry connections, enabling them to test theories in real-world contexts and contribute to solutions that have immediate commercial relevance.

The longer-term impact of this engagement is significant, as students who work with ARM Hub often accelerate their careers, taking on roles in advanced manufacturing, robotics, and related fields. Some leverage their experience to launch their own ventures, contributing to the pipeline of innovative start-ups that the sector needs to sustain growth. ARM Hub is therefore helping to build a more highly skilled workforce, create jobs, and enable knowledge transfer. This boosts Australia's reputation as a destination for skilled labour, contributing to job retention and the reshoring of previously offshored skilled jobs. Young Guns and UAP (see case study in section 7) both demonstrate the value of upskilling traditionally lower skilled roles, and the opportunities this enables for domestic and international employment growth, and reshoring.

Advocacy and thought leadership

Beyond direct work with businesses and students, ARM Hub plays an active role in shaping the direction of the robotics, advanced manufacturing, and AI sectors through advocacy and thought leadership. The Hub's leadership team regularly represents Australian industry at international conferences, delivering keynote addresses and participating in high-level panels that position Australia as a serious contributor to the global conversation on advanced manufacturing.

This outward-facing engagement helps raise the profile of Queensland and Australian advanced manufacturing and digital automation on the world stage, attracting attention from international partners, investors, and collaborators. It also ensures that ARM Hub (and, by extension, the Australian businesses it serves) remains connected to global best practices, emerging technologies, and market trends that can inform domestic strategy and investment decisions.

In Queensland and Australia, ARM Hub acts as a trusted voice to government and policymakers. As well as making submissions to and speaking at parliamentary inquiries, ARM Hub regularly hosts ministers, senior officials, and policy advisors at its facilities, giving them firsthand exposure to the challenges and opportunities facing industry in AI, robotics, and advanced manufacturing. These engagements are often educational opportunities that help shape a more nuanced understanding of what manufacturers need to

innovate, what barriers stand in their way, and how policy can be designed to support rather than hinder progress. The Hub also regularly hosts international delegations and is a showcase for Queensland and Australia's advanced technologies and manufacturing capabilities.

This work can elevate the entire sector by advancing the technology agenda (both domestically and internationally), helping create an environment in which AI, robotics and advanced manufacturing are better recognised as critical to Australia's economic future. This, in turn, can attract investment, talent, and policy attention that benefits not only ARM Hub's direct clients but the broader industry ecosystem in which they operate.

4.2 Social impacts

ARM Hub delivers tangible social benefits across workplace safety, healthcare and workforce inclusion. These impacts are experienced by the businesses directly supported by ARM Hub and extend across the broader Australian community.

Workplace safety is a core focus of many ARM Hub partners. For example, ARM Hub supported Brisbane-based ProTx in commercialising the Arresta100, a 7-metre, 2-tonne vehicle-barrier trailer designed to protect road workers at temporary worksites. ARM Hub's support spanned design-for-manufacture review, robotic welding integration, facility layout planning and access to hardware-ready workspace (ProTx impact study, 2026). It has been delivered to ProTx's first customer, Ventia, for market launch in 2026. This is anticipated to address the market gap for a towable, rapidly deployable barrier that absorbs collision energy through controlled deformation. The Arresta100 is expected to reduce the estimated 793 annual crashes at Australian roadside worksites, including 18 fatalities and 245 serious injuries.[44]

Box 4.1 Back-of-the-envelope economics: the benefits of lives saved

While there are obvious social benefits to saving lives and reducing injuries, in economics, it is standard to value these outcomes using the value of a statistical life (VSL) and the value of a statistical life year (VLY). The Commonwealth's Office of Impact Assessment (OIA) places the VSL at $5.7 million and the VLY at $245,000 in 2024 dollars, reflecting society's willingness to pay for small reductions in the risk of premature death and for each additional year of healthy life. These parameters allow consistent, transparent monetisation of safety benefits in cost–benefit analysis, even though no single individual's life is being "priced".

In economic terms, avoiding 18 fatalities alone implies benefits of roughly 18 × $5.7 million ≈ $102.6 million. Serious injuries are typically valued as a fraction of a life year (or multiple life years) lost or impaired, and using the OIA's VLY of $245,000 and treating each serious injury as equivalent to several life-years of health loss (for example, 3–5 VLYs depending on severity and duration), would add on the order of $180–300 million in benefits from the 245 serious injuries avoided. On this basis, the safety benefits of widespread Arresta100 deployment are plausibly in the high hundreds of millions of dollars, before accounting for additional reductions in minor injuries, property damage, traffic disruption and downstream productivity losses.

Source: ACIL Allen

Similarly, ARM Hub developed an AI OHS Assistant for the Air-conditioning and Mechanical Contractors Association (AMCA), representing over 130 businesses. The tool provides HVAC technicians with instant, sourced answers to safety queries drawn from AMCA-approved documentation, rather than relying on

[44] ARM Hub. (2026). *Enhancing Australian road safety with ProTx*. https://www.armhub.com.au/impact-studies/protx.

outdated manuals or waiting for supervisors. A companion AI SWMS Generator reduces the time required to complete legally required Safe Work Method Statements from up to 4 hours to under 15 minutes. This is expected to support over 3,000 safety queries per week and 400 SWMS documents per month across ACMA's member network.[45] By streamlining access to accurate safety information and ensuring consistent compliance documentation, these tools significantly reduce risks, enhance decision-making, and foster a safer working environment across industry.

> *The automated warehouse handles 80,000 tons a year worth of warehouse activity with nobody in there, and it's the single biggest and most effective risk reduction that I've seen in my career."*
>
> *ARM Hub user*

In mining, ARM Hub supported Koodaideri in commercialising its 'Safe Adjust' hydraulic tuning system, which allows maintenance technicians to remotely calibrate hydraulic systems on live equipment rather than working in close proximity to high-risk machinery.[46] This improves worker safety and operational efficiency by reducing machinery downtime. Koodaideri is looking to scale its operations globally, while retaining local manufacturing.

The case studies also highlight important social impacts, with ARM Hub supporting Young Guns (see case study in section 6) to transform a typically transient and low-engagement workforce into a highly engaged one. Young Guns and UAP (see case study in section 7) both highlight the impact of robotic assistance, advanced tools and automation on employee upskilling and the creation of new skilled roles, leading to an overall increase in the number of jobs.

ARM Hub has contributed to enhanced healthcare by supporting health tech businesses to improve patient diagnostics and treatments. This includes supporting Innovative Rehab Technologies in bringing the ROBERT neurorehabilitation robot to market in Australia, a mobile device that delivers high-repetition therapy for stroke and other neurological patients. ROBERT allows allied health assistants and nurses to deliver care, freeing therapists to treat more patients. This is particularly important in regional areas, where staff shortages mean treatment falls short of clinical guidelines. ARM Hub's membership model cut the company's time-to-market from years to 6 months.[47]

Similarly, in 2024 ARM Hub started to support Australian biotechnology company Microbio to develop the data and AI foundations needed to commercialise InfectID-BSI, a diagnostic assay that can detect 26 sepsis-causing pathogens directly from whole blood in under 3 hours. ARM Hub continues to support Microbio in managing and analysing complex data from global clinical trials, advancing a life-saving technology that could enable faster diagnosis and treatment of patients with septicaemia worldwide. This relates to services delivered under Service 1.

[45] ARM Hub. (2026). *AI supporting HVAC workers*. https://www.armhub.com.au/impact-studies/amca.
[46] ARM Hub. (2025). *Enhancing safety in high-risk environments*. https://www.armhub.com.au/impact-studies/enhancing-safety-and-efficiency-for-equipment-and-maintenance-technicians-working-in-high-risk-environments.
[47] ARM Hub. (n.d.). *Rehab robot leads to better patient health*. https://www.armhub.com.au/impact-studies/rehab-robot-leads-to-better-patient-health.

Vignette 2 Microbio and Harnessing AI

Context



Source: https://www.armhub.com.au/impact-studies/harnessing-ai-to-accelerate-global-sepsis-trials

Sepsis is an inflammatory response to an infection that can damage the body's tissues and organs.[48] Sepsis infection kills roughly 11 million people each year.[49] The timely diagnosis of sepsis has consistently been a limiting factor in its treatment, as standard blood cultures take 24 to 48 hours to return results. As sepsis is a time-critical infection, these hours are important and can cost lives. There is also a strong clinical and commercial case for faster, more precise diagnosis to avoid prescribing generic antibiotics whilst awaiting a diagnosis, as this contributes to antimicrobial resistance.

Microbio is a start-up biotechnology company that built InfectID-BSI, a diagnostic test that detects 26 sepsis-causing pathogens directly from whole blood in under three hours, using a 0.5mL blood sample.[50] The test achieves a 99.7% negative predictive value, thereby identifying pathogens that standard cultures often miss.[51]

Microbio aim to commercialise its diagnostic assay, which is currently CE marked for sale in the European Union and the United Kingdom and progressing through the Food, Drug and Cosmetic Act (FDA) 510(k) approval process for the United States market.[52] Commercialisation requires large-scale clinical trials to generate data. These complex data needs to be managed efficiently and accurately. As such, Microbio needed a system for managing these data, one that could ingest heterogeneous data from international sites, standardise it reliably, and enable non-technical staff to analyse it.[53]

Outcomes and impacts

Microbio established an AI tool with ARM Hub's AI Adopt Centre, enabling it to manage and govern its clinical trial data across multiple sites. This tool can access volumes of clinical data, compile and analyse it, and validate it against test results. This replaces manual data entry and reconciliation with automated data that is available for analysis. The system also incorporated Large Language Models as AI tools, enabling non-technical staff to conduct internal data analysis and manage clinical trials from different locations worldwide.[54]

Beyond the platform design, Microbio and ARM Hub developed a Data and AI Roadmap to guide Microbio through the phases of commercialisation, including trial delivery, data collection, and eventual commercialisation of the InfectID-BSI product.

Microbio has already secured 11 distribution partners across 22 global markets, and this collaboration is accelerating its progress toward achieving FDA 510(k) clearance.[55] Phase 1 of the data infrastructure is in place to support the data collection and validation required for the FDA submission process. The submission is expected to be lodged in 2026, with US market entry to follow clearance.

[48] Sepsis Australia, *What is sepsis?*, Accessed 28 September 2026, https://www.australiansepsisnetwork.net.au/what-is-sepsis/.
[49] ARM Hub AI Adopt Centre, 2025, Harnessing AI to Accelerate Global Sepsis Trials.
[50] Ibid.
[51] Ibid.
[52] Ibid.
[53] Ibid.
[54] ARM Hub, *Harnessing AI to Accelerate Global Sepsis Trials*, Accessed 28 September 2026, https://www.armhub.com.au/impact-studies/harnessing-ai-to-accelerate-global-sepsis-trials.
[55] ARM Hub AI Adopt Centre, 2025, Harnessing AI to Accelerate Global Sepsis Trials.

4.3 Cultural impacts

ARM Hub is delivering cultural impacts by helping Australian manufacturers transition to advanced manufacturing, strengthening workforce capability, supporting more diverse participation in technology-driven industries, and contributing to the growth of Australia's creative industries.

ARM Hub is contributing to improved workforce diversity, equity and inclusion by addressing the structural barriers women face in manufacturing and deep-tech entrepreneurship. In Queensland, women hold just 22% of founder roles,[56] and women-only founding teams captured under 0.5% of Australian venture capital in 2025.[57] Women also account for just 27% of the manufacturing workforce.[58] Research points to a growth-stage funding gap, rather than a pipeline problem.

ARM Hub is supporting female founders through targeted programs. The Female Founders Technology Roadmap aims to accelerate business growth, while the Female Founders Scale-up Manufacturing Accelerator equips Queensland's women-led businesses to scale from prototype to full production. The accelerator supported Fish Girl founder Umar Nguyen to automate and scale her business, Australia's only producer of wild-caught scampi caviar (see Vignette 3). By deliberately targeting underrepresented founders, ARM Hub challenges the cultural norms of an advanced manufacturing sector that has historically been male dominated.

ARM Hub is supporting businesses to enhance the availability and public accessibility of art and culture. The 5-year partnership with UAP, a Queensland-based creative manufacturing company, has focused on robotics, AR/VR and generative AI at the intersection of manufacturing, design, architecture and public art. This has driven an increase in staff numbers in Australia and internationally and expanded global sales of large-scale public art and architectural works. This has allowed the company to expand production of culturally significant public artworks on a global scale (see case study in section 7).

ARM Hub's banana de-handing feasibility study, conducted with Hort Innovation and the Australian Banana Growers' Council, illustrates a cultural shift in primary industries toward embracing advanced technology. The project involved extensive grower engagement in Far North Queensland and garnered a sector-wide willingness to adopt robotics and computer vision in a traditionally manual industry (Vignette 1).

More broadly, ARM Hub has supported the development of advanced manufacturing capability in Queensland, Australia and on the global stage. Brisbane start-up Valiant Space launched a rocket thruster component into orbit on a SpaceX mission.[59] EM Solutions is scaling naval satellite communications manufacturing to support the delivery of a $150 million Royal Australian Navy contract.[60] These achievements, facilitated by ARM Hub's ecosystem, contribute to a cultural identity for Australian industry that extends beyond resources and agriculture to encompass deep technology and space.

ARM Hub's support for Young Guns, a First Nations-founded container unloading business, delivers cultural impact by challenging industry norms that treat container unloading as low-value, transient labour. As a First Nations-founded enterprise expanding across Australia, New Zealand and Canada, Young Guns has a mission to increase the proportion of First Nations employees in its workforce. These higher-paid, skilled positions support economic independence and reconnection with land and waterways, given that many ports operate on or near First Nations lands and waters. The model has broader value as a demonstration of how

[56] Queensland Government (2023). *Queensland female innovators to benefit from almost $1 million in support.* Accessed 10 September 2026. https://statements.qld.gov.au/statements/98248

[57] Queensland Government (2026). *Women in Manufacturing Apprentice Awards announced*. Accessed 10 September 2026. https://statements.qld.gov.au/statements/104640

[58] Women's Agenda (July 2025). *2025 tracking to be worst year on record for capital raised by female-only founding teams*. Accessed 10 September 2026. https://womensagenda.com.au/business/entrepreneurs/2025-tracking-to-be-lowest-year-on-record-for-capital-raised-by-female-only-founding-teams/

[59] ARM Hub. (n.d.). *Brisbane space start-up takes off!* https://www.armhub.com.au/impact-studies/brisbane-space-start-up-takes-off.

[60] ARM Hub. (n.d.). *Digital twin for naval satellites*. https://www.armhub.com.au/impact-studies/digital-twin-for-naval-satellites.

advanced technology can sit alongside community, trust and employment objectives (see case study in section 6).

Vignette 3 The Fish Girl

Context

The Fish Girl is a startup founded by former chef Umar Nguyen, a strong advocate for sustainable seafood practices. The business is focused on making seafood processing more ethical, efficient, and globally competitive while creating a fully traceable, waste-free supply chain.[61]

Umar is also Australia's sole producer of wild-caught scampi caviar, making the niche industry heavily dependent on her business.[62] She sells 3kg batches (150 x 25g tins), which require careful sorting to remove impurities from 6kg of raw product. Each kilogram takes between 5 and 6 hours to process.[63]

As a result of the repetitive and laborious process, Umar sustained permanent damage to her left arm, along with shoulder issues and 2 slipped discs in her spine.[64] To maintain her health and her clientele, she was forced to decline large and international orders.[65]



Source: https://www.armhub.com.au/impact-studies/empowering-female-founders-automating-australia-s-only-wild-caught-scampi-caviar

Outcomes and impacts

Umar was one of 6 women to participate in the ARM Hub Technology Roadmap Accelerator for Female Founders. ARM Hub's Female Founder accelerators are tailored to address the structural barriers women face in manufacturing and deep-tech entrepreneurship. By investing in female-led businesses, ARM Hub helped ensure that the benefits of Australia's industrial transformation are accessible, equitable, and globally competitive.[66]

During the program, ARM Hub identified Umar's manufacturing challenges and created a personalised roadmap to implement the solutions. The engineering expertise of the ARM Hub team led to a new machine that replaces tweezers in the sorting process.[67] The machine, which Umar affectionately refers to as "Bernie", is a modified aspirator used in dental surgeries. A tiny nozzle sized for scampi eggs is fitted on the machine.[68] As of September 2026, a vision-guided robotic cell has been integrated and validated, enabling automatic detection and removal of discoloured scampi caviar from a processing tray (after larger debris has been removed by hand). This replaces a manual, ergonomically demanding task with an automated platform that improves repeatability, product consistency and operator safety, while handling a delicate premium product gently.

The machine also improved the accuracy of the sorting process and increased the amount of time Umar could work.[69] This resulted in up to a 60% increase in productivity and up to a 20% increase in annual turnover, enabling exports to Asia and the United States of America. As the production of wild-caught scampi caviar is heavily dependent on The Fish Girl, the machine has also been instrumental in sustaining and expanding a niche industry.

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[61] ARM Hub (n.d.). Empowering Female Founders: Automating Australia's Only Wild-Caught Scampi Caviar. https://www.armhub.com.au/impact-studies/empowering-female-founders-automating-australia-s-only-wild-caught-scampi-caviar

[62] Box, L (2025). How technology has helped secure the future of Australian scampi caviar. https://www.hospitalitymagazine.com.au/the-new-tech-solving-a-scampi-caviar-problem/

[63] ARM Hub (n.d.). Empowering Female Founders: Automating Australia's Only Wild-Caught Scampi Caviar. Op. cit.

[64] Box, L (2025). How technology has helped secure the future of Australian scampi caviar. Op. cit.

[65] ARM Hub (n.d.). Empowering Female Founders: Automating Australia's Only Wild-Caught Scampi Caviar. Op. cit.

[66] ARM Hub (n.d.). Accelerators. Op. cit.

[67] Ibid.

[68] Box, L (2025). How technology has helped secure the future of Australian scampi caviar. Op. cit.

[69] Ibid.

4.4 Environmental impacts

ARM Hub's portfolio includes several projects that directly reduce environmental harm or accelerate the transition to a low-carbon economy.

Southern Green Gas, an ARM Hub tenant, is developing Direct Air Capture (DAC) technology to remove carbon dioxide (CO_2) directly from the atmosphere. The DAC units house solar-powered canisters that capture atmospheric CO_2 for sequestration underground or conversion into renewable fuels. The technology is designed to operate in remote, arid areas without infrastructure support. Southern Green Gas is building 3 modules at ARM Hub before scaling to commercial production.[70]

ARM Hub is enhancing energy storage by supporting Vaulta, a Brisbane start-up manufacturing lithium battery packs for residential storage. Vaulta's no-weld design allows batteries to be disassembled at the cell level, enabling the reuse and recycling of components and giving batteries a second life. This directly addresses the environmental concerns around lithium-ion end-of-life disposal. Vaulta has tripled its production capability from 10 to 30 batteries per month since joining ARM Hub in December 2023, and is listed as the preferred battery supplier in multiple tenders.[71]

ARM Hub's work with Seed Terminator addresses environmental sustainability in agriculture. The device destroys weed seeds during harvesting, reducing reliance on herbicides amid growing herbicide resistance and associated health implications. ARM Hub supported the company to scale production from 150 to 700 units annually, with a target of 8,000 units by 2031. In January 2025, Seed Terminator was awarded $3.1 million under the Industry Growth Program to support scale-up and global export. The technology promotes sustainable farming practices by enabling integrated weed management without chemical inputs.[72]

ARM Hub has supported Australia in addressing the local and global challenge of textile waste. Working with The Salvation Army, Kmart, and QUT, ARM Hub developed an approach to automate the sorting of textile waste, with up to 679,000 tonnes reaching Australian landfills each year. This will reduce landfill and better protect the environment (see Vignette 4).

The UAP case study (section 7) also demonstrates the value of reshoring manufacturing services in Australia. Our analysis estimates that UAP's onshoring efforts have and will save 134 tonnes of CO_2 from 2018-2042.

[70] ARM Hub. (n.d.). *Southern Green Gas: Capturing carbon dioxide*. https://www.armhub.com.au/impact-studies/southern-green-gas-capturing-carbon-dioxide.

[71] ARM Hub. (n.d.). *Vaulta, a start-up to build a smart, safe, and clean lithium battery for Australian homes*. https://www.armhub.com.au/impact-studies/vaulta-a-start-up-to-build-a-smart-safe-and-clean-lithium-battery-for-australian-homes.

[72] ARM Hub. (n.d.). *Seed Terminator scale-up and export*. https://www.armhub.com.au/impact-studies/seed-terminator-successfully-received-funding-to-scaleup-and-export-a-weedkilling-device.

Vignette 4 Salvos Stores Textile Recovery Facility

Context

The Salvation Army is a global organisation headquartered in London, England, and operating in over 130 countries. In Australia, the organisation's mission is to be actively involved in national issues and advocate for social change, while bringing hope to people experiencing hardship and injustice.[73]

Textile waste is a major cause of landfill in Australia. The average Australian purchases 55 items of clothing each year, with over 1.55 billion units imported and manufactured annually. Since much of this is made from non-durable and unsustainable materials, an estimated 200,000 tonnes of clothing end up in landfill each year.[74]



Source: https://www.salvosonline.org.au/post/salvos-stores-launch-world-first-textile-recovery-facility-in-brisbane

The Salvation Army has a long history of collecting, sorting and recycling used clothing and fabric, with activities dating back to the late 19th century.[75] The organisation's approach to reuse and recycling helps reduce textile waste and promote a circular economy, with 14,500 tonnes of textiles diverted from landfill and 49 million items repurposed or sold through Salvos Stores in FY24-25 alone.[76]

Major barriers to further reducing the amount of textile waste in landfill include poor collection, sorting and recycling infrastructure, complexity of the supply chain, and a lack of data collection and consumer awareness or motivation.[77] Sorting and disaggregating processes were also time-consuming and labour-intensive due to the range of textiles, making the process very uneconomical.

Outcomes and impacts

The ARM Hub worked with key stakeholders, including The Salvation Army, Kmart, the Queensland University of Technology, and industry experts across the garment supply chain, to identify solutions to divert large volumes of unsaleable textile donations from landfill. The stakeholders collaboratively developed and delivered a series of workshops to address major barriers to further reducing textile waste in landfills. The workshop resulted in a plan to develop a demonstrator for automated sorting and disaggregation using existing and novel technologies, including artificial intelligence systems and robotic equipment. The workshops also resulted in a better understanding of the textiles supply chain through the mapping of reuse and recycling processes.[78]

Following the workshops, the Salvation Army launched the Salvos Stores Textile Recovery Facility, Australia's first automated textile sorting and decommissioning facility in Queensland. The facility will use artificial intelligence and robotics to process and sell up to 5,000 tonnes of textile waste annually, collected through Salvos Stores and other business partners. The facility has demonstrated economically viable infrastructure that keeps decommissioned materials in circulation through automated sorting and disaggregation of textiles. This reduces landfill waste, protects the environment, and generates additional revenue to fund the Salvation Army's frontline work across the country.[79]

[73] Salvation Army (n.d.). About Us. https://www.salvationarmy.org.au/about-us

[74] Salvos Stores (2026). Salvos Stores Textile Recovery Facility. https://www.salvosstores.com.au/stories/salvos-stores-textile-recovery-facility

[75] Worthing, S. (2025). Salvos Stores launch Australia-first Textile Recovery Facility in Brisbane. https://www.salvosonline.org.au/post/salvos-stores-launch-world-first-textile-recovery-facility-in-brisbane

[76] Salvos Stores (n.d). Donate Goods. https://www.salvosstores.com.au/donate-goods

[77] Khan, M.I. et al (2023). 'Textile waste management in Australia: A review'. *Resources, Conservation & Recycling Advances*, 18. p.10. https://doi.org/10.1016/j.rcradv.2023.200154

[78] ARM Hub (n.d.). Addressing Textile Supply Chain Through Technological Innovation. https://www.armhub.com.au/impact-studies/addressing-textile-supply-chain-through-technological-innovation

[79] Worthing, S. (2025). Salvos Stores launch Australia-first Textile Recovery Facility in Brisbane. Op. cit.

5 Concluding remarks

This section provides our final thoughts on the impact assessment.

5.1 ARM Hub's model is fit-for-purpose

ARM Hub's operating model is well-aligned with the objectives of both the Queensland Government's *Transforming Queensland Manufacturing* strategy and the Australian Government's *Future Made in Australia* agenda. At its core, the Hub is designed to translate research into commercial outcomes, support manufacturers, particularly SMEs, to adopt advanced technologies, and build the domestic capability required for a competitive, resilient manufacturing sector.

Several features of ARM Hub's model distinguish it as an effective delivery mechanism for these goals:

- focus on industry-led problems
- independence but connection to government and academia
- in-house expertise
- physical space.

Unlike research centres that are incentivised to prioritise publication and contribution to scholarship or incubators that focus on start-up formation, ARM Hub is oriented toward industry-led problems. The Hub's engagements begin with real business challenges and end with working prototypes, validated processes, or deployable solutions. This commercial approach means that R&D activity is directed toward outcomes that matter to industry, including productivity gains, cost reductions, and new revenue streams, rather than theoretical advances that may never leave the lab.

ARM Hub is a not-for-profit organisation and is operationally independent, though it maintains strong connections to both government and academia. This positioning allows the Hub to act as a neutral broker, trusted by businesses as a partner rather than a vendor, and by government and universities as a credible channel for translating policy and research into practice. The Hub also communicates the reality of industry development back to government and the research sector.

Users consistently noted that this independence makes ARM Hub easier to work with than traditional government programs or commercial providers. There is less bureaucracy, more flexibility, and a personal, collaborative approach that lowers the barrier to engagement. Businesses report feeling treated as partners in problem-solving, not as customers in a transactional relationship. This ease of doing business has been a significant driver of sustained engagement, particularly among SMEs that lack the resources to navigate complex procurement or grant processes.

The Hub's not-for-profit model also means its pricing and engagement are accessible to SMEs, with government grants commonly funding the first tier of engagement. According to the sample of end-users consulted for this study, the first high-quality service is often offered at no cost, followed by affordable solutions, with access to equipment and facilities that would otherwise be prohibitively expensive. ARM Hub lowers the financial barrier to innovation, technology adoption and advanced manufacturing. This is particularly important for SMEs operating on thin margins and unable to absorb the risk of large upfront R&D investments.

The availability of dedicated physical space and a common-user facility, equipped with advanced manufacturing tools, robotics systems, and testing facilities, is a critical enabler of ARM Hub's impact. This infrastructure, alongside data and AI infrastructure, enables businesses to prototype, iterate, and validate solutions in a controlled environment, with support from in-house experts who can troubleshoot, refine, and optimise designs in real time.

ARM Hub's focus on hands-on, collaborative problem-solving, rather than advisory, grant-making, or pure research, means that its work can have real impact. It is structured to deliver on the strategic priorities of government, to meet the practical needs of industry, and to build the long-term capability of the Australian advanced manufacturing sector. In this way, ARM Hub addresses a gap in the support available from government innovation programs, grant-delivery bodies, or advisory organisations. As policymakers and industry leaders consider how to accelerate technology adoption and strengthen domestic manufacturing, ARM Hub can offer a proven template.

5.2 Evidence of tangible impact

ARM Hub is delivering measurable impact across the Queensland and Australian economies, societies, cultures, and environments. Our analysis finds that these contributions occur both through the direct outcomes of ARM Hub's activities and through broader spillover benefits that extend across the innovation system and wider community. These represent the broader, often indirect, contributions of innovation, technology adoption, and advanced manufacturing to national prosperity.

ARM Hub is delivering strong, quantifiable economic returns. Our impact analysis shows that ARM Hub's activities are expected to increase Australia's GDP by a cumulative total of $498 million over 2019-2038 and generate $6.48 for every $1 of investment (which includes partner co-contributions and government funding). In Queensland, ARM Hub is expected to increase real GDP by a cumulative $182 million. As a result, an additional 23 jobs will be created in Australia each year, with 9 additional jobs in Queensland every year, as well as 4,050 workers supported by participation in ARM Hub's activities annually.

While not its primary function, ARM Hub's activities have generated substantial social, cultural and environmental impacts that extend well beyond the economic metrics considered in this report. The case studies, vignettes, and stakeholder consultation demonstrate that, with ARM Hub's assistance, businesses have enhanced workplace safety, health outcomes, and workforce growth, addressing challenges in road worker protection, occupational health compliance, and regional healthcare access. With ARM Hub's support, environmental sustainability has been advanced through carbon capture technology, battery recycling solutions, herbicide-free weed management, and textile waste automation. Through ARM Hub's ecosystem, advanced manufacturing and digital adoption have been fostered in Australian industry, historical barriers for women and First Nations entrepreneurs in deep tech have been challenged, and a cultural identity has emerged that extends beyond resources and agriculture into advanced manufacturing, creative industries and space technology.

These outcomes highlight the scale and significance of ARM Hub's contribution to measurable economic value, while also generating wider benefits for Australian and Queensland communities and industries. Many of these impacts would not have occurred without ARM Hub's ambition and approach to commercialisation.

5.3 Future impact

The tangible results already delivered by ARM Hub are the foundation for significantly greater benefits as the prospective opportunities identified through the Hub's work are scaled. The early successes showcased in this report demonstrate that the Hub's model can generate measurable efficiency gains and capability uplift. As these solutions mature and are adopted more broadly across partner organisations and sectors, their cumulative impact on productivity, safety, technology adoption and advanced manufacturing will compound, positioning ARM Hub as a catalyst for sustained transformation in Australia's advanced manufacturing ecosystem.

ARM Hub has delivered meaningful outcomes for the manufacturing industry since its establishment, supported by a relatively modest level of financial investment. While ARM Hub has received lower levels of funding than international comparators, it has the potential to further scale its impact as additional

investment is attracted to the Hub. For example, government funding for similar centres around the world has attracted private investment to scale the level of impact delivered. The ARM Institute in the USA, which receives approximately $126 million in awarded funding, aims to attract private capital to national security priorities and scale investment in critical technologies.[80] Singapore's Advanced Remanufacturing and Technology Centre has received approximately $77 million[81] from Rolls-Royce and the Agency for Science, Technology and Research to develop smart manufacturing technologies in collaboration with around 100 companies.[82] A network of 9 Catapult Centres was established in the UK to support innovation, de-risk the transition from research to commercial delivery, and stimulate additional private investment in R&D across the UK. These Catapult Centres were most recently supported by an additional $3 billion[83] over the 5-year funding period beginning in 2022.[84] Further, domestic examples demonstrate larger scales of investment, including the $57.5 million Commonwealth-backed Additive Manufacturing Cooperative Research Centre[85] and the Australian Automation and Robotics Precinct, which received an initial $28 million capital investment from the WA State Government.[86] The economic impacts of ARM Hub would likely be further enhanced through additional investments.

There is a clear opportunity to amplify ARM Hub's impact by investing more in the physical infrastructure that underpins its activities. Expanding the Hub's facilities, demonstration spaces, and deployment environments would increase its capacity to host more complex, multi-partner projects and accelerate the transition from proof of concept to operational reality. This infrastructure investment would also signal a long-term commitment to industry partners, encouraging deeper collaboration and co-investment in the Hub's initiatives.

The establishment of pooled or competitive funding pots could provide a flexible mechanism to match high-potential initiatives with appropriate capital. By creating dedicated funding streams accessible on a merit or competitive basis, ARM Hub could prioritise projects with the strongest strategic alignment, scalability, and impact potential. This approach would reduce barriers to entry for innovative ideas and ensure that promising opportunities are not delayed or lost due to funding and capacity constraints.

Increased operational funding to grow engineering, data, and AI support capabilities is critical to reducing single-point dependencies and building resilience within the Hub's delivery model. Expanding the team would create important career pathways for ARM Hub's key talent, allowing them to grow, learn, and continue to deliver best-in-class advice to the organisations that engage with the Hub's offerings. It would also enable the Hub to take on a larger and more diverse portfolio of projects without compromising quality or responsiveness.

Lastly, enhanced support for marketing and communications would raise awareness of ARM Hub across Australian industry. A more visible presence would attract a broader range of participants, enabling them to bring their networks, expertise, and needs into the Hub's ecosystem. This, in turn, would multiply the Hub's impact by fostering new collaborations, expanding its knowledge base, and strengthening its role as a central node in Australia's advanced manufacturing network.

[80] The ARM Institute (2024) *DoD Office of Strategic Capital Engages with the ARM Institute* https://arminstitute.org/news/osc-visit/

[81] SGD$70 million converted to AUD using the exchange rates reported by the RBA for August 2026. RBA (2026). Op. cit.

[82] Ang, R (2019) *A*Star, Rolls Royce pump in additional $8m investment to smart manufacturing technology development* https://www.straitstimes.com/business/companies-markets/astar-and-rolls-royce-pump-in-additional-8-million-investment-to-smart

[83] GBP£1.6 billion converted to AUD using the exchange rates reported by the RBA for August 2026. RBA (2026). Op. cit.

[84] HM Treasury (2022) *Autumn Statement 2022 HTML* https://www.gov.uk/government/publications/autumn-statement-2022-documents/autumn-statement-2022-html

[85] AMCRC (n.d.) *About* https://www.amcrc.com.au/about/

[86] AARP (2024) *Australia's biggest robotics and automation precinct opens in WA* https://www.theaarp.com.au/media-release-australias-biggest-robotics-and-automation-precinct-opens-in-wa/

ACIL ALLEN

Case studies

6 Case study 1: Young Guns Container Crew

6.1 Introduction

Young Guns Container Crew (Young Guns) is an Indigenous-owned logistics company established in Brisbane in 2004 by brothers Scott and Trent Young, with operations across Australia, New Zealand and Canada. The company specialises in loading and unloading shipping containers and has positioned itself around safe, reliable and scalable supply chain services rather than a traditional low-skill labour model.

The collaboration with ARM Hub, named Polaris, was a digital transformation and new-product development project in logistics automation. It focused on improving safety, productivity and efficiency while keeping people central to the operating model rather than pursuing full labour replacement. Young Guns started collaborating with ARM Hub at a time when the broader supply chain industry was beginning to progress automation and robotics, and when large customers were planning or building automated distribution centres. Young Guns wanted to ensure that, as automation entered the market, its workforce could collaborate with technology rather than be displaced by it.

The core problem Young Guns wanted to resolve was that unloading containers was labour-intensive, repetitive and physically demanding, with material safety risks and inefficiencies in traditional workflows. At the same time, the industry was evolving to incorporate robotics and automation, and trajectories often assumed humans should be removed from the process altogether.

Young Guns saw the need for an automation pathway that would optimise workers' roles in the system, improve safety and throughput, and create a scalable service offering that could grow the business and support more employment across Australia, New Zealand and North America.

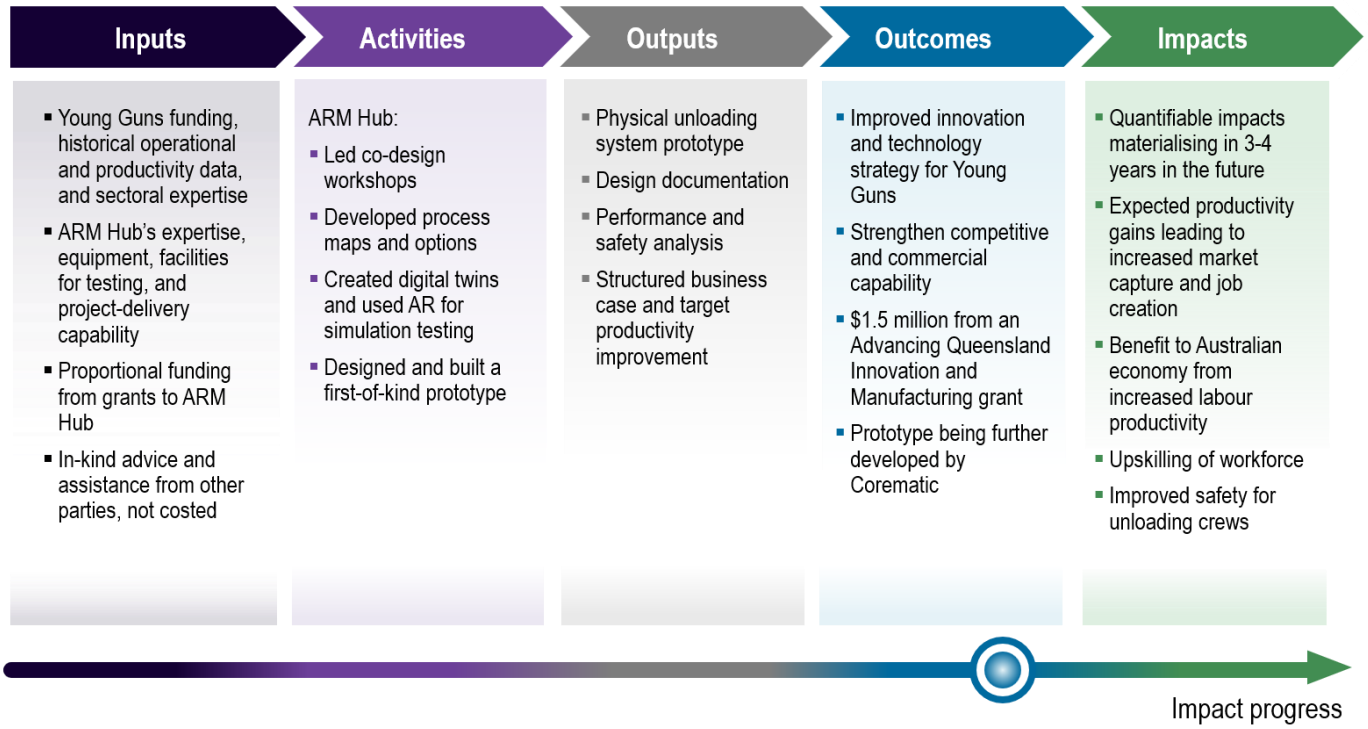
Before approaching ARM Hub, Young Guns had already pursued "low-tech" innovation in its operations, developing in-house designs for simple equipment such as dollies and rigid tools that helped teams unload containers more efficiently without robotics or automation. This low-tech suite had been successfully in place for several years. Still, the company recognised the need to explore higher-tech solutions to future-proof its business model and differentiate itself as customers increasingly considered full automation.

Young Guns connected with ARM Hub as its first significant, structured industry partnership in the innovation space. ARM Hub offered a combination of proximity and practical collaboration in Queensland, links to universities and research expertise in robotics and augmented reality (AR), and a project focus that aligned closely with Young Guns' aim to explore how automation and robotics could enhance a manual workforce rather than replace it. This made ARM Hub a foundational partner in Young Guns' journey from a solely labour-based model to a people-plus-technology logistics solution.

6.2 Impact pathway

A high-level impact pathway for Young Guns' work with ARM Hub is summarised in Figure 6.1, with further detail in the subsequent sections.

Figure 6.1 Young Guns impact pathway



Source: ACIL Allen

Project inputs

The Polaris project drew on a mix of operational knowledge, user insight, technical capability and collaborative R&D resources.

Key enabling inputs included:

— ARM Hub's in-house robotics, electronics, design and project-delivery capability

— financial contribution from Young Guns over the 3-year project

— proportional funding from the Queensland Government, QUT, and other grants[87]

— in-kind advice from Associate Professor Jared Donovan and Dr Tim Williams at QUT

— Young Guns' historical operational and productivity data

— Young Gun's sectoral expertise.

In consultation with Young Guns, the team also emphasised intangible inputs from ARM Hub such as trust, credibility and transparency. These factors supported the development of a productive relationship with ARM Hub, which in turn helped the company navigate the innovation sector, engage with research capabilities and build confidence in its own ability to run complex technology projects.

The project was jointly funded through financial and in-kind support from ARM Hub and Young Guns.

[87] The use of funding granted to ARM Hub's activities is not disaggregated necessarily by project. As such, the contribution of funding partners to this project has been calculated as a proportion of establishment and ongoing funding, excluding business development, calculated as Young Guns' proportion of total companies engaged within contracted envelope.

Project activities

ARM Hub's activities on Polaris went beyond technical design to include structured problem definition, concept maturation and hands-on prototype testing. The work package bridged research, product development and implementation planning.

Detailed process mapping and option generation

ARM Hub and Young Guns conducted a series of workshops to map every step of the container-unloading process, providing a baseline for ideation. The solution needed to improve safety, productivity and efficiency in Young Gun's operations. It was critical to identify the parameters that would define the solution, including limited space, portability requirements, and constraints on the installation of equipment at customer facilities. This phase generated multiple conceptual options, which were progressively narrowed using operational, safety and feasibility criteria, helping to prevent the project from pursuing unproductive development pathways.

AR-enabled design and simulation

Using AR tools, ARM Hub recreated container environments virtually. The team developed a detailed 3D computer-aided design (CAD) model of the distribution centre, containers, and the Polaris system, which was then transferred into a HoloLens-based AR environment. This simulation modelled the full container de-stuffing process, with each unpacker, forklift, container, and pallet represented as interactive agents within the system.

This step allowed Young Guns' team members to experience the proposed solutions through virtual reality (VR)/AR and provide feedback on ergonomics, usability and workflow impacts. This was particularly significant for a workforce that had not previously engaged with advanced technology projects, allowing them to contribute their expertise, and gain a tangible sense of ownership and involvement. It also allowed for performance to be tuned and assessed against Young Guns' productivity and safety targets before committing to a full physical build.

Figure 6.2 Young Guns team members trialling Polaris design using AR



Source: ARM Hub

Prototype design-and-build

ARM Hub led the design and build of a first-of-type physical prototype, installed and tested within ARM Hub's facility using a real shipping container and stock from one of Young Guns' customers. These closed-environment trials allowed the team to validate core functionality and gather detailed performance and safety data.

ARM Hub worked to ensure the prototype complied with AS4024 Australian Safety of Machinery Type C Standards and the *Work Health and Safety Act 2011* at handover. The first-of-type testing highlighted that the initial design would face significant safety regulation hurdles in an operational deployment, which became a critical learning for the next design iteration.

Overall, the activities constituted an end-to-end innovation process from ideation through to proof-of-concept, with ARM Hub providing structure, technical capability and a safe environment to test and learn.

Project outputs

The clearest tangible output from the ARM Hub phase was a physical prototype unloading-system designed to augment human teams in container operations.

Additional outputs included:

— a digital twin and associated simulations of container-unloading workflows

— documented design options and a preferred concept, with detailed performance and safety analysis

— a structured business case and Return on Investment (ROI) framing built around target productivity improvements and manual-handling risk reductions.

Even though the first-of-type device was ultimately assessed as requiring design iteration to meet AS4024 Type C requirements, the prototype proved the underlying concept and methodology. Young Guns took the design, performance data and safety learnings into a new phase with Corematic, where the core functionality of the prototype developed at ARM Hub was retained. At the same time, the engineering was refined to meet safety requirements and performance goals at a higher Technology-Readiness Level (TRL). Importantly, the detailed performance and safety analysis undertaken by ARM Hub helped Corematic progress more rapidly with the preferred solution.

Project outcomes

The ARM Hub partnership contributed to a sustained increase in Young Guns' innovation capability, strategic confidence and capacity to pursue automation opportunities. Its effects have extended beyond the original prototype. The company has established an internal innovation function, strengthened its competitive proposition, attracted significant follow-on investment, developed new industry partnerships and progressed the technology toward certification, manufacturing and operational deployment.

Increased innovation and technology-development capability

One of the most significant outcomes was a step-change in Young Guns' capability and confidence to undertake complex technology-development projects. Through the ARM Hub collaboration, Young Guns gained practical experience working with robotics and AR experts, managing iterative prototyping and testing, and incorporating operational knowledge into technology development to enhance productivity and safety compliance.

The partnership has also provided valuable learning and upskilling opportunities for Young Guns' staff, including opportunities to test the prototype, and contribute their perspectives, experiences and expertise in container loading and unloading to prototype improvements. This capability has been embedded within the organisation through the establishment of a dedicated in-house innovation and optimisation team focused on continuous improvement, automation opportunities, and implementation of technology solutions across its operations. The project therefore contributed to a shift from undertaking innovation as an individual project to developing an ongoing organisational capability for innovation. Without ARM Hub's involvement over 3 or so years, Young Guns would likely be several years behind where it is now in its innovation journey.

Greater strategic capability and a clearer position on automation

The project also influenced Young Guns' strategic approach to automation. Rather than viewing automation as a threat to its existing workforce and service model, Young Guns strengthened its core position centred on integrated human-plus-automation solutions, offering customers a way to modernise container unloading without building expensive, fully automated systems themselves.

The ARM Hub collaboration helped Young Guns develop and test this strategic stance in an industry increasingly considering full automation. The project therefore contributed not only to the development of a specific technology concept, but also to the company's broader understanding of where it can create value in an increasingly automated industry.

Strengthened competitive and commercial capability

The enhanced innovation capability has strengthened Young Guns' ability to demonstrate technological capabilities and achieve continuous improvement in competitive tender processes with major suppliers. Large customers often ask about innovation and continuous-improvement strategies in their tenders, and Young Guns can now demonstrate active, advanced work in container-unloading automation. This gives Young Guns a clear point of difference and marks it as a long-term partner for customers seeking both cost-effective services and credible innovation pathways.

The project also contributed to the company's ability to attract external investment. During the later stages of the partnership, Young Guns secured an Advancing Queensland Innovation and Manufacturing grant of $1.5 million. This provides evidence that the capability and technology pathway developed through the project has supported subsequent investment in innovation.

Progression from research prototype toward commercial deployment

The ARM Hub prototype and the knowledge generated through the collaboration provided a foundation for subsequent technology development. Following the ARM Hub partnership, Young Guns partnered with Corematic, an automation specialist, to redesign the device to address the safety hurdles identified during first-of-type testing. Corematic subsequently developed multiple prototype versions and progressed the concept through TRL 6 to repeated TRL 7 tests at a live customer facility.

The revised design is undergoing independent safety review for use in operational environments. Young Guns is now progressing towards manufacturing and deployment of the device.

These developments demonstrate a progression from research and prototype development toward a technology with a potential pathway to operational deployment. Young Guns has explicitly recognised the ARM Hub prototype and the knowledge generated through the partnership as the foundation that made this advanced stage possible.

6.3 Project impacts

Economic

Successful commercialisation and scale-up of the technology has the potential to generate economic benefit through productivity improvement, business growth and new commercial opportunities. For Young Guns, the primary pathway to economic impact is through the device increasing the speed and capacity of container destuffing operations. Greater productivity would enable the company to service additional and larger contracts without a proportional increase in operating resources, supporting increased market capture and revenue.

In Australia, this growth could support additional employment, including skilled roles in equipment maintenance, analytics and software development. Commercialisation could also strengthen Young Guns' Australian customer network and expand to more countries beyond New Zealand and Canada.

In line with standard CBA practice for publicly funded programs, the assessment of ARM Hub's impacts is undertaken from the perspective of Australian society as a whole, and therefore quantifies only the economic improvements that accrue within Australia, excluding benefits realised in other jurisdictions. This is a material consideration for Young Guns, which operates in New Zealand and Canada and may expand into additional countries beyond these markets.

It should be emphasised that the benefit calculated in this case study reflects the benefit to Australian society as a whole, not to Young Guns as an individual firm. The introduction of the automation solution can create new jobs and revenue for Young Guns. However, net benefits to Australia only arise from: (i) increased market share captured overseas; (ii) market expansion (that is, new demand); or (iii) Young Guns being more efficient. In this last case, the benefit is the resource cost saving, not the additional revenue.

In this case study, the calculated benefit is the resource cost saving arising from the productivity uplift created by the automation solution. The economic benefit is the difference between the cost of providing the same container destuffing service under the baseline (without the technology) and under the Polaris scenario (with the technology), enabled by the productivity gain.

Employment generated through growth in overseas markets, while a genuine outcome of ARM Hub's support, represents an economic benefit to the host country rather than to Australia, and has therefore been excluded from the quantified benefit stream. Similarly, the analysis assumes that only a limited share of the profits generated by Young Guns' international operations is repatriated to Australia. The majority of international earnings are conservatively assumed to be retained and reinvested offshore to fund future expansion and growth, rather than flowing back to Australia. This conservative treatment ensures the CBA does not overstate the domestic return on investment by attributing overseas employment or retained international earnings as an Australian economic benefit, consistent with the principle that publicly funded innovation support should be evaluated primarily on the value it creates for the Australian economy.

The economic modelling conducted here therefore, examines the cost savings to Young Guns from greater market capture and productivity improvements generated by the device. Greater productivity will improve the speed of existing container destuffing processes, allowing them to take on more and larger scale contracts, which in turn allows the company to hire and train more staff. The modelling therefore, compares 2 scenarios:

- **Baseline scenario:** Young Guns continues to grow and capture additional and market share without the ARM Hub-supported technology, but at a lower rate.
- **Polaris scenario**: successful implementation and scale-up of the technology increases operational productivity, enabling greater market capture and associated revenue growth.

The difference in saved labour costs between these scenarios represents the incremental impact associated with the technology pathway, with a proportion attributed to the contribution of the ARM Hub collaboration. This provides the basis for estimating the Australian economic benefits attributable to the collaboration.

Australian container market

The standard measurement in shipping is Twenty-Foot Equivalent Unit, or TEU. Young Guns currently has operations in 5 major Australian cities: Brisbane, Melbourne, Sydney, Adelaide and Perth. In the financial year 2024-25, nearly 8.5 million TEUs passed through these ports, and in the coming years, the Australian cargo market is expected to grow at a compound annual growth rate (CAGR) of 4.41% to 2034.[88] By 2041-42, total TEU throughout will have more than doubled (see Figure 6.3).

Figure 6.3 Growth in TEU throughput in Australian major ports (2024-2042)



Source: ACIL Allen

Of the total TEUs passing through a port, only a relatively small share is likely to contain cargo suitable for Young Guns' operations. This is because Young Guns primarily unloads and packs general consumer goods, retail stock, and fast-moving consumer goods (FMCG), so a significant portion of container traffic will fall outside that profile. Although containers account for the bulk of port throughput, ports also handle substantial volumes of non-container cargo, and not all containerised freight is appropriate for this type of unpacking and packing service. On this basis, the modelling adopts a conservative assumption on the proportion of total TEU that represents the "desirable" container market relevant to a business like Young Guns.[89]

The modelling has made assumptions around the volume of the container market Young Guns currently services.[90] The company expects that successful implementation and industry adoption of the device at scale will increase its addressable market share by improving the productivity and capacity of its operations. These estimates represent emerging or expected future impacts rather than fully verified realised outcomes at this stage.

The increased market capture of Australian TEUs was modelled using a Gompertz curve, when it is expected that a fully functional solution will be available for deployment. The Gompertz curve provides an

[88] IMARC (2025). Australia Cargo Containers Market Size, Share, Trends and Forecast by Type, Size, End User, and Region, 2026-2034. Accessed at: https://www.imarcgroup.com/australia-cargo-containers-market

[89] Note: these assumptions have been used to inform the modelling, yet are considered commercial in confidence and have not been included in the report.

[90] Ibid.

S-shaped adoption profile in which market penetration increases progressively following deployment, before growth slows as the technology approaches its assumed maximum market share.

This approach reflects the bounded nature of the opportunity. Even if the technology is successfully commercialised, it is unlikely to capture the entire desirable container market. Some freight will remain unsuitable, some customers will not switch, and operational constraints will limit the achievable level of market penetration. The Gompertz curve naturally represents this kind of diminishing-growth pattern by allowing rapid early gains after deployment, followed by slower growth as market penetration rises.

Under the baseline scenario modelled by ACIL Allen, it is assumed that, in the absence of working with ARM Hub and developing the Polaris prototype, Young Guns would still continue to grow and capture new market share, but at a lower rate, assumed as 2 additional percentage point per year relative to the company's market capture in 2026-27 (equivalent to an increase of 30 percentage points over the period to 2041-42).

Productivity improvement

The Transport, Postal and Warehousing sector in which Young Guns operates has an average profit margin of approximately 11%.[91] Wages typically account for around 25% of operating costs across the sector.[92] Young Guns is somewhat atypical in this space, as their business model is heavily reliant on manual labour, so for the purposes of this case study we have assumed a higher base wage structure.[93]

In consultation with Young Guns, stakeholders indicated that the proposed automation solution would deliver productivity improvements to manual handling operations, with resulting benefits for reduced labour costs associated with manual handling operations, relative to the base case.[94]

Attribution

ARM Hub's contribution to the project was primarily upstream and enabling rather than the final hardware solution. It undertook the initial project scoping, identified key limiting parameters and safety risks, and helped prevent the project from pursuing unproductive development pathways, thereby materially de-risking the work. ARM Hub also supported Young Guns' successful application for the Advancing Queensland Innovation and Manufacturing grant, which provided $1.5 million in funding and enabled the project to continue through later development stages. On a conservative basis,10% of the total project benefits could therefore be attributed to ARM Hub, reflecting its role in shaping the project's direction and supporting its progression, rather than in delivering the deployable final system, which was instead guided by Corematic.

Calculation of BCR

The estimated direct costs and attributed benefit from ARM Hub's work with Young Guns are shown in Figure 6.4.

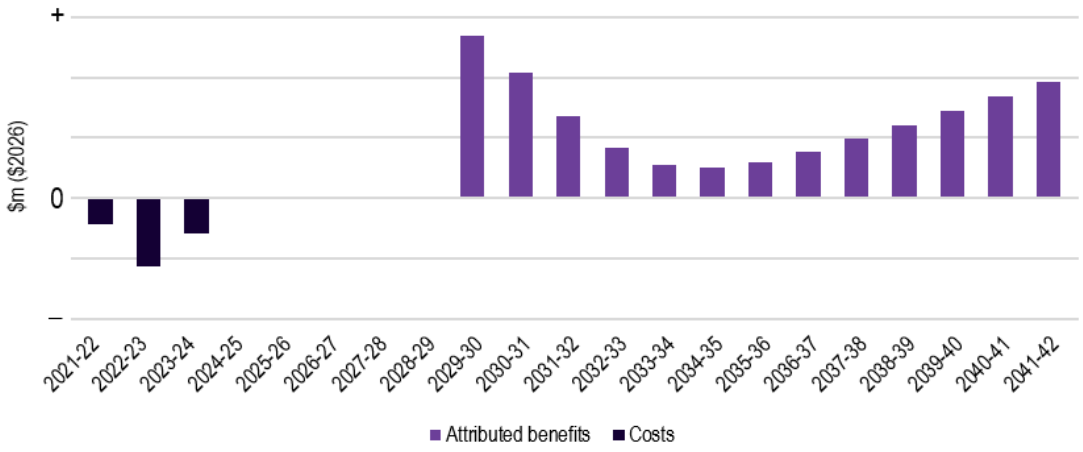
[91] IBISWorld 2025. Stevedoring Services in Australia.

[92] Ibid.

[93] Note: assumptions have been used to inform the modelling, yet are considered commercial in confidence and have not been included in the report.

[94] Ibid.

Figure 6.4 Attributable costs and benefits from the Polaris project with Young Guns



Source: ACIL Allen

Under the assumptions outlined above, it is estimated that Polaris would generate a BCR, calculated as the present value of benefits divided by the present value of costs, of 7.78. This means that every dollar invested in the Polaris project produced $7.78 in benefits. This represents a significant positive return on ARM Hub's investment in Young Guns and Polaris.

Sensitivity testing

Given the uncertainties associated with several of the assumptions in the CBA, sensitivity analysis was conducted to assess the sensitivity of results to substantial changes in the following assumptions:

- discount rates
- market capture from the new product (what might occur in the future with the introduction of the new product)
- counterfactual market capture (what might occur in the future without the introduction of the new product)
- attribution to ARM Hub.

The results of the sensitivity analysis are presented in the table below. As shown in this table, the BCR remains above 1 across all sensitivity tests, even under the most conservative assumptions.

Table 6.1 Sensitivity analysis – impact of sensitivity tests on the economic impacts

	BCR
Central case	7.78
Discount rate	
Increases from 7% to 10%	5.52
Decrease from 7% to 3%	12.79
Increase in desirable cargo capture from introduction of new product	
Decrease from central to low by 2042	10.00
Increase from central to high by 2042	5.54
Counterfactual market capture to 2042	
Decrease from central to low	12.76
Increase from central to high	2.77
Attribution to ARM Hub	
Decease from 10% to 5%	3.89
Increase from 10% to 15%	11.67

Source: ACIL Allen

Some of the results above may appear counterintuitive. One might expect that as Young Guns increases its market share, the BCR of the automation solution would also increase. Similarly, one might expect that higher baseline market capture would reduce the incremental BCR. However, the opposite pattern is observed.

This occurs because the automation solution enables Young Guns to expand market capture, which in turn increases employment and associated wage costs. Although the solution improves labour productivity, the wage cost differential between the counterfactual (without the productivity increase) and the intervention case (with the productivity increase) narrows as the scale of operations grows. In effect, the absolute labour cost savings per unit of output diminish at higher volumes, even though total productivity gains remain positive.

Social

Young Guns' business model is explicitly built around transforming a typically transient and low-engagement workforce into a highly engaged one. Automation was designed to support, rather than undermine, that model.

The project will likely improve safety through enhanced risk mitigation and compliance with machinery and workplace safety standards, which will have a significant impact given the physically demanding nature of container unloading. This will help reduce acute accidents, injuries and near misses, and long-term workforce wear and tear injuries. This, in turn, contributes to reduced workforce disruption and insurance costs.

Automation of this kind would also contribute to higher-quality employment through employee upskilling, the creation of new skilled roles, and a broader shift in workforce identity from manual unloading alone to operating in a more technology-enabled logistics environment. This has the potential to contribute to a more diverse workforce, better workforce outcomes and enhanced transferable skills for employees.

Cultural

The cultural impact of the project is tied to business identity, sector norms and Indigenous entrepreneurship. Young Guns' stated approach challenges an industry norm that treats container unloading as low-value, transient labour and instead frames it as a professional, team-based and improvement-oriented service.

By working with ARM Hub on an automation concept that keeps humans in the system, the company also embeds a culture of innovation in which technology complements people rather than replacing them. Bringing in a more diverse and engaged workforce allows new perspectives to shape the company's growth and enhance its innovation potential.

For an Indigenous-founded business that has already been recognised through Supply Nation, Australia's leading database of verified Indigenous businesses, and major customer partnerships, the model has broader demonstration value for how advanced technology can sit alongside community, trust and employment objectives.

Young Guns has a mission to increase the proportion of Indigenous employees in the workforce. Expanding the company's footprint in Australia, New Zealand and Canada allows for the creation of more job opportunities for Indigenous workers.

7 Case study 2: Urban Art Projects

7.1 Introduction

Urban Art Projects (UAP) is a Brisbane-founded public art and architectural fabrication company established in 1993 by brothers Daniel and Matthew Tobin. It has grown into a global business delivering large-scale artworks and architectural features through studios and offices across Australia and overseas. UAP's work with ARM Hub sits within a broader relationship that predates ARM Hub itself and is closely tied to UAP's longer-term digital transformation journey in advanced manufacturing.

UAP is an especially relevant case because its collaboration with QUT, RMIT and others helped shape the circumstances from which ARM Hub emerged, making this project both a company-level transformation story and part of ARM Hub's institutional origin story.

The collaboration with ARM Hub emerged from a manufacturing challenge inside UAP's workshop. The company needed to fabricate highly bespoke, geometrically complex work more efficiently while remaining competitive in custom manufacturing. A pivotal trigger was UAP's work on a Frank Gehry-designed stainless-steel staircase, where a gap emerged between sophisticated digital design and the capacity to translate this into reality using labour-intensive traditional fabrication methods such as panel beating.

UAP recognised that if it was to automate aspects of production for unique objects, the automation would need "to see" (that is, perceive the object's three-dimensional form and position and adapt the robot's movements to the geometry of each individual workpiece). This created the need for robotic vision and smarter robotics, as opposed to existing simple repetition-based automation. That need led UAP to a major collaboration with QUT and RMIT through an $8 million (total value) IMCRC-backed project focused on robotics polishing, robotic vision and automation for bespoke fabrication. ARM Hub later grew out of that collaborative environment.

The early phase of the collaboration was driven by several linked problems:

— manual fabrication methods were time-consuming and difficult to scale for one-off, complex commissions

— UAP needed to improve competitiveness against offshore production and rising international cost pressures

— dome workshop processes, such as polishing, were dirty and potentially hazardous, creating safety and workforce longevity concerns

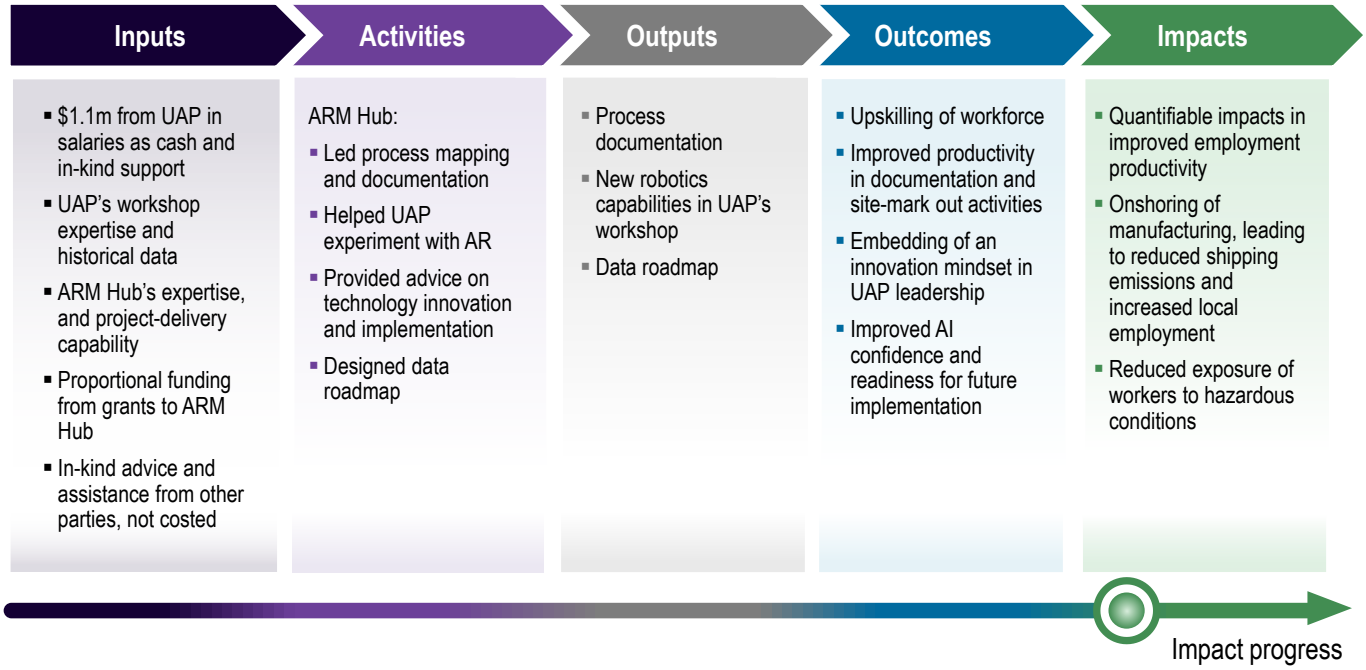
— as UAP expanded globally, fragmented operational and business data later became a major barrier to efficient decision-making and AI adoption.

The collaboration evolved over time. Earlier work centred on robotics, robotic vision, augmented and virtual reality, and related Industry 4.0 capabilities in fabrication. More recent work shifted toward Data and AI-as-a-Service, including a co-designed roadmap to consolidate fragmented data, integrate operational and business systems, and create a platform for analytics and AI-enabled decision-making using Databricks-based Lakehouse architecture.

7.2 Impact pathway

A high-level impact pathway for UAP's work with ARM Hub is summarised in Figure 7.1, with further detail in the subsequent sections.

Figure 7.1 UAP impact pathway



Source: ACIL Allen

Project inputs

Phase 1: industry 4.0 capabilities

ARM Hub and UAP staff (as well as QUT and RMIT partners in the early stages of the project) combined their operational knowledge, user insight, and technical capability to document, design and test robotic visioning solutions.

Key enabling inputs included:

— proportional funding from the Queensland Government, QUT and other founding grantees
— co-funding and in-kind support from UAP
— UAP's workshop expertise and historical production data
— ARM Hub's engineering, electronics and design skills
— initial robotics research capability from QUT and RMIT.

Phase 2: data roadmap

In Phase 2, the main inputs shifted towards data infrastructure and AI expertise. ARM Hub's Data and AI-as-a-Service offer provided access to Databricks-based Lakehouse architecture and specialist support in data engineering, AI tooling and roadmap design. UAP brought a global footprint of ERP (enterprise resource planning) system, CRM (customer relationship management) system, payroll, HR (human resources), safety

and operational technology systems. As well as their expertise, UAP also contributed $28,000 (ex. GST) in 2024 to the project.

Financial and in-kind support for the project are outlined in Table 7.1.

Table 7.1 Support for the project (nominal, ex. GST)

Contributor	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Phase 1								
UAP – Salaries as cash	$150,000	$150,000	$150,000	$150,000	-	-	-	$505,048
UAP – Other in-kind	$290,000	$290,000	$290,000	$290,000	-	-	-	$600,000
Proportional funding from other grantees	$126,262	$126,262	$126,262	$126,262	-	-	-	$1,160,000
Phase 2								
UAP	-	-	-	-	-	-	$28,000	$28,000
Grand total	**$566,262**	**$566,262**	**$566,262**	**$566,262**	**$-**	**$-**	**$28,000**	**$2,293,048**

Source: ARM Hub

Project activities

Phase 1: industry 4.0 capabilities

The first major wave of activity centred on robotics, robotic vision and Industry 4.0 capability building in UAP's Brisbane workshop. UAP worked with QUT's robotics labs to explore how robots could mill, grind and polish irregular objects rather than repetitive standard parts. This work evolved into the multi-year $8 million total value IMCRC-backed project, with the same core robotics team ultimately forming part of the newly established ARM Hub.

A significant early activity was process mapping and documentation for how expert polishers and fabricators would manually perform the work. UAP was awarded a $100,000 Innovation Connections grant (total value, with matched funding from the Australian Government and UAP) so partners could observe workshop tasks, interrogate split-second decisions that experienced tradespeople make in response to the metal, and translate those tacit skills into parameters and algorithms that could inform robotic vision and path-planning. This interrogation created a foundation for technological translation for the IMCRC grant that codified craft knowledge that had not been done before by UAP.

Alongside the core robotic-vision work, UAP and ARM Hub experimented with adjacent digital tools. The team trialled VR pattern-making to design in virtual space, adopted augmented reality for workshop documentation and complex 3D mark-out, and began using collaborative robots in selected fabrication and finishing tasks. ARM Hub's advice helped UAP test technologies such as AR goggles and cobots at low barrier to entry, often by borrowing equipment or accessing engineers to set up tooling and interfaces on existing robots. UAP highly valued ARM Hub's focus on working to identify fit-for-purpose solutions rather than marketing or specific solutions for sale.

Over time, these activities moved from experimentation to embedded practice. UAP began using augmented reality almost daily for pattern-making, hole-marking, workshop documentation and site installation. Robotic milling, additive manufacturing, polishing bays and smart foundry implementations were progressively installed, contributing to increased project throughput, improved safety in dirty and demanding tasks like polishing, and stronger time-based competitiveness against offshore production.

Phase 2: data roadmap (ongoing)

The second major wave of activity has focused on data and AI, recognising that fragmented systems and inconsistent data would limit how far UAP could advance its automation and analytics. ARM Hub launched its Data and AI-as-a-Service capability in late 2023, creating the framework through which a structured UAP data project could be delivered. UAP and ARM Hub worked together to design a data roadmap that would consolidate information across global operations and support future AI-enabled decision-making.

A co-design workshop brought together UAP leaders and ARM Hub specialists to document current systems, pain points and ambitions for data use. The team mapped how ERP, CRM, payroll, HR, safety, spreadsheets and operational technology data flowed through the business, identified duplication and gaps, and prioritised use cases such as forecasting, AI-powered document search and predictive maintenance. This exercise underpinned the UAP Data Roadmap Strategy version 1.0, drafted in October 2024, which set out staged implementation from initial environment setup through to applied AI.

The roadmap proposed an initial Stage 0 and Stage 1 covering Azure subscription setup, Databricks workspace configuration, user onboarding and core governance. Subsequent stages envisaged priority data ingestion, definition of curated data sets, implementation of a first 'golden report' (i.e. single source of truth) use case.

Project outputs

From Phase 1, the clearest tangible outputs were new robotic capabilities and embedded Industry 4.0 tools in UAP's workshop. These included robotic milling and additive manufacture, collaborative polishing bays, smart foundry implementations, documented process maps and codified craft knowledge that can be reused in future automation projects.

From Phase 2, the key outputs to date have been strategic and architectural rather than fully commercial systems. ARM Hub and UAP produced a formal UAP Data Roadmap Strategy and implemented a Lakehouse architecture approach using Databricks, giving UAP a clearer pathway into the future for integrating multiple business systems and deploying AI tools responsibly.

Project outcomes

The first phase of the collaboration delivered both measurable business outcomes and intangible capability gains (see economic impacts section below).

The AR phase produced a clear improvement in the speed and practicality of workshop documentation. Rather than preparing a traditional documentation package of approximately 30 pages of drawings, including points measured across 3 axes, UAP used AR goggles to overlay a holographic model on the physical workpiece and guide construction directly from the digital model. This reduced the need for paper drawings and made complex 3-dimensional forms easier for workshop staff to interpret and set out.

This process was trialled on a project with a very tight delivery timeframe. UAP ran the AR and conventional documentation processes in parallel, with the AR-enabled process getting the work onto the workshop floor within 3 weeks, while the conventional documentation package took 5.5 to 6 weeks. UAP estimated that relying solely on the conventional approach would have delayed the project by approximately 3.5 weeks. AR, therefore, enabled the company to meet the project timeframe while maintaining the conventional documentation stream as a safety check to ensure that the AR-enabled process delivered a high-quality result.

UAP also reported a significant productivity improvement in complex site mark-out activities. For one installation involving suspended work, the use of AR reduced the mark-out period from approximately 5 days

to 1.5 days. This represents a saving of around 3.5 days per project, or a 70% reduction in mark-out time, allowing installation crews to complete work more quickly and giving UAP greater confidence in accepting projects with demanding delivery schedules.

UAP attributes a significant share of its increased competitiveness to the digital transformation journey supported by ARM Hub and predecessor collaborations. Technology adoption has enabled the company to take on more complex jobs, meet tighter timelines and retain more work in Brisbane, improving supply-chain resilience and strengthening local employment. The philosophy has been to use technology to make roles safer and more efficient, rather than remove jobs, allowing UAP to employ more staff and win more work even as tasks like polishing become less dirty and hazardous.

Benefits are still emerging from the data and AI phase. UAP reports that the roadmap and early Databricks use have improved its understanding of data requirements, given a structured view of where AI can realistically add value, and reduce the risk of investing in off-the-shelf AI products that are not well matched to its needs. The main gain to date is confidence and readiness: UAP now knows what data quality and system integration will be needed to leverage future AI products for forecasting, robotic finishing and broader operational analytics, and has begun taking steps to put that foundation in place. This will reduce the overall startup time required for future AI uptake.

7.3 Project impacts

Economic

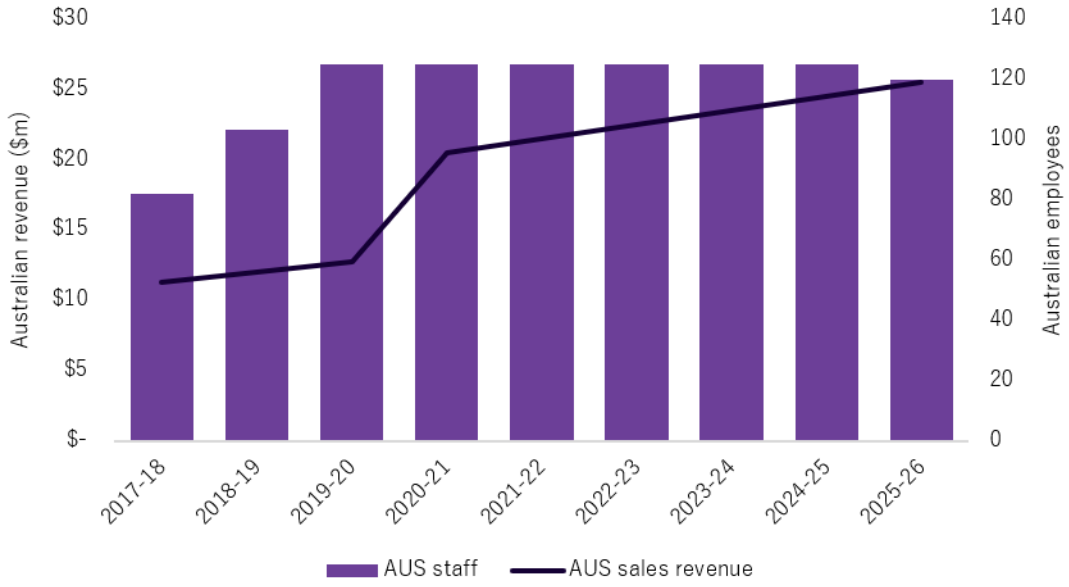
As noted above, UAP achieved significant revenue and employment gains during its work with ARM Hub. The benefit to the Australian economy more broadly, however, is the labour productivity gains from implementing UAP robotic and technological solutions, as well as the reduction in transport emissions resulting from onshoring manufacturing.

While *global* sales for UAP have increased from approximately $44 million in 2017-18 to $120 million in 2025-26, as noted in the case study above, this CBA includes only *domestic* productivity improvements. This treatment is equally relevant to UAP, given its extensive international footprint, including studios in the United States, the UAE, China, and the Netherlands, as well as its Brisbane operations. Employment, project delivery, and operational activity generated across these overseas studios represent economic benefit to those host jurisdictions and UAP as a firm, not to Australia more generally, and have accordingly been excluded from the quantified benefit stream. Consistent with the approach applied elsewhere in this study, only a limited share of profits from UAP's global operations is assumed to flow back to Australia, with the majority retained offshore to fund continued international expansion and growth. This is a deliberately conservative assumption, meaning the CBA is likely to understate the true economic impact to Australia, and the results presented should therefore be interpreted as a lower-bound estimate of ARM Hub's actual contribution.

Australian market and future revenue growth

UAP has indicated that between 2018 and 2026, the company increased Australian sales from around $11.34 million to $25.5 million while projects using Industry 4.0 capabilities expanded from roughly 5% of UAP's work to about 80%. Australian staff numbers rose from 82 to around 120, representing a more than 46% increase.

Figure 7.2 UAP Australian sales revenue and employees (2017-2026)



Source: UAP

The productivity benefits, as outlined in the Project Outcomes section above, were considered instrumental in achieving these economic benefits. It is particularly notable that UAP's sales grew and were maintained during the COVID-19 pandemic. This was a period of general economic slowdown, widespread disruption to international trade and supply chains, and businesses worldwide redirecting funds away from discretionary and capital projects toward immediate operational survival. Against this backdrop, an increase in sales suggests that the productivity and efficiency gains enabled through ARM Hub's support gave UAP a genuine competitive advantage, allowing it to win and deliver work even as broader market conditions weakened.

Future growth in UAP's Australian sales is modelled as a logarithmic increase. This reflects the assumption that demand for large-scale art installations will continue to expand, but as the market matures, growth is expected to moderate rather than continue at the same pace indefinitely. Similarly, employment is expected to be maintained at an average of 130 employees for the long run.

The counter-factual revenue growth (i.e. what would have occurred in the absence of UAP's collaboration with ARM Hub) has been assumed at a conservatively lower rate of 15% relative to 2025-26 sales. Future growth post 2025-26, as above, has been modelled using a logarithmic function.

Productivity improvement

The Fabricated Metal Product Manufacturing sector in which UAP operates has an average profit margin of approximately 6.9%.[95] Wages typically account for around 20% of operating costs across the sector.[96]

The AR and site-marking examples point to productivity improvements of 54% and 70% respectively. However, this work represents only a portion of UAP's overall operations, so these gains do not necessarily translate into contract wins at an equivalent rate. Likewise, while robotic milling and collaborative polishing bays have reduced the time required for these tasks, the resulting economic benefit depends on whether UAP can convert that efficiency into new work (specifically, bidding for and winning contracts that were previously out of reach due to price or time constraints). As such, labour productivity improvements have

[95] IBISWorld 2026. Fabricated Metal Product Manufacturing in Australia
[96] Ibid.

been assumed at a much lower rate of 20%. The productivity gains are assumed only to have manifested 2-3 years into the commencement of the project, as UAP began to integrate new technology into their operations (that is, productivity gains were modelled as beginning in 2020-21).

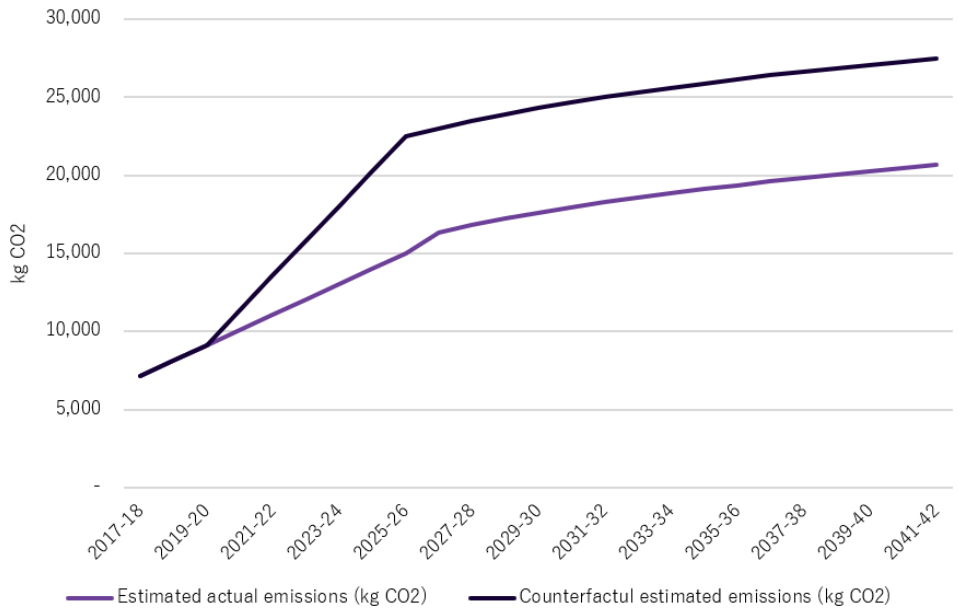
Emissions

During the course of the work with ARM Hub, UAP was able to onshore a significant proportion of its fabrication work. Between 2018 and 2022, the import value from UAP's global workshops reduced from 38% of Australian revenue down to 2%. In 2026, UAP continues to import less than 5% of Australian revenue from their global workshops.

This, of course, has the benefit of reducing transport emissions, with fewer shipments from their international workshops coming to Australia (presumed for the purposes of this analysis to be coming from China). The difference in emissions involved in the manufacturing of pieces is assumed to be equivalent between Australia and China (and therefore not accounted for here).

- The amount of carbon that results from shipping is a product of the number of shipments, average weight of the shipment (assumed as 28 tonnes)[97], the distance from China to Australia (assumed as approximately 9,000 kilometres)[98], and the grams of carbon emissions per tonne-kilometre (assumed as 12.1g CO_2).[99]
- The difference between the estimated actual and counterfactual emissions is shown in Figure 7.3 below. The counterfactual assumes that UAP continued to import the equivalent of 38% of its counterfactual revenue.
- The costing of emissions used the AER values for carbon emissions.[100]

Figure 7.3 Carbon emissions – estimated actual vs counterfactual



Source: ACIL Allen

[97] TEU Inc. (2025). How much dies a 20ft container weigh? Accessed at: https://teuinc.com/blog/how-much-does-a-20-ft-container-weigh

[98] Fluent Cargo. Shanghai to Brisbane. Accessed at: https://www.fluentcargo.com/routes/shanghai-cn/brisbane-au

[99] A. Cristea, et al., (2012). Trade and the greenhouse gas emissions from international freight transport. Journal of Environmental Economics and Management. http://dx.doi.org/10.1016/j.jeem.2012.06.002

[100] https://www.nsw.gov.au/sites/default/files/noindex/2025-03/tpg24-34-carbon-emissions-in-the-investment-framework.pdf

Table 7.2 AUD carbon values (per tonne) ($2026)

	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30	FY 31	FY 32	FY 33	FY 34	FY 35	FY 36	FY 37	FY 38	FY 39	FY 40	FY 41	FY 42
AER cost of carbon	83	89	93	99	106	117	127	138	150	162	174	188	201	216	230	246	262	280

Source: AER

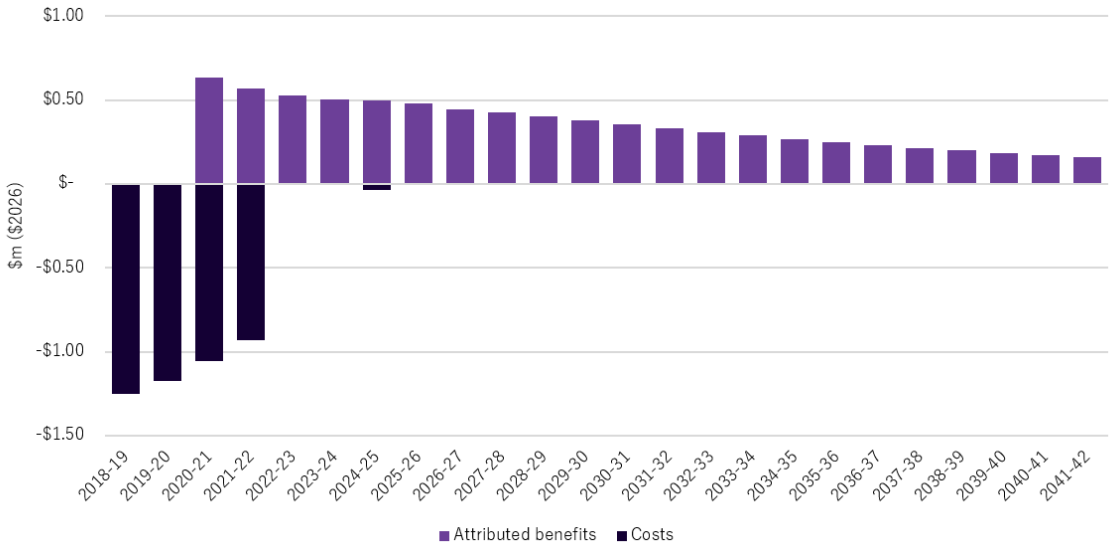
Attribution

On a conservative basis, 30% of the total project benefits have been attributed to ARM Hub over the analysis period 2018-19 to 2041-42. ARM Hub's contribution to the UAP project helped translate fabrication and polishing expertise into process maps, robotic-vision parameters and automation pathways, supported the practical testing and adoption of AR, cobots and other Industry 4.0 tools, and subsequently established the data and AI roadmap and Lakehouse architecture needed for future analytics and automation. This attribution of benefits also reflects earlier QUT and IMCRC collaborations, UAP's own investment and implementation effort, and the company's broader digital transformation journey.

Calculation of NPV and BCR

The estimated direct costs and benefits from ARM Hub's work with UAP are shown in Figure 6.4.

Figure 7.4 Attributable costs and benefits from ARM Hub's work with UAP



Source: ACIL Allen

Under the assumptions outlined above, it is estimated that the work has and will continue to generate $7.85 million (present value in 2026 dollars) in increased Australian profit over the evaluation period from 2018-19 to 2041-42. It should be noted that the emissions benefits is very small, accounting for approximately 0.27% of total benefits. The present value of project costs (in 2026 dollars) is $4.44 million.

In net present value (NPV) terms, the overall attributable benefit of the project in 2026 using a 7% real discount rate would be $3.42 million. The BCR of the project, calculated as the present value of benefits divided by the present value of costs, is estimated to be 1.77. This means that every dollar invested in this

work with UAP by UAP, ARM Hub, its grantees and partners, produced $1.77 in benefits for the Australian economy. This represents a strong positive return on ARM Hub's investment in UAP.

Sensitivity testing

Given the uncertainties associated with several of the assumptions in the CBA, sensitivity analysis was conducted to assess the sensitivity of results to substantial changes in the following assumptions:

— discount rates

— productivity increase relative to the counterfactual

— attribution to ARM Hub.

The results of the sensitivity analysis are presented in the table below. As shown in this table, the NPV remains positive (and the BCR remains above one) for all sensitivity testing, even with the most conservative assumptions.

Table 7.3 Sensitivity analysis – impact of sensitivity tests on the economic impacts

	NPV ($ million)	BCR
Central case	$3.42	1.77
Discount rate		
Increases from 7% to 10%	$2.19	1.41
Decrease from 7% to 3%	$5.28	2.53
Productivity increase from transformation		
Decrease from 20% to 10%	$1.34	1.30
Increase from 20% to 30%	$5.50	2.24
Attribution to ARM Hub		
Decrease from 30% to 20%	$0.80	1.18
Increase from 30% to 40%	$6.04	2.36

Source: ACIL Allen

Environmental

As noted above, producing more work in Brisbane rather than importing from offshore reduces transport-related activity between countries, and the associated greenhouse gas emissions. Reshoring also supports shorter and more visible supply chains, and more environmentally sustainable manufacturing processes. Australian manufacturers generally operate under stricter environmental regulation than many offshore counterparts, with more consistent waste management practices for water, waste, and local pollution.

Over the analysis period 2018-2042, it is estimated that UAP's onshoring efforts have saved and will save 134 tonnes of CO_2.

UAP is also exploring opportunities to reduce redundant data storage, optimise infrastructure, improve predictive maintenance, and streamline processes through a unified data platform, all of which could reduce waste, duplicated effort and unnecessary equipment downtime. These benefits may be realised into the future with further implementation of the data roadmap.

Social

UAP has derived social impacts related to workforce safety, skills and job quality.

While UAP's facilities maintain high safety standards, the nature of the work inherently involves exposure to certain hazards. Chronic exposure risks include welding fumes, silica dust from stone masonry and sand casting, solvent vapours, and metal fumes from finishing and patina work. Acute injury risks include burns, crush and pinch points, electric shock, UV flash from welding, and cuts, as well as cumulative physical-load risks such as hand-arm vibration syndrome, noise-induced hearing loss, and repetitive strain from manual assembly, installation, and panel work.

The introduction of robotic assistance and advanced tools is expected to further reduce this risk profile by removing workers from direct exposure zones, building on UAP's existing safety practices. This is expected to support staff longevity and contribute to improved long-term health and wellbeing outcomes. However, many of these occupational health conditions develop over extended periods, so the full benefits of the project are yet to materialise.

The collaboration has also supported workforce development by embedding new digital capabilities into day-to-day operations. Staff have been upskilled to engage with robotics operation, programming, and maintenance, enabling the business to enhance its competitiveness, secure additional work, and ultimately support growth in employment.

Cultural

UAP operates at the intersection of manufacturing, design, architecture and public art. By helping UAP fabricate increasingly complex, bespoke works more competitively and locally, the collaboration supports the production of cultural and civic assets that shape public spaces and enable artists, architects and designers to realise ambitious ideas. This has broader benefits for the general public given that many of these works are publicly displayed.

There is also a broader cultural and sectoral effect. UAP's visible use of robotics, AR/VR and advanced manufacturing provided inspiration for many companies who chose to visit and learn from its example. This demand for digital transformation support was one of the inspirations for ARM Hub itself. In that sense, the UAP project had demonstration value beyond the company, contributing to a wider culture of advanced-manufacturing adoption, both in Australia, and at UAP's international sites in the Netherlands, United States, and China.

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Appendices

A ARM Hub University Partners

This appendix lists the universities with which ARM Hub holds a formal partnership agreement. These partnerships provide ARM Hub and its industry clients with access to research, specialist expertise, and collaborative funding opportunities across priority areas including robotics, artificial intelligence, advanced manufacturing, and cybersecurity.

The universities that ARM Hub has a formal partnership with are:

1. University of Queensland
2. Queensland University of Technology
3. Griffith University
4. University of Southern Queensland
5. Central Queensland University
6. University of the Sunshine Coast
7. University of Technology Sydney
8. University of Adelaide
9. Murdoch University
10. Swinburne University of Technology
11. RMIT University
12. Monash University
13. Australian National University
14. UNSW Sydney

B Methodology for estimating direct benefits of ARM Hub

B.1 Service 1: Data and AI as a service

From 2024 to now, ARM Hub operates a Data and AI-as-a-Service offering that gives manufacturing businesses access to data and AI infrastructure without requiring them to build equivalent capability internally. The service is designed to unlock business data while maintaining security, privacy and control, using a pay-as-you-go model and enterprise-grade AI tooling. Its core technical architecture is a data "lakehouse" using the Databricks platform built on Azure Microsoft, with Databricks and Microsoft acting as a strategic technology partners.

The lakehouse brings together data from machines, spreadsheets, sensors and software systems into a unified cloud environment, enabling firms to move from fragmented data sets to analysis, insight and AI-enabled use cases. Based on ARM Hub's experience engaging with over 300 SMEs over 2 years, many small and medium manufacturers collect data across machines, ERP systems, spreadsheets, maintenance logs, sensors and quality systems but do not operationalise it because the data is dispersed and the organisation lacks data engineering or AI skills. The service is structured to address this integration problem within relatively short timeframes, particularly for firms with limited internal IT resources, by providing access to a pre-configured platform.

AI-as-a-Service provides AI tools that can be applied to company data that has been unified in the lakehouse. Natural language AI Bots are a commonly deployed tool. Additionally, an Agentic AI engine has been built – and is downloadable for free on GitHub – and companies are building AI tools using this engine to drive the productivity and novel business outcomes from their own business data.

The quantitative benefits of this service are new revenue streams, productivity uplift, accelerated R&D commercialisation, and faster growth through improved competitiveness and market reach outcomes come from turning fragmented manufacturing data into a secure, AI-enabled environment that supports more efficient operations and better decision-making.

Accelerated growth, productivity uplift, and reduced time to commercialisation

Given the difficulties in disaggregating the proximate causes of accelerated growth, the benefits of using ARM Hub's data and AI-as-a-service are assumed to be a general increase in productivity relative to a business-as-usual counterfactual.

In this approach, it is assumed that all companies would have adopted AI in the absence of ARM Hub. AI has become and will continue to become ubiquitous, and it is highly unlikely that companies, even small manufacturers, will avoid adopting it. Although it is assumed that all 80 companies will adopt AI, their post-implementation growth rate (9% per annum for 5 years) is assumed to be lower than it would be had they adopted the AI with ARM Hub (assumed at 12% p.a. for 5 years). ARM Hub's service is assumed to deliver a higher post-implementation growth rate because it combines pre-integrated data pipelines, domain-specific AI templates and hands-on implementation support, allowing firms to move from fragmented data to production use cases faster and with fewer failed pilots than a standalone, self-directed AI adoption.

Further, ARM Hub has been assumed to accelerate the lag between implementation and productivity benefit. ARM Hub provides ready-made lakehouse architecture, a ready-made Agentic AI engine, and embedded data engineering and change-management support, which reduces the time firms spend on integration, skills build-up, and trial-and-error before seeing measurable operational improvements.

The assumptions used in the CGE modelling are outlined below.

Table B.1 Benefits assumptions – Data and AI-as-a-service

Data/assumption	Value	Source/rationale
Program reach	80	ARM Hub
Average annual revenue of existing companies participating in the programs	$1.2m p.a.	Based on the weighted average turnover of the industries of ARM Hub's clients
Baseline growth (average growth rate of these companies under BAU)	2.96% p.a.	RBA small business bulletin – Retail Sales Values Index, 2023-2025
Growth rate from adopting AI without ARM Hub	9% p.a. for 5 years	ACIL Allen assumption informed by productivity uplift across workforce, sales, marketing activities
Post-program growth rate with ARM Hub	12% p.a. for 5 years	ACIL Allen assumption informed by productivity uplift across workforce, sales, marketing activities
Attribution to ARM Hub	20%	Informed by ARM Hub
Baseline time to market (lag to impact under BAU)	3 years post-program participation	ACIL Allen assumption, informed by ARM Hub's experience with industry. Three years is the typical lag period for data and AI investments among companies that work with ARM Hub..
Reduction in time to market (lag to impact under program)	1.5 years post-program participation	ACIL Allen assumption, informed by stakeholder consultation and ARM Hub's experience with industry where ARM Hub's services accelerate the time to market.
Impact duration	5 years	ACIL Allen assumption, informed by ARM Hub. It is assumed that after 5 years, further investments are required to keep up with advancements in the industry.

Source: ACIL Allen

B.2 Service 2: Scale-up manufacturing

ARM Hub's scale-up manufacturing service focuses on supporting firms as they move from concept, prototype or pilot stages into production. The scale-up function is best understood as a bundled technology adoption service rather than a single product. It combines industrial design, design for manufacture, robotics, automation, data management, computer vision, human-centred design and project delivery to assist firms in moving from idea to production. In practical terms, this covers workflow redesign, prototyping of automated systems, assessment of equipment options, testing digital twins and preparing for higher-volume manufacturing.

ARM Hub offers pathways that run from technology audits and roadmaps through prototyping, automation and AI deployment, with the objective of progressing from initial ideas to commercially viable implementation. Activities include adoption sprints, demonstrator projects, expert technical services and support for scaling partnerships. These activities are relevant to manufacturing scale-up because they help

firms select and implement appropriate technologies, test systems before major equipment investments, and expand production capacity through collaboration.

The quantitative benefits of this service manifest through reduced project failure and time to market, increased access to external funding and investment, productivity uplift, accelerated growth and revenue uplift, reductions in defects and rework costs, and faster technology development and commercialisation. By translating readiness assessments and stage-by-stage roadmaps into concrete actions, ARM Hub helps firms identify and remove technical and commercial risks early, which shortens decision cycles and reduces costly surprises in later development stages.

Accelerated growth & revenue, productivity uplift, and reduced time to market

As with the above, the benefits of using ARM Hub's scale-up manufacturing service are assumed as a general increase in productivity against a business-as-usual counterfactual.

Unlike the data and AI-as-a-service, it is assumed here that the 72 companies would not have engaged in scale-up manufacturing activities in the absence of ARM Hub. This reflects the observation that many small and medium manufacturers lack the internal capability, capital and risk tolerance to pursue formal scale-up programmes on their own, and would otherwise remain at the prototype or pilot stage, rely on ad-hoc equipment purchases, or outsource production. These companies are assumed to grow at an average rate of 2.96% in the business-as-usual case.

Working with ARM Hub is assumed to both accelerate development and implementation of innovation, and provide a 5-year productivity increase rate of 5.4% before growing at the BAU rate to 2038.

The assumptions used in the CGE modelling are outlined below.

Table B.2 Benefits assumptions – Scale-up manufacturing (accelerated growth and revenue)

Data/assumption	Value	Source/rationale
Program reach	72	ARM Hub
Average annual revenue of companies participating in the programs	$1.3m p.a.	Based on weighted average turnover of the industries of ARM Hub's clients
Baseline growth	2.96% p.a.	RBA small business bulletin – Retail Sales Values Index, 2023-2025
Post-program growth rate	5.4% p.a. for 5 years	ARM Hub Impact Report survey
Attribution to ARM Hub	30%	Informed by ARM Hub
Baseline time to market	5 years post-program participation	ACIL Allen assumption. Manufacturing investments typically require a longer lag time than for implementation and data and AI services.
Reduction in time to market	3 years post-program participation	ACIL Allen assumption, based on stakeholder consultation and ARM Hub's experience in working with companies in manufacturing sector.
Impact duration	5 years	ACIL Allen assumption, based on ARM Hub's experience in working with companies in manufacturing sector.

Source: ACIL Allen

Increased access to external funding and investment

These impacts capture how ARM Hub improves firms' ability to secure external funding and accelerates technology development and commercialisation. ARM Hub participants are assisted to win follow-on grants and secure private investment, both more often and sooner. This additional capital funds R&D that leads to commercial outcomes, reflecting an increased success rate in attracting external funding and a measurable acceleration in translating innovation into market value.

Table B.3 Benefits assumptions – Scale-up manufacturing (access to investment)

Data/assumption	Value	Source/rationale
Program reach (number of existing companies who participated)	72	ARM Hub
Proportion of companies that would successfully secure more funding	100%	ARM Hub
Average external funding amount (total per company)	$1.74m	ARM Hub
Funding duration (years of funding)	4	ACIL Allen assumption based on typical grant/funding agreement
Share of R&D that would generate return	80%	ACIL Allen assumption informed by ARM Hub
Rate of return	15% p.a. for 10 years	ACIL Allen assumption, informed by previous impact assessments on R&D in manufacturing sector.
Attribution to ARM Hub	30%	ACIL Allen assumption informed by ARM Hub
Lag to impact	3 years post-program participation	ACIL Allen assumption, similar to accelerated growth and revenue assumption for Scale-up manufacturing.
Impact duration	10 years	ACIL Allen assumption, similar to accelerated growth and revenue assumption for Scale-up manufacturing.

Source: ACIL Allen

B.3 Service 3: Accelerators

Accelerator programs are used to speed up technology adoption and adaptation across priority sectors. They are structured to support sovereign capability, commercial readiness and international competitiveness, rather than operating purely as short-term mentoring schemes.

The quantitative benefits of the accelerator programs are accelerated growth and revenue uplift, increased access to external funding and investment, shortened timelines for technology development and commercialisation, and the creation of new startups and/or revenue streams. By pairing sector-specific mentoring with matched funding, platform access, training and tailored commercial support, the programs help participants de-risk innovation, validate technologies more quickly and move closer to market at a faster pace. They also support export readiness and broader market reach, which strengthen the commercial case for investment and help firms scale beyond their initial customer base.

Accelerated growth & revenue, productivity uplift, and reduced time to market

The benefits of participating in ARM Hub's Accelerator programs are modelled as a general productivity uplift against a business-as-usual counterfactual. As with the scale-up manufacturing service, it is assumed that participating firms would not have accessed equivalent acceleration support in the absence of ARM Hub. Because Accelerator firms are typically smaller and earlier-stage, they are assigned slightly higher baseline and attributable growth rates, with a larger share of the observed growth explicitly attributed to ARM Hub's support.

Table B.4 Benefits assumptions – Accelerators (accelerated growth and revenue)

Data/assumption	Value	Source/rationale
Program reach	31	ARM Hub
Average annual revenue of companies participating in the programs	$200,000	Based on weighted average turnover of the industries of ARM Hub's clients
Baseline growth	10% p.a.	ACIL Allen assumption, typical start-up growth rate in early phases.
Post-program growth rate	25% p.a. for 5 years	ARM Hub Impact Report survey
Attribution to ARM Hub	40%	Informed by ARM Hub
Baseline time to market	5 years post-program participation	ACIL Allen assumption, informed by ARM Hub's experience with industry.
Reduction in time to market	3 years post-program participation	ACIL Allen assumption based on stakeholder consultation with ARM Hub users.
Impact duration	5 years	ACIL Allen assumption based on previous economic impact assessments in related sectors.

Source: ACIL Allen

Increased access to external funding and investment

These impacts capture how ARM Hub's close, early-stage engagement with Accelerator firms strengthens their ability to secure external funding and accelerates technology development and commercialisation. By working intensively with companies at the earliest phases of their development, ARM Hub helps them refine their value proposition, de-risk their technology and prepare compelling funding applications. This support enables firms to attract follow-on grants and investment more often and sooner, funding R&D that leads to commercial outcomes and reflecting both an increased success rate in securing external capital and a measurable acceleration in translating innovation into market value.

Table B.5 Benefits assumptions – Accelerators (access to investment)

Data/assumption	Value	Source/rationale
Program reach (number of existing companies who participated)	31	ARM Hub
Proportion of companies that would successfully secure more funding	100%	ARM Hub

Data/assumption	Value	Source/rationale
Average external funding amount (total per company)	$1.74m	ARM Hub
Funding duration (years of funding)	4	ACIL Allen assumption based on typical grant/funding agreement
Share of R&D that would generate return	80%	ACIL Allen assumption informed by ARM Hub
Rate of return	15% p.a. for 10 years	ACIL Allen assumption
Attribution to ARM Hub	30%	ACIL Allen assumption informed by ARM Hub
Lag to impact	3	ACIL Allen assumption, based on previous economic impact assessment in other sectors.
Impact duration	10	ACIL Allen assumption, based on previous economic impact assessment in other sectors.

Source: ACIL Allen

B.4 Other impacts: students

ARM Hub accelerates career progression in science and robotics by addressing the difficulty of gaining initial industry-relevant experience. It provides hands-on skills development in industrial robotics, automation and data systems, together with recognised credentials that signal readiness to employers. This enables participants to enter the field sooner and advance more rapidly, resulting in a measurable uplift in average salary compared with a business-as-usual baseline.

The assumptions used in the CGE modelling are outlined below.

Table B.6 Benefits assumptions – Scale-up manufacturing (access to investment)

Data/assumption	Value	Source/rationale
Program reach (number of students)	204	ARM Hub
Income premium for faster career progression	5%	ACIL Allen assumption, informed by analysis of ABS's income by qualification.
Attribution to ARM Hub	25%	Assumption informed by ARM Hub
Lag to impact post participation	0	ACIL Allen assumption, based on previous impact assessments.
Impact duration	25	ACIL Allen assumption, based on previous impact assessments.
% of undergrads	50%	ACIL Allen assumption, based on ARM Hub's input.
% of postgrads	50%	ACIL Allen assumption, based on ARM Hub's input.

Source: ACIL Allen

C The Tasman Global Model

Tasman Global is a dynamic, global CGE model that has been developed by ACIL Allen for the purpose of undertaking economic impact analysis at the regional, state, national and global level.

A CGE model captures the interlinkages between the markets of all commodities and factors, considering resource constraints, to find a simultaneous equilibrium in all markets. A global CGE model extends this interdependence of the markets across world regions and finds simultaneous equilibrium globally. A dynamic model adds onto this the interconnection of equilibrium economies across time periods. For example, investments made today are going to determine the capital stocks of tomorrow and hence future equilibrium outcomes depend on today's equilibrium outcome, and so on.

A dynamic global CGE model, such as *Tasman Global*, has the capability of addressing total, sectoral, spatial and temporal efficiency of resource allocation as it connects markets globally and over time. Being a recursively dynamic model, however, its ability to address temporal issues is limited. In particular, *Tasman Global* cannot typically address issues requiring partial or perfect foresight. However, as documented in Jakeman et al (2001), it is possible to introduce partial or perfect foresight in certain markets using algorithmic approaches.[101] Notwithstanding this, the model does have the capability to project the economic impacts over time of given changes in policies, tastes and technologies in any region of the world economy on all sectors and agents of all regions of the world economy.

Tasman Global was developed from the 2001 version of the Global Trade and Environment Model (GTEM) developed by ABARE (Pant 2007)[102] and has been evolving ever since. In turn, GTEM was developed out of the MEGABARE model,[103] which contained significant advancements over the Global Trade Analysis Project (GTAP) model of that time.[104]

C.1 A dynamic model

Tasman Global is a model that estimates relationships between variables at different points in time. This contrasts with comparative static models, which compare 2 equilibriums (one before an economic disturbance and one following). A dynamic model such as *Tasman Global* is beneficial when analysing issues for which both the timing of and the adjustment path that economies follow are relevant in the analysis.

C.2 The database

A key advantage of *Tasman Global* is the level of detail in the database underpinning the model. The database is derived from the GTAP database.[105] This database is a fully documented, publicly available global data base which contains complete bilateral trade information, transport and protection linkages among regions for all GTAP commodities. It is the most detailed database of its type in the world.

[101] Jakeman, G., Heyhoe, E., Pant, H., Woffenden, K. and Fisher, B.S. (2001). *The Kyoto Protocol: economic impacts under the terms of the Bonn agreement*. ABARE paper presented to the International Petroleum Industry Environmental Conservation Association conference, 'Long Term Carbon and Energy Management - Issues and Approaches', Cambridge, Massachusetts, 15-16 October.

[102] Pant, H.M. (2007), *GTEM: Global Trade and Environment Model*, ABARE Technical Report, Canberra.

[103] Hanslow, K. & Hinchy, M. (1996). *The MEGABARE model: interim documentation*. Canberra: ABARE.

[104] Hertel, T. (1997). *Global Trade Analysis: modelling and applications.* Cambridge University Press, Cambridge.

[105] Aguiar, A., Chepeliev, M., Corong, E., McDougall, R., & van der Mensbrugghe, D. (2019). *The GTAP Data Base: Version 10.* Journal of Global Economic Analysis, 4(1), 1-27.

Tasman Global builds on the GTAP database by adding the following important features:

- a detailed population and labour market database
- detailed technology representation within key industries (such as electricity generation and iron and steel production)
- disaggregation of a range of major commodities including iron ore, bauxite, alumina, primary aluminium, brown coal, black coal and LNG
- the ability to repatriate labour and capital income
- explicit representation of the states and territories of Australia
- the capacity to represent multiple regions within states and territories of Australia explicitly.

Nominally, version 10.1 of the *Tasman Global* database divides the world economy into 153 regions (145 international regions plus the 8 states and territories of Australia) although the regions are frequently disaggregated further. ACIL Allen regularly models Australian or international projects or policies at the regional level including at the or at the state/territory/provincial level for various countries.

The *Tasman Global* database also contains a wealth of sectoral detail currently identifying up to 76 industries (Table C.1). The foundation of this information is the input-output tables that underpin the database. The input-output tables account for the distribution of industry production to satisfy industry and final demands.

Industry demands, so-called intermediate usage, are the demands from each industry for inputs. For example, electricity is an input into the production of communications. In other words, the communications industry uses electricity as an intermediate input.

Final demands are those made by households, governments, investors and foreigners (export demand). These final demands, as the name suggests, represent the demand for finished goods and services. To continue the example, electricity is used by households – their consumption of electricity is a final demand.

Each sector in the economy is typically assumed to produce one commodity, although in *Tasman Global*, the electricity, transport and iron and steel sectors are modelled using a 'technology bundle' approach. With this approach, different known production methods are used to generate a homogeneous output for the 'technology bundle' industry. For example, electricity can be generated using brown coal, black coal, petroleum, base load gas, peak load gas, nuclear, hydro, geothermal, biomass, wind, solar or other renewable based technologies – each of which has its own cost structure.

The other key feature of the database is that the cost structure of each industry is also represented in detail. Each industry purchases intermediate inputs (from domestic and imported sources) primary factors (labour, capital, land and natural resources) as well as paying taxes or receiving subsidies.

Table C.1 Standard sectors in the Tasman Global CGE model

no	Name	no	Name
1	Paddy rice	39	Diesel (incl. nonconventional diesel)
2	Wheat	40	Other petroleum, coal products
3	Cereal grains nec	41	Chemical, rubber, plastic products
4	Vegetables, fruit, nuts	42	Iron ore
5	Oil seeds	43	Bauxite
6	Sugar cane, sugar beet	44	Mineral products nec
7	Plant- based fibres	45	Ferrous metals
8	Crops nec	46	Alumina
9	Bovine cattle, sheep, goats, horses	47	Primary aluminium

no	Name	no	Name
10	Pigs	48	Metals nec
11	Animal products nec	49	Metal products
12	Raw milk	50	Motor vehicle and parts
13	Wool, silkworm cocoons	51	Transport equipment nec
14	Forestry	52	Electronic equipment
15	Fishing	53	Machinery and equipment nec
16	Brown coal	54	Manufactures nec
17	Black coal	55	Electricity generation
18	Oil	56	Electricity transmission and distribution
19	LNG	57	Gas manufacture, distribution
20	Other natural gas	58	Water
21	Minerals nec	59	Construction
22	Bovine meat products	60	Trade
23	Pig meat products	61	Road transport
24	Meat products nec	62	Rail and pipeline transport
25	Vegetable oils and fats	63	Water transport
26	Dairy products	64	Air transport
27	Processed rice	65	Transport nec
28	Sugar	66	Warehousing and support activities
29	Food products nec	67	
30	Wine	68	Communication
31	Beer	69	Financial services nec
32	Spirits and RTDs	70	Insurance
33	Other beverages and tobacco products	71	Business services nec
34	Textiles	72	Recreational and other services
35	Wearing apparel	73	Public Administration and Defence
36	Leather products	74	Education
37	Wood products	75	Human health and social work activities
38	Paper products, publishing	76	Dwellings

Source: ACIL Allen.

Note: nec = not elsewhere classified.

C.3 Model structure

Given its heritage, the structure of the *Tasman Global* model closely follows that of the GTAP and GTEM models and interested readers are encouraged to refer to the documentation of these models for more detail.[106] In summary:

— The model divides the world into a variety of regions and international waters.
  — Each region is fully represented with its own 'bottom-up' social accounting matrix and could be a local community, an LGA, state, country or a group of countries. The number of regions in a given

[106] Namely Hertel, T. (1997). Op. cit. and Pant, H.M. (2007). Op. cit., respectively.

simulation depends on the database aggregation. Each region consists of households, a government with a tax system, production sectors, investors, traders and finance brokers.

- 'International waters' are a hypothetical region in which global traders operate and use international shipping services to ship goods from one region to the other. It also houses an international finance 'clearing house' that pools global savings and allocates the fund to investors located in every region.
- Each region has a 'regional household'[107] that collects all factor payments, taxes, net foreign borrowings, net repatriation of factor incomes due to foreign ownership and any net income from trading of emission permits.

- The income of the regional household is allocated across private consumption, government consumption and savings according to a Cobb-Douglas utility function, which, in practice, means that the share of income going to each component is assumed to remain constant in nominal terms.
- Private consumption of each commodity is determined by maximising utility subject to a Constant Difference of Elasticities (CDE) function which includes both price and income elasticities.
- Government consumption of each commodity is determined by maximising utility subject to a Cobb-Douglas utility function.
- Each region has *n* production sectors, each producing single products using various production functions where they aim to maximise profits (or minimise costs) and take all prices as given. The nature of the production functions chosen in the model means that producers exhibit constant returns to scale.
  - In general, each producer supplies consumption goods by combining an aggregate energy-primary factor bundle with other intermediate inputs and according to a Leontief production function (which in practice means that the quantity shares remain in fixed proportions). Within the aggregate energy-primary factor bundle, the individual energy commodities and primary factors are combined using a nested Constant Elasticity of Substitution (CES) production function, in which energy and primary factor aggregates substitute according to a CES function with the individual energy commodities and individual primary factors substituting with their respective aggregates according to further CES production functions.
  - Exceptions to the above include the electricity generation, iron and steel and road transport sectors. These sectors employ the 'technology bundle' approach developed by ABARE[108] in which non-homogenous technologies are employed to produce a homogenous output with the choice of technology governed by minimising costs according to a modified Constant Ratios of Elasticities of Substitution, Homothetic (CRESH) production function. For example, electricity may be generated from a variety of technologies (including brown coal, black coal, gas, nuclear, hydro, solar etc.), iron and steel may be produced from blast furnace or electric arc technologies while road transport services may be supplied using a range of different vehicle technologies. The 'modified-CRESH' function differs from the traditional CRESH function by also imposing the condition that the quantity units are homogenous.
- There are 4 primary factors (land, labour, mobile capital and fixed capital). While labour and mobile capital are used by all production sectors, land is only used by agricultural sectors while fixed capital is typically employed in industries with natural resources (such as fishing, forestry and mining) or in selected industries built by ACIL Allen.
  - Land supply in each region is typically assumed to remain fixed through time with the allocation of land between sectors occurring to maximise returns subject to a Constant Elasticity of Transformation (CET) utility function.

[107] The term "regional household" was devised for the GTAP model. In essence it is an agent that aggregates all incomes attributable to the residents of a given region before distributing the funds to the various types of regional consumption (including savings).

[108] Hanslow, K. & Hinchy, M. (1996). Op. cit.

- Mobile capital accumulates as a result of net investment. It is implicitly assumed in *Tasman Global* that it takes one year for capital to be installed. Hence, supply of capital in the current period depends on the last year's capital stock and investments made during the previous year.
- Labour supply in each year is determined by endogenous changes in population, given participation rates and a given unemployment rate. In policy scenarios, the supply of labour is positively influenced by movements in the real wage rate governed by the elasticity of supply. For countries where sub-regions have been specified (such as Australia), migration between regions is induced by changes in relative real wages with the constraint that net interregional migration equals zero. For regions where the labour market has been disaggregated to include occupations, there is limited substitution allowed between occupations by individuals supplying labour (according to a CET utility function) and by firms demanding labour (according to a CES production function) based on movements in relative real wages.
- The supply of fixed capital is given for each sector in each region.

The model has the option for these assumptions to be changed at the time of model application if alternative factor supply behaviours are considered more relevant.

- It is assumed that labour (by occupation) and mobile capital are fully mobile across production sectors implying that, in equilibrium, wage rates (by occupation) and rental rates on capital are equalised across all sectors within each region. To a lesser extent, labour and capital are mobile between regions through international financial investment and migration, but this sort of mobility is sluggish and does not equalise rates of return across regions.
- For most international regions, for each consumer (private, government, industries and the local investment sector), consumption goods can be sourced either from domestic or imported sources. In any country that has disaggregated regions (such as Australia), consumption goods can also be sourced from other intrastate or interstate regions. In all cases, the source of non-domestically produced consumption goods is determined by minimising costs subject to a CRESH utility function. Like most other CGE models, a CES demand function is used to model the relative demand for domestically produced commodities versus non-domestically produced commodities. The elasticities chosen for the CES and CRESH demand functions mean that consumers in each region have a higher preference for domestically produced commodities than non-domestic commodities and a higher preference for intrastate- or interstate-produced commodities than foreign commodities.
- The capital account in *Tasman Global* is open. Domestic savers in each region purchase 'bonds' in the global financial market through local 'brokers' while investors in each region sell bonds to the global financial market to raise investible funds. A flexible global interest rate clears the global financial market.
- It is assumed that regions may differ in their risk characteristics and policy configurations. As a result, rates of return on money invested in physical capital may differ between regions and therefore may be different from the global cost of funds. Any difference between the local rates of return on capital and the global cost of borrowing is treated as the result of the existence of a risk premium and policy imperfections in the international capital market. It is maintained that the equilibrium allocation of investment requires the equalisation of changes in (as opposed to the absolute levels of) rates of return over the base year rates of return.
- Any excess of investment over domestic savings in a given region causes an increase in the net debt of that region. It is assumed that debtors service the debt at the interest rate that clears the global financial market. Similarly, regions that are net savers gives rise to interest receipts from the global financial market at the same interest rate.
- Investment in each region is used by the regional investor to purchase a suite of intermediate goods according to a Leontief production function to construct capital stock with the regional investor cost minimising by choosing between domestic, interstate and imported sources of each intermediate good via the CRESH production function. The regional cost of creating new capital stock versus the local rates of return on mobile capital is what determines the regional rate of return on new investment.

— In equilibrium, exports of a good from one region to the rest of world are equal to the import demand for that good in the remaining regions. Together with the merchandise trade balance, the net payments on foreign debt add up to the current account balance. *Tasman Global* does not require that the current account be in balance every year. It allows the capital account to move in a compensatory direction to maintain the balance of payments. The exchange rate provides the flexibility to keep the balance of payments in balance.

— Detailed bilateral transport margins for every commodity are specified in the starting database. By default, the bilateral transport mode shares are assumed to be constant, with the supply of international transportation services by each region solved by a cost-minimising international trader according to a Cobb-Douglas demand function.

— Emissions of 6 anthropogenic greenhouse gases (namely, carbon dioxide, methane, nitrous oxide, HFCs, PFCs and SF_6) associated with economic activity are tracked in the model. Almost all sources and sectors are represented; emissions from agricultural residues and land-use change and forestry activities are not explicitly modelled but can be accounted for externally. Prices can be applied to emissions which are converted to industry-specific production taxes or commodity-specific sales taxes that impact on demand. Abatement technologies similar to those adopted in a report released by the Commonwealth Government (2008) are available and emission quotas can be set globally or by region along with allocation schemes that enable emissions to be traded between regions.[109]

More detail regarding specific elements of the model structure is discussed in the following sections.

C.4 Definition of South East Queensland

In this report, South East Queensland has been defined as the combination of the following LGAs, as outlined in the table below.

Table C.2 Definition of South East Queensland - LGAs

no.	LGA	Population (2025)
1	City of Brisbane	1,375,301
2	City of Moreton Bay	532,445
3	City of Logan	403,515
4	City of Ipswich	268,272
5	Redland City	172,831
6	Scenic Rim Region	46,947
7	Somerset Region	26,936
8	Lockyer Valley Region	46,058
9	City of Gold Coast	691,230
10	Sunshine Coast Region	381,957
11	Toowoomba Region (only urban extent)	186,276
12	Shire of Noosa	59,551

Source: Queensland Government (2023). South East Queensland Infrastructure Supplement.

[109] Australian Government (2008), *Australia's Low Pollution Future: the economics of climate change mitigation*, Australian Government, Canberra.

C.5 Population growth and labour supply

Population growth is an important determinant of economic growth through the supply of labour and the demand for final goods and services. Population growth for each region represented in the *Tasman Global* database is projected using ACIL Allen's in-house demographic model. The demographic model projects how the population in each region grows and how age and gender composition changes over time and is an important tool for determining the changes in regional labour supply and total population over the projected period.

For each of region, the model projects the changes in age-specific birth, mortality and net migration rates by gender for 101 age cohorts (0-99 and 100+). The demographic model also projects changes in participation rates by gender by age for each region, and, when combined with the age and gender composition of the population, endogenously projects the future supply of labour in each region. Changes in life expectancy are a function of income per person as well as assumed technical progress on lowering mortality rates for a given income (for example, reducing malaria-related mortality through better medicines, education, governance etc.). Participation rates are a function of life expectancy as well as expected changes in higher education rates, fertility rates and changes in the work force as a share of the total population.

Labour supply is derived from the combination of the projected regional population by age by gender and regional participation rates by age by gender. Over the projected period labour supply in most developed economies is projected to grow slower than total population because of ageing population effects.

For the Australian states and territories, the projected aggregate labour supply from ACIL Allen's demographic module is used as the base level potential workforce for the detailed Australian labour market module, which is described in the next section.

C.6 The Australian labour market

Tasman Global has a detailed representation of the Australian labour market which has been designed to capture:

- different occupations
- changes to participation rates (or average hours worked) due to changes in real wages
- changes to unemployment rates due to changes in labour demand
- limited substitution between occupations by the firms demanding labour and by the individuals supplying labour
- limited labour mobility between states and regions within each state.

Tasman Global recognises 97 different occupations within Australia – although the exact number of occupations depends on the aggregation. The firms that hire labour are provided with some limited scope to change between these 97 labour types as the relative real wage between them changes. Similarly, the individuals supplying labour have a limited ability to change occupations in response to the changing relative real wage between occupations. Finally, as the real wage for a given occupation rises in one state relative to other states, workers are given some ability to respond by shifting their location. The model produces results at the 97 3-digit Australian New Zealand Standard Classification of Occupations (ANZSCO) level which are presented in Table C.3.

The labour market structure of *Tasman Global* is thus designed to capture the reality of labour markets in Australia, where supply and demand at the occupational level do adjust, but within limits.

Labour supply in *Tasman Global* is presented as a 3-stage process:

1. labour makes itself available to the workforce based on movements in the real wage and the unemployment rate
2. labour chooses between occupations in a state based on relative real wages within the state
3. labour of a given occupation chooses in which state to locate based on movements in the relative real wage for that occupation between states.

By default, *Tasman Global*, like all CGE models, assumes that markets clear. Therefore, overall, supply and demand for different occupations will equate (as is the case in other markets in the model).

The *Tasman Global* database includes a detailed representation of the Australian labour market that has been designed to capture the supply and demand for different skills and occupations by industry. To achieve this, the Australian workforce is characterised by detailed supply and demand matrices.

On the supply side, the Australian population is characterised by a 5-dimensional matrix consisting of:

— 7 post-school qualification levels
— 12 main qualification fields of highest educational attainment
— 97 occupations
— 101 age groups (namely 0 to 99 and 100+)
— 2 genders.

The data for this matrix is measured in persons and was sourced from the ABS 2011 Census. As the skills elements of the database and model structure have not been used for this project, it will be ignored in this discussion.

The 97 occupations are those specified at the 3-digit level (or Minor Groups) under the ANZSCO (see Table C.3).

On the demand side, each industry demands a particular mix of occupations. This matrix is specified in units of FTE jobs where an FTE employee works an average of 37.5 hours per week. Consistent with the labour supply matrix, the data for FTE jobs by occupation by industry were also sourced from the ABS 2011 Census and updated using the latest labour force statistics.

Table C.3 Occupations in the Tasman Global database, ANZSCO 3-digit level (minor groups)

ANZSCO code, Description	ANZSCO code, Description	ANZSCO code, Description
1. MANAGERS	**3. TECHNICIANS & TRADES WORKERS**	**5. CLERICAL & ADMINISTRATIVE**
111 Chief Executives, General Managers and Legislators	311 Agricultural, Medical and Science Technicians	511 Contract, Program and Project Administrators
121 Farmers and Farm Managers	312 Building and Engineering Technicians	512 Office and Practice Managers
131 Advertising and Sales Managers	313 ICT and Telecommunications Technicians	521 Personal Assistants and Secretaries
132 Business Administration Managers	321 Automotive Electricians and Mechanics	531 General Clerks
133 Construction, Distribution and Production Managers	322 Fabrication Engineering Trades Workers	532 Keyboard Operators
134 Education, Health and Welfare Services Managers	323 Mechanical Engineering Trades Workers	541 Call or Contact Centre Information Clerks
135 ICT Managers	324 Panel beaters, and Vehicle Body Builders, Trimmers and Painters	542 Receptionists
139 Miscellaneous Specialist Managers	331 Bricklayers, and Carpenters and Joiners	551 Accounting Clerks and Bookkeepers
141 Accommodation and Hospitality Managers	332 Floor Finishers and Painting Trades Workers	552 Financial and Insurance Clerks
142 Retail Managers	333 Glaziers, Plasterers and Tilers	561 Clerical and Office Support Workers
149 Miscellaneous Hospitality, Retail and Service Managers	334 Plumbers	591 Logistics Clerks
	341 Electricians	599 Miscellaneous Clerical and Administrative Workers
2. PROFESSIONALS	342 Electronics and Telecommunications Trades Workers	
211 Arts Professionals	351 Food Trades Workers	**6. SALES WORKERS**
212 Media Professionals	361 Animal Attendants and Trainers, and Shearers	611 Insurance Agents and Sales Representatives
221 Accountants, Auditors and Company Secretaries	362 Horticultural Trades Workers	612 Real Estate Sales Agents
222 Financial Brokers and Dealers, and Investment Advisers	391 Hairdressers	621 Sales Assistants and Salespersons
223 Human Resource and Training Professionals	392 Printing Trades Workers	631 Checkout Operators and Office Cashiers
224 Information and Organisation Professionals	393 Textile, Clothing and Footwear Trades Workers	639 Miscellaneous Sales Support Workers
225 Sales, Marketing and Public Relations Professionals	394 Wood Trades Workers	
231 Air and Marine Transport Professionals	399 Miscellaneous Technicians and Trades Workers	**7. MACHINERY OPERATORS & DRIVERS**
232 Architects, Designers, Planners and Surveyors		711 Machine Operators
233 Engineering Professionals	**4. COMMUNITY & PERSONAL SERVICE**	712 Stationary Plant Operators
234 Natural and Physical Science Professionals	411 Health and Welfare Support Workers	721 Mobile Plant Operators
241 School Teachers	421 Child Carers	731 Automobile, Bus and Rail Drivers
242 Tertiary Education Teachers	422 Education Aides	732 Delivery Drivers
249 Miscellaneous Education Professionals	423 Personal Carers and Assistants	733 Truck Drivers
251 Health Diagnostic and Promotion Professionals	431 Hospitality Workers	741 Store persons
252 Health Therapy Professionals	441 Defence Force Members, Fire Fighters and Police	
253 Medical Practitioners	442 Prison and Security Officers	**8. LABOURERS**
254 Midwifery and Nursing Professionals	451 Personal Service and Travel Workers	811 Cleaners and Laundry Workers
261 Business and Systems Analysts, and Programmers	452 Sports and Fitness Workers	821 Construction and Mining Labourers
262 Database and Systems Administrators, and ICT Security Specialists		831 Food Process Workers
263 ICT Network and Support Professionals		832 Packers and Product Assemblers
271 Legal Professionals		839 Miscellaneous Factory Process Workers
272 Social and Welfare Professionals		841 Farm, Forestry and Garden Workers
		851 Food Preparation Assistants
		891 Freight Handlers and Shelf Fillers
		899 Miscellaneous Labourers

Source: ABS (2009), ANZSCO – Australian and New Zealand Standard Classifications of Occupations, First edition, Revision 1, ABS catalogue no. 1220.0.

C.7 Labour market model structure

In the model, the underlying growth of each industry in the Australian economy results in a growth in demand for a particular set of skills and occupations. In contrast, the supply of each set of skills and occupations in a given year is primarily driven by the underlying demographics of the resident population. This creates a market for each skill by occupation that (unless specified otherwise) needs to clear at the start and end of each time period.[110] The labour markets clear by a combination of different prices (i.e., wages) for each labour type and by allowing a range of demand and supply substitution possibilities, including:

- changes in firms' demand for labour driven by changes in the underlying production technology
  - for technology bundle industries (electricity, iron and steel and road transportation) this occurs due to changes between explicitly identified alternative technologies
  - for non-technology bundle industries this includes substitution between factors (such as labour for capital) or energy for factors
- changes to participation rates (or average hours worked) due to changes in real wages
- changes in the occupations of a person due to changes in relative real wages
- substitution between occupations by the firms demanding labour due to changes in the relative costs
- changes to unemployment rates due to changes in labour demand, and
- limited labour mobility between states due to changes in relative real wages.

All of the labour supply substitution functions are modified-CET functions in which people supply their skills, occupation and rates of participation as a positive function of relative wages. However, unlike a standard CET (or CES) function, the functions are 'modified' to enforce an additional constraint that the number of people is maintained before and after substitution.[111]

Although technically solved simultaneously, the labour market in *Tasman Global* can be thought of as a 5-stage process:

- labour makes itself available to the workforce based on movements in the real wage (that is, it actively participates with a certain number of average hours worked per week)
- the age, gender and occupations of the underlying population combined with the participation rate by gender by age implies a given supply of labour (the potentially available workforce)
- a portion of the potentially available workforce is unemployed, implying a given available labour force
- labour chooses to move between occupations based on relative real wages
- industries alter their demands for labour as a whole and for specific occupations based on the relative cost of labour to other inputs and the relative cost of each occupation.

By default, *Tasman Global*, like all CGE models, assumes that markets clear at the start and end of each period. Therefore, overall, supply and demand for different occupations will equate (as is the case in other markets in the model). In principle, (subject to zero starting values) people of any age and gender can move between any of the 97 occupations while industries can produce their output with any mix of occupations. However, in practice the combination of the initial database, the functional forms, low elasticities and

[110] For example, at the start and end of each week for this analysis. *Tasman Global* can be run with different steps in time, such as quarterly or bi-annually in which case the markets would clear at the start and end of these time points.

[111] As discussed in Dixon et al (1997), a standard CES/CET function is defined in terms of *effective units*. Quantitatively this means that, when substituting between, say, X_1 and X_2 to form a total quantity X using a CET function a simple summation generally does not actually equal X. Use of these functions is common practice in CGE models when substituting between substantially different units (such as labour versus capital or imported versus domestic services) but was not deemed appropriate when tracking the physical number of people. Such 'modified' functions have long been employed in the technology bundles of *Tasman Global* and GTEM. The Productivity Commission have proposed alternatives to the standard CES to overcome similar and other weaknesses when applied to internationally traded commodities. See Dixon, P.B., Parmenter, B., Sutton, J., & Vincent, D. (1997), *ORANI: A Multisectoral Model of the Australian Economy*, Amsterdam: North Holland.

moderate changes in relative prices for skills, occupations etc. means that there is only low to moderate change induced by these functions. The changes are sufficient to clear the markets, but not enough to radically change the structure of the workforce in the timeframe of this analysis.

Factor-factor substitution elasticities in non-technology bundle industries are industry specific and are the same as those specified in the GTAP database, while the fuel-factor and technology bundle elasticities are the same as those specified in GTEM.[112] The detailed labour market elasticities are ACIL Allen assumptions, previously calibrated in the context of the model framework to replicate the historical change in the observed Australian labour market over a 5-year period.[113] The unemployment rate function in the policy scenarios is a non-linear function of the change in the labour demand relative to the base case with the elasticity being a function of the unemployment rate (that is, the lower the unemployment rate the lower the elasticity and the higher the unemployment rate the higher the elasticity).

[112] Pant, H.M. (2007). Op cit.

[113] This method is a common way of calibrating the economic relationships assumed in CGE models to those observed in the economy. See for example Dixon, P.B. and Rimmer, M.T. (2002), *Dynamic General Equilibrium Modelling for Forecasting and Policy*. Contributions to Economic Analysis 256, Amsterdam: North Holland.

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