



imcrc | we champion
manufacturing
innovation

imcrc.org

Innovative Manufacturing CRC Annual Highlights 2017-2018



Australian Government
Department of Industry,
Innovation and Science

Business
Cooperative Research
Centres Program

THANK YOU

Manufacturing is an essential part of Australia's knowledge economy and innovation ecosystem. Together, through collaborative investment, research impact and innovation, IMCRC helps transform and build a thriving, relevant and globally integrated Australian manufacturing industry.

Thank you for your support throughout 2017-2018.

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Disclaimer

IMCRC has endeavoured to ensure that all information in this publication is correct. The Annual Highlights have been prepared to align with the IMCRC Commonwealth Agreement, referencing progress, activities, participants and other matters as at 30 June 2018, unless it is otherwise specified within the document.

Contents

04	HIGHLIGHTS 2017-18
06	Message from the Chair
08	Message from the CEO and Managing Director
10	ABOUT IMCRC
12	Our Partners
14	Our Board
16	Our Team
18	CHAMPIONING MANUFACTURING INNOVATION
19	Program 1. Additive Manufacturing Processes
22	Program 2. Automated and Assistive Technologies
24	Program 3. High Value Product Development
27	Program 4. Industrial Transformation
30	ADVANCING INDUSTRY TRANSFORMATION
30	Collaboration
31	Education and Training
32	SME Engagement
33	Communications

Highlights 2017-18

Approved
17 research projects,
with 11 projects commenced



Manufacturing research
across **4 states** and within
4 industry growth sectors



Invested in **2**
Industry 4.0 test labs



Engaged more than
25 students



Allocated
\$17 million of \$30 million
of Commonwealth funding



Achieved a total
project research investment of
\$100 million



Launched the
Industrial Transformation Program
through **futuremap™**

futuremap™

Achieved
13 of 14 Commonwealth
research milestones



Message from the Chair



The last twelve months have marked a period of strategic advancement and getting projects underway, combined with consolidation for IMCRC.

During that time, IMCRC established its stability and credibility with industry and research institutions alike, and achieved the ground-breaking development of futuremap™.

By the end of fiscal year (FY) 2017-18, the IMCRC successfully:

- approved \$17 million investment in new manufacturing research projects, increasing the number of projects that IMCRC supports to seventeen. This generates more than \$100 million in R&D investment in manufacturing innovation
- supported the establishment of two Industry 4.0 test labs offering manufacturing small and medium enterprises (SMEs) access to the latest technologies
- launched futuremap™, a business maturity diagnostic tool that helps Australian manufacturing SMEs assess the current state of their business and identify areas of focus and potential investment to transform and future-proof their business. Six workshops were held, including with 78 SME manufacturers
- signed the Fraunhofer Engagement Agreement and commenced project work to bring the latest Industry 4.0 research to Australia.

The IMCRC has made satisfactory progress against the Commonwealth Agreement milestones with the majority achieved. We thank the Commonwealth for their continued support for the CRC.

I want to thank IMCRC members and collaboration partners for their continued support, and take this opportunity to congratulate IMCRC CEO and Managing Director, David Chuter, for his performance over the past twelve months and I thank his team for their hard work and professionalism over the year.

Finally, I want to welcome Robert Cohen and Professor Roy Green to the Board, and I thank the Board and Board Committee members for their support and contribution to the IMCRC through the year.

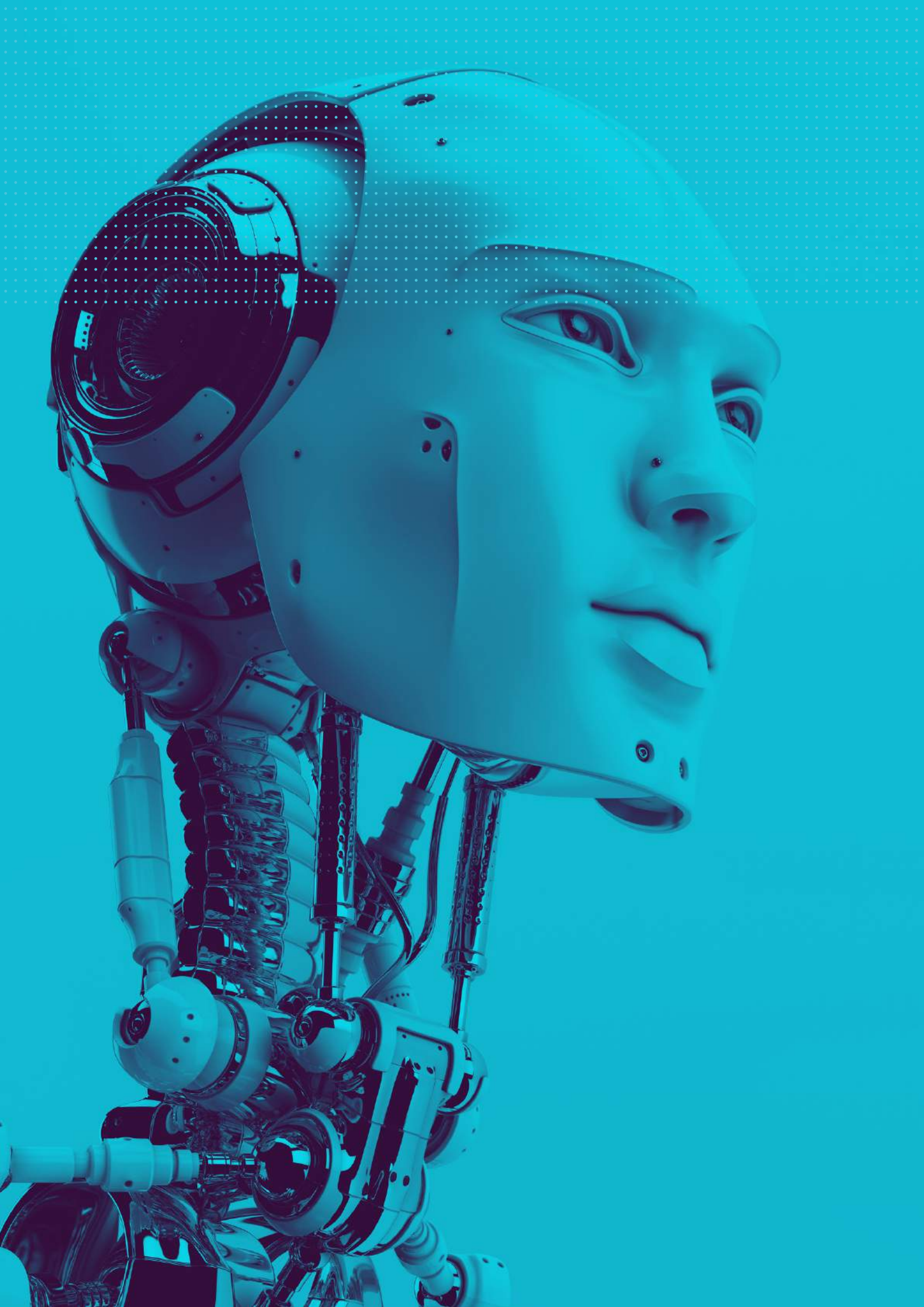
With the initial establishment difficulties now well behind us, the year ahead presents a great opportunity for the IMCRC and its participants and members, not to mention the multitude of companies involved in our manufacturing research projects.

I look forward to us making the most of those opportunities, meeting the challenge of investing the remaining IMCRC funds available in outstanding projects, and providing a path forward for manufacturing in Australia through innovation.

Thank you.

A handwritten signature in black ink, appearing to read 'I. Macfarlane'.

The Hon Ian Macfarlane
Chair



Message from the CEO and Managing Director



It has been a year of significant progress for the CRC, our members and project participants. Our primary objective has been the selection and approval of an exciting range of innovative manufacturing research projects.

By the end of FY 2017-18, we have approved seventeen industry-led projects, granting up to \$17 million of the \$30 million cash available from the Commonwealth for these projects. This has catalysed around \$100 million total investment in Australian manufacturing research and development to date, when industry and research organisations cash and in-kind contributions are included. Particularly pleasing is that this has involved multiparty and multi-year research initiatives that will deliver significant manufacturing and commercial outcomes, including projects:

- with two of our Industry Essential Participants
- with fourteen new Industry Project Participants and collaborators, including SMEs
- with the majority of our member research organisations
- within the Advanced Manufacturing, Medical Technologies and Pharmaceutical, Building and Construction, Mining and Defence sectors
- with research being undertaken across Queensland, New South Wales, Victoria and South Australia
- with research across a wide range of innovative manufacturing technologies such as additive manufacturing, sensors and data analytics, robotics and assistive technologies, advanced materials and virtual and augmented reality.

THE PRIMARY OBJECTIVE FOR FY 2018-19 WILL BE THE SELECTION AND APPROVAL OF FURTHER PROJECTS TO FULLY UTILISE THE COMMONWEALTH'S \$30 MILLION FUNDING.

We continue to work with both industry and our research organisations to finalise the project and research programs portfolio. Progress would not have been possible without the support of our member research organisations, and I both thank and continue to encourage those organisations to maintain the intensity required to collaborate successfully with industry to create and deliver significant benefits to the Australian and global manufacturing sector. The projects that we have underway are great examples of what is possible.

In FY 2017-18 we also finalised the development, and commenced deployment, of IMCRC's Industrial Transformation Program, heralded by the launch of futuremap™, our proprietary business maturity diagnostic tool, at National Manufacturing Week in May 2018. futuremap™ has been specifically developed for Australian manufacturing SMEs to help them on their advanced manufacturing and digital transformation journey, and to generate increased awareness, appetite and ambition in areas such as leadership development, business model innovation and Industry 4.0 uptake. futuremap™ the tool as well as the accompanying interactive group workshops have been extremely well received by industry, encouraging IMCRC to roll out more events in collaboration with the Commonwealth's Entrepreneurs' Programme and others industry partners, such as the Australian Industry Group, in 2018-19.

To further promote Industry 4.0 within Australia, IMCRC signed a Framework Engagement Agreement with the Fraunhofer Gesellschaft to establish a broader framework of collaboration and sharing of research and Industry 4.0 best practice between Australia and Germany, with IMCRC being Fraunhofer's preferred portal into Australia and New Zealand on Industry 4.0. IMCRC also supported the South Australian State Government in establishing two new Industry 4.0 test labs in South Australia. IMCRC is represented on Australia's Industry 4.0 Advanced Manufacturing Forum, leading the Research and Innovation workstream.

IT HAS BEEN AN INTENSELY BUSY AND EXCITING YEAR FOR OUR TEAM. THE PACE OF CHANGE IN OUR SECTOR, AND PERHAPS GENERALLY, IS NOW MORE EXPONENTIAL THAN LINEAR, AND GENUINE INNOVATION COUPLED WITH INDUSTRY 4.0 BRINGS IMMENSE OPPORTUNITIES.

The achievements of the past year would not have been possible without significant contributions from all within our team, and I would like to thank them for their ongoing commitment to make a difference to the industry we exist to serve.

I also would like to thank our Chair, the Hon Ian Macfarlane, as well as the Board of Directors for their continued backing of both our strategy and our team.

Finally, and on behalf of our team and Board, I would like to extend our appreciation to the Commonwealth, without whose support and commitment the IMCRC would be unable to deliver on our mission to help catalyse the transformation of Australian manufacturing through collaborative investment, research impact and innovation.



David Chuter
CEO and Managing Director

About IMCRC

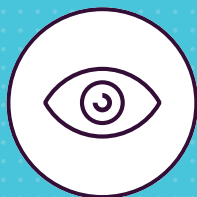
THE INNOVATIVE MANUFACTURING CRC LIMITED (IMCRC) IS AN INDEPENDENT, NOT-FOR-PROFIT COOPERATIVE RESEARCH CENTRE THAT HELPS AUSTRALIAN BUSINESSES INCREASE THEIR GLOBAL RELEVANCE THROUGH RESEARCH-LED INNOVATION IN MANUFACTURING PRODUCTS, PROCESSES AND SERVICES.

In collaboration with businesses, research organisations, industry associations, and government, we:

- co-fund, on a dollar-for-dollar matched basis, broad, multidisciplinary and industry-led manufacturing research projects that deliver commercial outcomes
- advance the wider cause of manufacturing transformation through industry education and public advocacy.

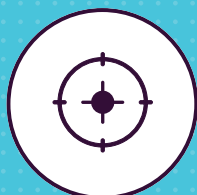
Manufacturing has entered a fourth industrial revolution. This offers vast opportunities for Australian companies to create new products and services, expand into new supply chains and markets in Australia and around the world, and attract and develop a new generation of skilled employees.

We aim to encourage and help manufacturers to invest in collaborative research to exploit innovative technologies. We want to see the public perception of a capital and labour intensive 'brand of manufacturing' shift to one that embraces industrial transformation, in which companies leverage digital technologies, including Industry 4.0, to deliver innovative business models and sell new products, services and solutions to a global market.



Our Vision

is for Australian manufacturing to be thriving, relevant and globally integrated.



Our Mission

is to help catalyse the transformation of Australian manufacturing through collaborative investment, research impact and innovation.



Our Values

Collaboration

Improving engagement between industry, research institutions and the global community with open, respectful conversations that leverage effective feedback and 'collective genius' to find the best pathways to success.

Entrepreneurship

Thinking and acting creatively and adventurously and providing the insights and advice necessary to activate a spirit of enterprise and risk taking.

Leadership

Demonstrating the courage and boldness necessary to create and foster the skills and methods needed to bring about industrial transformation. Prepared to question the norm, find better solutions and drive outcomes.

Advocacy

Energising, engaging and inspiring individuals and the wider community to get behind the transformation of Australian manufacturing.

Advancement

Pursuing economic and social progress by continuously seeking opportunities for change, growth and evolution.

Our Partners

IMCRC believes in collaboration. By connecting companies and research organisations, and sharing knowledge and resources, we aim to make Australian manufacturing innovative, effective, resilient and relevant.

Industry



Research



Other



* IMCRC Essential Participants as at 30 June 2018

** Jumbo Vision International Pty Ltd trading as CadWalk is the Essential Participant

Our Board

IMCRC is governed by an independent Board of Directors that oversees the organisation's research and work in creating long-term impact for Australian manufacturing. The Board represents a broad range of industry, research and government expertise.



Hon Ian Macfarlane
Independent Director, Chair



Mr David Chuter
Managing Director (and CEO)
Chair, Innovation Investment
Committee



Professor Mary O'Kane AC
Independent Director
Chair, Audit and Risk Committee
Member, Nominations and
Remuneration Committee



Dr Alexander Gosling, AM
Independent Director
Member, Audit and
Risk Committee



Mr Simon Marriott
Independent Director



Dr Jens Goennemann
Growth Centre Director



Mr Robert Cohen
Research Nominee Director
(Appointed 28/09/2017)



Mr Innes Willox
Industry Nominee Director
Chair, Nominations
and Remuneration
Committee



Prof Roy Green
Research Nominee Director
(Appointed 28/09/2017)
Member, Audit and
Risk Committee



Dr Jenni Lightowlers
IMCRC Company Secretary
Member, Nominations
and Remuneration
Committee



Prof Calum Drummond
Research Nominee Director
(Retired 28/09/2017)
Member, Nominations and
Remuneration Committee



Prof Robert Saint
Research Nominee Director
(Retired 28/09/2017)
Member, Audit and
Risk Committee

Three advisory committees have been established to assist the Board in the executions of its duties:

Audit and Risk Committee (ARC)

offers guidance in terms of corporate and financial governance.

Nominations and Remuneration Committee (NRC)

provides advice on policies and best practices concerning recruitment, performance and remuneration of IMCRC Board and staff.

Innovation Investment Committee (IIC)

is an independent advisory committee that assesses IMCRC's manufacturing research projects and advises the Board on potential investments. The IIC consists of the following industry and research experts:

Dr Michele Allan

Chair, Meat & Livestock Australia

Ross Pilling

ex Chair and Managing Director, Australia & New Zealand

Mark Peters

State Director, Queensland, Northern Territory, AMGC

Prof Matthew Cuthbertson

Pro Vice-Chancellor (Research Development, Innovation and Commercialisation), Swinburne University of Technology

Tim McLennan

CEO, QUT bluebox

David Chuter

CEO and Managing Director, IMCRC

Our Team

IMCRC's day-to-day operations are managed by the IMCRC management team and staff.



David Chuter
CEO and Managing Director



Dr Jason Coonan
Chief Operating Officer



Dr Matthew Young
Manufacturing Innovation Manager



Jana Kuthe
Communications, Marketing
and Events Manager



Sameera Silva
Finance Manager



Dr Min-Yin Yap
Project Research Officer



David Chandler
Project Research Officer



Lance Worrall
Director, Industrial Transformation
(Secondment from Flinders
University)

In FY 2017-18, IMCRC also engaged in full or part-time capacity:

Dr Nico Adams - Industrial Transformation Program (secondment from CSIRO)
Dr Melanie Ayre - Industrial Transformation Program (secondment from CSIRO)
Ms Sarah King - Industrial Transformation Program (secondment from CSIRO)
Mr Rohann Chapman - Industrial Transformation Program
Ms Liz McMillan - Administration



Championing Manufacturing Innovation

Manufacturing has entered a fourth industrial revolution. This offers vast opportunities for Australian manufacturing businesses to create new products and services, expand into new supply chains and markets in Australia and around the world, and attract and develop a new generation of skilled employees.

IMCRC co-funds industry-led research into innovative manufacturing technologies and processes. Across four research programs, IMCRC collaborates with manufacturing businesses, research organisations, industry associations and government, investing significantly in partnerships that support innovation and deliver commercial outcomes to ensure the Australian manufacturing sector can meet the challenges and opportunities of the global economy.

These multidisciplinary research programs are designed to comprise a series of projects, carefully crafted and executed to deliver significant benefits to IMCRC participants and create important insights to be shared with the wider manufacturing community.

IMCRC supports four research programs:

- 1. Additive Manufacturing Processes**
- 2. Automated and Assistive Technologies**
- 3. High-value Product Development**
- 4. Industrial Transformation**

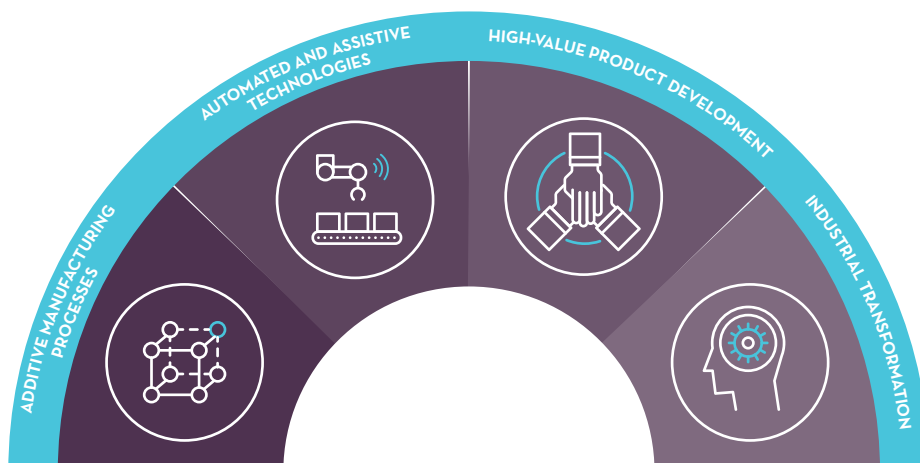
Successful project applications, meeting IMCRC's primary selection criteria, ensure that a project:

- is industry-led, delivers clear outcomes, and involves advanced manufacturing (ideally within key growth sectors)

- demonstrates genuine collaboration, including with SMEs, Industry Growth Centres and other CRCs
- creates opportunities to access global value/supply chains
- delivers wider benefits to Australian manufacturing industry, and contributes to the sector transformation and sustainability
- requires high-quality research with universities and/or other research organisations in Australia, and facilitates higher education
- has a clear IP utilisation/commercialisation plan (Note: IMCRC does not own Project IP. IP ownership is determined between the industry and research participants based upon where it can be most effectively commercialised)
- has a clear business innovation and transformation plan and/or Industry 4.0 adoption plan
- has a defined return on research investment, with both manufacturing and commercial outcomes.

IMCRC's Innovation Investment Committee (IIC) approves projects up to \$1m in cash value, or recommends approval to the IMCRC Board.

In 2017-18, nine new research projects commenced, increasing the total number of active IMCRC projects to eleven by 30. June 2018. IMCRC approved six additional projects in the financial year. All ongoing projects are progressing well. To date, there have been no significant technical or scientific impediments impacting on their research progress. At this stage of the IMCRC, no changes to the directions of the four research programs are proposed.





Program 1: Additive Manufacturing Processes

Additive manufacturing, or 3D printing, is the fastest-growing sector of manufacturing globally, due to the many benefits it offers companies in terms of new product development, time to market, reduced waste and product cost.

The program's key research focuses on:

- developing and utilising existing and novel materials, process control, characterisation and surface engineering
- advancing additive systems such as multi-material systems
- tailoring additive manufacturing design including shape and topography optimisation, integration of creative design and additive process engineering.

In FY 2017-18, the following **four research projects** commenced:



Machine vision for Industry 4.0 high-speed printing

Machine vision for Industry 4.0 high-speed printing

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$1,135,845	\$349,797	01/04/2017	1.4	Effusiantech Pty Ltd (SPEE3D)	University of Technology Sydney (UTS)

Objectives

- to automate the process of 3D metal printing by developing 3D scanning technology, which, using image sensing, will digitally acquire the shape printed by the machine
- to characterise this data, 3D geometry processing software will be developed, providing a CAD-like representation to the CNC mill. This allows the part to be positioned for milling in a fully automated process as well as in-process sensing, which incorporates feedback to the part build software resulting in improved accuracy during manufacture
- to position SPEE3D's technology to compete not only on speed but quality and accuracy with other internationally developed metal printing processes.



Just in time patient specific
tumour implants

Just in time patient specific tumour implants

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$12,109,690	\$2,360,245	01/06/2018	4.75	Stryker Australia Pty Ltd	RMIT University, University of Technology Sydney (UTS), St Vincent's Hospital Melbourne

Objectives

- to transform the way musculoskeletal tumour implants are developed, manufactured and supplied, shifting the paradigm to a local, bespoke setting within the hospital
- to develop image analysis and implant design tools that allow a precise robotic resection of the tumour
- to combine the specialised imaging with additive manufacturing techniques for the construction of customised implants capable of achieving multi-density/property cross-sections and surfaces. Manufactured using just-in-time supply chain principles, these implants can then be inserted during the operation.



Application of additive metal
technology to operational aircraft

Application of additive metal technology to operational aircraft

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$819,000	\$120,000	01/03/2018	2	RUAG Australia Pty Ltd	RMIT University

Objectives

- to develop an additive manufacturing process to address corrosion and stress-corrosion damage affecting the structural integrity of components in operational aircraft
- to explore geometry restoration using laser deposition technology to solve problems associated with corrosion/cracks in wing planks without the need for traditional major structural repair or component replacement
- to enable onsite repair and production of parts to improve aircraft maintenance processes including warehousing and transport.



Revolutionising mineral separation using additive manufacturing

Revolutionising mineral separation using additive manufacturing

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$3,579,384	\$700,000	01/04/2018	1.75	Mineral Technologies Pty Ltd	University of Technology Sydney (UTS)

Objectives

- to demonstrate how composite polymers can be used to manufacture precision-engineered mineral separation and mining equipment
- to redesign the helically shaped gravity concentrator using complex and efficient geometries in a way suited to an existing 3D printing technology. A product specific 3D printing machine will then be designed and prototyped to optimise the manufacturing process of the gravity concentrator
- to deliver additive manufactured products with embedded Internet of Things (IoT) connected sensors providing feedback about the product performance as well as insights into equivalent wear and structural characteristics for specific minerals and ore concentrations.

For more information on IMCRC's manufacturing research projects, please visit imcrc.org/projects.



Program 2. Automated and Assistive Technologies

Australian manufacturers have been challenged by lower tariffs, low cost competitors from emerging economies and rapidly changing technologies. To remain competitive, manufacturers must adapt and invest in assistive and automation technologies that offer quality and operational efficiencies.

The program investigates a suite of agile manufacturing technologies to improve the performance and operational effectiveness of short run and personalised production systems. The aim is to develop:

- assistive robotics and support systems (e.g. vision) that provide real-time, physical support to the workforce
- automated technologies with perception and situational awareness capabilities that interact safely with their environment including other assistive technologies and the workforce across the manufacturing process
- distributive heterogeneous collaboration technologies that enhance OH&S, skill augmentation and continuous quality control and assessment.

In FY 2017-18, two new projects have commenced, increasing the total number of active 'Automated and Assistive Technologies' **research projects to three**.



Visualisation tools for the design of manufactured high-end instrumented facilities

Visualisation tools for the design of manufactured high-end instrumented facilities

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$5,991,500	\$1,050,000	01/04/2017	5	Jumbo Vision International Pty Ltd	University of South Australia

Objectives

- to develop a set of novel Spatial Augmented Reality user interface tools that support and help visualise the design of high-end instrumented facilities
- to demonstrate design concepts in real time allowing clients to walk around, physically touch and modify the proposed layout/interiors
- to demonstrate alternative manufacturing opportunities to existing local businesses and encourage the development of new strategies to offer specialised services to industry.



Design robotics for mass customisation manufacturing



Tradiebot

Design robotics for mass customisation manufacturing

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$7,978,005	\$1,050,000	01/07/2017	4.75	UAP Australia Pty Ltd	Queensland University of Technology (QUT), RMIT University

Objectives

- to develop robotic vision systems and software user-interfaces to support the custom design-to-manufacture cycle
- to test and integrate the systems with industrial robots that can manufacture high-value, complex products at reduced time and cost
- to set up a Design Robotics Open Innovation Network, enabling a peer-to-peer business knowledge transfer program as well as establish a Living Laboratory Network.

Tradiebot

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$1,333,495	\$400,347	18/01/2018	3	Tradiebot Industries Pty Ltd	Swinburne University of Technology

Objectives

- to enable a low-cost rapid repair service for automotive plastic trim and assembly components utilising 3D printing technologies and robotics along with complex materials
- to research novel polymer material solutions compatible with standard 3D printing processes
- to create a 'Repair-bot' that integrates 3D printing, 3D scanning and robotics for in-situ automotive part repairs, allowing the replacement part being directly manufactured on the damaged component and thus reduces repair cost, time, waste and environmental impact.

For more information on IMCRC's manufacturing research projects, please visit imcrc.org/projects.

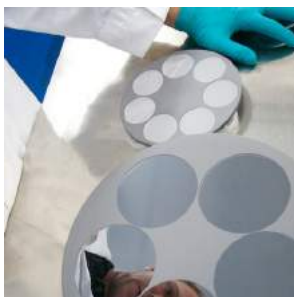


Program 3. High Value Product Development

Considering Industry 4.0 and advancements in digitisation, automation, and the increasing demand for mass customisation, Australian manufacturers need to invest in and deploy new product innovations to future-proof their businesses.

Program 3 'High Value Product Development' aims to develop for instance new electronic devices, diagnostic tools and implantable materials that utilise key enabling science and manufacturing technologies. These will enable Australian manufacturers to rapidly develop, produce, supply and support new products and technologies into international markets and supply chains.

In FY 2017-18, the following **four research projects** have commenced:



High Performance Normally OFF GaN High Electron Mobility Transistors (HEMT)

High Performance Normally OFF GaN High Electron Mobility Transistors (HEMT)

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$2,635,001	\$300,000	01/09/2017	2	BluGlass Limited	Griffith University

Objectives

- to develop a commercially viable Normally OFF fail-safe, lower cost and smaller gallium nitride (GaN) based high electron mobility transistors (HEMT)
- to combine two Australian enabling technologies – BluGlass' deposition technology called Remote Plasma Chemical Vapour Deposition (RPCVD), a revolutionary low temperature approach for the manufacture of semiconductor materials and Griffith University's Queensland Microtechnology Facility (QMF) Atomically Smooth SiC on large Si (SiC on Si) wafers
- to deliver world leading enabling technology platform and processes (RPCVD) for the manufacture of GaN Commercially viable SiC on Si substrate that addresses manufacturing cost, difficulty in engineering and the IP 'minefield' that is a barrier to wider manufacturing adoption.



Smart electric compressor for refrigeration and air conditioning on electric vehicles

Smart electric compressor for refrigeration and air conditioning on electric vehicles

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$1,328,720	\$182,610	01/09/2017	2	SuperCool Asia Pacific Pty Ltd	Griffith University

Objectives

- to develop an intelligent semi-hermetically sealed electric swash plate compressor for use in mobile air-conditioning and refrigeration applications for passenger and commercial vehicles and equipment
- the smart compressor will be Internet of Things (IoT) enabled with onboard diagnostic systems. Data generated from these systems will provide valuable information for quality control, maintenance and development, leading to a shorter product improvement cycle and providing service provision to end-users
- to design a compact, robust, and suitable for harsh Australian environments, technology will offer transformational services to electric air-conditioned and refrigerated vehicle and equipment operators worldwide.



A novel approach to biofilm disruption and removal

A novel approach to biofilm disruption and removal

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$3,565,459	\$740,250	01/04/2018	4	Whiteley Corporation Pty Ltd	University of Sydney

Objectives

- to develop a new approach to resolving bacterial biofilm problems in humans and industrial settings, through mimicking natural and synergistic multimodal strategies
- to develop new therapeutic treatments for biofilm mediated infection, that effectively disrupt the formation of biofilm and eradicate underlying bacteria found, for instance, in the lungs of cystic fibrosis patients, chronic urinary tract infections, burn wounds
- to develop and manufacture small/highly customisable high-value formulated products for different applications and carriers (e.g. gels, foams and coating) using advanced manufacturing design methods and processes.



Antimicrobial nanosurface for orthopaedic implants

Antimicrobial nanosurface for orthopaedic implants

Total Project Value (AUD)	IMCRC Funding (AUD)	Start Date	Duration (Years)	Industry Partner	Research Partner
\$19,615,233	\$2,999,806	01/03/2018	4	Global Orthopaedic Technology Pty Ltd	University of South Australia; University of Adelaide

Objectives

- to explore nano-modification technology based on the structure of the dragonfly wing to create antimicrobial surface for orthopaedic implants
- to confirm the safety of medical implants with the antimicrobial surface - 'smart surface' - and test their bacteria-killing properties which will reduce the chance of infections after surgery
- to develop a manufacturing infrastructure that allows the antimicrobial nano-surface to be engineered onto existing medical devices.

For more information on IMCRC's manufacturing research projects, please visit imcrc.org/projects.



Program 4. Industrial Transformation

The fourth industrial revolution (Industry 4.0) is changing the global manufacturing landscape. While creating new opportunities for Australian manufacturers through connected, more efficient production and new business models, Industry 4.0 impacts the market dynamics across the entire sector, affecting, in particular SME manufacturers along the value chain.

Program 4 aims to advance the wider cause of manufacturing transformation through industry education and public advocacy. It seeks to create and provide resources that particularly assist SME manufacturers to assess and adopt emerging digital technologies and new business models.



David Chuter speaks at a futuremap™ workshop



Tonsley Manufacturing Innovation Hub (TMI)

In FY 2017-18, the **Industrial Transformation Program** has successfully:

- established and advanced relationships with important influencers, stakeholders and service providers around Industry 4.0 such as the Internet of Things Alliance Australia (IoTAA), Australia's Industry 4.0 Advanced Manufacturing Forum, CSIRO, the Australian Industry Group (Ai Group) and selected universities as well as with Germany's Fraunhofer Institutes and New Zealand's Callaghan Innovation and Manufacturer's Network
- supported with the South Australian State Government the establishment of two Industry 4.0 test labs: Tonsley Manufacturing Innovation Hub (TMI) and the Additive Manufacturing Applied Research Network (AMARN) in South Australia. Actively promoted the objective of a national connected network of test labs operating as education and service facilities for manufacturing SMEs
- developed and launched futuremap™ – a business maturity diagnostic tool – which helps manufacturing SMEs assess and understand their current state of maturity, as well as identify areas of focus and potential investment to transform and future-proof their business
- advanced the collaboration with Germany's Fraunhofer Institutes to develop a pragmatic and flexible suite of tools customised for Australian manufacturing SMEs. The aim is to adapt Fraunhofer's offerings to a shorter affordable program to help businesses attain a level of maturity around Industry 4.0 by which they can determine their own preferred course of action
- progressed an Engagement Agreement with the Fraunhofer Gesellschaft with the objective of increasing awareness and application of Industry 4.0 in Australian manufacturing. The Agreement, signed outside the reporting period (on 19 July 2018), provides a framework for collaboration on joint projects and recognises IMCRC as Fraunhofer's preferred portal for Industry 4.0 in Australia and New Zealand.



FUTUREMAP™ IS A BUSINESS DIAGNOSTIC TOOL SPECIFICALLY DESIGNED TO ASSIST AUSTRALIAN MANUFACTURING SMEs ASSESS AND MAP THEIR MATURITY LEVELS AND CAPABILITIES IN AREAS INCLUDING

- Market positioning
- Leadership, strategy and change management
- Innovation and use of technology
- Digital manufacturing (Industry 4.0).

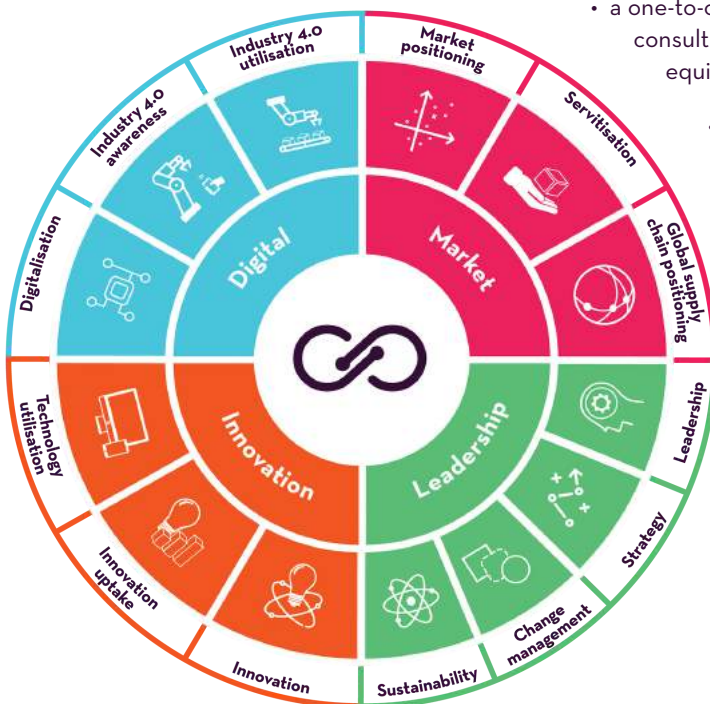
Systematically examining their business against thirteen key areas of industrial and manufacturing maturity, futuremap™ provides respondents pointers to the most productive focal points for improvement and gains for the business.

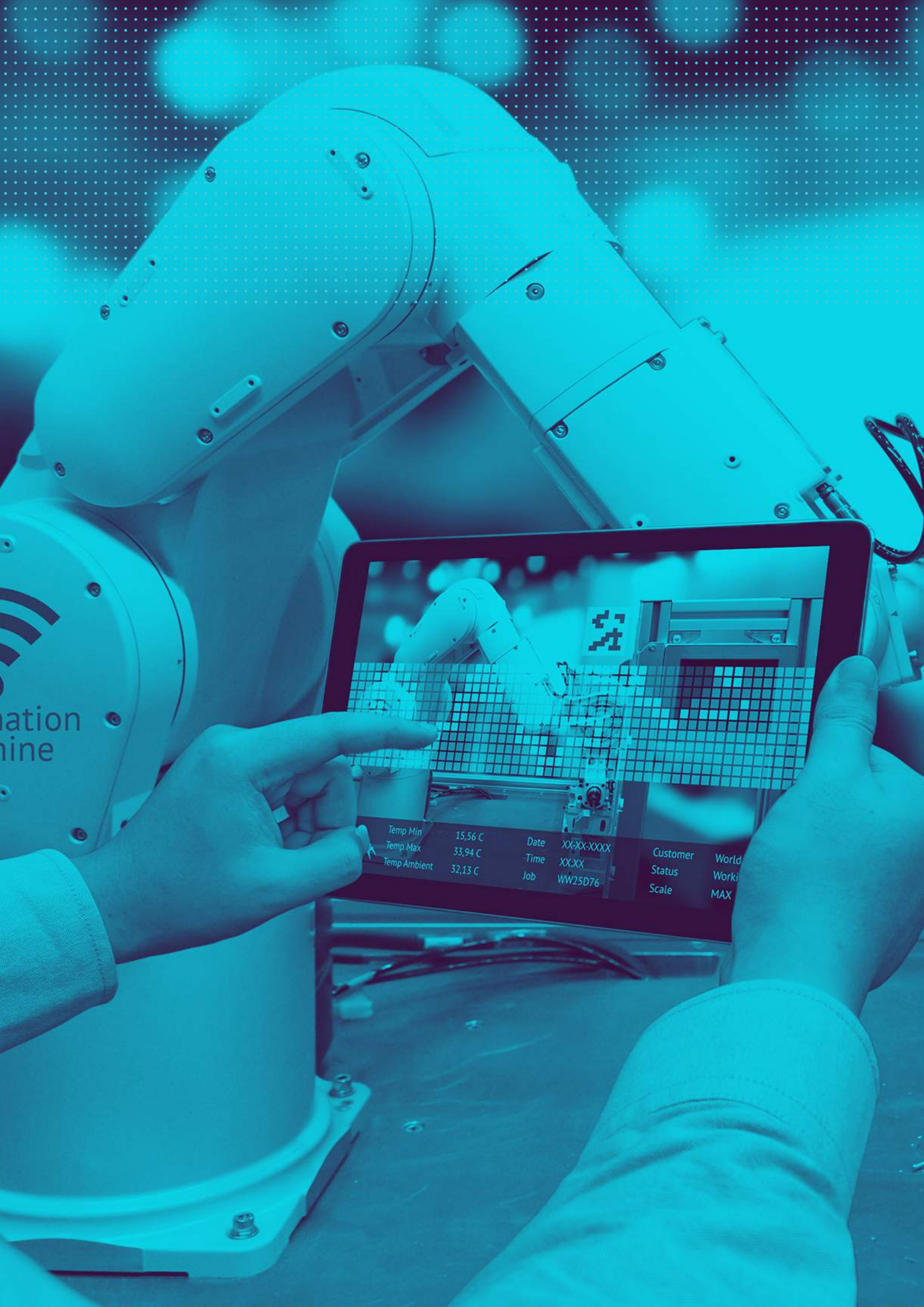
futuremap™ is deployed through a collaboration model with the Commonwealth's Entrepreneurs' Programme, with further growth in the number and range of collaboration partners envisaged going forward.

futuremap™ is delivered in either:

- a one-to-one format conducted by an accredited consultant/business adviser with the business' CEO or equivalent, or
- at facilitated events and workshops organised by the IMCRC or its project partners on a one-to-several basis.

For more information on futuremap, please visit futuremap.org.au.





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Advancing Industry Transformation

Collaboration

Collaboration is at the heart of IMCRC's business operations. By connecting industry, research organisations and the wider manufacturing community, sharing different ideas, experiences and ways of thinking, IMCRC aims to fuel innovation and create new businesses and research opportunities that will benefit Australian manufacturing.

Research

- IMCRC's research participants, comprising CSIRO and thirteen universities located in Victoria, New South Wales, Queensland and South Australia, form a unique network of manufacturing research expertise and infrastructure. By fostering interdisciplinary collaborations and facilitating the exchange of expertise between diverse research groups, IMCRC ensures that Australian manufacturers can access the best resources necessary for any project.
- In FY 2017-18, IMCRC progressed a Framework Engagement Agreement with Germany's Fraunhofer Gesellschaft which will govern the knowledge exchange between both organisations and will see IMCRC as Fraunhofer's preferred portal within Australia and New Zealand on Industry 4.0.

Industry

- IMCRC collaborates with the Australian manufacturing industry at large including, but not limited to, manufacturing businesses – small, medium and large – interested in advancing their manufacturing capabilities to strengthen their competitive position. Eleven industry-led research collaborations have started in FY 2017-18 and progressed in key industry growth sectors such as advance manufacturing, medical technologies, mining and building and constructions.
- With the launch of futuremap™, IMCRC has also created a connection model – through either one-on-one discussions or as part of interactive workshops – to engage directly with SME manufacturers to inform and educated them about Industry 4.0.

- Through formal collaborations with industry associations, such as Ai Group and PrefabAUS, IMCRC informed Australian manufacturers how emerging digital technologies will be impacting their business operations.
- On an international level, IMCRC and three of its industry participants – UAP, Mineral Technologies and Tradiebot Industries – collaborated with New Zealand's Callaghan Innovation and joined their US Manufacturing Trek – a delegation of 26 New Zealand manufacturers heading to the Internet of Manufacturing Conference in Chicago. Over the course of a week, IMCRC's industry participants not only got an exclusive look inside US manufacturing businesses investing in IIOT technologies but had the chance to exchange ideas with their New Zealand counterparts.

Government

- IMCRC has established close working relationships with the Commonwealth Government as well as with state and local governments to help catalyse industry-research collaboration and manufacturing growth.
- futuremap™ exemplifies the effective collaboration of multiple government organisations. Together with the Entrepreneurs' Programme and other industry partners, IMCRC delivered six interactive futuremap™ workshops, followed by a marketplace for manufacturing businesses to collaborate and learn about available government assistance programs.
- In FY 2017-18, IMCRC also supported the State Government of South Australia in establishing two Industry 4.0 test labs: Tonsley Manufacturing Innovation Hub (TMI) and the Additive Manufacturing Applied Research Network (AMARN).



futuremap™ workshop



CSIRO 'Manufacturing the Future' roadshow

SME Engagement

Australian manufacturing SMEs are critical to Australia's economy. However, disruptive technologies, new business models and global competition are changing the business landscape, putting increased pressure on businesses to develop new ideas, new products and services to maintain their competitive advantage. For SMEs this presents further challenges as they are often limited by access to the funding, facilities and expertise that is needed to assist their business in adapting for growth.

IMCRC ENGAGES WITH MANUFACTURING SMEs THROUGHOUT AUSTRALIA, ENCOURAGING THEM TO THINK DIFFERENTLY ABOUT THE OPPORTUNITIES AND CHALLENGES THAT EMERGING DIGITAL TECHNOLOGIES AND BUSINESS MODELS POSE FOR THEIR BUSINESS.

In FY 2017-18, IMCRC:

- advanced several manufacturing research projects across IMCRC's research programs with SME businesses
- ensured that all research applications adhere to the SME collaboration requirement (integral part of project agreements)
- engaged with and raised awareness amongst SME manufacturers to re-think their business processes and consider emerging digital technologies to step up competitiveness and create differentiated products
- launched futuremap™ – a business diagnostic tool specifically designed to assist Australian manufacturing SMEs assess and map the current state of their businesses across thirteen key areas of industrial and manufacturing maturity
- held six futuremap™ workshops in collaboration with the Entrepreneurs' Programme that were attended by 124 companies including 78 SME manufacturers. The workshops provided them with the necessary support and funding connections to achieve their business goals.

Education and Training

IMCRC's Education and Training activities focus on catalysing the transformation of the Australian manufacturing sector. A large component of this involves engaging directly with manufacturing SMEs via the Industrial Transformation Program to increase their awareness and application of Industry 4.0.

To build the manufacturing workforce of the future, IMCRC supports PhD scholarships, masters and internships in collaborative research programs.

In FY 2017-18:

- welcomed eight PhD students as part of IMCRC supported research programs, exceeding the Commonwealth milestone of six PhD students commencing in the period
- supported two undergraduate students
- delivered six interactive futuremap workshops focusing on leadership, innovation and Industry 4.0 and engaging with 124 industry members of which 78 were manufacturing SMEs
- presented at key industry events including CSIRO's 'Manufacturing the Future' roadshow across Australia to inform manufacturers about key enabling technologies
- invited three IMCRC industry participants – UAP, Tradiebot Industries and Mineral Technologies – on an international delegation to the 'The Internet of Manufacturing' conference in Chicago (USA).

Communications

The Australian manufacturing sector is diverse. Effective and engaging stakeholder engagement and communications are essential to realise IMCRC's vision for a thriving, relevant and globally integrated Australian manufacturing industry.

IMCRC's strategic communications objectives are to:

- **create awareness, understanding of and commitment** to IMCRC, and the contributions made by the CRC, its industry and research participants and partners to specific manufacturing research innovations, and the Australian manufacturing industry at large
- **engage and collaborate** with manufacturing businesses, research organisations, industry associations and government, building strong relationships that drive innovation and thus help transform Australia's manufacturing industry
- **inform, educate and support** Australian manufacturers, in particularly small and medium businesses, to enhance their product portfolio, re-think their business models and invest in new technologies, and at the same time advocate for the wider manufacturing community to get behind the digital transformation of the industry.

In FY 2017-18, and to meet these objectives, IMCRC focused its communications activities on branding, media relations, events and conference and social media engagements, with the highlights being:

- developed and successfully implemented IMCRC's new brand
- held the official launch of the IMCRC, attended by over 100 industry, research and government representatives, at RMIT University's Advanced Manufacturing Precinct with the Minister for Industry, Science and Innovation, Senator The Hon Arthur Sinodinos AO officiating
- built a compelling narrative that champions IMCRC's research initiatives and positions the organisation as a leading voice for innovative manufacturing in Australia. In collaboration with IMCRC's research and industry participants, we released fourteen media

announcements which resulted in news coverage in 170+ publications – nationally and internationally

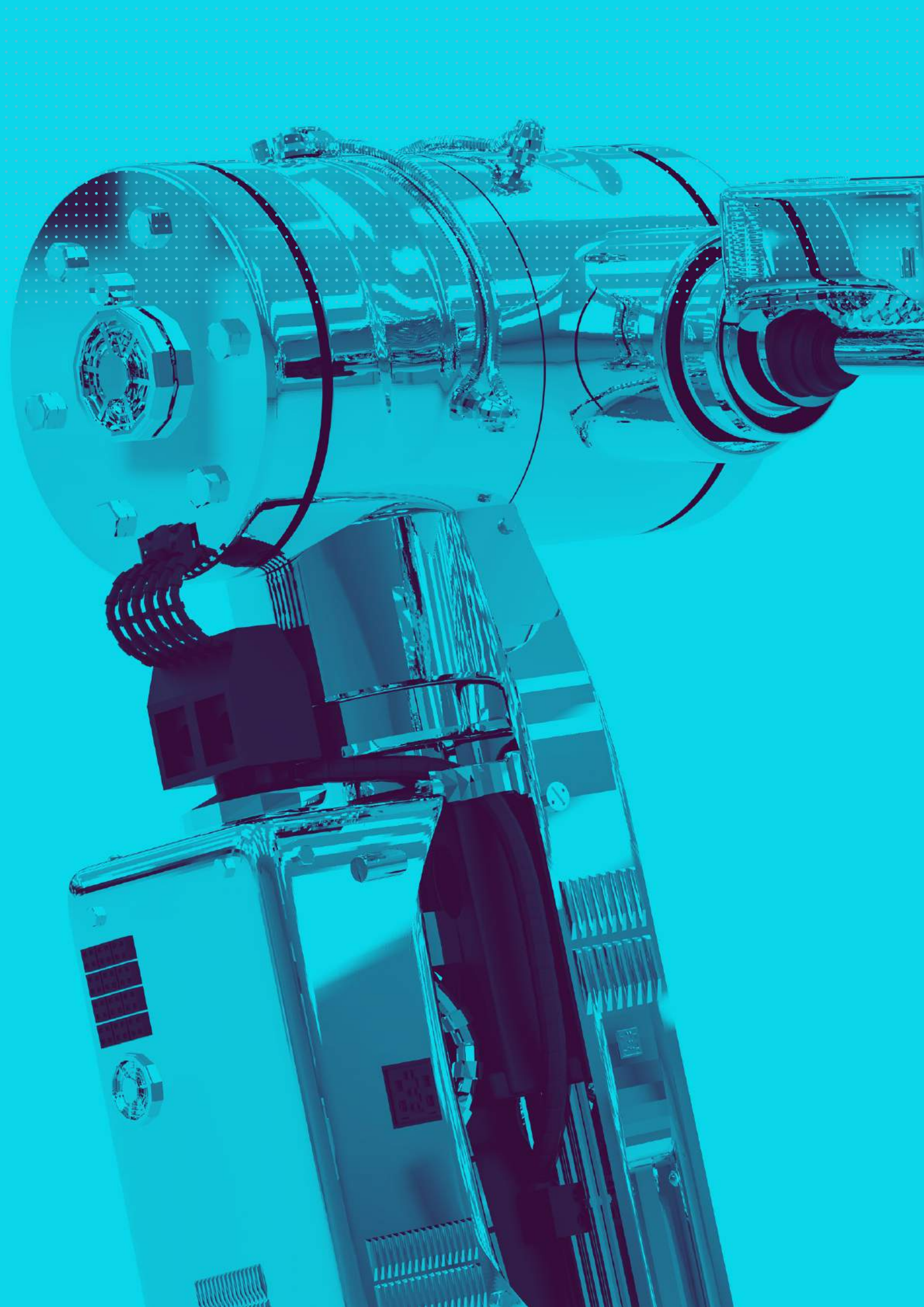
- developed and launched IMCRC's new website (imcrc.org) which since its launch in August 2017 has attracted an average of 1,400 visitors per month
- informed IMCRC members, participants and a broader public network about IMCRC's latest research initiatives, organisational and industry news through the delivery of a six-weekly email newsletter called Innovate
- introduced IMCRC's social media policy and guidelines and established an active presence on the professional media platforms LinkedIn and YouTube
- engaged in 40 speaking opportunities across Australia's manufacturing sector, reaching an audience of around 2,700 industry stakeholders. Key events included the Industrial Internet of Things Summit, AMTIL's National Conference and National Manufacturing Week.
- launched futuremap™ in collaboration with the Advanced Manufacturing Growth Centre and the Entrepreneurs' Programme at National Manufacturing Week in May 2018.

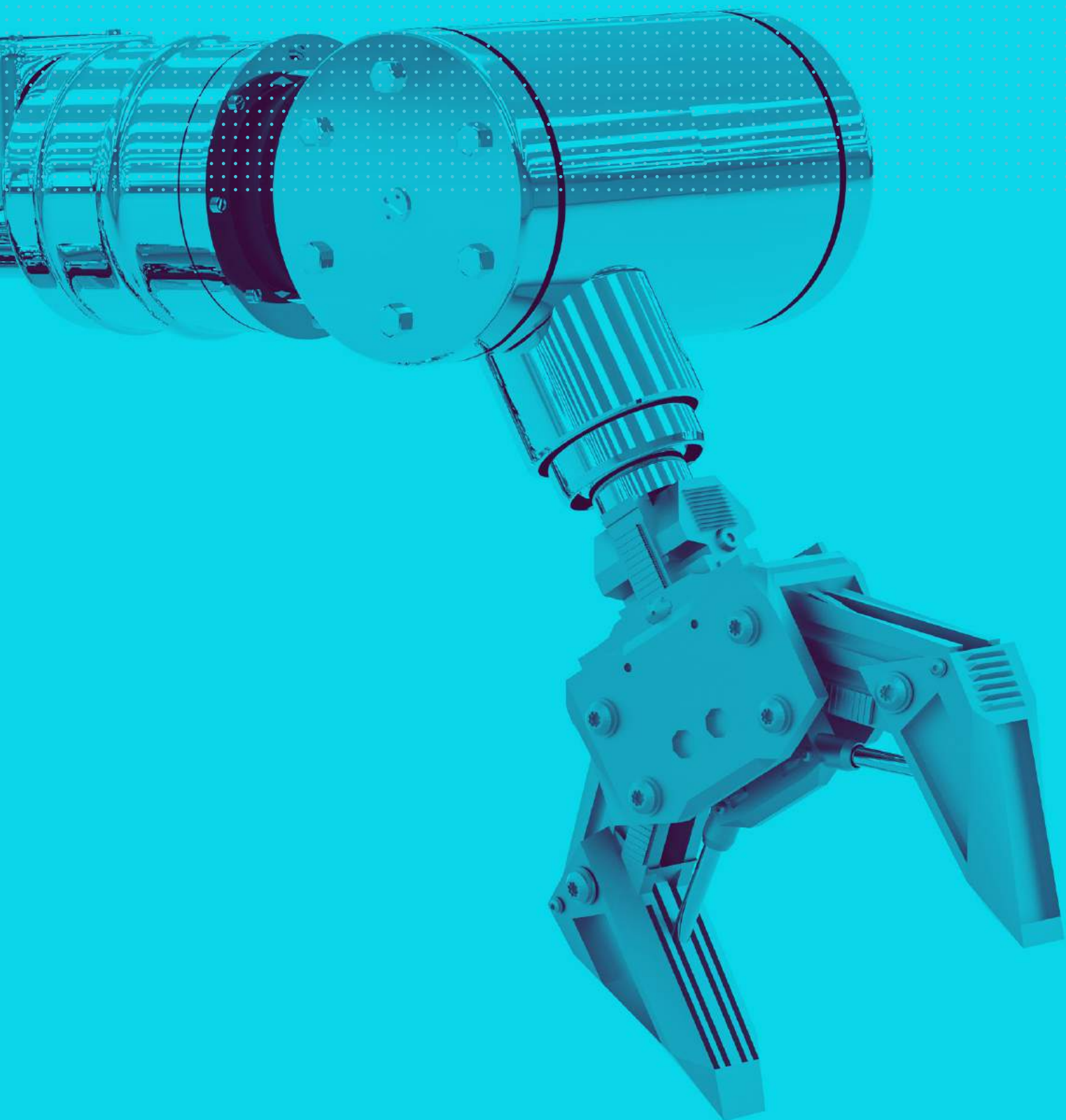


The Hon Ian Macfarlane speaks at the IMCRC launch



National Manufacturing Week







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