

2025

ANNUAL REPORT

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Australian Government
Department of Industry,
Science and Resources

Cooperative Research
Centres Program

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MESSAGE FROM THE CEO

Low productivity and a housing shortage were in focus during this year's federal election, and have remained national priorities.

Federal Housing Minister, the Hon. Clare O'Neil has stated it has become 'uneconomic' to build in Australia. And we agree. Business-as-usual approaches won't deliver the homes Australians need. The Economic Reform Roundtable explored ways to improve productivity — the key to improving living standards and strengthening Australia's economic resilience.



These challenges intersect with housing. Building hasn't changed much in 100 years. Construction costs have risen by 65% in a decade. Productivity has fallen by half. And that's why we can't build houses quickly enough, creating an availability and affordability crisis.

Innovation is at the heart of addressing both problems. Improving productivity — through research and innovation — will help deliver the housing we need. Yet, the Australian building industry doesn't have a new ideas problem — we have an implementation problem.

So, Building 4.0 CRC is focusing on demonstrating what's possible. Our activities span the entire building value chain — from new construction methods and digital design tools to advanced manufacturing and circular systems. Together with our government, industry and research partners, we are generating the evidence base for real change.

The flagship Homes NSW Modern Methods of Construction (MMC) Program demonstrates how industrialised building processes can transform housing delivery. The Program's 'kit-of-parts' model standardises core components — such as kitchens, bathrooms and balconies — that can be manufactured offsite and assembled onsite, delivering homes faster, more safely and at lower cost.

It came to life at our Showcase, held in September and October 2025. The event launched a two-bedroom Demonstrator Apartment built using 80% offsite manufacturing and 20% onsite assembly. The Showcase attracted more than 1,000 attendees, including senior representatives from government, industry and research. It provided a tangible example of how modern construction methods can boost productivity, reduce costs, and create local jobs and supply chains.

Throughout 2025, Building 4.0 CRC continued to expand its research portfolio and industry impact. New projects explore critical issues such as construction industry insolvencies (Project #80), use of remotely piloted aircraft for inspection (Project #90) and new cooling technologies for more efficient buildings (Project #76). These joined a growing body of work — now more than 80 projects — addressing different parts of the building ecosystem.

Other significant initiatives include Project #112, developing standardised offsite-manufactured designs for kitchens, bathrooms and laundries; and Project #58, which is identifying how existing housing stock can be retrofitted to improve social and environmental performance.

Circularity and sustainability is a recurring theme, with three new projects exploring how to apply circular economy principles across the industry: Project #106, Project #108 and Project #110.

The CRC is also investing in the future of the construction workforce. Project #49, Project #102, Project #111 and Project #117 are examining how to equip workers with the digital and technical skills needed for industrialised, data-driven construction methods. That's because innovation depends not just on technology, but on people capable of applying it.

Research insights were shared widely throughout the year — including the Federal Government's Housing Productivity and Construction Innovation Roundtables, and the Housing Supply: Challenges and Opportunities discussion hosted by the Parliamentary Friends of Housing at Australian Parliament House. And through platforms like the Future Building Podcast, featuring global thought leaders such as Mark Farmer, we continued to connect local and international expertise to accelerate progress.

As Australia focuses on improving productivity across the economy, Building 4.0 CRC's research and partnerships are demonstrating what's possible — helping turn innovative ideas into practical, scalable solutions that make housing more affordable, sustainable and accessible for all Australians.

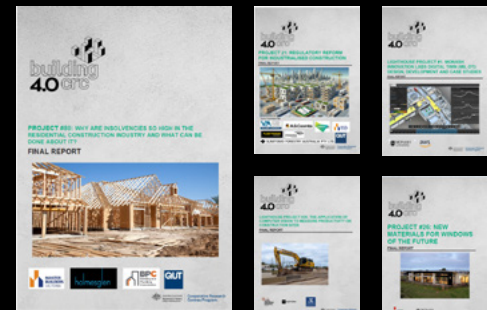
BUILDING 4.0 CRC MAJOR ACHIEVEMENTS

83 projects launched since CRC began:

26 active projects

9 projects launched in 2025

55 projects completed



30+

Another

8

PhD students completed their studies

Homes NSW MMC Program Showcase – The Future of Housing

September and October 2025

1,000+ visitors

19 Suppliers demonstrating in the Supplier Hall

Special guests included Hon. Dr Andrew Charlton MP (Federal Assistant Minister for Science, Technology and the Digital Economy), Hon. Rose Jackson MLC (NSW Minister for Housing), Hon. Clare O'Neil MP (Federal Minister for Housing) and Hon. Daniel Mookhey MLC (NSW Treasurer)

43

current partners
(industry, project,
research,
government)

61 partners
altogether to date

37 Elevator Initiative
members

building
4.0 crc

presentations by
Executive Team
members and
researchers at
conferences,
forums, workshops

- Prof. Mathew Aitchison presented at the Housing Supply: Challenges and Opportunities discussion, hosted at Parliament House by the Parliamentary Friends of Housing
- He also participated in Construction Productivity Roundtable and Housing Productivity and Innovation Roundtable

19 students
completed to date

Tobias Kramer and
Shabnam Lotfian
recognised for
research contributions

Homes NSW MMC Program researchers at Monash University awarded Monash University Vice Chancellor's Award for Excellence in Enterprising Research.

217

Masters level researchers worked with the CRC during FY24-25, bringing the total to 1,025 students to date

Training video on Industry 4.0 concepts created for Holmesglen students across the building curriculum

The Homes NSW MMC Program (Project #95) has emerged as the CRC's flagship project, reflecting both the resources and time allocated to it, and its broad relevance to so many aspects of Australian society and the home construction industry. It is delivering a tangible solution for the national housing shortage — a problem exacerbated by diminishing productivity, a lack of regulatory coherence, fragmentation and workforce capacity among other issues. By partnering with government, Project #95 demonstrates a path forward that is attainable through incremental adoption over time while addressing many of the other challenges concurrently.

The 80+ projects executed to date enable projects like #95 — providing a knowledge base and innovative solutions to address the challenges MMC housing development faces.

While the case study on the Homes NSW MMC Program illustrates the impact of this project, it is one of many 'jewels' that form the trove of excellent, world-leading research from the past year's endeavours.

PROF. CHRIS KNAPP, RESEARCH DIRECTOR, BUILDING 4.0 CRC

The CRC launched 9 projects during 2025. Cumulatively, we have launched 83 projects in our first 5 years, 55 of which are now completed (see opposite).

Several projects launched or continuing through 2025 focus on creating the building workforce of the future:

- **Project #66** recommended a new Bachelor degree (Bachelor of Digital Construction and Management). Holmesglen Institute formally submitted the request to the Tertiary Education Quality and Standards Agency in February 2025, with the degree anticipated to launch in semester 1 of 2026.
- **Project #102** is analysing how Modern Methods of Construction affect the construction workforce, identifying training and skill development needs.
- **Project #111** is creating a VET qualification framework for Modern Methods of Construction, to bridge gaps in skills and training for tradespeople and para-professionals.
- **Project #117** is developing a post-graduate qualification that offers advanced knowledge and practical application skills crucial for accelerating Australia's transition towards low-carbon, circular and more sustainable building practices.

Other projects are looking at ways to improve the operating environment for building in Australia:

- **Project #21** recommended a coordinated national approach to regulatory reform, involving streamlined certification, harmonised state regulations and modernised compliance pathways.
- **Project #49** is identifying the challenges and opportunities of emerging technologies in construction, their impacts on workplace practices and working conditions, and future training needs.
- **Project #80** explored the systemic, regulatory and cultural factors driving record insolvency rates across Australia's construction sector, and recommended practical steps to build long-term resilience.

Others still are demonstrating new technologies that can improve efficiency, productivity and sustainability:

- **Project #71** is automating the time-consuming and error-prone process of resolving clashes between structural and mechanical layouts using algorithmic BIM tools
- **Project #85** is exploring robotic brick laying
- **Project #86** is using 3D printing to enable concrete infrastructure without formwork
- **Project #100** is assessing the environmental performance and comfort of 3D printed housing.

B4.0CRC PROJECTS BY RESEARCH THEME

Digitalisation (n=27)

01 - e-Planning / e-Approvals Phase 1
 02 - Automated tracking of materials for improved supply chain logistics*
 04 - Computational Design & Optimisation Tools for Prefab Building Systems
 06 - Field data collation to support real-time operational management
 11 - Environmental Credentials for Building Technology Platforms*
 12 - VR/AR Technologies in Vocational Education / Training
 22 - Design Automation methods for Steel Framed Buildings Phase 1
 29 - Real-time EH&S Intervention to Improve Site Safety*
 31 - Demystifying Volumetric Construction: A Study of the Bathroom Pod
 33 - Remote Compliance Inspections*
 38 - Victorian Govt Digital Build
 42 - Workflow Automation Tools for Home Designs
 46 - Data analytics for structural fiber resources optimization*
 53 - Automated Design Optimisation and AI Tools for Prefab Systems
 57 - Wind Comfort Simulation and New Engineering Design Process
 LHP 01 - Monash Smart Manufacturing Precinct
 LHP 13 - Mixed Reality Construction Demonstration
 LHP 28 - Computer vision to measure productivity and enhance safety
 44 - Generative Architectural Design Engine
 49 - Implications of Industry 4.0 Technologies on Work Practices
 50 - Automated Cloud Based Residential Energy Estimations*
 55 - Towards Smart Contracts and Smart Finance in Construction Phase 1
 71 - Automated Decision-Making During Early-Stage Building Design
 85 - From Digital Design to Human Robot Collaborative Masonry Construction
 90 - Evaluating the Effectiveness of Roofing Work Inspection Using Drones*
 105 - Blockchain-Powered Peer-to-Peer Energy Trading
 112 - Flexible wet cores for volumetric housing construction

Industrialisation (n=20)

03 - Projects to Platforms
 08 - Prefab, Integrated Wall Systems - Scoping Study
 10 - Product Platform for Volumetric Building - Scoping Study
 17 - Implication of Industry 4.0 for the construction industry: smart prefab
 19 - Hybrid Timber-Steel Structural Systems for Mid to High Rise Buildings*
 20 - Systems & methods for robustness of mid-rise Light Gauge Steel buildings
 23 - Prefab: Barriers & opportunities in the Australian housing market
 24 - Robust and Fire-resilient Light Gauge Steel Systems for Mid-Rise Buildings
 25 - Framework of steel fabrication & processing in the OSM & prefabrication
 26 - New materials for windows of the future
 28 - Componentised Internal Wall Systems for multi residential applications
 34 - Acoustic flanking (Scoping Phase 1)
 41 - New Materials for Windows of the Future
 45 - Prefab Wall Integrated System Demonstration House & Market Study
 47 - Future Building Technologies and Solutions
 LHP 06 - Malvern East Apartment Development
 32 - Acoustic Flanking performance of mid-rise Light Gauge Steel (LGS)
 61 - Building Productivity – Product, Process, People
 95 - The Homes NSW MMC Program
 LHP 03 - Independent Living Lab (NCHA)

People, Practices & Culture (n=21)

02 - Auto tracking of materials for supply chain logistics and provenance*
 09 - Implementing DfMA & Lean Construction Principles
 15 - Resource optimisation Studies: Forest to Building
 21 - Regulatory Reform for Industrialised Building
 29 - Applying Artificial Intelligence for Safety on Construction Sites
 30 - Critical Path IMPACT through Productisation
 33 - Remote Compliance Inspections*
 40 - Business Model Innovation in the Building Industry
 56 - Training and Optimising CRC Research in Construction
 60 - Mass Timber Wellness
 65 - European Research Tour
 66 - Future of Construction Education
 80 - Insolvency in the Construction Industry
 93 - US Research Tour
 99 - Showcase 2024 Prototyping
 103 - ABCB Handbook for NCC compliance using MMC
 90 - Evaluating the Effectiveness of Roofing Work Inspection Using Drones*
 97 - SSAA Digital Platform Development
 102 - Skills and Training Implications of Modern Methods of Construction
 111 - VET Qualifications System and Training Framework for MMC
 117 - Graduate Certificate in Sustainable Building*

Sustainability (n=24)

05 - Automatic compliance and energy rating system
 11 - Environmental Credentials for Building Technology Platforms*
 18 - Long-span Low-Carbon Floor Systems (Scoping Study)
 19 - Hybrid Timber-Steel Structural Systems for Mid to High Rise Buildings*
 27 - Environmental Decision-Support for Structures
 35 - Prefab Housing Solutions for Bushfire & Disaster Relief
 36 - Academic validation of performance gap research in energy rating
 37 - Aust Timber Fibre Insulation Scoping Study
 46 - Data analytics for structural fibre resources optimisation*
 48 - Shared Interest Project: Circular Economy
 59 - Innovative Steel-Timber-Concrete Composite StrongFloor
 68 - Post and Plate CLT Scoping, Optimisation, and Testing
 70 - Building Circularity 4.0: First Steps to Adoption
 50 - Automated Cloud Based Residential Energy Estimations*
 58 - The Retrofit Housing Atlas: Adaptive Reuse of Housing in Australia
 76 - Thermally Active Floor Panels for Cost Effective Space Cooling
 84 - Feasibility Study of Recycling Excavated Clay Materials in Concrete
 86 - Sustainable 3D Printed Concrete for Bespoke Infrastructure
 100 - Aboriginal Housing Office 3D Printed Homes
 104 - High Rise Mass Timber Residence Through Post & Plate System
 106 - Retrofitting Reimagined: A Product-Service System Toolkit
 108 - Project Circle Design Phase
 110 - Circular Design Strategies for Future-Proofing Building Services
 117 - Graduate Certificate in Sustainable Building*

White - completed projects

Black - active projects

*project is listed across multiple themes

CASE STUDY

PROJECT #95: THE HOMES NSW
MMC PROGRAM

PROGRAM #: 2 | **DATE COMMENCED AND DURATION:** May 2024, 36 months

PROJECT LEADS: Professor Mathew Aitchison, Faith Halliday (Building 4.0 CRC)

PROJECT PARTIES: Homes NSW, Monash University, University of Melbourne

THE INDUSTRY PROBLEM

The traditional method of housing construction, largely unchanged for a century, is too slow and costly to meet growing demand.

The NSW Government aims to construct 8,400 new homes and repair 30,000 existing dwellings. To maximise the impact of the NSW Government's investment, Homes NSW and Building 4.0 CRC have developed the Modern Methods of Construction (MMC) Program.

THE SOLUTION

The MMC Program is a revolutionary approach to delivering social housing, leveraging modern manufacturing techniques and digitally enabled processes to create standardised building components offsite. These components are then assembled rapidly onsite, fundamentally shifting the traditional 80% onsite, 20% offsite construction model.

Rather than think about building site by site or project by project, the program encompasses a 360° view of housing: from design and development, through to construction, maintenance and repair. Starting with medium-density homes (4–6 storey buildings) and using the standardised kit-of-parts manufactured offsite, these parts will be assembled onsite, employing systems and processes to meet tenant needs, speed up delivery and unlock economic efficiencies.

The 'Kit-of-Parts' Approach

The Program uses a Kit-of-Parts methodology: a pre-defined suite of movable building components (e.g., bathrooms, kitchens, balconies, etc.) manufactured offsite and assembled onsite. This system allows for flexibility in design while improving build speed, quality and cost-efficiency. Not every part is made offsite; the system provides for around 20% of building works to enable every building to be 'fitted' to the specifics of its location. In the other 80%, every part is designed to fit together within a standardised assembly framework, forming homes that are adaptable yet easily repeatable.

How it works

- Homes are designed using a set of movable, interchangeable parts e.g., Clip-on balconies, double-glazed windows, preset wall dimensions etc.
- These parts are manufactured by multiple suppliers across the state using the same materials and processes, and from the same specifications.
- Standardisation ensures compatibility, interoperability and scalability.
- Parts are delivered to the building site and assembled according to the specific site conditions, environment and client design preferences.

Repeatable, scalable model for social housing delivery that addresses 3 critical areas:

1. Tenants, Land & Housing Types – We are identifying high-priority sites and tenant needs to inform a replicable design framework for medium-density housing (4–6 storey apartments). Our work includes site analysis and design-led urban principles to ensure buildings suit diverse communities, integrate into local environments, and align with Homes NSW's future pipeline.
2. Product, Supply Chain & Platform – This stream develops the backbone of the MMC Platform by defining products and components for standardisation to form the kit of parts and building a standardised design and assembly system. The team is working with suppliers to test this system, ensuring repeatability and scale is achievable, and developing benchmarking metrics to quantify and test outcomes. The primary goal is to achieve economic efficiencies while attaining the design standards and product requirements set by Homes NSW.
3. Change Management & Delivery Pathways – We are building a change framework to guide procurement, supply chain engagement and industry upskilling to scale. This includes engaging with stakeholders to inform all stages of the program, building a procurement process that is scalable and improves time and cost outcomes, and designing an education and training framework for upskilling on the new ways of building using MMC.



Homes NSW MMC Program Demonstrator Apartment

“Modular housing is already used across Europe and around the world, and now NSW is leading the way in Australia. This is our secret weapon to tackle the housing crisis, building faster, reducing waste and delivering the quality homes our state needs.”

HON. ROSE JACKSON MLC, MINISTER FOR HOUSING

WHAT'S NEXT

Homes NSW and Building 4.0 CRC demonstrated a fully built, two-bedroom apartment at a Showcase event at Mascot (NSW) in September 2025. Read the wrap up (pp 14–15).

CASE STUDY

PROJECT #100: IEQ MONITORING
OF ABORIGINAL HOUSING OFFICE
3D PRINTED HOUSES

PROGRAM #: 4 | **DATE COMMENCED AND DURATION:** July 2024, 18 months (duration of the evaluation activities)

PROJECT LEAD: Dr Sara Omrani

PROJECT PARTIES: NSW Aboriginal Housing Office, Blue IoT, Queensland University of Technology

THE INDUSTRY PROBLEM

The shortage of affordable and quality housing in Australia, particularly in regional, rural and remote communities, is exacerbated by slow and costly conventional construction methods.

Further, indoor environmental quality in Aboriginal housing remains significantly underrepresented in research and housing policy in Australia.

THE SOLUTION

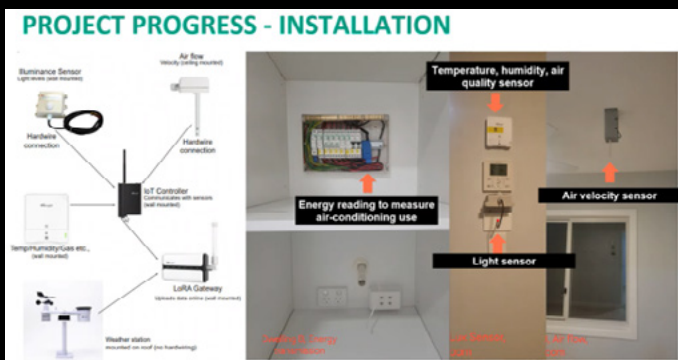
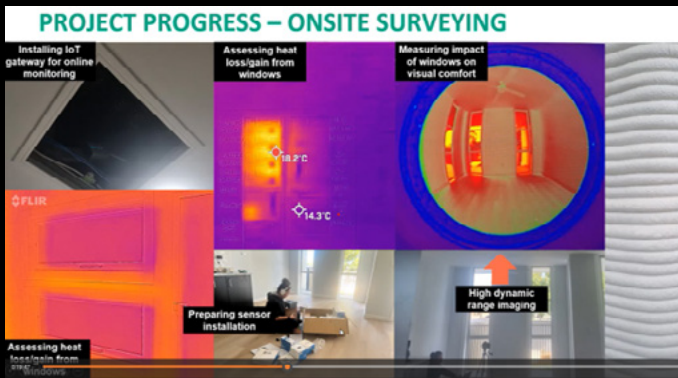
The NSW Aboriginal Housing Office (AHO) is piloting 3D printing technology to construct 2 townhouse units in Dubbo, NSW.

The project aims to test the effectiveness of 3D-printed houses in providing comfortable indoor environments by:

- Objectively evaluating the indoor environment quality (IEQ) in 2 pilot townhouses and 2 conventionally built homes using sensors to measure thermal environment, air quality, lighting environment and energy consumption (figure 2)
- Subjectively study the IEQ perceptions in focus groups
- Analyse the objective and subjective measures of IEQ in both cases
- Identify strengths and limitations in the IEQ performance to inform strategies for enhancing current and future 3D printed housing developments.

"Access to safe, affordable and culturally appropriate housing is fundamental to improving health, education and wellbeing for Aboriginal communities in regional and remote areas. Research into innovative construction methods offers a pathway to delivering these homes faster, more sustainably and in ways that reflect local needs."

NAEF QASSIS, ACTING DIRECTOR PROPERTY, NSW ABORIGINAL HOUSING OFFICE



Sensor installation and surveying

WHAT'S NEXT

The findings will provide the AHO with insights into the suitability of 3D-printed houses for larger-scale deployment, with the aim to provide improved housing options for Aboriginal communities across NSW.

Success for the project will:

- Accelerate uptake of new construction methods to deliver affordable and quality housing
- Demonstrate inclusive and collaborative research with Aboriginal communities in Dubbo about IEQ
- Lead to co-designed environmental strategies that meet the cultural needs of Aboriginal people for comfort and satisfaction
- Demonstrate the benefits and strengths of embedding cultural knowledge into the delivery of quality housing.



Homes NSW MMC Program Demonstrator Apartment

CASE STUDY

LIGHT HOUSE PROJECT #3:
NATIONAL CENTRE FOR HEALTHY
AGEING INDEPENDENT LIVING LAB**PROGRAM #:** 2 | **DATE COMMENCED AND DURATION:** March 2024, 21 months**PROJECT LEADS:** Dr Rachel Couper, Monash University**PROJECT PARTIES:** Fleetwood Australia, Monash University

THE INDUSTRY PROBLEM

Research shows the physical infrastructure of dwellings enhances healthy and active ageing, and can also ensure safe and timely discharge of older people from inpatient settings. Healthy ageing requires social interaction, physical activity, adaptable living spaces and capacity for assistive technologies and specialist interventions. This multidisciplinary approach relies on collaboration between architects, product designers, healthcare managers and providers (including occupational therapists, physiotherapists and medical professionals), community aged care providers (including nurses and personal care support workers), ambient assisted living and healthcare product manufacturers, and industry housing providers.

But, there is little research about how to bring these disciplines together to create new innovations in living environments for ageing.

"The Independent Living Lab is helping us understand how the built environment impacts the independence of older adults. It brings together older adults and their caregivers with innovative design, technology and adaptable spaces that will empower people to live well, safely and independently. Ageing in place is what most older Australians want. This research will help older people maintain their independence, wellbeing and social connections, reducing reliance on institutional care."

PROF. TERRY HAINES, NATIONAL CENTRE FOR HEALTH AGEING

THE SOLUTION

The National Centre for Health Ageing (NCHA) Independent Living Lab is a simulated home environment for multidisciplinary research, testing and demonstrating integrated spatial, assistive technology and care models for health living and ageing. The Independent Living Lab will provide the research infrastructure for testing, simulation and demonstration of integrated spatial and care models through the provision of a technology-enabled, adaptable and flexible domestic-scale environment.

Lighthouse Project #3 specifically focused on the design and construction of the NCHA Independent Living Lab, through key research streams:

1. Identify and articulate the future community health and aged care practices that the Lab needs to support through stakeholder engagement and co-design workshops.
2. Identify spatial and experiential qualities for the architecture that support the needs of those providing and receiving care, including options for changing how care can be delivered (e.g. creating technology-enabled environments that allow for remote care delivery rather than line-of-sight care delivery).
3. Undertake the design development of a simulated home environment that can act as a research hub, or independent living lab, for a team of multidisciplinary researchers across a broad range of integrated fields that cover in architecture, construction, housing and health.
4. Identify recommendations for the continued offsite manufacture and prefabrication of independent living labs, through analysis of lessons learned from the design, manufacturing and construction teams.

DISCUSSION AND RECOMMENDATIONS

The NCHA's Independent Living Lab demonstrates clear opportunities to inform both practice and policy, with implications spanning from individual quality of life to national healthcare strategies. The Lighthouse Project research team consists of an interdisciplinary group of highly experienced researchers from several research labs. This includes MADA Future Building Intuitive (FBI), who specialise in developing design-led, industrialised construction methodologies, researchers from MADA Design Health Collab and the Monash Urban Lab (MUL), each bringing a strong history of practice-led research, and experts from the School of Primary and Allied Health Care who bring expertise in occupational therapy and the design of environments for people with cognitive impairment or disability. The composition of the team highlights the need for interconnected cross-disciplinary solutions.

The research involved applying co-design principles to understand the client and user requirements of the Independent Living Lab. These requirements were then distilled into architectural and structural drawings and been prototyped to test their capacity to be integrated into industry partners' industrialised construction systems. This study thus provides a robust, evidence-based pathway for developing new models of living environments. Prototyping architectural prepositions for industrialised construction systems indicates a focus on solutions that can be mass-produced and widely adopted, potentially leading to more affordable and accessible healthy ageing environments across Australia. In essence, the Independent Living Lab Lighthouse Project is not only about designing a building; it's about fundamentally rethinking how we support healthy ageing in Australia, with a strong emphasis on user-centred design, technological innovation, and scalable, modular construction solutions that have the potential to deliver widespread individual and societal benefits.

Key findings from the Lighthouse Project highlight the importance of translating user requirements into architectural and structural solutions that can be effectively prototyped and integrated within offsite manufacturing systems. The evidence suggests that prioritising user needs, embedding evidence-based design and aligning outcomes with broader policy objectives, particularly in relation to housing and aging in place, can generate significant benefits for aged care, housing and healthcare infrastructure. Based on these insights, the project recommends that future initiatives adopt a similar user-driven, evidence-informed approach that strengthens the connection between design innovation, industrialised construction practice and policy development. Documenting and sharing these lessons will ensure their applicability in guiding future living lab construction projects and shaping system-wide improvements.



Artist visualisations of the Independent Living Lab

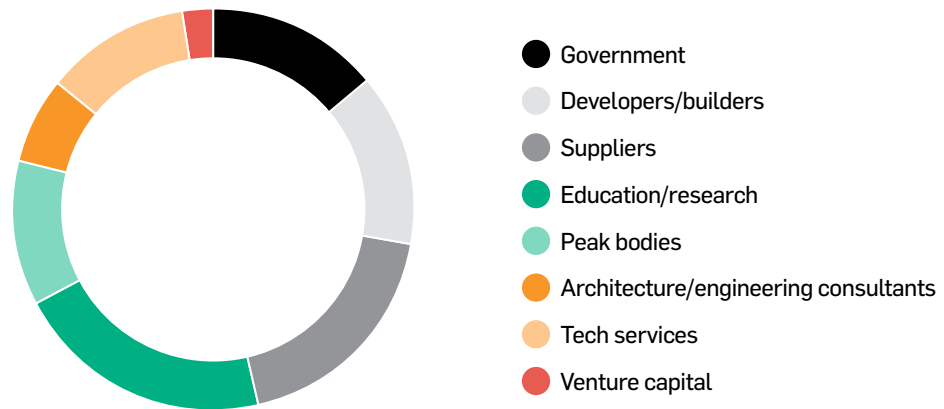
WHAT'S NEXT

The offsite construction of the Independent Living Lab is very close to completion and the modules are due to be transported and assembled onsite in October 2025. The next phase of the Lighthouse Project research involves the continued documentation and tracking of this process, through to practical completion and handover. In addition, the research will focus on capturing the perspectives of key stakeholders as the offsite manufacture and onsite assembly draws to completion.

These targeted interviews with designers, healthcare providers and industry partners will help to identify the most valuable lessons learnt from translating user requirements into architectural and structural drawings, and from prototyping these within industrialised construction systems. These conversations will generate deeper insights into how user needs (as consumers, practitioners and researchers) can be better prioritised, how evidence-based architectural solutions can be embedded in practice, and how outcomes can more effectively inform government policies in aged care, housing and healthcare infrastructure. Documenting and synthesising stakeholder input will provide a critical foundation for shaping future modular independent living lab projects and ensuring the transferability of learnings across both practice and policy domains.

COLLABORATION AND ENGAGEMENT

Building 4.0 CRC partners cover the building supply chain — both large and small companies, as well as State Government agencies and peak bodies.



New partners and SMEs (members of our Elevator Initiative) continue to expand our network of collaborators and influencers. During 2025, new partners ranged from tech start-ups to building systems providers, from national training providers to international engineering consultants:

- **Airmaster** – Project #106 (Retrofitting Reimagined: Enabling circular economy with a Product–Service System Toolkit)
- **Arup** – Project #106 (Retrofitting Reimagined: Enabling circular economy with a Product–Service System Toolkit)
- **BlueloT** – Project #100 (IEQ Monitoring of Aboriginal Housing Office 3D printed houses)
- **BuildSkills Australia** – Project #102 (Skills and training implications of Modern Methods of Construction: Across design, manufacture and assembly)
- **Cedar Pacific** – Project #104 (Development of a solution for high-rise mass timber residences through a Post & Plate system – Phase 2 Numerical and experimental investigation)
- **Lendlease Development** – Project #108 (Project Circle Design Phase 1)
- **Taphcore®** – Project #76 (Thermally active floor panels for cost effective space cooling)
- **Web3in Tech Lab** – Project #105 (Blockchain-powered peer-to-peer energy trading: Advancing sustainability and affordability in smart residential communities).

The Elevator Initiative continues to engage with SMEs that are passionate about transforming Australia's building sector. Members enjoy invitations to exclusive networking events and to collaborate on projects. To date, we have 37 members, representing a range of sectors.

Other key collaboration and engagement activities are described below.

True collaboration happens when industry, government and research come together with a shared purpose. This year, we've strengthened those partnerships, launching some of our most impactful research initiatives to date. Our engagement with State and Federal Governments has reinforced national support for modern construction approaches, while our projects continue to deliver practical outcomes that enhance productivity and sustainability across the sector.

CLAIRE O'LEARY, INDUSTRY LEAD, BUILDING 4.0 CRC



EXECUTIVE TEAM PRESENTATIONS AT CONFERENCES AND OTHER EVENTS, including

February 2025: CHIA NSW Conference, Prof. Chris Knapp, Adj. Prof. Daryl Patterson (Speakers)

February 2025: SCI-Arc Los Angeles Bush Fire Resilience Event, Prof. Mathew Aitchison, Prof. Mel Dodd (Speakers)

March 2025: ULI Debate on Modular Housing, Prof. Mathew Aitchison (Speaker)

April 2025: Property Council of Australia's National Housing Summit, Prof. Mathew Aitchison (Speaker)

April 2025: CHIA VIC Biennial Conference, Modern Methods of Construction for Social Housing, A/Prof. Duncan Maxwell (Speaker)

April 2025: Q Shelter Community of Practice, Prof. Chris Knapp (Speaker)

May 2025: Sydney Build Expo 2025, Prof. Mathew Aitchison, Prof. Chris Knapp (Speakers)

May 2025: 5th Annual Future of Construction Summit (FCON), Prof. Mathew Aitchison, Adj. Prof. Daryl Patterson (Speakers)

June 2025: CHIA NSW Community Housing 2025, Prof. Chris Knapp (Facilitator)

June 2025: Engineers Australia Prefabricated, Modular and Offsite Construction webinar, Fraser Paxton (Speaker)

July 2025: Construction Productivity Roundtable, Prof. Mathew Aitchison (Participant)

July 2025: Housing Productivity and Innovation Roundtable, Prof. Mathew Aitchison (Participant)

August 2025: 3rd Annual Affordable Housing Australasia, Prof. Tuan Ngo (Speaker)

August 2025: Offsite25, Adj. Prof. Daryl Patterson, Prof. Tuan Ngo (Speakers)

September 2025: Constructonomics, Prof. Chris Knapp (Speaker)

September 2025: Housing Now, Prof. Mathew Aitchison (Speaker)

October 2025: Melbourne Build Expo 2025, Prof. Tuan Ngo, A/Prof. Duncan Maxwell (Speakers)

November 2025: prefabAUS Member Workshop: System 600, Adj. Prof. Daryl Patterson, A/Prof. Dane Miller (Speakers)

November 2025: Parliamentary Friends of Housing, Prof. Mathew Aitchison (Panel Member)

November 2025: Modular Construction – Rethinking How We Design, Develop and Build! Prof. Chris Knapp (Speaker)

November 2025: MBA National Conference, Prof. Mathew Aitchison (Speaker)

THE FUTURE OF HOUSING

This showcase is about proving what's possible. By taking a full-scale demonstrator from concept to reality, we're showing government, industry and the community that Modern Methods of Construction can deliver quality homes faster, safer and at lower cost. Our research shows that systematising construction, through approaches like the System 600 kit-of-parts, can reduce waste, cut delivery times and give families access to homes that are modern, adaptable and built to last.

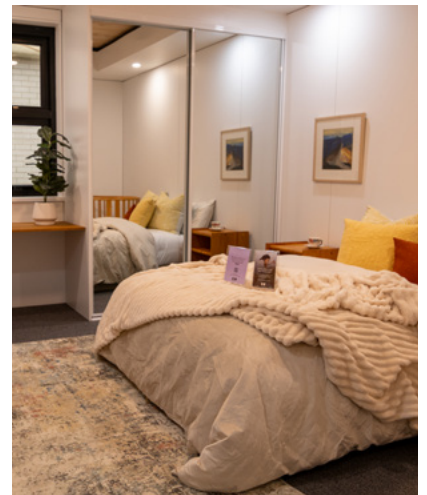
PROF. MATHEW AITCHISON, BUILDING 4.0 CRC

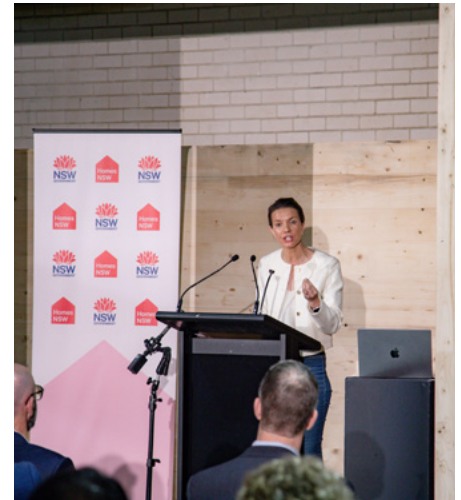
The Modern Methods of Construction (MMC) Showcase, jointly delivered by Homes NSW and Building 4.0 CRC, demonstrates how MMC can provide high-quality, scalable and sustainable housing more quickly and cost-effectively, with a strong focus on social and affordable housing.

At the heart of the Showcase is the two-bedroom Demonstrator Apartment.

Events throughout September and October attracted over 1,000 visitors:

- The launch (5 September), including special guests Hon. Dr Andrew Charlton MP (Federal Assistant Minister for Science, Technology and the Digital Economy), Hon. Rose Jackson MLC (NSW Minister for Housing, Minister for Homelessness, Minister for Mental Health, Minister for Youth, Minister for Water), Michael Wheatley (Homes NSW) and Yvonne Weldon AM
- The public Open Day (Friday 19 September), including Hon. Clare O'Neil MP (Federal Minister for Housing), Min. Jackson and Hon. Daniel Mookhey MLC (NSW Treasurer)
- A series of workshops with tailored content for specific industry groups:
 - Architects, Designers, Planners, Engineers
 - Builders, Suppliers, Certifiers, Regulators
 - Skills and Education providers
 - Community Housing Providers and other housing providers
- Private briefings for government and industry
- The Showcase Walk-Through (29 October), providing a final opportunity for people to see the Demonstrator before it is dismantled.





SUPPLIER HALL

The Showcase Supplier Hall showcased building suppliers who are helping make the future of building a reality.

- Xlam/Hyne
- Modscape
- Nexans
- Lipman
- Fastmount
- Basis
- XFrame
- Holmes Solution
- Sipform
- Arkit
- A.G. Coombs
- Simpson Strong-Tie
- SYNC
- Green Timber Tech (GTT)
- Rothoblaas
- Brother Nature
- TBS
- Multipanel
- NeXTimber



AND TOUR OF HOLMESGLEN SKILLS AND TRAINING CENTRE (March 2025)

Prof. Chris Knapp (Research Director, Building 4.0 CRC), Dr Robert Sobyra (Executive Director, Research and Planning, BuildSkills Australia), Dr Henry Pook (Director, Centre for Applied Research and Innovation Company, Holmesglen Institute), Russell Yarnton (A.G. Coombs) and Corrie Williams (Master Builders Victoria) discussed key skill gaps and showcased innovative solutions and groundbreaking initiatives shaping the workforce of tomorrow, with a special focus on the transition to Prefabricated Construction and Modern Methods of Construction (MMC). Sharing insights from CRC Projects #66, #95 and #111, speakers outlined how they are servicing the next generation of highly skilled and innovative building professionals and transforming the culture of construction.

Following the panel discussion, Liz Jansz (Dean, Building and Construction Faculty, Holmesglen Institute) conducted a tour of the Holmesglen Skills and Training Centre.





HOW GLOBAL CORPORATES ARE INVESTING IN CONSTRUCTION TECHNOLOGY WEBINAR (August 2025)

In conjunction with Building 4.0 CRC, leading construction technology funds Zacua Ventures and Superseed Ventures hosted a virtual panel discussion on how global corporates are approaching construction technology innovation and investing.

Vivin Hegde, the Founding Director of Hilti Group's Venture Office, and Chris Pattenden, the Managing Partner of the Reece Group's Venture Fund, shared their insights and experiences in corporate venture capital and the trends shaping construction technology.



MODERN METHODS OF CONSTRUCTION MASTERCLASS (October 2025)

This masterclass aimed to increase understanding of Modern Methods of Construction (MMC) across NSW Government departments. This interactive experience for senior NSW Government executives highlighted MMC's role in building quality homes faster and more cost effectively. Presenters — Prof. Mathew Aitchison, Prof. Jerker Lessing, A/Prof. Duncan Maxwell, A/Prof. Lee-Anne Khor and Prof. Chris Knapp — outlined:

- The state of building innovation in Australia and the opportunities and obstacles to MMC
- The ingredients of industrialised building
- International case studies, including the UK, the USA, Singapore, Hong Kong and Canada
- How MMC can be applied in NSW to achieve government priorities
- Regulation, Skills and Education that builds capacity to implement MMC
- Procurement and data that supports a robust pipeline of MMC infrastructure projects.



EDUCATION AND TRAINING

The Building 4.0 CRC PhD cohort fosters an environment of innovation, collaboration and impact on the future of the building and construction industry. These students work on real problems and build strong connections with researchers, industry experts and other students. In return, industry gets to connect with emerging leaders who will drive innovation and shape the sector in the years to come.

FRASER PAXTON, EDUCATION MANAGER, BUILDING 4.0 CRC



Fatheen Hisham studied at the Queensland University of Technology, investigating the fire resistance behaviour of light gauge steel framed truss floor-ceiling systems made of lipped channel joists. His research involved developing fire design guidelines that can help predict the fire resistance levels across a range of LSF floor-ceiling system configurations. He submitted his these in December 2024 and is a Fire Consultant with Bloom Fire Consulting.



Rozi Karimi studied at Monash University, exploring how social media cultural practices affect team feedback and whether it can improve team performance on construction sites. She submitted her thesis for assessment in March 2025 and is working at Monash University.



Shabnam Lotfian studied at the Queensland University of Technology, exploring how biomimetic design, computational design and robotic fabrication can revolutionise the way we create sustainable, high-performance architectural components. She submitted her thesis for assessment in May 2025 and is an Assistant Digital Innovation Consultant at Arup.

Another eight PhD students have completed their studies and joined the Building 4.0 CRC alumni. That brings the total number finished to 19, with another 27 continuing their studies.



Peyman Jafari studied at the University of Melbourne, developing an integrated property valuation method that considered the physical, geographical, environmental, socio-economic and legal factors that affect property valuation. He submitted his thesis in May 2025 and is a Research Fellow at the Centre for Spatial Data Infrastructures and Land Administration at the University of Melbourne.



Gihan Ranasinghe studied at the Queensland University of Technology, investigating the behaviour of light gauge steel framed (LSF) truss floor-ceiling systems. His research involved developing fire design guidelines that can help predict the fire resistance levels of LSF using experimental and numerical studies. He submitted his thesis in June 2025 and is a Research Fellow at QUT's Fire and Wind Engineering Lab.



Sajjad Eini-Zinab studied at the University of Melbourne, focusing on using augmented reality (AR) and mixed reality (MR) technologies for remote building site inspection, to improve accuracy, safety and timeliness. He submitted his thesis in July 2025 and is a Senior Geospatial Automation Specialist at Outline Global.



Fernando Pavez studied at Monash University, exploring collaboration strategies using social network analysis to design an effective collaboration process for circular construction business networks. He submitted his thesis for assessment in September 2025 and is working at Monash University.



Nazli Soltanmohammadlou studied at the Queensland University of Technology, investigating construction safety. Her research involved developing a socio-technical model to analyse the safety of plant and machinery using a system thinking approach. She submitted her thesis in December 2025 and is working at QUT.

IGNITING PHD RESEARCH

Building 4.0 CRC is offering two grants to the rising stars in our PhD cohort. The grants are open to all students in the Building 4.0 CRC PhD program, both current and graduated.

• 2 x \$10,000 PhD Innovation Seed Funding Grants

Each grant will support further development of a genuinely promising idea, project or opportunity that can extend the applicants' PhD research. The funding is for expenses such as lab testing, legal/IP support and prototype development. It cannot be used for general living expenses or PhD tuition-related expenses.

The successful candidate applicants will also receive mentoring support from an established venture capital or commercialisation entity.

Submissions close 15 December 2025, with successful applicants announced in February 2026. All work must be completed by December 2026 and will be presented at a CRC event in 2027.



CELEBRATING PHD EXCELLENCE

Two Building 4.0 CRC PhD alumni have been recognised for outstanding research and innovation.

Shabnam Lotfian received two prestigious prizes at the 2025 Australian Good Design Awards in October 2025.

Shabnam was recognised in both the Design Research and Concept Design categories for her groundbreaking work in robotic incremental sheet forming (RISF) for bio-inspired lightweight structures.

The Australian Good Design Awards, established in 1958, are Australia's highest international design accolade, celebrating projects that push the boundaries of innovation, sustainability and social impact. The jury described DIATOMA as a brilliant showcase of innovation and impact, demonstrating how nature, technology and material efficiency converge to create beautiful, high-performance free-form structures, challenging conventional design and fabrication approaches and shaping the future of sustainable construction.

Tobias Kramer received the QUT Outstanding Doctoral Thesis Award 2024, awarded in May 2025.

QUT's Outstanding Doctoral Thesis Awards are awarded to the top 5% of doctorate students, recognising outstanding contributions to knowledge and research excellence. Tobias received the award for his research on personal thermal comfort and creating a prediction tool that can be used in early design stages of buildings.

GOVERNANCE

Building 4.0 CRC has now completed its fifth year and the Board is firming up future transition arrangements. The Board is considering administrative procedures and a range of transition opportunities. This process will continue until the CRC's term ends in 2027.

THE BOARD



Dr Bronwyn
Evans AM
Chair



Prof. Mathew
Aitchison
CEO



Prof. Shane
Murray
Nominee
Director



Theodora
Elia-Adams
Independent
Director



Dr Steve
Gower
Independent
Director



Jan Bingley
Independent
Director



Prof. Ben
Rubenstein
Nominee
Director

The Executive Team

We welcomed the following new faces to the Executive Team in 2025:

- Paul Higgins (Engagement Advisor)
- Clare Gunning (Government Relations Advisor).

We farewelled the following people, and thank them for their contribution:

- Smaro Exelby (Engagement Lead)
- Kathy Mac Dermott (Engagement Advisor).



COMMUNICATIONS AND MEDIA

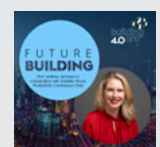
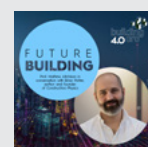
In 2025, Building 4.0 CRC finalised 67 publications:

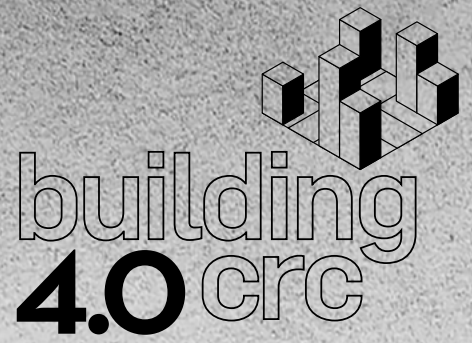
- 33 journal articles
- 10 conference papers
- 3 submissions to government inquiries
- 10 project final reports
- 6 podcasts
- 1 video
- 3 newsletters
- 1 corporate report.

CRC activities generated 98 media mentions throughout 2025 (up from 73 in 2024). Highlights include:

- SBS Dateline: Like IKEA but for houses: Could Sweden's housing revolution come to Australia?
- ABC Life Matters: Are modular homes the solution to Australia's housing shortage
- AFR: This home came in kit parts: Could it save 20pc on a new build?

The CRC has 5,675 followers on LinkedIn (compared with 4,469 in 2024).





2025

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