Better buildings and new efficiencies through technology and collaboration
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OVERVIEW

The building industry is central to our economy, contributing 13% of GDP and employing over 1.4 million Australians.* Unlike other sectors, it has failed to modernise and is plagued by rising costs and stagnating productivity. Through deep collaboration and new technologies of the 4th industrial age, Building 4.0 CRC will catapult the industry into an efficient, connected and customer-centric future. This will deliver better buildings at lower cost and the human capacity to lead this future industry.

OUTCOMES

COST—37.5% reduction in project costs through digital technology & off-site manufacturing
ENERGY—40% reduction in life cycle costs through high-performing, efficient buildings
TIME—40% reduction in project delays through integrated, live scheduling
SUSTAINABILITY—50% reduction in CO2 emissions for more sustainable buildings
WASTE—80% reduction in construction waste & re-work for higher productivity
EXPORTS—Up to 25% increase in the export of building products & construction services
BEST PRACTICE—Improved quality, customer satisfaction, safety & certainty
REGULATION—Improved policy & regulatory frameworks
COMMUNICATION—Connect industry with common protocols & interfaces, and shared data
CULTURE—Create an open, collaborative, innovative, inclusive & gender diverse industry
EDUCATION—Train 36 PhDs & 1000 Masters Students
JOBS & TRAINING—Create new high-skill jobs—training 7000 apprentices in new technologies

STATE OF PLAY

Construction and property have a major impact on the economy, environment and society. With the world’s urban areas increasing by 200,000 people per day, access to housing is critical. Importantly 30% of global greenhouse gas emissions are attributable to buildings.

For decades, building has been plagued by rising costs, stagnant productivity, high waste and low margins. These problems are compounded by the record demand for buildings of increasing complexity, higher performance standards, with increased customer expectations and sustainability requirements. The industry needs to meet these demands while finding new efficiencies to lower costs.

In Australia, evidence of the building sector’s shortcomings are found in the housing affordability crisis, several recent high-profile safety events, falling quality, skills shortages and the highly disproportionate levels of insolvency of the industry’s 345,000 SMEs.

Building has not kept pace with the rapid technological and organisational change of modern business and society, which has led other sectors to gains in productivity and customer satisfaction. Building’s core challenge remains the modernisation of a fragmented and adversarial industry, which has hitherto blocked the collective problem-solving approach required for change.

Australia’s existing high-cost, low-tech building sector is an ideal target for disruption. Building 4.0 CRC will prepare the industry for this event and place Australia among world-leaders in the field.

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The scale of global construction:

Valued at **US$10 trillion** per annum and accounting for **13% of global GDP**

With a projected growth rate of **3.6% per annum**, it is expected to reach **US$14 trillion by 2025**.

In Australia, construction accounts for:

**8.1% of GDP** — larger than mining (6.9%), manufacturing (6.0%) and agriculture (2.2%).

This share grows to **13%** if ‘construction’ expands to include property and real estate services.

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By taking a ‘whole-of-system’ approach, the Building 4.0 CRC aims to create an innovation ecosystem. This leverages the entire construction value chain to underpin the sector’s future prosperity and unlock opportunities for growth and productivity. This will lead to an increase in GDP share, growth in high value employment for Australians, a reduction in greenhouse gases and make better housing that is more liveable and affordable for Australians.
BUILDING 4.0 CRC | PROSPECTUS

ALIGNMENT WITH NATIONAL PRIORITIES AND GROWTH CENTRES

Building 4.0 CRC aims to develop an internationally competitive, dynamic and thriving Australian advanced manufacturing sector for building, in alignment with the Commonwealth Government’s national priorities and the Advanced Manufacturing Growth Centre’s (AMGC) objectives.

Further to the AMGC’s priorities all governments of the past decade have nominated housing affordability as a significant national challenge.

Recent experiences and research show that the market alone cannot address this problem.

The Building 4.0 CRC will contribute by providing innovative housing solutions which are affordable, comfortable and suitable for long-term tenure.

<table>
<thead>
<tr>
<th>AMCG Objectives</th>
<th>Building 4.0 CRC Contribution</th>
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<tbody>
<tr>
<td>Improve Competitiveness of Australian Manufacturing Industry</td>
<td>Australian industry will gain an early mover competitive advantage, realised in new products and intellectual property that will position Australia as a global leader.</td>
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<tr>
<td>Access to Global Supply Chains</td>
<td>Multi-national partners open doors to global opportunities and have a commitment to grow their Australian supply chain as new opportunities emerge.</td>
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<tr>
<td>Improved Managerial and Workforce Skills</td>
<td>A highly skilled digitally-oriented workforce is required for successful industrial transformation. The Building 4.0 Training Program has been designed with these critical needs to deliver.</td>
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<tr>
<td>Cooperation between Industry and Research Institutions</td>
<td>Providing much needed R&amp;D to a consortium of industry and research partners who have a demonstrated track record of collaboration and R&amp;D investment.</td>
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<tr>
<td>Reduction of Red Tape</td>
<td>Digital solutions based on cross enterprise protocols and standards will substantially remove red tape, blockages and inefficiencies.</td>
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<tr>
<td>Transformational Impact</td>
<td>Where competition and antagonism is currently the rule, the future industry will be collaborative, and share risk with increased transparency.</td>
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<tr>
<td>Market and Consumer Needs</td>
<td>The future building industry will put the consumer’s needs at the centre of the building experience.</td>
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<tr>
<td>Capacity / Capability Increase</td>
<td>The Building 4.0 CRC will grow the work force of the future, and up-skill the current workforce.</td>
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RESEARCH PROGRAMS

The Building 4.0 CRC’s research partners bring expertise in fields essential to the transformation of the construction industry. This expertise spans Architecture, Design, Planning, Construction, Engineering, Business, Information Technology, and Law. Well-known for their industry partnerships and expertise in applied research Building 4.0 CRC’s research partners will work with industry on collaborative ‘lighthouse’ projects.

Research programs, representing the three irreducible elements of the future building industry, will deliver: new products, services and businesses; new jobs and relationship; new systems, protocols and networks; and ultimately new buildings, precincts and ecologies.

PROGRAM 1
SECTORAL TRANSFORMATION
This program aims to develop new industry-wide culture, practices and standard protocols that will enable the transformation of the entire sector. This includes skills and training development, policy and regulations improvement, supply and value chain connection, and consumer and market engagement.

PROGRAM 2
DIGITAL TRANSFORMATION
This program will leverage the latest technologies, data science and AI in the development of new building processes and techniques. This will enable the application of IoT and smart field technologies such as AR/VR and robotics to optimise all phases of building delivery.

PROGRAM 3
BUILDING TRANSFORMATION
This program targets the improvement of building “hardware” and processes, and their interaction with the digital and sectoral programs. This aims at improving all aspects of the key building phases: development, design, production, assembly, operation, maintenance and end-of-life.

Research Outcomes
a. Products, Services and Businesses
b. Jobs, Engagement and Relationships
c. Systems, Protocols and Networks
d. Buildings, Precincts and Ecologies
Activities include...

- Training that addresses the existing lack of emphasis on the customer experience at all project stages from feasibility to handover
- Research to unlock the professional and trade ‘silos’ that fragment traditional construction’s value chain
- Facilitating dialog between all tiers of government and industry bodies to develop codes and regulations that are responsive to future building needs
- Defining skills training that responds to new technologies and advanced manufacturing processes and systems
- Investigate new procurement processes that are networked with responsive and smart modes of managing legal contracts
- Securing investment for continuous improvement and entrenching a collaborative mindset between business and research institutions
- Defining new business models that favour collaboration over competition, and use digital technologies to create a construction ‘ecosystem’
- Research and training that informs a new culture in construction focused on sustainability, advanced technology, and is diverse and inclusive
Activities include...

- Moving from ‘project’ focus to product platforms with high knowledge transfer
- Analysis and collection of data from building projects to generate clear metrics for benchmarking of building improvement
- Implementing new and appropriate technologies to inform design, construction, and occupant management
- Design and production automation, monitoring, and optimisation through data and applied technological solutions
- Digital connection of construction sites to provide live progress monitoring and feedback, with connection to the factories
- Tracking of building elements through the use of IoT tags and devices for streamlined supply chain management and building occupancy and performance monitoring
- Reducing the ‘tech-stack’ of construction through the elimination of stand-alone solutions
Activities include...

- Improving building operation and performance, including structural, material, acoustic, fire safety, thermal, energy consumption, health and well-being.
- Investigate new, cost-effective, high-performance building materials, systems and processes.
- Faster construction that reduces disruption to neighbouring sites and local infrastructure. Safer buildings and sites that reduce worker injury and fatalities.
- Innovative building design to create an enhanced and interactive customer experience and respond to changing customer demographics.
- Improved production and assembly techniques that leverage design for manufacturing and assembly, and advanced manufacturing processes.
- Development of IoT solutions for building management, sensors that provide reliable and real-time performance data.
- Development of strong and clear ecological sustainability targets that prioritise a zero impact built environment across the whole life-cycle.
- Elimination of harmful and toxic materials to create healthy buildings that prioritise the wellbeing of occupants.
VALUE PROPOSITION AND PARTNER BENEFITS

A 5X to 10X productivity boost can be achieved by the building industry if manufacturing principles are applied. Building 4.0 CRC’s principles aim to decrease waste, creating buildings that are faster, cheaper, smarter, and will capture new opportunities by facilitating collaborative work between stakeholders across the whole value chain in co-operation with government and research organisations. This collaborative structure enables partners to understand the value of new thinking and to integrate innovative practices in their work.

Building faces fierce competition for highly skilled tech talent from other sectors. The CRC will create pathways to future employees to develop new, tech-focused skills through a deep understanding of the industry’s needs and culture.

- Participation on ‘lighthouse’ projects as a safe testing ground for new partner relationships and ideas;
- Creating growth from new products, services and intellectual property;
- Conducting research and development in an integrated manner;
- Commercialisation bringing together expertise from multiple disciplines, collaborating in a single entity;
- Industry-focused R&D projects that leverage Commonwealth funding and expert researchers; and
- Providing access to new talent and development opportunities for staff.

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- Leverage investment from CRC partner contributions and the Commonwealth to conduct industry-focused research that makes an economic, social and environmental impact;
- Develop research capability in collaboration with other research and industry partners;
- Develop strong relationships with government and industry participants;
- Lead the development of approximately 12 Post Docs and 36 PhDs; and
- Work with industry and government partners to establish Australia as a leading hub for the advanced manufacturing of buildings.

- Reduction of project costs;
- Reduction of life cycle costs;
- Reduced construction delays;
- Reduced greenhouse gas emissions;
- Reduced construction waste;
- Increasing building material and construction services exports;
- Improved quality, customer satisfaction, safety & certainty;
- A more collaborative and inclusive culture; and
- New high-skill and high-value jobs with training in new technologies needed by industry.

- A stronger economy driven by improvements to productivity and competitiveness and increased exports and employment;
- An improved environment created by better designed buildings that deliver social and ecological outcomes;
- Provision of evidence and data that will define future policy settings for industry;
- Improved construction policy and regulatory frameworks; and
- More connected industry with common protocols & interfaces, through a foundational layer of deep data.

The building sector is the largest employer of Australians with more than 1.4 million jobs, and the training of 50,000 apprentices each year.\(^3\)

The sector is of vital importance to the nation’s social and economic outcomes. Industry experts are in strong agreement that sectoral change is both necessary and imminent. The Building 4.0 CRC will fulfill the key roles of both preparing and leading this sectoral change. The education and training strategy will address current skill shortages, demographic change from a retiring workforce, and new skills demanded by this digital age.

The CRC’s partners from industry, VET, universities and government will work together to understand training and education requirements for today’s jobs. These requirements will inform new skills that leverage evolving advanced technology for new jobs and career pathways. The CRC will establish industry-led programmes increasing partnerships between VET and universities. These partnerships will deliver the next generation of highly-skilled and innovative building professionals. This will increase the number of apprentices who continue to attain degrees ensuring that education aligns with skills shortages and that varied teaching approaches are practiced to encourage increased diversity to transform the culture of construction.

**The CRC will deliver:**

- **Industry-linked research and skills training**
  - 36 PhD Candidates
  - Educate 1,000 Masters Graduates
  - New Training for 7,000 Apprentices

- **Partnerships with key players in the sector**
  - Innovation Centres
  - Venture Capital and Private Equity Groups
  - Industry

- **Support an incubation to emerging businesses**
  - SMEs
  - Start Ups
  - Entrepreneurs

- **Development of new courses and live building projects**
  - Micro Courses for Industry
  - VET and University Courses
  - ‘Hands-On’ ‘Lighthouse’ Projects

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As a not-for-profit company, the Building 4.0 CRC will be limited by guarantee and governed by an independent board selected by the members of the CRC.

A Projects Advisory Committee, comprised of a mix of independent and participant members, will review research project proposals submitted by members, and provide recommendations to the board.

Project agreements will be documented prior to project commencement and will outline terms such as partners involved, investment, IP ownership and commercialisation rights, timing and milestones.

CRC participants will be grouped into three tiers based on levels of cash contribution. Each tier will have different rights commensurate with their level of contribution.

<table>
<thead>
<tr>
<th>Tier</th>
<th>Cash contribution (per annum)</th>
<th>Member of the CRC</th>
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<tbody>
<tr>
<td>Tier 1</td>
<td>At least $350,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Tier 2</td>
<td>At least $100,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Tier 3</td>
<td>At least $30,000</td>
<td>Yes</td>
</tr>
<tr>
<td>Affiliates</td>
<td>NA</td>
<td>No</td>
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</tbody>
</table>

Developing an Innovation Ecosystem

Universities

Research
(Pure & Basic Research)

Development
(Applied & Translational R&D)

Building 4.0 CRC

Community & User Feedback

Policy and Regulation

Industry Players

Commercialisation
Companies: Large & SMEs Capital: PE and VC

Community / Market

Application
End-Users of Innovation
KEY PARTNERS

WHAT IS A CRC

The Cooperative Research Centre (CRC) Programme is the peak funding initiative of the Australian Government for industry-focused R&D.

CRCs focus on medium to long-term industry-led collaborations to develop important new technologies, products and services and assist in driving the growth of new industries.

CRC terms are up to 10-years and are granted an average $4.5 million per annum in Commonwealth funding, deliver research, education and training activities.

More information can be found at: www.business.gov.au/assistance/cooperative-research-centres-programme
WHAT NEXT?

For more information visit www.building4pointzero.org

See overleaf for contact information.

Stage 1 Applications Closes
Jul 1 2019

Stage 1 Shortlisting
Sep 2019

Stage 2 Final Pitch and Application Submission
Oct/Nov 2019

Final Results Announced
Dec 2019

Project Begins
Jul 2020
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