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CHAPTER TWO

A SUSTAINABLE INDUSTRY R&D PROGRAM

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Abstract

The current global economic climate has focused the attention of construction practitioners on the benefits that applied research can deliver to their business. This paper draws on the history, achievements and lessons of the Australian CRC for Construction Innovation—the first national R&D and implementation centre servicing Australia’s built environment industry. It then explores the model of its planned successor - the Sustainable Built Environment Centre as industry, government and research stakeholders seek a stronger engagement in a more environmentally, socially and economically sustainable future.

1 Introduction

Australia faces major challenges to modernise the environmental, social and economic performance of its infrastructure and buildings to meet increasing demands for more sustainable communities. The nation’s built environment industry has entered a period of unprecedented challenge as it: maximises national returns from infrastructure investment and economic stimulus packages; seeks to reduce carbon pollution and adapt to climate change; and maintains competitive advantage during the global financial crisis and beyond. This industry contributes the greatest value-add to Australia’s GDP of any industry, making it the most
efficiency conduit for national economic growth. Government stimulus investments positioning the industry at the forefront of the nation’s recovery strategy must be used effectively, efficiently and sustainably to mitigate long-term underinvestment in national infrastructure. These challenges also increase pressure on the industry’s predominant small-to-medium sized enterprise (SME) base to improve traditionally poor innovation, safety and productivity rates and build new skills and business opportunities in the emerging sustainable built environment economy.

This paper is structured by first providing a background to the Australian built environment industry; followed by a brief examination of the need for applied research and education in this industry. Next, the evolution of Australia’s Cooperative Research Centre (CRC) for Construction Innovation into the Sustainable Built Environment Centre is described in terms of the existing and planned future centre activities and its partner expectations. The paper concludes by proposing a number of observations about a sustainable R&D program based on the Australian experience.

2 Background – Australian Built Environment Industry

The Australian built environment industry (incorporating property, planning, design, construction and facility management) employs around one million people through 365,000 businesses (82% of which are SMEs; ABS 2007), and earns $100 billion annually.

The built environment industry is one of Australia’s most important industries and an integral part of the national economy, contributing significantly to the rest of the Australian economy as an enabler. It is also a key contributor to Australia’s well-being and progress and has a major influence on every citizen. It provides the homes in which we live, the places where we work and play, our schools and hospitals, and the infrastructure essential for day-to-day living such as roads, hospitals, schools, water, electricity and telecommunications. The Australian Bureau of Statistics estimates that from an initial $1 million extra output in the construction sector alone, $2.9 million in output could be generated in the economy as a whole.

Yet there is an acknowledged underinvestment in national infrastructure as evidenced by recent analysis (Coombs and Roberts, 2007) contained in the Australian’s Government’s Budget Strategy and Outlook 2008-09. The average age of Australia’s public sector infrastructure has been rising since the 1970s, providing support for the view that Australia is approaching, or past, the point where much of the public infrastructure delivered in the 1950s and 1960s will need to be renewed or replaced. For example, in 1978 the average age of public infrastructure was 15 years and in 2006 this average age had risen to 20 years. A survey of a wide

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1 The construction industry has the highest number of SMEs compared to other industries. A small business is defined as employing less than 20 people. (ABS, 2007)
range of comparable countries indicates that while Australia is slightly above the OECD average in terms of the perceived ability to support economic activity, it is below the average of leading advanced economies, in part due to its aging infrastructure (World Economic Forum, 2007).

Traditionally, the building and construction industry has been characterised by a culture of being slow to research and innovate. The industry also has a notorious record of adversarial relationships and an identified need to improve its safety and productivity performance and respond more effectively to adapt to climate change. Today’s internationally competitive environment demands a smarter approach. The work of Australia’s CRC for Construction Innovation has addressed these challenges, lead cultural change and delivered real benefits to its partners, the industry and the Australian community. However this Centre’s charter of service will come to a close in 2009.

3 The Need for Applied Research in the Built Environment

The CRC for Construction Innovation was a key outcome of a partnership between the former Australian Government and industry in a collaborative effort that reviewed the challenges to industry competitiveness through the Building and Construction Industries Action Agenda (2000). The subsequent Action Agenda Evaluation Report highlights the winning of this CRC to service the Australian property, design, construction and facility management industry as an outstanding outcome comprising one of only four major outcomes, with the imperative that the CRC continue to service this critical industry. Prior to the formation of Construction Innovation, there was no national research and implementation centre engaging industry, government and universities across the nation. Since the Building and Construction Industries Action Agenda, a further two industry Action Agendas—the Facilities Management Action Agenda (2004) and the Built Environment Design Professions Action Agenda (2008) reinforced the industry’s need for a consolidated national applied research centre.

Independent of these Action Agendas, throughout 2003 and 2004, Construction Innovation facilitated a pioneering foresight exercise involving an extensive series of national industry workshops and interviews with industry leaders and key participants across the built environment supply chain. In this collaborative process with the major industry associations, industry’s views on the future challenges and required research were sought. The subsequent report, Construction 2020: A Vision for Australia’s Property and Construction Industry (Hampson and Brandon, 2004) highlighted the following Construction 2020 Visions for the industry’s future:

1. Environmentally sustainable construction
2. Better meeting client needs
3. Improved business environment
4. Welfare and improvement of the labour force
5. Information and communication technologies for construction
6. Virtual prototyping for design, manufacture and operation
7. Off-site manufacture
8. Improved process of manufacture of constructed products.

Blended with the identified needs of investing partners to the CRC for Construction Innovation, these visions strategically informed the development of the applied research focus of the Centre and served to secure a stronger and more comprehensive base of industry support. This Construction 2020 initiative and the extensive stakeholder engagement activities throughout the two-year process served to consolidate support from the industry associations, especially those forming the Australian Construction Industry Forum (ACIF), comprising 13 organisations representing almost 200,000 individuals across the industry supply chain. This broader and strategically important engagement was considered critical in the industry partnership central to creating a cultural change to embrace research and innovation.

Figure 1. The CRC for Construction Innovation

As an update to this process, Construction Innovation facilitated a fresh National Industry Stakeholder Forum in 2007, bringing 50 industry, government and research leaders together in Sydney. This Forum provided a mandate for Construction Innovation to develop a bid for the upcoming new CRC Program funding round with the triple bottom line research and implementation agenda based on environmental, social and economic sustainability.

On the basis of this affirmation of industry and government research user needs, Construction Innovation sought stakeholder investors across the supply chain and,
together with leading international research agencies as supporting research and innovation partners, developed a comprehensive national bid for the Sustainable Built Environment Centre, and submitted an application to the March 2009 funding round of the Australian Government’s CRC Program.

Coinciding with the industry momentum for this initiative, Australia’s Minister for Innovation, Industry, Science and Research, Senator Kim Carr, highlighted (18 March 2009) the need for Australian research groups to create cooperative networks of teams and individuals and to be active participants in the global knowledge economy and innovation system. One of the new Australian Government’s 10 ambitions for research and innovation was to double the level of collaboration between Australian businesses, universities and publicly funding research agencies over the next decade. In particular, Senator Carr promoted the need for forging partnerships with public sector researchers to achieve a 25% increase in the proportion of businesses engaging in innovation over the next decade, and the continuing increase in the number of businesses investing in R&D.

Against this backdrop, the global financial crisis has sharply increased pressure on governments as they implement reforms of planning, funding and regulating infrastructure and building construction internationally to counteract the global slowdown. In Australia the Federal Government is introducing a comprehensive national approach to the provision and delivery of infrastructure which has traditionally been the responsibility of the states. The Federal Government has made more efficient delivery of national infrastructure a critical element in its plan to stimulate business and protect jobs in the current global economic downturn.

4 Construction Innovation evolves to Sustainable Built Environment

Construction Innovation has led Australia’s built environment research and helped shape national industry development over the last eight years. During its term, the Centre has grown from 19 partners in 2001–02 to 27 in 2007–08 and doubled its initial partner investment. Its collaborative teams have delivered 70 research projects, and produced over 300 publications, including 25 books, 97 refereed journal articles, 215 refereed conference papers. In education and training, the Centre facilitated research into practice training to more than 10,000 individuals and supported 24 research higher degree graduates, including 18 PhD completions. Highlights of the research and implementation achievements of the CRC for Construction Innovation include the examples in the table below.
The newly developed Sustainable Built Environment Centre is a direct response to the urgent need articulated by industry and government\(^2\) for targeted sustainability solutions to address real industry challenges and to follow the national success of the CRC for Construction Innovation. Sustainable Built Environment plans to undertake key activities in sustainability, health and safety, productivity and procurement research and education to underpin the existing momentum for transforming industry culture.

\[\text{Figure 2. The Sustainable Built Environment CRC}\]

\(^2\) National Built Environment Industry Forum, Sydney, 3 December 2007
The Centre will bring together leading research teams and individuals across Australia and internationally. It will be a world-leading model for industry-ready R&D, providing the scientific foundations and supply chain collaborations to deliver key research and education outputs of national interest through five Programs and supported across three National Exemplar Projects as illustrated (Figure 2).

<table>
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<tr>
<th>Research Outputs</th>
<th>Utilisation</th>
<th>Benefits</th>
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<tr>
<td><strong>Your Building</strong> provides up-to-date online information on industry best practice in sustainable commercial building design and facility management.</td>
<td>Around 600 registered end-users include Asset Owners, Developers, Designers, Contractors and Facility Managers.</td>
<td>Your Building users have reported significant productivity improvements in using the industry best practice resources.</td>
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<td><strong>LCA Design</strong> is a software tool that can automatically calculate and chart the environmental impact of construction materials and building products.</td>
<td><strong>LCA Design</strong> has been trialled in the USA, Europe and Australia to optimise the environmental impact of commercial buildings at the design stage of their life cycle.</td>
<td><strong>LCA Design</strong> assists users to reduce greenhouse emissions, air and water pollution, and saves energy through its assessment of building designs.</td>
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<td><strong>The Sydney Opera House Facility Management Exemplar</strong> project showcased digital modelling technologies in one of the world’s busiest performing arts centres.</td>
<td>This project demonstrated that seven existing (and incompatible) IT systems could be consolidated to one 3D digital model, allowing greater security and cost-effective facility maintenance.</td>
<td>The benefit of this work has been valued at $78 million over 10 years in maintenance cost savings on the Sydney Opera House. This project has underpinned a national training program and won national and international industry awards.</td>
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<td>This <strong>Construction Safety Competency Framework</strong> was designed for safety managers and senior managers to more effectively deliver safety management programs nationally.</td>
<td>Training packages and learning tools are available to VET, industry and other training institutions, better equipping the industry to understand safety culture and improve the industry’s overall safety performance.</td>
<td><strong>Construction Innovation</strong> has created an unprecedented national alliance of industry, government and researchers committed to saving lives and preventing injuries on Australia’s construction sites, across state and territory jurisdictions.</td>
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The proposed Centre’s 36 participants include the nation’s peak industry associations and training groups to provide effective utilisation pathways to industry SMEs and ensure uptake of Centre outputs by end-users. The Centre’s
ability to drive improvements in industry’s sustainability performance will be achieved through reforming public policy, developing industry standards and promoting best practice for ecological modernisation. The Centre intends to coordinate a major cross-sector initiative to deliver global sustainability research outcomes and package them for Australian industry through an innovation exchange network with a particular emphasis on SMEs.

The new Centre’s research, education and utilisation strategies will deliver significant impacts including: increased performance of built assets, reduced greenhouse gas emissions, increased industry productivity, innovation, safety and skills development.

To showcase applied research outputs and facilitate knowledge exchange, the proposed Centre will focus a significant component of its research and development on three high profile capital works and property portfolio projects – in health, education and transport. The Western Australian Princess Margaret Children’s Hospital, Victorian Schools Plan, and Gold Coast Rapid Transit Project in Queensland will serve as National Exemplar Projects for the Centre and facilitate a research-in-action approach across Program activities. A number of smaller demonstrator projects across the country, including the Sydney Opera House and Queensland High Court Building, will also validate technologies and research findings in other real life settings.

5 Conclusions

Around the world, nations are grasping infrastructure and building renewal as well as grants and tax incentives to boost economic activity and maintain jobs. Additionally, the goal of improving productivity and strengthening industry to effectively deliver nation-building assets for long term economic prosperity requires a complementary investment in national research and education. The model of industry, government and research participants collaborating in applied research and education through a cooperative research centre is one such mechanism – and one that can provide long-term national benefits – raising the sea-level of industry performance to better deliver more sustainable communities.

Global market challenges, climate change, new technology and rising client expectations are stimulating a radical rethink of how the Australian built environment industry can be re-engineered to enhance its performance. The Australian CRC for Construction Innovation provides a leading model for change - working at the interface of industry, government and research at a national and international level. The value derived from the CRC initiative is significant—its partners derive value directly from the applied research outcomes, technology diffusion and leadership offered through participation in the CRC; industry benefits through broader technology diffusion and up-skilling especially through strategic activities with industry associations; and the community benefits from economic growth fuelled by innovation in an industry that is shown to be
influential in leading the economy in innovation-stimulated growth. The tripartite collaboration between industry, government and research is developing a robust national research and innovation capability delivering real value to its stakeholders.

The Australian built environment industry is on the cusp of a new era in realising the benefits of a close industry, government and research relationship for stronger national and international performance through improved innovation. The evolution sought for the Australian CRC for Construction Innovation into the Sustainable Built Environment Centre will test stakeholders in their resolve to provide a long term base for this initiative to deliver a more environmentally, socially and economically sustainable future.

6 References


Blake Dawson Waldron and Australian Constructors Association, Scope for Improvement, A Survey of Pressure Points in Australian Construction and Infrastructure Projects, Blake Dawson Waldron, Sydney, 2006

Brown, K; Hampson, KD and Brandon, PS, Clients Driving Construction Innovation - Mapping the Terrain, ISBN 0-9758047-1-5, Brisbane: CRC for Construction Innovation, 2005


Achieving World-class Safety in the Australian Building and Construction Industry, Canberra: Department of Employment and Workplace Relations, 2006


Gallaher, MP; O’Connor, AC; Dettbarn, Jr, JL and Gilday, LT, Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry, National Institute of Standards and Technology, Department of Commerce, Gaithersburg, USA, August 2004


Innovation Construction Research Centre, The University of Reading, Benchmarking International Construction Competitiveness, <http://www.icrc.reading.ac.uk>, 10 January 2004


World Economic Forum Global Competitiveness Report, 2007/08 (www.weforum.org/gcr)