

# CONSTRUCTION 2030

## A Roadmap for R&D Priorities for Australia's Built Environment

The property and construction industry is the foundation of the Australian economy and is responsible for the development, construction and maintenance of infrastructure that supports Australian society. Understanding the likely future landscape of this industry will be of strategic benefit to the industry future and our society.



**Sustainable  
Built Environment**  
National Research Centre

# Implementing visions of the future requires establishing robust priorities...



- areas that the construction industry must direct specific research action. This is necessary because of the potential future benefits and because these areas are unlikely to progress without construction industry attention.

This study refers to Australia's *built environment* – the physical infrastructure and buildings (e.g. roads, dams, health centres and commercial buildings) as well as how the built environment is conceived, designed, constructed and managed, including business and educational aspects.

In 2004, following extensive national consultation, the *Construction 2020* report was delivered by the Cooperative Research Centre (CRC) for Construction Innovation. It identified nine industry visions for future practice. The overall vision was that Australian industry would take more responsibility for leading and investing in R&D through tripartite industry, government and research collaboration. The need to build industry's capacity and ability to undertake robust and viable national research and innovation to deliver real value to property and construction businesses was also identified.

In 2012, the successor to the CRC for Construction Innovation – the Sustainable Built Environment National Research Centre (SBEnc), has progressed this industry development initiative to create the basis of an industry R&D roadmap establishing priorities that respond to likely industry futures. Earlier analysis has revealed significant growth in engagement between industry, government and researchers and described case studies of R&D in advanced ICT and procurement, safety and green buildings. The roadmap can shape decisions as to how to more profitably engage in research to secure business advantages.

## **Construction 2030 identifies:**

- areas that will need research for adaptation to local conditions or partnering with other industries to produce usable results for the Australian construction industry

## **Robust priorities need realistic assessments of future conditions...**

Visions for the future help provide a focus for industry when clarifying its investment priorities. However, aspirations must be cast within realistic assessments of the future conditions under which they will have to be achieved. The *Construction 2030* research team undertook this assessment to generate a map of key drivers of the large-scale social (macro-social) environment to which the industry may need to adjust.

The *what-if* map of key sectors of the Australian future landscape captures the greatest inherent uncertainties of the macro-social environment. The map includes a broad range of future applications of emergent trends relevant to the industry. The map was used to generate decision scenarios that covered combinations of likely future uncertainty settings including: climate change, skills, economy, attitudes, policies/governance, energy and technology. The scenarios were tested with industry representatives in a series of national workshops. Participants then selected the possible technology capabilities that best matched the scenario conditions.

## **Construction 2030 priorities**

The list of technology capabilities was subjected to expert review regarding the timing and likelihood that the technologies were to emerge. Some technologies may be expected to emerge from existing research in construction or in other industries, others will not emerge within a practical timeframe, if at all, unless the property and construction industry itself conducts the research.

Research that requires adaptation to local construction industry conditions or that requires partnering with other industries to produce usable results for construction has been identified.

Areas that are likely to be critical to the industry and which are not currently receiving sufficient research effort have also been identified. It will be necessary to strengthen existing research capacity and organisational relationships for industry-wide issues that do not respond to direct market forces.

All research areas must be continuously monitored for unplanned innovation and unexpected developments in the macro-social environment.



*“Energy transition will be a major driver of innovation.”*

*“Nanotechnology and cognitive technologies will transform the industry and our economy.”*

**Table 1: Summary of R&D priorities for Australia’s property and construction industry**

Research Area	Description	Industry need	Action focus
<b>1. Model-based facility lifecycle business models</b>	Model-based information technologies have the potential to facilitate profound changes in the way business is structured and value captured across the built environment life cycle. Enabling alternative business models will be crucial to commercialising critical technologies and solutions.	<ul style="list-style-type: none"> <li>• Key link between the capital asset and more effective asset delivery and management.</li> <li>• Collaborative processes supported by robust facility lifecycle management tools.</li> </ul>	<b>Conduct active research</b>
<b>2. Intelligent infrastructure and buildings</b>	Electronics, sensor and communication, analysis and network applications that improve the control, comfort, security, management and optimisation of infrastructure and buildings to improve occupant welfare and sustainability across the full lifecycle. Nano-scale sensors may be embedded in the structure itself.	<ul style="list-style-type: none"> <li>• To enhance control, automation, integration and communication of facility durability, performance and sustainability along entire property and construction value chain using long-life sensor systems.</li> <li>• To enable a longer view of investment and planning with reduced life cycle costs.</li> </ul>	<b>Conduct active research</b>
<b>3. Solutions for a more sustainable built environment</b>	Different types of solutions can make the built environment more sustainable – through concept, design, construction and ownership. To create incentives for their development and use, many of these solutions are dependent on novel systems, standards, tools, and financial and business models.	<ul style="list-style-type: none"> <li>• To adapt to changing business conditions including market and regulatory environment.</li> <li>• For greening the existing and future built environment and adapting to climate change.</li> </ul>	<b>Conduct active research</b>
<b>4. Information and communications technology (ICT) for radical redesign</b>	ICT is critical to facilitate improved conceptual and detailed design taking into account the need to disseminate information on and support new materials and trends, construction processes and asset management. Predictive tools and optimisation techniques for integrating product and process design at a single asset level to intermediate scales of urban or network level are required.	<ul style="list-style-type: none"> <li>• To respond to climate change at multiple levels of design – facility, precinct, and regional design.</li> <li>• To find new energy balances in the design of built environment systems brought about by changes to energy generation.</li> </ul>	<b>Conduct research for local conditions</b>
<b>5. Biotechnology for tree-based materials</b>	Considerable research is being conducted into materials, products and processes based on trees for structural and non-structural applications. These range from UV, moisture and decay resistance to increased insulating or conduction performance, through to new nano-cellulose–metal composite materials.	<ul style="list-style-type: none"> <li>• To respond to societal expectations, climate change and skills shortages.</li> <li>• Possibilities for new materials with customised properties and more effective processes such as modular construction.</li> </ul>	<b>Conduct research for local conditions</b>
<b>6. Educational curricula</b>	The need for lifelong learning, shifts in business models, advanced ICT and sustainability presents challenges and opportunities to curricula. This includes initial and continuing education in the technical, operational and management aspects of the industry.	<ul style="list-style-type: none"> <li>• For integrated teaching in the use of new approaches and technologies.</li> <li>• Stronger integration of research and teaching and customised career-long education.</li> </ul>	<b>Conduct research for local conditions</b>

**The Sustainable Built Environment National Research Centre (SBEncr)** is the successor to Australia's CRC for Construction Innovation. The SBEncr is a key research broker between industry, government and research organisations servicing the built environment.

The SBEncr is continuing to build an enduring value-adding national research and development centre in sustainable infrastructure and building with significant support from public and private partners around Australia and internationally.

Benefits from SBEncr activities are realised through national, industry and firm-level competitive advantages; market premiums through engagement in the collaborative research and development process; and early adoption of Centre outputs. The Centre integrates research across the economic, social and environmental sustainability areas in programs respectively titled Driving Productivity through Innovation, People, Processes and Performance, and Greening the Built Environment.

The Construction 2030 roadmap was completed by the Strategic Foresight team at Swinburne University of Technology and VTT Technical Research Centre of Finland. It forms a component of the SBEncr Project 2.7 *Leveraging R&D Investment for the Australian Built Environment* which seeks to maximise the benefits of R&D investment to Australia's infrastructure and building industry through improved understanding of historic investment mechanisms and impacts, and future industry research needs.

The full Construction 2030 report is available from the web: [www.sbenrc.com.au](http://www.sbenrc.com.au)

This research wouldn't be possible without the ongoing support of our industry, government and research partners:



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**PARSONS  
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*"Infrastructure and building construction can enable sustainability and drive social innovation"*



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