



SHAKY FOUNDATIONS

The construction industry has one of the lowest innovation rates of any industry in Australia. Over-regulation and a failure to grasp the efficiencies and opportunities afforded by technology are at the heart of the problem, according to Dr Keith Hampson, CEO of the CRC for Construction Innovation.

Australia's building and construction industry is in the grip of a resources-led boom. This has resulted in severe pressure on infrastructure delivery and impacted on the industry in other ways, through shortages of skilled staff and scarcity of materials.

A new Federal Government agency, Infrastructure Australia, has been established to develop a new, national approach to planning, funding and implementing the nation's infrastructure needs.

As a civil engineer and project manager who has worked in Australia and overseas, and as a committed educator and researcher in the property, design, construction and facilities management industry, I welcome the opportunity this approach presents.

Federation revisited

More than 100 years ago a poster was circulated in the colonies of Australia pleading for a 'yes' vote on Federation. Its sentiments are still relevant to the construction industry today:

"The vote...will determine whether we will continue as we are, a clutter of petty provinces, each waging a wasteful competition with the other by means of hostile tariffs...or whether we shall have the courage to accept the responsibility cast upon us by the heritage of this great continent." (circa 1898)

Unfortunately, a culture of petty, provincial competition still impedes productivity growth and innovation in our industry. It is a culture that must be addressed at both an industry and government level.

Infrastructure Australia will be a high priority vehicle for implementing national change. The agency has the charter to standardise tender processes and contract documentation between Commonwealth and state jurisdictions, together with project approval techniques, and will also streamline planning and approval processes by harmonising guidelines, legislation and regulation.

Over-regulation

At present, the construction industry is one of the most regulated industries in Australia. Research undertaken by the Cooperative Research Centre (CRC) for Construction Innovation – an alliance of 27 industry, government and research partners – has documented the types of costs exacted on construction projects, firms and industry by the current regulatory environment.

Costs associated with government regulations include direct costs, normally in the form of taxes, insurances, duties and fees. Additional indirect costs result from complying with these regulations.

However, in a fragmented federal system of government, such as that

which operates in Australia, costs can also be incurred through adaptation costs – that is, the costs incurred when firms attempt to work across jurisdictions. These costs involve:

- ✱ adapting documentation for different spheres of government;
- ✱ variations in outcomes occurring between spheres of government and sometimes within the same government agency; and
- ✱ delays and red tape preventing realisation of business opportunities.

Adaptation costs have been estimated by the Building Product Innovation Council (2003) as being up to A\$600 million per annum for building product manufacturers alone. Productivity gains from increased harmonisation of the regulatory system have been estimated in the hundreds of millions of dollars.

Lagging behind

While industry is historically suspicious of government, it should be noted that government does not hold the monopoly on “petty, provincial competition” that impedes industry productivity and innovation.

While there have been significant improvements, the construction industry still has one of the lowest innovation rates of any industry in Australia. It ranks third last across all Australian industries in terms of the proportion of business expenditure on innovation and second last in terms of the proportion of income generated from innovation.

The industry works to time-critical project deadlines and tends to stick with what it knows rather than risk introducing new practices. There is a lack of collaboration between those along the supply chain, resulting in a ‘silo’ mentality amongst those responsible for the design and delivery of buildings and infrastructure.

What IT revolution?

Essentially, the industry is yet to undergo the sort of IT revolution enjoyed by the banking and finance sector. According to the American Banking Association, the average cost for a full-service branch transaction is US\$1.07, compared to the US\$0.01 cost of an internet banking transaction – a 100-fold reduction.

Given that the property, design, construction and facility management industries account for 20% of Australia's GDP – not to mention the industry's strong multiplier linkages with other important industries, particularly transport and mining – it is staggering to consider what benefits a similar reduction in operating costs could achieve for our economy.

Holy grail

It is widely acknowledged that the ‘holy grail’ for engineers and architects is integrated electronic models that all the designers of the different elements of a building or facility can use. The model can then be used throughout the construction process and handed over to the client or facility manager.

This requires a common set of data, which can be accessed by the various disciplines along the supply chain – added to, then shared. Such technology already exists. Building Information Models (BIM), which operate with a common industry standard, can encompass all the information about a building – from 3D modelling, drawing and schedule production to the creation and management of information about a building.

According to cost analyses undertaken in the landmark United States National Institute of Standards and Technology (NIST) report (2004), incompatible data and information costs the US capital facilities close to US\$16 billion per annum. The cost to Australian industry is estimated at A\$1.2 billion.



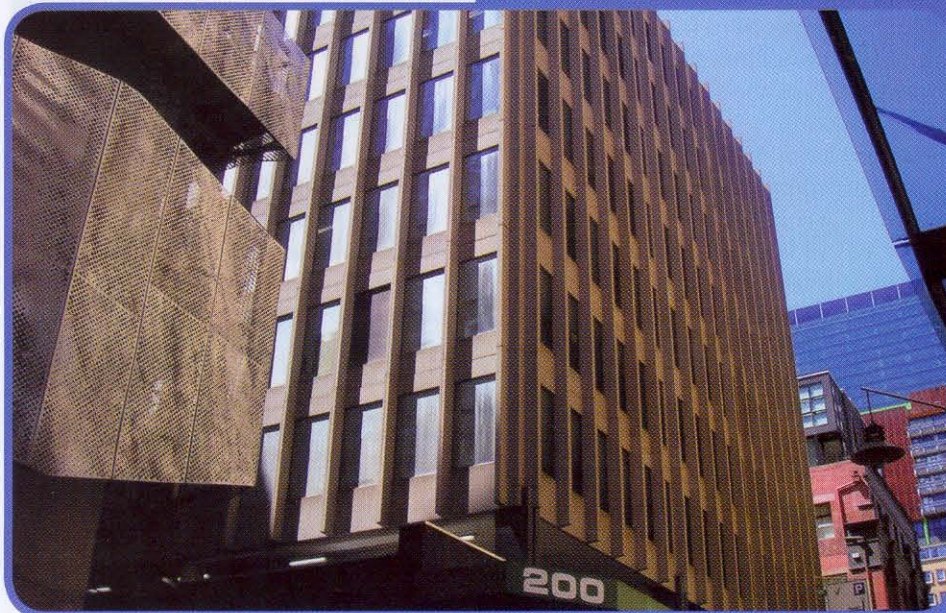
Dr Keith Hampson, CEO, CRC for Construction Innovation

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Digital-age design

For the first time, building designers will be able to minimise the environmental damage caused by construction materials and resource waste under a plan by the CRC for Construction Innovation to bring property design into the digital world.



LCADesign was used as part of the environmental impact assessment of Council House 1 in Melbourne

The initiative uses software to allow designers to develop an eco-profile of a building earmarked for construction or refurbishment. The profile will estimate the amount of greenhouse gases and carcinogens a building could generate over its entire life as well the resources it would consume for energy and water.

Designers will be able to use the information to electronically modify their creation to lessen its environmental impact.

Unlike today's manual assessments, which can take many weeks to complete and are often subjective, the technology – called Life Cycle Assessment (LCA) Design – can accurately complete an eco-profile within minutes.

"We are determined to harness the power of research and technology to help the construction industry become a part of the climate change solutions we so desperately need," says CRC Construction Innovation CEO, Dr Keith Hampson.

"Bringing building design out of the 20th century paper economy and into

the digital age will be a critical part of our plan to reduce the enormous impact buildings have on the natural environment."

A recent study, prepared on behalf of the Australian Built Environment Council (ASBEC) by the Centre for International Economics (CIE), showed that 23% of Australia's total greenhouse gas emissions were attributed to building use. Also, the World Business Council for Sustainable Development reports that in colder nations, buildings account for up to 40% of energy consumed and greenhouse gas emitted.

The initiative comes on top of the CRC for Construction Innovation's recently launched *Your Building* web portal, which uses social networking technology, similar to Wikipedia, to allow the industry to share important information about building sustainability.

LCADesign links building products, which have been plotted on a 3D Computer Aided Design (CAD), to a massive environmental impact database. Using internationally recognised indicators, designees are provided with an exact breakdown of the ecological damage their buildings could cause to human health and nature, enabling them to vary their designs accordingly.

Dr Hampson said LCADesign was trialled extensively in Australia, California, Holland and Germany and a license for commercial distribution and use had been granted to Ecquate, an AEC consultancy firm with representatives in Brisbane, Sydney, Melbourne and Hobart.

"With LCADesign, designers can not only measure the impact of greenhouse gases and water use but also estimate the environmental implications of raw material extraction, manufacturing, packaging, maintenance, transport, storage and disposal of building materials and products," Dr Hampson said.

"In one Melbourne trial, the technology was used to choose new wool carpet that neutralised the 35-year-old building's entire carbon footprint."

These costs arise from the multiple entry of data throughout the chain of the delivery process, rework, and the making-good of errors that have crept in through inaccurate transfer of information. “Wasteful competition” indeed!

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Government leadership

Governments are a significant source of business for Australian firms. They have capacity to support innovative firms and provide an early market for new products and processes. Rather than being responsible for wasteful duplication, government and other major clients can actually drive competition and industry innovation.

For example, the US General Services Administration’s (GSA) Public Building Service, which manages major projects totalling US\$10.5 billion annually, has established a policy of requiring BIM software with a common international open industry standard.

In Australia, such a key innovation driver has been left to market forces to determine, with the result that our industry has splintered its efforts along several proprietary vendor lines, preventing industry-wide uptake and investment. This presents a serious threat to the future competitiveness of our industry.

Attracting talent

It is also interesting to speculate how this lack of IT advancement and, in some cases, a dinosaur-like mentality, may impact on young people considering a career in the industry.

In reality, the type of culture change required to address the issues of streamlining the operating environment, as described above, will not be implemented simply by the stroke of a bureaucrat’s pen.

It is people who affect change – human beings working together across the interfaces of industry, government and research.

Working together, we have a unique opportunity to more effectively deliver sustainable buildings and infrastructure for the national interest and take a long-term leadership position in the development of world’s best practice.

Website: www.construction-innovation.info