

Cooperative Research Centre for Construction Innovation

Annual Report 2002-03



Established and supported under the Australian Government's Cooperative Research Centres Program



CRC Construction Innovation
BUILDING OUR FUTURE

construction innovationintention

Building our future.

Leaders in construction and property research.

*With 19 industry, government and research partners, the Cooperative Research Centre for **Construction Innovation** is well positioned to achieve its vision to lead the Australian property and construction industry in innovation and collaboration. Our vision takes us across Australia and around the globe.*

What we value:

*collaboration
respect for people
integrity
research excellence
innovation and sustainability
leadership responsibility*

The objectives of what we are doing. To

- *enhance the contribution of long term scientific and technological research and innovation to Australia's sustainable economic and social development*
- *enhance collaboration between researchers, industry and government, and to improve efficiency in the use of intellectual and research outcomes*
- *create and commercially exploit tools, technologies and management systems to deliver innovative and sustainable constructed assets to further the financial, environmental and social benefit to the construction industry and the community.*

The mission is broad and achievable. To

- *deliver tools, technologies and management systems that will improve the long term effectiveness, competitiveness and dynamics of a viable construction industry in the Australian and international contexts. This will be achieved through greater innovation in business processes, strengthened human relations and ethical practices, and more effective interactions between industry and its clients*
- *drive healthy and sustainable constructed assets and optimise the environmental impact of built facilities through sound conceptual basis for economic, social and environmental accounting of the built environment, virtual building technology to examine performance prior to documentation, construction and use and assessing human health and productivity benefits of smart indoor environments*
- *deliver project value for stakeholders for the whole-of-life, from business need, design and construction, through to ownership, asset management and reuse through improved communication and use of knowledge, increased productivity and value, effective delivery and management of whole-of-life assets.*

*The Cooperative Research Centre for **Construction Innovation** is a national collaboration involving 19 industry, government and research partners and has been made possible through a \$14 million Federal Government grant through the CRC Program complemented by \$50 million of cash and in-kind support from industry, research and other government partners. We are headquartered at Queensland University of Technology in Brisbane.*

Our start-up was in July 2001 with the help of 19 founding participants, including:



CRC's bring together researchers from universities, CSIRO and other government laboratories, and private industry or public sector agencies, in long-term collaborative arrangements which support research and development and education activities that achieve real outcomes of national economic and social significance.



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two construction innovation executive insight



*Introducing
John McCarthy*

John is recognised as one of the property and construction industry leaders. He has an intimate working relationship with major banks, superannuation funds, institutional investors, financiers and senior real estate professionals and property analysts, as well as the key industry bodies within the building and construction industry. Professional roles have included Director of Property Funds Management at Deutsche Bank and MD of Abigroup Asset Services. He is currently a Director of the Australian Building Codes Board after spending two years as Chair of the Australian Construction Industry Forum.

chairman's insights

The CRC for **Construction Innovation** has a clear vision to lead the Australian property and construction industry in collaboration and innovation.

Innovation in the property and construction industry presents a number of challenges. This past twelve months has seen a range of political, social and technical challenges to the industry including an Australian Government instigated Royal Commission, property value escalations throughout Australia's capital cities, a healthy property and construction economy, challenges in the labour force, and a drive to more sustainable constructed assets delivered in a manner that provides enhanced value to facility owners and operators. Construction Innovation is well-poised to deliver benefits to our industry that address current and future challenges.

An important event in this reporting period has been the confirmation of our International Construction Research Alliance (ICALL), bringing together leading international applied research and development organisations servicing property and construction. As Chairman I was honoured to have represented Construction Innovation in February 2003 at the International Conference titled *Revaluing Construction* in Manchester, UK. This provided an invaluable platform to highlight the formation, and the early successes of our CRC to a senior international audience.

The challenges that the Australian property and construction industry face have been well addressed by the consolidation of Construction Innovation and in refining our initiatives for the future. This past year has seen a consolidation of management systems, in the staffing and in the accommodation for the research and administration staff at National Headquarters at Queensland University of Technology in Brisbane. It has also been a period of refinement of the research program to ensure a sharper, more industry-focused

approach to delivering outcomes of real industry benefit.

Importantly, a highly consultative process was successful in delivering a Strategic Plan that involved all stakeholders including those from Project, Program, Research Committee and Board throughout a period from July 2002 through to March 2003. This important document has focused the attention of stakeholders on our challenges and goals for the future. The Strategic Plan development also formed a major component of our successful second Annual Retreat. The Annual Retreat focused on building bonds across industry, government and researchers, so that the understanding and respect across our three types of partners became more solidified, and the Strategic Plan development was advanced to the stage of Governing Board signoff. The Annual Retreat forms an important part of our senior level activities for the future.

The Governing Board of our CRC has continued to deliver excellent results with committed and informed decision making from all Directors. This CRC is fortunate to have a highly competent and motivated Governing Board.

I look forward to continuing my close working relationship with our Chief Executive Officer in Dr Keith Hampson, and the highly committed and professional staff of Construction Innovation and its stakeholders. 2003-04 promises to be a most exciting and rewarding year.



chief executive officer finding the balance

This past year has been characterised by increasing collaboration and support from across our extensive partner network. The CRC for **Construction Innovation** currently has secured commitment from 230 individuals across five major Australian cities, equating to in excess of 50 equivalent full-time staff. This extensive network of contribution has provided this CRC with the impetus for sturdy growth and developing strength in practical outcomes.

We have restructured our research activities into three core programs: Business and Industry Development; Sustainable Built Assets, and Delivery and Management of Built Assets. Each of these integrated programs is underpinned by an advanced Information and Communication Technology (ICT) platform. Importantly, the leadership of each program and platform comprises a research director and a senior industry leader to ensure the industry relevance of the research activity and application of outcomes.

A number of research projects are nearing completion with encouraging signs of excellent results. One of the major deliverables from our research program includes *LCADesign*; an integrated eco-efficiency assessment tool for commercial buildings to capture an important share of CAD-based initiatives for future green building design. Additionally, an extensive research effort in integrating electronic information flows is nearing completion with the ability of automating CAD quantity calculations to assist design and cost management consultants in up-front design estimates. Another project will provide a web-based decision support tool that will provide guidance to clients and project managers in selecting project delivery methodologies and reviewing lessons learned on previous projects.

Two projects have successfully completed in the reporting period, including *Sustainability and the Building Code of Australia* and *Creating a Benchmarking Service for the Australian Construction Industry*. By the close of this reporting period, we have 28 current projects with a further six to complete this next 6 months. Looking forward, the extension of our research to highly visible national demonstrator projects will reinforce the practical application and value of our research activities.

Education and training is an important emerging aspect of Construction Innovation's activities given the imminent completion of a number of our larger projects. The Governing Board has recently approved the Education and Training strategy, whereby this CRC will provide informed content to our partner network and to other education providers, particularly through our strong relationship with the Australian Construction Industry Forum network. Education and Training activities will be enhanced by the recent appointment of our first Education and Training Officer.

Commercialisation and Technology Transfer is a key opportunity for our developing role in up-skilling staff in our partner network and the property and construction industry generally. We have recently appointed a part-time Technology Transfer Officer to assist in the practical dissemination of our research outcomes. Again, we will seek to complement existing industry providers from our partner and associate network.

External communication has been a key focus for our CRC this past 12 months. We have ended the year with a strong record of industry magazine, newspaper and radio coverage, and the first completed Construction Innovation book for sale to the industry and the community. Effective communication of this CRC's activities amongst our partner and industry network will be a priority for the future. Continued targeting of key media outlets will remain a focus in communicating the strengths and innovative practices of our partners, and Construction Innovation's leadership of the Australian property and construction industry.

An important successful initiative in February 2003 was the signing of the International Construction Research Alliance (ICALL) at the Stanford Centre in Berlin. This three-year partnership is between Construction Innovation and four other leading international applied research and development institutions servicing property and construction – including Stanford University in the United States, VTT in Finland, CSTB in France and The University of Salford in the United Kingdom. I confidently predict ICALL will deliver significant benefits for our CRC in the future across collaborative research projects, joint international conferences and workshops, international student and researcher exchange, and in joint promotion and networking.

We are embarking on a process of strengthened engagement with industry through our *Construction 2020* initiative. This project will workshop the future vision of the Australian property and construction industry throughout the nation, and will position the future of Construction Innovation as an integral driver to growth through applied research in this vital industry. This initiative will also integrally support our Education, Technology Transfer and External Communication activities across the nation.

I am confident that our highly committed staff is well-equipped for future challenges in the next phase of our growth in delivering benefits to industry through applied research, education and training, and technology transfer. Our Governing Board and Research Committee continue to provide strong and rigorous leadership, and with the on-going support of our partners, I look forward to further demonstrating the value of our CRC to our partners, our industry and our community in the year to come.



We introduce
Keith Hampson

Keith is committed to building a more internationally competitive Australian property and construction industry by developing applied technology and management systems and promoting better education and innovative practices. As CEO of the CRC for Construction Innovation he has responsibility for crafting a blend of commercial and public good outcomes on behalf of the Centre's industry, government and research partners. Keith's career has spanned these three sectors, where he has developed a reputation as an energetic leader with a strong blend of technical and management skills and formal qualifications gained through international experience and scholarship.

three construction innovationstructure and management

The 19 partners involved in the CRC for **Construction Innovation** in 2001–02 continued their involvement for the duration of 2002–03. They are Arup Australasia, Australian Building Codes Board, Bovis Lend Lease, Building Commission, CSIRO, DEM, John Holland, Kennards Hire, Queensland Department of Main Roads, Queensland Department of Public Works, Queensland Department of State Development, Queensland University of Technology, Rider Hunt, Royal Melbourne Institute of Technology, Springfield Land Corporation, University of Newcastle, University of Sydney, University of Western Sydney, and Woods Bagot, all of whom are leading players servicing the Australian property and construction industry.

Organisation and Management

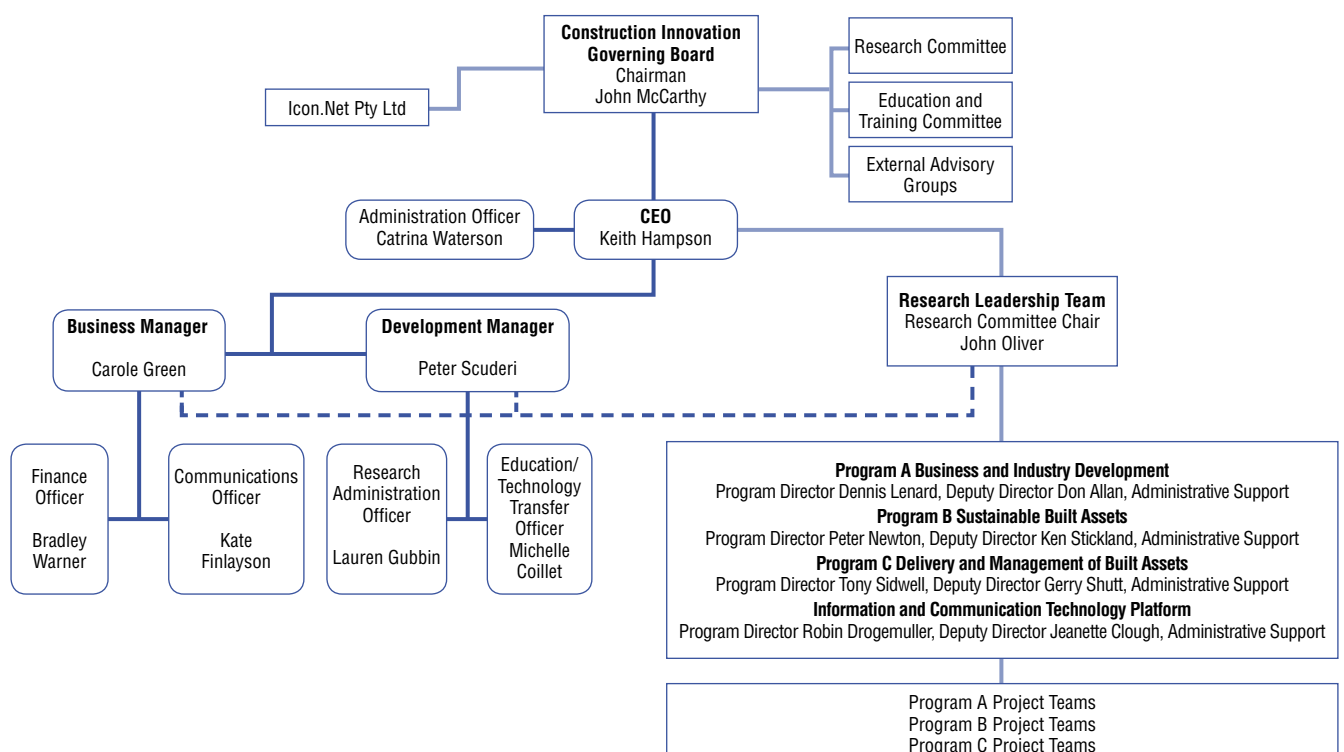
CRC for **Construction Innovation** is an unincorporated joint venture governed by a Board comprising ten representatives from the 19 CRC Participants and an independent Chair. Icon.Net Pty Ltd has been established to hold all CRC intellectual property. It acts as a trustee on behalf of Construction Innovation Participants. The Chair of the Governing Board also chairs meetings of the directors of Icon.Net Pty Ltd.

The Governing Board has been supported throughout this year by the work of the Research Committee on the management of the Research Program. Currently, an Education and Training Committee is being established, as well as an External Advisory Group focusing on Technology Transfer.

Leading Construction Innovation is Dr Keith Hampson in the role of CEO. He is assisted in the Senior Management Team by Carole Green, Business Manager and Peter Scuderi, Development Manager. The Senior Management Team is supported by the Research Leadership Team which consists of the Chair, the Research Committee, three Program and three Deputy Program Directors, and an ICT Platform Director and Deputy. The Research Leadership Team meets fortnightly with the CEO, Business Manager and Development Manager in relation to the Research Program.

Five additional positions located in our headquarters support the activities of Construction Innovation. They are Administration Officer (Catrina Waterson), Finance Officer (Bradley Warner), Communications Officer (Kate Finlayson), Research Officer (Lauren Gubbin), and Education/Technology Transfer Officer (Michelle Coillet).

CRC for Construction Innovation Organisation Structure





governingboard

CRC for **Construction Innovation's** Governing Board met four times in 2002–03 at locations in Sydney, Brisbane, Melbourne and Canberra. The Governing Board is responsible for determining Construction Innovation policy on all matters relating to its objectives and activities and for ensuring these are carried out in accordance with the provisions of the Commonwealth and Centre Agreements.

John McCarthy has continued to chair the Governing Board. Changes to Board membership during the year include Glenn Palin replacing Richard Barton on Richard's retirement from John Holland; John Gough replacing David Gardiner due to a change in position within Queensland University of Technology; and Gary Moore replacing Simon Carlile from the commencement of the year at the request of the University of Sydney. The three Queensland State Government representatives continue to rotate their attendance at Board meetings whereby at any one meeting there are two in attendance.

Our Board members bring a wealth of experience and industry contacts to Construction Innovation.

Governing Board Chair, John McCarthy

John McCarthy is immediate past Chair of the Australian Construction Industry Forum (ACIF), Director of the Australian Building Codes Board and Director of the Association of Consulting Engineers, Australia (ACEA). Professional roles have included Director of Property Funds Management at Deutsche Bank and MD of Abigroup Asset Services. John attended 4 Construction Innovation Board Meetings throughout 2002-03.



David Singleton is a Director of Arup Group Ltd, a member of the Global Board and Chairman of the Australasia Division with responsibilities for the Arup businesses in Australia, New Zealand, Papua New Guinea, Singapore and Indonesia. He is a Fellow of the Institution of Engineers, Australia, is Immediate Past President of the Association of Consulting Engineers Australia, and is the Chair of the Australian Construction Industry Forum and of the National Engineering Registration Board. He is a Director of the Cooperative Research Centre for Construction Innovation. David attended 3 Construction Innovation Board Meetings 2002-03, with an alternate director attending 1 meeting in his place.



Glenn Palin holds the position of General Manager, Northern Region and as a Director of John Holland Pty Ltd is responsible for all John Holland's building and engineering projects throughout Queensland and the Northern Territory. Glenn attended 1 Construction Innovation Board Meeting in 2002-03.



Chung-Tong Wu was appointed to the position of Deputy Vice-Chancellor, Development and International at the University of Western Sydney in April 2002. A specialist in regional development planning, he has extensive research and professional involvement with international planning projects, especially in China, Indonesia, Malaysia, Taiwan and Vietnam. Tong took up his Board position in early 2003-04.



Rod Wissler's professional background is in the Arts and Arts Education. Since joining QUT his work has focused on research and postgraduate studies. His current portfolio covers international marketing and protocol, the QUT International College, Research and Commercialisation, Fundraising and Alumni, Community Service, Creative Industries Sector and the Gardens Point Cultural Precinct. Rod formally took up his Board position in early 2003-04.



three governingboard



Keith Farr is Executive Director of Building Division, Queensland Department of Public Works, and is responsible for building and built environment research, policy and advice, and the provision and management of government accommodation. Keith has worked to establish and enhance strong links with the building construction and real estate industries to foster innovation and industry improvement. Keith attended 2 Construction Innovation Board Meetings 2002-03.



Mike Hefferan is the Executive Director of Industry Development Queensland, Department of State Development, and is responsible for government involvement in and support for Queensland industry, both in existing mainstream and new, high growth sectors. He is Director of several companies and on the Board of three Cooperative Research Centres and several inter-government groups in Industry Development and Applied Research. Mike attended 1 Construction Innovation Board Meeting in 2002-03.



Dennis Wogan is Executive Director of Capability and Delivery Division in the Queensland Department of Main Roads. His current area of responsibility covers the enhancement of the department's technical capability through its programs in R&D, technical training and technical knowledge transfer. He also has a key responsibility for improving the Department's works delivery policies and systems including its contractual and prequalification systems for contractors and consultants, and works in close association with road construction industry bodies. Dennis attended 3 Construction Innovation Board Meetings throughout 2002-03.



John Oliver is Chairman for Australia, New Zealand and Singapore for the Rider Hunt Group. He has held an executive role in a professional cost consultancy practice since 1975 and has experience in every major facet of the profession. John's skills lie in a hands-on approach bringing his experience in contractual and cost planning matters together to provide risk averse strategies. John attended 3 Construction Innovation Board Meetings in 2002-03.



Gary Moore holds the Foundation Chair of Environment-Behaviour Studies as well as being Dean of Architecture at The University of Sydney. Before coming to Australia, he was Director of the Wisconsin Space Grant Consortium. He is the immediate past president of the Association of Architecture Schools of Australasia, and Chair of the Council of Deans of Architecture and the Built Environment. Gary attended 3 Construction Innovation Board Meetings during 2002-03.



Neil Furlong is Pro-Vice Chancellor, Research and Innovation, with RMIT University. He is a Senior Fellow with the School of Chemistry, University of Melbourne; Editor, Asia and Australasia – Colloids and Surfaces A (Elsevier) – since 1995; Fellow – International Union of Pure and Applied Chemistry; Honorary Secretary – Australian Academy of Technological Sciences and Engineering; and Convenor of Australia/Japan Collaborative Exchange Program in "Surface and Colloid Chemistry (since 1987). Neil attended 3 Construction Innovation Board Meetings 2002-03, with an alternate director attending 1 meeting in his place.



Larry Little has participated in industry groups including the Construction Industry Development Agency, the Joint Building Standards Policy Board and the International Council for Building Research Studies and Documentation (CIB). He is currently the Chief of CSIRO Manufacturing and Infrastructure Technology. Larry attended 2 Construction Innovation Board Meetings 2002-03, with an alternate director attending 1 meeting in his place.



Gavin Stubbs is currently General Manager, Queensland and Northern Territory for Bovis Lend Lease Pty. Ltd (BLL). He has also been responsible for national BLL business units and has worked internationally. He has significant experience in senior property roles in Project Management, Design and Construction across many industry sectors and markets. Gavin attended 2 Construction Innovation Board Meetings 2002-03, with an alternate director attending 1 meeting in his place.

Richard Barton previously held the positions of General Manager (Queensland) and Executive Director of John Holland Pty Ltd. In this role, he was responsible for all activities of John Holland Pty Ltd in Queensland. Prior to this appointment, he held positions including Manager Civil Engineering Division, Manager Building Division, Design and Construction Manager for Building Division and Project Manager or Construction Manager on numerous Building, Civil and Heavy Engineering projects. Richard attended 2 Construction Innovation Board Meetings 2002-03, with an alternate director attending 1 meeting in his place.



David Gardiner is Deputy Vice-Chancellor (Academic) of Queensland University of Technology. He oversees the eight faculties and QUT Carseldine at QUT. He also chairs the University's Teaching and Learning Committee, and is responsible for oversight of academic policies and programs and the Oodgeroo Unit. He attended no Construction Innovation Board Meetings 2002-03, but had an alternate director attend 2 meetings in his place.



John Gough is Professor of Computer Science and Dean of the Faculty of Information Technology at Queensland University of Technology. He has served on various industry and government committees, and is a board member of Software Engineering Australia, Queensland. Before moving to Information Technology, John worked in Nuclear Science for ten years. John attended 1 Construction Innovation Board Meeting throughout 2002-03, with an alternate director attending 1 meeting in his place.



Keith Hampson is CEO of the CRC for Construction Innovation and has responsibility for crafting a blend of commercial and public good outcomes on behalf of the Centre's industry, government and research partners. Keith's career has spanned these three sectors, where he has developed a reputation as an energetic leader with a strong blend of technical and management skills and formal qualifications gained through international experience and scholarship. Keith attended 4 Construction Innovation Board Meetings in 2002-03.



Carole Green is Business Manager with CRC for Construction Innovation and is responsible for the overall financial, contractual, reporting, promotional and human resource management of Construction Innovation and is Secretary to the Governing Board. Carole attended 4 Construction Innovation Board Meetings 2002-03.



Icon.Netpty Ltd

Icon.Net Pty Ltd has a primary role in holding the CRC for **Construction Innovation's** intellectual property. As there is limited Centre Intellectual Property to date, in its three meetings over 2002-03 Icon.Net has focused on developing the necessary procedures and protocols to allow this to happen effectively.

Company Officers are:	No. of meetings attended	No. attended by alternates
John McCarthy – Chair	2	1
Gavin Stubbs, Bovis Lend Lease	2	1
Richard Barton, John Holland	2	
Glenn Palin, John Holland	1	
David Gardiner, QUT	0	2
John Gough, QUT	0	1
David Singleton, Arup	1	2
Neil Furlong, RMIT	2	
Debbie Bullock, Company Secretary	3	

three researchcommittee



The Research Committee met four times during 2002-03 and continues to be effectively chaired by John Oliver, Managing Director of Rider Hunt, Sydney. As of 1 January 2003, the Research Committee was restructured to align with the revised structure of the Research Program implemented 1 January 2003 providing a more focused industry-driven approach. At this time all Program Directors, Deputy Program Directors, the ICT Platform Director and Deputy ICT Platform Director joined the committee.

The Research Committee plays an active and essential role in advising the Board on research policy, strategy and planning. It monitors, reviews and evaluates the implementation and outcomes of the Research Management Plan, the Research Budget and research policies and procedures; reviews research programs and research reports in light of the Research Management Plan and Research Budget; and provides recommendations to the Board on the establishment, continuation or termination of research projects.

researchcommittee members

Research Committee Chair, John Oliver



John is currently Managing Director of Rider Hunt, Sydney. He has held an executive role in a professional cost consultancy practice since 1975 and has experience in every major facet of the profession working on projects with the smallest of budgets through to those in the hundreds of millions. His experience covers projects within the major cities of Australia, isolated civil projects and those overseas. He has lectured in cost planning and economics to graduate and post graduate courses and provided expert witness advice in legal disputes. John's skills lie in a hands-on approach bringing his experience in contractual and cost planning matters together to provide risk adverse strategies.

Program and Platform Directors

Dennis Lenard
Director, Centre for
Infrastructure and Property
University of Newcastle



Peter Newton
Science Director, Chief
Research Scientist
CSIRO



Tony Sidwell
Head, School of Construction
Management and Property
Queensland University of
Technology



Robin Drogemuller
Project Leader
CSIRO



Deputy Program and Platform Directors

Don Allan
Director, Industry Policy
Queensland Department of
Public Works



Ken Stickland
National Leader, Building
Services
Arup Australasia



Gerry Shutt
Manager, Knowledge
Management
John Holland



Jeanette Clough
IT Manager
Rider Hunt Melbourne



Secretary

Peter Scuderi
Development Manager
CRC for Construction
Innovation



Mary Lou Maher
Professor of Design
Computing
University of Sydney



Headquarter Staff

Keith Hampson
CEO
CRC for Construction
Innovation



John Spathonis
Principal Manager
(Research & Development)
Queensland Department of
Main Roads



Carole Green
Business Manager
CRC for Construction
Innovation



Richard Hough
Principal
Arup Australasia



Other Committee Members

Brian Ashe
Manager – Research
Australian Building Codes
Board



Arun Kumar
Associate Dean (Research
& Development), Professor
of Highway Engineering
Royal Melbourne Institute
of Technology



Dale Gilbert
Director – Built
Environment Research Unit
Queensland Department of
Public Works



Jeff Norton
Director, Policy Services
Building Commission,
Victoria
(finished role February
2003)



Graham Miller
Associate Professor, Head
of School, Construction,
Property and Planning
University of Western
Sydney



Peter Nassau
Director, Building Quality
Building Commission,
Victoria
(began role February 2003)

Research Leadership Team

*The Research
Leadership Team
consists of:*

Program A Business and Industry Development

*Program Director:
Dennis Lenard*

*Deputy Director:
Don Allan*

Program B Sustainable Built Assets

*Program Director:
Peter Newton*

*Deputy Director:
Ken Stickland*

Program C Delivery and Management of Built Assets

*Program Director:
Tony Sidwell*

*Deputy Director:
Gerry Shutt*

Information and Communication Technology Platform

*Platform Director:
Robin Drogemuller*

*Deputy Director:
Jeanette Clough*

*With the
restructuring of the
Research Program
from 1 January
2003, the Research
Leadership Team
meets fortnightly
with the CEO,
Business Manager
and Development
Manager. This has
proved to be an
extremely useful
mechanism for
enhancing the
management and
administration of the
Research Program
and ensuring the
blend of researcher
and research user
perspectives are
integrated across the
research programs.*



Centre Visitor

Professor Vernon Ireland continued to be the CRC for **Construction Innovation's** Centre Visitor throughout 2002-03. Professor Ireland is Director of Project Management and Industry Programs, Education Centre for Innovation and Commercialisation, The University of Adelaide and has attended Research Committee and Board meetings providing valuable input into the management and operations of Construction Innovation. Professor Ireland was involved in the CRC's First Year Visit and will be a key participant in our upcoming Second Year Review.

four construction innovationcooperative links

*Cooperative linkages ensure the relevance of CRC for **Construction Innovation** activities to the broader community both here in Australia and internationally.*

Within Australia we are strengthening our formal linkages with the Australian Construction Industry Forum (ACIF), and in this next period will be hosting an ACIF Board Meeting in Brisbane. We value the access that the ACIF membership provides to the industry associations, the professional associations, the constructors and the manufacturers encompassed within the ACIF grouping. ACIF is already a partner in Construction Innovation research and this relationship will strengthen through extended engagement in education/technology transfer activity this next period.

Importantly, plans are currently being developed for the broader industry to be engaged in a formal initiative in the future to ensure the community benefits of Construction Innovation are well communicated and valued.

Internal Linkages

Internal communication within the CRC for **Construction Innovation** is a critical activity that has warranted serious effort on behalf of our key managers. We have 230 individuals contributing to Construction Innovation across Australia, particularly centred in Brisbane, Sydney, Melbourne, Newcastle and Canberra. The coordination of this number of individuals spread across 19 organisations has meant we have a significant task in providing consistency of information and ensuring that our communication provides value for individuals for the organisations represented and for Construction Innovation as an entity.

We have a series of structured and unstructured approaches to our internal linkages. These include the production and dissemination of a bi-monthly newsletter to partner members on Construction Innovation activities and projects, and regular contact with partner communications personnel and stakeholders.

We convene Research Program workshops across each developing research proposal to ensure research users and research providers are attuned to each others needs and capabilities.

The Research Committee comprises representation from industry, government and research partners and provides recommendations about research proposals which are passed before the Board. The Research Committee is also a collaborative mechanism to ensure internal linkages are developed, whereby industry, government and research partners come together to make strategic decisions on behalf of Construction Innovation. Construction Innovation places a high value on the ongoing relationships developed through our Annual Retreat and through our upcoming Research Conference – intended to be an annual event. Both of these collaborative strategies strengthen internal linkages, in particular within the research teams across Australia.

On a formal level, the opportunity for engagement of researchers with research users is not only encouraged in each project but is a Construction Innovation central initiative across all research, education and training and technology transfer programs. Every research project requires at least two industry and two research partners to participate to ensure collaboration and to strengthen industry relevance.

In addition, an Executive Report Card process has been instigated whereby each partner organisation to Construction Innovation receives an annual update of our progress including where each organisation is positioned in Construction Innovation's activities and projects. The Executive Report Card process includes extensive follow-up evaluative meetings and has highlighted each participant's unique expectations from the CRC relationship. It has also reinforced the strength of commitment in playing a key role in leading the Australian property and construction industry.

The feedback has been consistently positive and has also provided us with the opportunity to continue honing our approach to delivering specific partner, industry and community benefits.

Joint promotion of the practical outcomes from targeted research activity to a national and international audience remains a focus for all partners.

Promotion is enhanced by Construction Innovation's use of partner logos, a trademark of their respective organisations.

External Linkages

The Australian Construction Industry Forum (ACIF) is a key to the future of the CRC for **Construction Innovation** and its meshing with the industry associations and industry generally. This CRC grew out of early valuable support from ACIF amongst others, and will consolidate its relationship in this next year through a number of initiatives, with opportunities in education and training, technology transfer, and further engagement in Construction Innovation's applied research efforts. Construction Innovation has also enjoyed an historic link to ACIF through its current Chair being a former Chair of ACIF and one of our private sector Board members being the current chair of the ACIF Board. Construction Innovation has also worked closely with ACIF in the development of membership of that group to strengthen the unified approach to industry development for the future.

Construction Innovation has enjoyed early support from Construction Training Queensland and Construction Training Australia, and in this next period will work closely with these organisations in providing a conduit for dissemination of research outcomes and technology transfer.

On a number of Construction Innovation's research projects we have strengthened the project and provided a clearer path for technology transfer through clearing third parties to be participants to the agreement. Third parties include Environment Australia on some of our environment activities, ACIF on our competitiveness and innovation work, the tele-technology company "B-Site" for our IT activities, and also Construction Training Queensland and Queensland Department of Housing on our Integrated Sustainable Housing Development project. We appreciate the input from these external organisations who add value and reach to our research, education and technology transfer activities.

Other CRC's

The early development of relationships between other CRC's including Micro-technology, DSTC, Innovative Wood, Coastal Zone, and two new CRC's: Interaction Design and Integrated Engineering Asset Management are being explored for more substantial opportunities for shared research and education activities.

Internationally



CRC for **Construction Innovation** is collaborating with world leaders in construction research and development with the collective aim of creating world best practice in international construction and property management via the launch of the International Construction Research Alliance (ICALL) on 25th February 2003 in Berlin, Germany. It is envisaged ICALL will contribute to Australia's economic growth and will ensure that international leaders collaborate with Australia in the property and construction research and development arena.

The 5 foundation members of ICALL include:

- Centre for Facilities Management (CFM), Research Institute for the Built and Human Environment, The University of Salford, UK;
- Centre for Integrated Facilitated Engineering (CIFE), Stanford University, USA;
- Centre Scientifique et Technique du Bâtiment (CSTB), France;
- Cooperative Research Centre for Construction Innovation, Australia; and
- VTT Building and Transport, Finland.

ICALL's signed agreement centres on four initiatives:

- **Collaborative Research Projects** – developing, collaborating and benchmarking research projects across national boundaries for domestic and international benefit, including undertaking joint research within the fields of Business and Industry Development, Sustainable Built Assets, and Delivery and Management of Built Assets. The use of advanced Information and Communication Technologies underpins each of these three areas.
- **Corporate Activities** – increasing global understanding and sharing of knowledge and aspirations. It is planned that Australia's CRC for Construction Innovation will host the first ICALL international conference scheduled for November 2004, highlighting the role clients can play in driving innovation in the property and construction industry.
- **Researcher and Student Exchange** – ICALL will provide opportunities for students, researchers and key international professionals to gain and share experiences with partner research centres in member countries. Researchers will also have the opportunity to work with leading researchers throughout Europe, Scandinavia and the United States, and Australia will benefit from a source of International Visitors.
- **Promotion and Networking** – ICALL will promote itself as a collaborative leadership network to the international community, highlighting their ability to provide applied research and development capabilities at an international level.

CONSTRUCTION CRC IN INTERNATIONAL ALLIANCE
The Cooperative Research Centre for Construction Innovation (CRC CI) has become a founding member of an international organisation, the International Construction Research Alliance (ICALL) formed recently with the aim of creating world best practice in international construction and property management.
ICALL will develop, initiate and benchmark joint research projects in the fields of business and industry development, sustainable built assets, and delivery and management of built assets.
Other members of ICALL include the Centre for Integrated Facilitated Engineering (CIFE), Stanford University, USA; Centre Scientifique et Technique du Bâtiment (CSTB), France; VTT Building and Transport, Finland; and Centre for Facilities Management (CFM), Research Institute for the Built and Human Environment, University of Salford, UK.
CRC CI will host the first ICALL conference scheduled for 2004, highlighting the role clients can play in driving innovation in the property and construction industry.
For further information Dr Keith Hampson, on Tel: (07) 3864 1393 enquiries@construction-innovation.info.

*Australian R&D Review,
1 April 2003 p16.*

International Visitors

To ensure international relevance of our research activity and to leverage from key international experts, CRC for **Construction Innovation** sponsored two significant visits from United Kingdom academic and industry research leaders throughout 2002-03.

Professor Peter Brandon, Pro-Vice Chancellor of Research from The University of Salford in Manchester, UK, visited Construction Innovation 11 June – 29 August 2002. During this time Professor Brandon complemented the activities of a number of research teams, provided valuable input to the Research Committee and Board, and assisted in the strategic positioning of Construction Innovation. Additionally Professor Brandon met for a series of one-to-one meetings with industry and government participants to provide an up-to-date view of UK-based research assessment initiatives in the areas of applied industry research servicing the property and construction industry.

Professor John Bennett from the University of Reading, UK, contributed to Construction Innovation throughout September, October and November 2002. Professor Bennett's expertise and his applied industry publications have provided valuable input to up-skilling the UK and global construction industries. His experience and ability to distil research results and provide focused "industry speak" has aided the uptake of research outcomes and provided Construction Innovation with a series of articles in industry and trade press throughout 2002-03.

It is expected that both Professor Brandon and Professor Bennett will have ongoing roles in the internationalisation of Construction Innovation's activities for the future.



*Introducing
Peter Brandon*

five construction innovationexploring new realities through research

The early development of the CRC for **Construction Innovation**, through the bid stage and into the first round of project funding, supported a range of projects based on the previous five-tiered program structure. This structure was refined to the current three level program structure through a period of extensive consultations throughout 2002, culminating in the following:

Program A Business Industry Development

Program B Sustainable Built Assets

Program C Delivery and Management of Built Assets

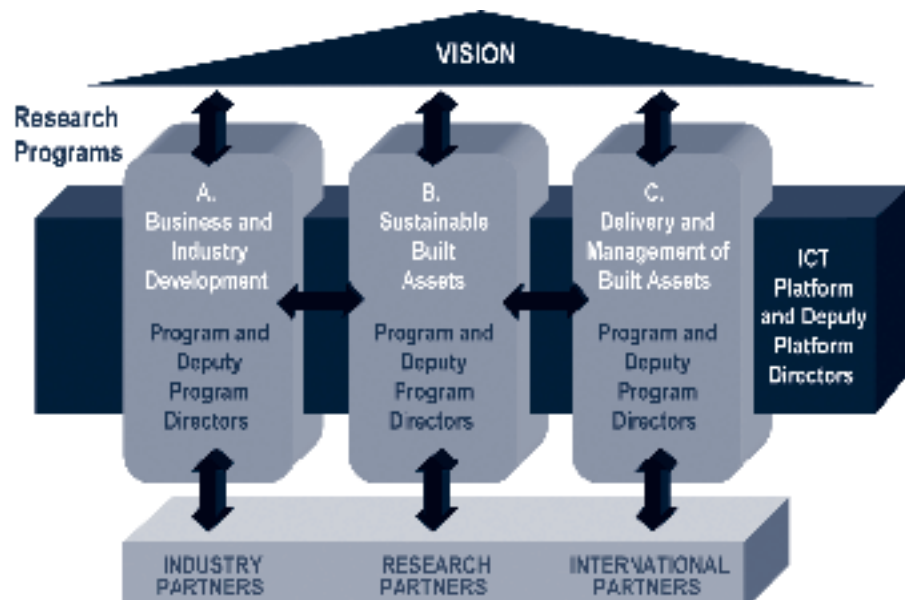
with an advanced Information and Communication Technology (ICT) Platform underpinning each of the programs.

In supporting the initial projects to gain momentum for our CRC, and during the transition to the new program structure, we have defined a need for a sharper focus and a more managed research program that provides enhanced industry deliverables.

For each Program, a Program and Deputy Program Director has been appointed, drawn in the first instance from one of our Research Participants and in the second instance, from our Industry or Government Participants. The Platform Director, drawn from a Research Participant, is responsible for the ICT Platform and is supported by a Deputy Platform Director drawn from an Industry Participant. This formalised management responsibility from the Research Leadership Team provides increased focus on developing applied research that delivers industry-ready outcomes.

This structure has been strongly promoted throughout 2002-03 and is a hallmark of our next round of research projects. An increased focus on top-down managed research is evident through the Quarterly Program Workshops attended by industry and research partners, the industry-led workshops on research themes such as Workplace Health and Safety, eBusiness and Quality of Design Documentation, and industry-led research projects.

Construction Innovation seeks to achieve a balance between top-down and bottom-up research development in its portfolio of projects.



research program A

business and industry development

Program Director:

Dennis Lenard

Deputy Program Director:

Don Allan

Research Project 2001-004-A

Knowledge Management and Innovation Diffusion

Project Duration: July 2001 – July 2004

Project Description:

This research will highlight how management of expert knowledge and information together with an Information and Communication Technology (ICT) decision support tool may be applied to other innovative ICT decision support tools.

Progress:

Seven interim reports have been completed including a Literature Review, a report titled Industry Definition for Knowledge Management and a Knowledge Management Framework titled Knowledge Advantage. The Knowledge Advantage concept comprises an ICT-enabled infrastructure, a leadership infrastructure and the necessary people infrastructure.

Future Directions:

This research will provide the Australian property and construction industry with access to a set of business practice guides that will establish standards within the construction industry forming a common well-defined language of terms and contexts of Knowledge Management and ICT diffusion methods. These guides will lead to best practice and methods of creating, measuring, acquiring, sharing and exploiting knowledge critical to the construction industry.

Project Team Members:

Andrew Finegan - RMIT
Peter Goldsmith - RMIT
Andrew Wilson - RMIT
Peter Bowtell - Arup Australasia
Mark McSweeney - Bovis Lend Lease
Roger Frith - Building Commission
Jeff Norton - Building Commission
Gerry Shutt - John Holland
Don Allan - Queensland Department of Main Roads
Craig Carpenter - Queensland Department of Main Roads
David Clifford - Queensland Department of Main Roads
Bill Semple - Queensland Department of Main Roads
Jane Williamson - Queensland Department of Main Roads
Tony Sidwell - Queensland University of Technology
Graham Brewer - University of Newcastle



Project Leader:

Derek Walker
RMIT

Research Project 2001-012-A

Innovation Potential, Directions and Implementation in the Building and Construction Product System

Project Duration: January 2003 – December 2005

Project Description:

This project focuses on the incidence and quality of innovation in the property and construction sector by generating and disseminating knowledge about the rate of innovation over time, what makes one business a better innovator than another, Best Practice implementation processes and the need to innovate and share innovations with others.

Progress:

Production of a literature review and an analytical framework to guide case study work has been completed. The analytical framework provides direction for fieldwork and will assist in the development of both the case study brochures and the analytical report. A key outcome of the two reports has been the development of a list of key influences on construction innovation and an understanding of their dynamics and inter-relationships.

Future Directions:

The benefit of this research for the Australian property and construction industry is access to information that will better equip the government and associated departments to strive for innovation best practice and improved business performance. The information will be presented in a website containing a series of innovation best practice case studies and the results of an Australian innovation survey of companies in the property and construction industry.

Project Team Members:

Terry Boyd - Queensland University of Technology
Isolde Macatol - Queensland University of Technology
Tim Rose - Queensland University of Technology
Richard Hough - Arup Australasia
Steve McFallan - CSIRO
Dion Harle - Queensland Department of Main Roads
John Spathonis - Queensland Department of Main Roads
Mike Swainston - Queensland Department of Main Roads
Don Allan - Queensland Department of Public Works
Neal Muller - Queensland Department of State Development
Rob Wilcox - Queensland Department of State Development
Jane Marceau - University of Western Sydney



Project Leader:

Karen Manley
Queensland University of Technology



Project Leader:
Graham Brewer
University of
Newcastle

Project Team Members:

Swee Eng Chen - University of Newcastle
Thayaparan Gajendran - University of Newcastle
Dennis Lenard - University of Newcastle
Robin Drogemuller - CSIRO
Geoff Caldwell - Queensland Department of Main Roads
David Marchant - Woods Bagot

Research Project 2001-016-A

Critical Success Factors for ICT Mediated Supply Chains

Project Duration: July 2002 – June 2004

Project Description:

This research team is creating a model that identifies critical success factors in information and communication technology mediated supply chains acknowledging the differing needs of individual organisations and participants in temporary project organisations.

Progress:

A Delphi study has been undertaken using a pilot study taken from a specific industry partner's project. A consolidated project report and a best practice guide framework have commenced.

Future Directions:

The Australian property and construction industry will benefit from this research by having access to a model to establish a best practice framework that acknowledges participants differing needs in temporary project organisations.



Project Leader:
Steve Rowlinson
Queensland
University of
Technology

Project Team Members:

Fiona Cheung - Queensland University of Technology
Tony Sidwell - Queensland University of Technology
Greg Foliente - CSIRO
Chris Evans - John Holland
Craig Carpenter - Queensland Department of Main Roads
Bob Giles - Queensland Department of Main Roads
Roy Sargent - Queensland Department of Main Roads
John Spathonis - Queensland Department of Main Roads
Graeme Tessier - Queensland Department of Main Roads
Derek Walker - RMIT
Marcus Jeffries - University of Newcastle
Dennis Lenard - University of Newcastle

Research Project 2002-022-A

Value in Project Delivery: Facilitating a Change in Culture

Project Duration: September 2002 – June 2004

Project Description:

This research team is addressing a specific need identified by the Queensland Government and its reaction to changing project delivery systems and the need to be accountable to the public and its stakeholders. The government has identified a need for further development in terms of organisation culture and attitudes in implementing the novel approaches embodied in relationship contracts. They accept that culture change is a slow process and that it is affected in the first instance by changing individuals' attitudes. Thus a change agent, based on a sound understanding of underlying culture and attitudes is required. The change must be directed towards developing attitudes and culture supportive of relationship contracting.

Progress:

The literature review for this project has been completed and a survey instrument designed for distribution to industry partners.

Future Directions:

The Australian property and construction industry will benefit from this research by having access to a toolkit for applications with a participating organisation. They will be able to extend the focus of the kit from the client organisation to all project stakeholders and will also have access to best practice guides.

research program B

sustainable built assets

Program Director:

Peter Newton

Deputy Program Director:

Ken Stickland

Research Project 2001-002-B

Life Cycle Modelling and Design Knowledge Development in Virtual Environments

Project Duration: October 2001 to September 2004

Project Description:

This research team aims to improve life cycle modelling of buildings through linking 3D models with maintenance data to allow the facility manager and designer to access information and knowledge that is currently inaccessible. The research also integrates data mining agents into the maintenance process to produce timely data for the facility manager on the affects of different maintenance regimes.

Progress:

A survey of existing data mining/knowledge discovery algorithms and systems used for data mining in the construction industry has been undertaken. In addition, a survey of available data from industry partners, of existing object-oriented models of building data, and a survey of virtual environment platforms as the basis for data mining, has been completed. A report has been produced demonstrating the application of data mining algorithms on industry maintenance data of buildings that searches for patterns and correlations within the existing building maintenance data to support decision making on future maintenance operations. In this demonstration, various data mining algorithms have been applied and the maintenance data analysed using interactive visual tools such as stacked histograms. The maintenance data of three asset types were selected for this demonstration including air handling units, thermostatic mixing valves and battery chargers, with the aim of discovering meaningful patterns to assist facility managers in strategic planning, as well as providing a knowledge base to shape future requirements in gathering and design briefing.

Future Directions:

The research will provide the Australian property and construction industry with the provision of an improved connection between maintenance and design knowledge on projects. This will be achieved by having access to a demonstration modelling tool in a 3D environment that can be linked directly to an Asset Management System.

Research Project 2001-005-B

Indoor Environments: Design, Productivity and Health

Project Duration: October 2001 to August 2003

Project Description:

This research is focused on minimising the incidences of Legionella disease outbreaks by using new design solutions for commercial air-conditioning cooling towers. This project will also determine the availability of Australian and international data for thermal comfort, lighting and indoor air quality; the populations and buildings affected; and procedures by which this information can be used to estimate real costs on the productivity and health of Australian office workers.

Progress:

A multidisciplinary approach was used to develop a detailed and costed research brief related to identification of engineering control solutions for Legionella in cooling towers. A literature review on indoor air quality in terms of data collection is also substantially completed. Over 500 references have been collected and approximately seven interviews with relevant key industry and research representatives have been conducted. A framework for the analysis of the literature has been developed which includes consideration of the measurement and an understanding of productivity, and a map of influences on productivity has been developed to assist in understanding the area.

Future Directions:

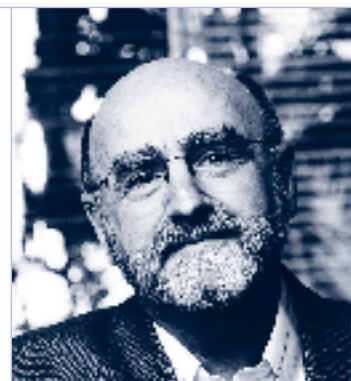
The benefit of this research for the Australian property and construction industry is access to a new demonstration model framework being developed through this project. The model will also estimate costs related to lost productivity resulting from poor quality indoor environments.

Project Team Members:

David Gunaratnam - University of Sydney
Mary Lou Maher - University of Sydney
Rabee Reffat - University of Sydney
Mike Rosenaman - University of Sydney
Lan Ding - CSIRO
Dale Gilbert - Queensland Department of Public Works
Teng Hee Tan - Queensland Department of Public Works
David Marchant - Woods Bagot

Project Team Members:

Richard Brown - Queensland University of Technology
Veronica Garcia Hansen - Queensland University of Technology
Lidia Morawska - Queensland University of Technology
Milan Jamriska - Queensland University of Technology
Haico Schepers - Arup Australasia
Caroline Noller - Bovis Lend Lease
Steven Brown - CSIRO
Angelo Delsante - CSIRO
Dale Gilbert - Queensland Department of Public Works



Project Leader:

John Gero
University of Sydney



Project Leader:

John Bell
Queensland University of Technology

**Project Leader:**

Selwyn Tucker
CSIRO

Project Team Members:

Michael Ambrose - CSIRO
Robin Drogemuller - CSIRO
David Johnston - CSIRO
Angela Williams - CSIRO
Stephen McFallan - CSIRO
Grace Mitchell - CSIRO
Peter Newton - CSIRO
Greg Smith - Arup Australasia
Brian Ashe - Australian Building Codes Board
Caroline Noller - Bovis Lend Lease
Rob Enker - Building Commission Victoria
Dale Gilbert - Queensland Department of Public Works
Delwyn Jones - Queensland Department of Public Works
Craig Pearman - Queensland Department of Public Works
John Bell - Queensland University of Technology
Nur Demirbilek - Queensland University of Technology
Lidia Morawska - Queensland University of Technology
Jay Yang - Queensland University of Technology
Tim Grant - RMIT
Karli James - RMIT
Graham Miller - University of Western Sydney
Carolyn Mitchell - Woods Bagot

Research Project 2001-006-B**Environmental Assessment Systems for Commercial Buildings**

Project Duration: September 2001 – June 2004

Project Description:

This research will provide a practical tool for designers, material producers, government regulators, building owners and managers to enable them to assess the environmental impact of commercial buildings. The research will produce LCADesign, a tested prototype of an environmental assessment tool capable of being linked to a 3D CAD model being developed in another Construction Innovation research project. This 3D CAD model has the capacity to calculate the quantities of each element in any building design described in the 3D computer model. This research project is determining how to convert the quantities of each element into the quantities of each of the main component materials used, and to do this from the earliest possible stages of the design process.

Progress:

Significant progress has been achieved in this project. In order to assess a demonstration building, data on the major materials has been obtained. While the environmental database now has considerable breadth in its coverage of products, there are many refinements, consistency checks and Australian details still required. Despite this, life cycle assessment can now be performed on all components in the demonstration building. An environmental assessment of a commercial building can now be undertaken by processing the 3D CAD data sequentially through Industry Foundation Classes (IFC) files, a product quantities estimator, a life cycle assessment calculator, and a display module. A broad knowledge of environmental emissions for building related products has now been developed.

Future Directions:

This research will provide the Australian property and construction industry with access to the environmental impact and costs of commercial buildings enabling players to consider these two aspects in tandem as design decisions are being made. This link is clearly essential in a market where construction decisions have to make commercial sense.

**Project Leader:**

Brian Ashe
Australian Building Codes

Project Team Members:

Rachel Hargreaves - Australian Building Codes Board
Matthew Patterson - Australian Building Codes Board
Richard Hough - Arup Australasia
Rob Enker - Building Commission (Victoria)
Peter Newton - CSIRO
Lam Pham - CSIRO
Kwesi Sagoe-Crenstil - CSIRO
Ron Apelt - Queensland Department of Public Works
John Bell - Queensland University of Technology

Research Project 2001-013-B**Sustainability and the Building Code of Australia**

Project Duration: January 2002 – April 2003

Project Description:

This research team is providing Construction Innovation with information that will allow the Australian Building Codes Board (ABCB) to determine the form of any sustainability requirements necessary in the Future Building Code of Australia.

Progress:

The final project report and database have been completed and submitted to Construction Innovation. The report provides the Australian Building Codes Board with options on its approach to sustainability in the Future Building Code of Australia. In addition, the database provides an extensive knowledge base on international sustainability requirements for buildings.

Future Directions:

The benefits of this research for the Australian property and construction industry is access to information on sustainable building developments in Australia and overseas, identification of issues and implications associated with sustainability requirements for buildings, and the opportunity to shape sustainability regulations for Australian buildings. The final outcome is a report on International Sustainability Requirements for Buildings and a recommendation for the ABCB regarding potential sustainability requirements in the Future Building Code of Australia.

Research Project 2001-014-B

Automated Code Checking

Project Duration: July 2002 – December 2003

Project Description:

This project is a scoping study to assess the capacity of object-based CAD systems to support automated checking of designs for compliance against requirements, and to test the comparative strengths and suitability of two different rule checking engines – EDM Model Checker and the Solibri Model Checker. The study involves the encoding of sections of the Building Code of Australia relevant to access by people with disabilities (Section D3) and the deemed-to-satisfy provisions including AS 1428.1. The opportunity to leverage outcomes from this project into other information and communication technology focussed projects will be investigated.

Progress:

Encodings of both performance-based and deemed-to-satisfy provisions of the Building Code of Australia (BCA) within the Engineering Database Management (EDM) Model Checker and Solibri Model Checker have been completed. Significant progress has been made on the evaluations of the relative performance, the evaluations of the expressiveness (capability), and estimates of the impact of scaling up the systems to handle full codes (ie ~4000 rules in BCA).

Future Directions:

Benefits to the Australian property and construction industry include a guide document for designers using ArchiCAD on how to structure their designs to allow automated rule checkers to operate effectively.

Project Team Members:

Lan Ding - CSIRO
Brian Ashe - Australian Building Codes Board
Roger Frith - Building Commission (Victoria)
John Gero - University of Sydney
Mike Rosenman - University of Sydney
David Marchant - Woods Bagot



Project Leader:
Robin Drogemuller
CSIRO

Research Project 2002-004-B

Noise Management in Urban Environments

Project Duration: July 2003 – April 2004

Project Description:

This research team recognises that noise management is about managing noise to protect community health and well-being. Recent research into traffic noise impact on community health shows that noise pollution can cause elevated physiological stress and Noise-Induced Hearing Threshold Shifts (NITS). These findings could make sustainable noise management in urban environments a mandatory requirement and a professional indemnity issue in the near future.

Progress:

Project Agreement has been signed and the Project Team established.

Future Directions:

At the completion of the research, the Australian property and construction industry will benefit by having access to a comprehensive, easy-to-understand guide for assessing the main community issues in managing transport-related noise (air, sea, land) in urban environments, and how to address these issues. A software package and user guide for improved noise management decisions will be produced, and innovative pricing arrangements for property potentially affected by noise will also be developed. Finally, the team will also provide innovative approaches to sustainable urban living environments in noise corridors.

Project Team Members:

Arun Kumar - RMIT
Sujeeva Setunge - RMIT
Peter Bowtell - Arup Australasia
Peter Newton - CSIRO
Arthur Hall - Queensland Department of Main Roads
Julie Schular - Queensland Department of Main Roads
John Spathonis - Queensland Department of Main Roads
Peter Syson - Queensland Department of Main Roads
Dale Gilbert - Queensland Department of Public Works
Ned Wales - Queensland University of Technology



Project Leader:
Saman DeSilva
RMIT



Project Leader:
Ivan Cole
CSIRO

Project Team Members:

Stephen McFallan - CSIRO
Gerry Trinidad - CSIRO
Gerry Shutt - John Holland
Dale Gilbert - Queensland
Department of Public Works
David Harrison - Queensland
Department of Public Works
Swee-Eng Chen - University of
Newcastle
Jamie MacKee - University of
Newcastle

Research Project 2002-010-B

Component Life: Delphi Approach to Life Prediction of Building Material Components

Project Duration: May 2003 – March 2004

Project Description:

This research team recognises there is a crucial need for a comprehensive and reliable database of building sub-systems and component service life as a function of environment and use. The “Durability of Materials Fraternity” in Australia and internationally is making rapid progress on predicting the life of individual components for specific materials. However, it will be many years before comprehensive databases are constructed from such studies. This research team is developing a pilot Delphi study bringing together an expert panel of architects, building scientists, materials scientists, statisticians, IT professionals, asset and facility managers and construction contractors. This multi-sectoral team will ensure robustness as well as the ability to gauge variability in opinion with a focus on metallic components.

Progress:

An audit of metal components in buildings has been undertaken and ACCME numbers have been assigned to all metal components. An on-line survey instrument will be utilised, realising the large number of “representative components” to be incorporated into the survey. A prototype of the survey instrument has been developed to allow industry partners to assess the concept.

Future Directions:

If this pilot study is successful, a full scale project will be established after which a database and information technology system for life prediction will be developed.



Project Leader:
Mary Lou Maher
University of Sydney

Project Team Members:

Kirsty Beilharz - University of
Sydney
John Gero - University of
Sydney
Michael Rosenman - University
of Sydney
Ayca Tuzmen - University of
Sydney
Richard Hough - Arup
Australasia
Steve Pennel - Arup Australasia
John Crawford - CSIRO
Lan Ding - CSIRO
Robin Drogemuller - CSIRO
Paul Berry - University of
Western Sydney
David Marchant - Woods Bagot
Carolyn Mitchell - Woods Bagot
Kanyarat Nemprem - Woods
Bagot

Research Project 2002-024-B

Team Collaboration in High Bandwidth Virtual Environments

Project Duration: May 2003 – December 2005

Project Description:

This research team is addressing two aspects of collaboration in virtual environments: the processes that enable effective collaboration using high bandwidth information communication technology; and, the models that allow for multiple disciplines to share their views in a synchronous virtual environment.

Progress:

Project Agreement has been signed and the Project Team established.

Future Directions:

The benefits to the Australian property and construction industry are strategically opportunistic. Many companies in the construction industry are now ready to pursue high bandwidth collaboration. The opportunity for Construction Innovation partners to do this with support from the CRC and with the experience of the research partners provides a competitive advantage that other organisations in the construction industry do not have.

Research Project 2002-043-B

Smart Building for Healthy and Sustainable Workplaces

Project Duration: January 2003 – July 2003

Project Description:

This project promotes social, economic and environmental sustainability in the built environment through research into the development of 'smart building' technologies that support healthy indoor environments, energy efficient operation and the maintenance of workplaces. While this research is a scoping study, the long-term goal for this project is to develop and implement technologies to support people-friendly (ie healthy), eco-friendly and commercially viable buildings and facilities, and to facilitate triple-bottom-line assessment and reporting. The study aims to assess technologies that could measure and control factors important for healthy and sustainable workplaces.

Progress:

The Scoping Study phase has been completed. Meetings with contractors and other specialists have occurred, and an extensive review of literature to determine state-of-the-art practice finalised. A facilitated workshop was conducted with all project participants, invited experts and industry representatives (facility managers, property investors, property managers, etc). Participants confirmed the findings in the review, provided input into development of Phase 2 of the project (prototyping and field trial), and mapped potential flow-on projects for the future. A complete draft of the Scoping Report was distributed to all partners.

Future Directions:

The benefits for the Australian property and construction industry include the development of smart building technologies, improved worker productivity and reduced building operation and maintenance costs. There are obvious long-term environmental benefits to the wider community through reduced energy usage. There is also potential for improving design concepts in both architectural and engineering aspects, in developing new materials, sensors and technologies for future smart-building systems, and in monitoring their effectiveness in reducing lost productivity costs associated with deficient working environments.

Project Team Members:

Steve Brown - CSIRO
Angelo Delsante - CSIRO
Gerard Ledwich - CSIRO
Philip Paevere - CSIRO
Charles Rono - CSIRO
Pavan Sikka - CSIRO
Paul Sloman - CSIRO
Colin Henson - Arup Australasia
Des Dykes - Bovis Lend Lease
Dale Gilbert - Queensland Department of Public Works
John Bell - Queensland University of Technology
Jay Yang - Queensland University of Technology



Project Leader:

Greg Foliente
CSIRO



Sydney Morning Herald,
17 March 2003, p5.

Program Director:

Tony Sidwell

Deputy Program Director:

Gerry Shutt

research program C delivery and management of built assets



Project Leader:

Tony Sidwell
Queensland
University of
Technology

Project Team Members:

Albert Chan - Queensland
University of Technology
Rosie Kennedy - Queensland
University of Technology
Steve Rowlinson - Queensland
University of Technology
Greg Foliente - CSIRO
Paul Tilley - CSIRO
Chris Evans - John Holland
Gerry Shutt - John Holland
Steve Hogan - Queensland
Department of Main Roads
John Collin - Queensland
Department of Public Works
Keith Farr - Queensland
Department of Public Works
Bob Giles - Queensland
Department of Public Works
Ken Moschner - Queensland
Department of Public Works
Ray Potts - Queensland
Department of Public Works
Tony Sgroi - Queensland
Department of Public Works
Derek Walker - RMIT
Chen Swee Eng - University of
Newcastle
Rod Gameson - University of
Newcastle
Marcus Jeffries - University of
Newcastle

Research Project 2001-003-C

Value Alignment Process for Project Delivery

Project Duration: October 2001 – December 2003

Project Description:

The Australian property and construction industry will have access to a new decision tool that goes beyond published reports and maps ideas for improving national construction industries. Rather than providing generalised advice based on broad principles, it provides specific advice about actions taken on projects that were successful, carefully matched to the specific needs and circumstances of individual clients and their project teams. This will be achieved via a computer-based decision tool that asks users questions about their project. The answers are used by the decision tool to create a profile of the project's inherent difficulty based on its size, complexity, predictability and the objectives it aims to achieve. The decision tool then uses the project profile to tell the user the level of risk encountered on projects with similar profiles, and the level of coordination required minimising those risks. This provides broad guidance for clients and project managers based on relevant advice from recent case studies of best practice.

Progress:

The literature review and the development of a best practice matrix decision support tool have been completed. Sufficient data collection has been completed to add functionality to the Decision Support Tool prototype, and twelve best practice interviews focused on case studies have been completed.

Future Directions:

The Australian property and construction industry will have access to an interactive web-enabled tool that provides information, advice and recommended actions on exceptional project delivery to a project team, and a web-based subscription service for access to the tool.

Queensland Master
Builder Magazine,
June/July 2003, p4.



Research Project 2001-007-C

Managing Information Flows with Models and Virtual Environments

Project Duration: July 2001 – June 2003

Project Description:

This research team has recognised two important developments that provide the basis for a dramatically better approach to using advanced information and communication technologies in construction. The first is the use of advanced ICT which already enables designers in other industries to work quickly and accurately with complex sets of information using object-oriented databases linked to 3D virtual reality models of their designs. The second is the development of Industry Foundation Classes (IFC) to provide internationally accepted standards that support the communication of digital data in construction projects. IFCs provide a framework allowing all the design information required for a building to form an integrated 3D virtual model which can be linked automatically to the management systems used in controlling time, cost and quality.

Progress:

This project is using alpha tested software to estimate concrete, reinforcing and formwork. The technology uses interoperability and IFCs that are integral in the use of 3D modelling and virtual environments. A demonstration of the technology has been given to key industry project participants who have confirmed its capabilities.

Future Directions:

A major benefit of this research for the Australian property and construction industry includes improved efficiency in design and construction. The new technology developed through this research will enable designs to be analysed more thoroughly, ensuring all details are constructed efficiently, within budget and on-time. A benefit for the Australian community will be better quality buildings, produced faster and at lower costs.

Project Team Members:

John Crawford - CSIRO
Lan Ding - CSIRO
Shawn Foo - CSIRO
Cheryl McNamara - CSIRO
Steven Shaw - CSIRO
Kwok-Keung Yum - CSIRO
Peter Bowtell - Arup Australasia
Brian McCloy - Bovis Lend Lease
Peter Addlem - John Holland
Ricky Cox - Queensland Department of Main Roads
Thomas Fussell - Queensland Department of Public Works
Ewen McDonald - Rider Hunt
John Oliver - Rider Hunt
John Gero - University of Sydney
Mary Lou Maher - University of Sydney
Rabee Reffat - University of Sydney
Mike Rosenman - University of Sydney
David Marchant - Woods Bagot



Project Leader:

Robin Drogemuller
CSIRO

Research Project 2001-008-C

Project Team Integration: Communication, Coordination and Decision Support.

Project Duration: March 2002 – November 2003

Project Description:

This research team is examining the potential of information and communication technology (ICT) to integrate construction project teams. The research is focusing on the development of on-line tools/systems which will provide decision support for the whole project life-cycle. It will evaluate the use of Internet-based Construction Project Management; e-tendering; e-archiving; and cultural barriers/enablers to Internet Based Construction Project Management (ICPM).

Progress:

Two reports have been completed for dissemination and publication. The reports are titled A brief synopsis of the use of ICT and ICPM in the construction industry (a literature review) and Scoping study final report. The reports identify technology issues and processes that could lead to more effective use of technology mediated communications, integration and decision support in the construction industry, particularly within project teams.

Future Directions:

The Australian property and construction industry will benefit from up-to-date knowledge in what ICPM tools and processes are currently in use in the property and construction industry how those tools can assist project management activities, and what cost-benefits are available through their use. The project will also deliver insights on what hand-held devices and associated software is currently in use in the property and construction industry and what devices are capable of being modified from other industries for use in construction. The project team will also develop a set of "best-practice" guidelines for the adoption and integration of ICPM systems and processes within organisations.

Project Team Members:

Achim Weippert - Queensland University of Technology
John Crawford - CSIRO
Paul Tilley - CSIRO
Selwyn Tucker - CSIRO
Geoff Caldwell - Queensland Department of Main Roads
Mark Haug - Queensland Department of Public Works
Graham Brewer - University of Newcastle
Chen Swee Eng - University of Newcastle
Rod Gameson - University of Newcastle
Richard Kolomy - University of Newcastle
Dennis Lenard - University of Newcastle
Rui Martins - University of Newcastle
Willy Sher - University of Newcastle



Project Leader:

Stephen Kajewski
Queensland University of Technology



Project Leader:
Arun Kumar
RMIT

Project Team Members:

Anthony Piyatrapoomi - RMIT
Sujeewa Setunge - RMIT
Ashish Shah - RMIT
Saman de Silva - RMIT
Bruce Johnson - Arup Australasia
John Reddie - John Holland
Dale Gilbert - Queensland Department of Public Works
Barbara Grieve - Queensland Department of Public Works
Neil Robertson - Queensland Department of Main Roads
John Spathonis - Queensland Department of Main Roads
Ten Hee Tan - Queensland Department of Public Works
Terry Boyd - Queensland University of Technology
Alan Jeary - University of Western Sydney

Research Project 2001-010-C

Investment Decision Framework for Civil Infrastructure Asset Management

Project Duration: October 2001 – March 2004

Project Description:

This research team is developing an investment decision framework for asset management incorporating economic, environmental and social factors using multi-criteria analysis. In the long term the framework will be developed into a software tool for data and monitoring techniques.

Progress:

Data has been collected to analyse the optimisation of pavement for two soil types (wet non-reactive soil and dry reactive soil). A method for optimising the sample spacing for pavement deflection data collection in order to maximise return on data collection investment has also been developed. A report on the optimisation method providing details of the optimisation analysis has been completed. In addition, a methodology for risk-adjusted budget assessment has been developed. An assessment of risk-adjusted budget has been conducted for 5-, 10-, 15-, 20- and 25-year periods at a 95% level of confidence. This has taken into account the variability of pavement strength that has been conducted using the methodology developed.

Future Directions:

This research will provide for the Australian property and construction industry, and in particular Australian infrastructure owners, with the ability to utilise effective investment choices and to identify and implement an investment decision framework for infrastructure asset management. An example of the usefulness of this model is that during the first 12 months of the project, the research team has been able to identify significant savings for private and public civil asset owners.

*Building Australia,
January/February 2003, p24.*



Research Project 2001-011-C

Evaluation of Functional Performance in Commercial Buildings

Project Duration: December 2001 – May 2004

Project Description:

This team is seeking to enhance commercial real estate performance within operational and investment contexts through the development of a model supporting improved decision-making over the facility life-cycle.

Progress:

The building audit reports prepared by a team of industry partner engineers for the sample portfolio of four office towers have been analysed to plot annual operating and capital cost projections. These projections along with other building operating data from the Queensland government have been entered into the property evaluation model. Initial testing of the model has been successful with valuation results aligning closely with those assessed by independent valuers. Risk analysis simulation modules have been developed, tested and linked to the property evaluation model. Linkages have been established with a major property funds manager with a view to furthering the project's research outcomes.

Future Directions:

The Australian property and construction industry will benefit from this project through enhanced appreciation and understanding of property market trends, forecasts and facility management. These trends and forecasts will be possible through access to a practical market-based cash flow model being developed. The tool will guide the buy/sell/hold/redevelop decision process and will be a standardised model capable of assessing the potential value range for a given property, its historical value change, and the value sensitivity to social, environmental and governance variables. The model will also assess the value/return outcomes under alternative scenarios (eg different holding periods, various capital expenditure positions), and will provide enhanced knowledge and understanding from component variable research (eg property market cycles, tenant demand, and risk analysis). The project will deliver more robust, accurate and defensible input variable determinations (eg rental growth forecasts) as a corollary to the component variable research.

Project Team Members:

Marcello Jonelli - Queensland University of Technology
Philip Kimmet - Queensland University of Technology
Stuart Ross - Queensland University of Technology
Emlyn Keane - Arup Australasia
Mervyn Cowley - Queensland Department of Public Works
Keith van Eyk - Queensland Department of Public Works
Teng Hee Tan - Queensland Department of Public Works
Stephen Ballesty - Rider Hunt
Arun Kumar - RMIT
John MacFarlane - University of Western Sydney



Project Leader:

Terry Boyd
Queensland University of Technology

Research Project 2002-052-C

Value in Project Delivery – Project Diagnostics

Project Duration: March 2003 – June 2004

Project Description:

This is a sub-project to 2001-003-C Value Alignment Process for Project Delivery and develops the elements of Project Diagnostics to explore reasons why projects fail to achieve their intended outcomes.

Progress:

Project Agreement has been signed and the Project Team established.

Future Directions:

Benefits of the project to the Australian property and construction industry are the development of indicators that provide advanced warning into a Diagnostics Toolkit Protocol. These will include metrics to indicate when projects are going wrong, to diagnose why projects may be failing, and to suggest means of returning them to better health – with a direct linkage to improved business outcomes.

Project Team Members:

Sheldon Sherman - Arup Australasia
Greg Foliente - CSIRO
Sherif Mohamed - CSIRO
Chris Evans - John Holland
Mike Swainston - Queensland Department of Main Roads
John Collin - Queensland Department of Public Works
Matthew Humphreys - Queensland University of Technology
Daniyal Mian - Queensland University of Technology
Tony Sidwell - Queensland University of Technology



Project Leader:

John Tsoukas
Arup

six construction innovation teaching, training, trying it on

The Education and Training Program strategy document was approved at the CRC for Construction Innovation Board Meeting held 28 May 2003. This document encompasses ideas contained in Schedule 1 of the Commonwealth Agreement and expands upon the summary documentation developed for the Strategic Plan 2003-2008. The Strategic Plan was developed over a nine-month period from 12 June 2002. During this time the Education and Training Program strategies were workshopped with a broad representation of CRC personnel.

The refined strategies are:

Strategy 1 – Curriculum Development and Support

- To provide input to university, TAFE and VET curriculum development.

Meetings have been held with the TAFE sector and course coordinators from Construction Innovation partner universities to consider options for exploiting research outcomes in curriculum development. Content from some research outcomes will be integrated into existing courses.

As projects near conclusion, Completion Strategies are being developed which map strategies to ensure project teams exploit research outcomes, and can include:

- identifying, and if appropriate developing, curriculum materials
- highlighting opportunities with Construction Innovation university participants for post graduate students to undertake research in a particular area to complement future research projects
- liaison with course coordinators from Construction Innovation university participants to encourage course curriculum development involving the use of ICT systems
- liaison with course coordinators from the TAFE and VET sector offering a presentation to staff and students on research outcomes.

Strategy 2 – Student Support

- To provide scholarship funds and a focus of industry reference for high quality PhD and Masters Students.

Nine out of twelve PhD and Masters by Research scholarships have been awarded to 30 June 2003. The last available scholarships are currently being finalised by respective universities. Each student has one academic and one industry supervisor providing linkages directly back to Construction Innovation industry partners. A number of students have come directly from Construction Innovation partners and in two instances, they are receiving top-up funding support from their employers.

Construction Innovation is offering Masters by Coursework scholarships providing rapid returns to industry from applied research projects. Ten scholarships are currently available.

Strategy 3 – Research Project Education Dispersion

- To identify education and training opportunities from research projects
- To develop greater appreciation and support from research teams for education efforts.

Workshops have been held with Construction Innovation partner organisations disseminating interim research findings. Workshop topics included: Knowledge Management, Legionella, Smart Technologies for Healthy Environments, Decision-Making Processes for Procurement Systems, Infrastructure Asset Management, and Evaluating Risk in Property Feasibility Studies.

Strategy 4 – Continuous Professional Development

- To provide opportunities for continuous professional development for industry and research personnel.

In developing project Completion Strategies, opportunities are being identified for half- and full-day programs to be delivered in major regional and capital cities. For example, a half-day workshop was held on 19 June 2003 in Brisbane on the theme Evaluating Risk in Property Feasibility Studies. Forty professionals from Construction Innovation partners and the broader industry attended the event. Opportunities such as these will be marketed through organisations with client-bases such as the Master Builders' Associations, Australian Construction Industry Forum (ACIF) and Construction Training Australia. In addition, industry and professional organisations will be encouraged to engage training providers who can develop and deliver short courses based on content developed from Construction Innovation's research outcomes.

A part-time Project Officer was appointed in June 2003 and charged with the role of developing and coordinating the implementation of the Education and Training strategies.

On 24 July 2003 an Education and Training workshop will be conducted to include Construction Innovation research partners, ACIF, Construction Training Australia and representatives from the TAFE and VET sectors. The workshop will define stakeholders to the strategies and request their assistance and guidance in further developing a program. Once the results of the workshop have been fed into the Education and Training strategies, expressions of interest will be sought for participation in our Education and Training Sub-Committee. These nominations will be put forward to our October 2003 Board meeting.

Construction Innovation's Education and Training Program will:

- increase the value of graduate researchers to Australia
- be recognised as a significant contributor to enhancing the collaborative culture of construction
- attract students by the reputation of its education activities
- partner with organisations to develop educational and professional development courses, using outcomes from Construction Innovation's research.

While Construction Innovation will 'pack' information into texts, seminars and conferences, we have identified significant downfalls in only relying on this type of knowledge diffusion. Our alignment with the VET sector and partnering with associations such as Construction Training Australia is expected to increase the construction industry's uptake of research outcomes.

scholarshipprogram

Each scholarship is worth \$30,000 which includes a \$24,000 stipend and a \$6,000 allowance for support such as project management training and applied research management skill development to produce industry-ready graduates for long-term opportunities in government, industry and/or research areas.

PhD Scholars

QUT - 2 RMIT - 2 University of Sydney - 2 University of Newcastle - 1

Masters by Research Scholars

QUT - 2

scholars

Wei Peng

Degree: PhD, University of Sydney **Commenced:** February 2003

Funding: CRC for Construction Innovation

Supervision: Academic: John Gero, University of Sydney Industry: David Marchant, Woods Bagot

Title: An Adaptive Design Tool that Learns

Research Focus:

The research proposes to develop a computational model of an adaptive design tool that learns. This is motivated by an attempt to apply agent technology to an existing design tool in order to assist the design process. This was achieved by providing an adaptive learning mechanism, and linking the designer to experience-based knowledge reservoirs – allowing the design tool to learn and design experiences to be reused. The research project will explore issues of adaptation, learning and memory within the multidisciplinary scope of design science, artificial intelligence, cognitive science, machine learning, etc. The outcome of this research would be a prototype exemplary system which may assist in filling the gap between a recognized deficiency in design tools and the latest computing and cognitive science research findings.

Aligned to Project: 2001-002-B

Biography:

Before Wei started his PhD study in the Key Centre of Design Computing and Cognition at the University of Sydney, he finished a Bachelor's degree in Engineering and a Master's degree in Information Science at UNSW. Working in the construction industry for almost 7 years, his major focus included building, electrical engineering, project coordination and consulting. With solid experience in building and extensive knowledge in computing, Wei is motivated to apply the advances of computing technology to the construction industry and to dedicate himself to research.

Ji Soo Yoon

Degree: PhD, University of Sydney **Commenced:** February 2003

Funding: CRC for Construction Innovation

Supervision: Academic: Professor Mary Lou Maher, University of Sydney
Industry: David Marchant, Woods Bagot

Title: Game-Engine Supported Agent-Based Collaborative Environments

Research Focus:

This research is motivated by the lack of support in adapting user interfaces in increasingly complex design software packages. To counter this problem, Ji Soo aims to develop an intelligent interface agent that adapts to users and can also be implemented in a virtual environment — built using a 3D multi-user game engine like the Valve engine which allows limited collaborative design tasks by users — to demonstrate the use of such agents in a design environment.

Aligned to Project: 2002-024-B

Biography:

Ji Soo began his PhD candidature in 2003. He graduated with a Bachelor of Engineering (Computer) (Hons) and a Bachelor of Science (Computer and Mathematics) from the University of Sydney. Ji Soo's research areas include Intelligent Agents, Embodied Agents in Virtual Worlds and the Use of 3D Game Engines in the Construction Industry. He has worked as a Research Assistant for a Construction Innovation research project on High Bandwidth Collaboration and one of his general interests is developing robots. Ji Soo hopes to make both theoretical and practical contributions in design computing by applying abstract research to real life situations to solve problems.



Wei Peng

"This Construction Innovation scholarship is of great importance to me and my family. Without this important financial support, I would not be able to concentrate on my research."



Ji Soo Yoon

"The scholarship enables me to concentrate solely on my research. It also provides the rare opportunity to participate in Construction Innovation research projects with valuable industry input."

six scholars



Gary Creedy

"This CRC scholarship gives me the opportunity to contribute to research on the equitable selection of contractors who can achieve the quality required within a sustainable and improving industry, at a price representing value and efficiency. The research will also help the Department of Main Roads determine future policies and processes."

Qindong Li

"This scholarship supports my study and gives me opportunities to contact industry and other researchers."

Gary Creedy

Degree: PhD, Queensland University of Technology

Commenced: February 2003

Funding: CRC for Construction Innovation

Supervision: Academic: Professor Tony Sidwell, Queensland University of Technology
Industry: Dennis Wogan, Queensland Department of Main Roads

Title: Matching Project Risk Profiles to Delivery Capabilities in Civil Infrastructure Projects

Research Focus:

This research project aims to develop a methodology whereby owners and contractors will be in a better position to identify project risk sources and the ownership of risks in infrastructure projects such as roads and bridges. The methodology will aim to ensure that risk factors are sufficiently identified to reflect the cost of risks in project cost estimates. The assessed quantum of risk can then be used as a factor when assessing and comparing individual tenders for best value. The project includes a proposed questionnaire on risk assessment during tendering which will be circulated to Australian road authorities and road contractors in early 2004. The developed methodology will be evaluated by way of a number of case studies planned for the later part of 2004.

Aligned to Project: 2001-003-C

Biography:

Garry joined Main Roads in 1964 as a cadet Draftsman and graduated as a Civil Engineer in 1972. Until 1992, Garry carried out various civil engineering and project management roles, as well as designing the department's construction costing and management systems. In 1976 he achieved a Graduate Diploma in Business Administration from Queensland University of Technology (QUT), and this has been followed by his MBA from Deakin University in 1995 and Graduate Certificate in Public Sector Management from Flinders University in 2000. Garry commenced his PhD studies at QUT in March 2003 and has been granted leave from the Department of Main Roads, Queensland.

Qindong Li

Degree: PhD, RMIT

Commenced: January 2002

Funding: CRC for Construction Innovation

Supervision: Academic: Professor Arun Kumar, RMIT
Industry: Neil Robertson, Queensland Department of Main Roads

Title: Integrated Decision Making Framework for Road Maintenance

Research Focus:

Qindong's research will develop a Multiple Criteria model to optimise allocation of budgets and the prioritization of projects across the network. It is based on the triple-bottom line concept.

Aligned to: 2001-010-C

Biography:

Qindong Li is a PhD scholar at RMIT University. He holds a BSc (Civil Engineering) from Sichuan University in China and MEng (Civil) from RMIT University. Qindong has been engaged for 4 years on civil infrastructure projects involving design and project management in China. His current areas of research interest include pavement performance models and decision-making in asset management.

Tayyab Maqsood

Degree: PhD, RMIT **Commenced:** August 2002

Funding: CRC for Construction Innovation

Supervision: Academic: Andrew Finnigan, RMIT Industry: Gerry Shutt, John Holland

Title: Investigating the Role of Knowledge Management in Supporting Innovation for Effective Planning and Delivery of Construction Projects

Research Focus:

Innovation is being regarded as a key to improving the low productivity levels commonly witnessed in the construction industry. Tayyab's research aims to investigate the role of knowledge management in supporting innovation. Soft Systems Methodology (SSM) has been selected as a basic qualitative research tool to carry out such investigations. The outcome will be the development of models of knowledge management encompassing innovation and organisational learning which can be used to transform an organisation into a learning organisation.

Aligned to: 2001-004-A

Biography:

Tayyab, a Civil Engineer with a Masters of Construction Engineering and Management, has worked in Pakistan, Thailand, UK and Hong Kong in various capacities including lecturer, Project Engineer and research associate. He is also a member of various professional organisations such as IEAust, AIB and ASCE. Tayyab's research interests include High Strength/High Performance Concrete, Fibre Reinforced Polymer (FRP) Bars/Plates as structural reinforcement, Project Management, Risk Management, Partnering, Knowledge Management, Information and Communication Technologies (ICT), Supply Chain Management, Information Visualisation and Virtual Reality.



Tayyab Maqsood

"This scholarship provided me with an opportunity to work in a rapidly growing area of knowledge management which holds a key to the future of the knowledge revolution and the knowledge economy – especially important to property and construction."

Cameron Beard

Degree: PhD, UN **Commenced:** February 2003

Funding: CRC for Construction Innovation

Supervision: Academic: Swee-Eng Chen, University of Newcastle Industry: David Marchant, Woods Bagot

Title: Information and Communication Technology Integration in the Construction Industry

Research Focus:

Cameron is exploring the integration of Information and Communication Technology (ICT) within the construction industry by taking a holistic/conceptual view of information and theorising how technologies can be used to assist in the communication of information among project participants.

Through focusing on communication and the flow of information through projects, an understanding of individual participants' information and communication requirements can be established thereby providing a framework for the effective integration of ICT.

Aligned to: 2001-016-A

Biography:

Cameron has recently completed a Bachelor of Construction Management at the University of Newcastle and in February 2003 commenced a postgraduate course. His final year dissertation explored the barriers to the implementation of ICT within the Australian Quantity Surveying profession. While undertaking this dissertation he worked part-time in a Quantity Surveying office and gained industry experience.



Cameron Beard

"This scholarship has allowed me to focus on my research and has made available key industry contacts through the CRC for Construction Innovation networks."

six scholars



Merv Cowley

"This CRC scholarship has provided an outstanding opportunity to focus fulltime on a practical research project that is aligned with and driven by both industry and academia."

Merv Cowley

Degree: Masters by Research, Queensland University of Technology

Commenced: February 2003

Funding: CRC for Construction Innovation

Supervision: Academic: Professor Terry Boyd, Queensland University of Technology
Industry: Keith van Eyk, Queensland Department of Public Works

Title: Property Market Forecasting – Valuation Implications

Research Focus:

Previous research has found inconsistencies in property market forecasting methodologies adopted by property professionals. The now dominant method for assessing the value/viability of major commercial buildings/developments requires explicit property specific and market forecasts.

This project will consolidate previous research and surveyed professional views to derive forecasting models suitable for testing with local market data. The most statistically reliable version/hybrid will be developed into a software module for linkage to the investment evaluation model being developed by the Construction Innovation Project Evaluation of Functional Performance in Commercial Buildings.

Aligned to: 2001-011-C

Biography:

After five years as an auctioneers' assistant, Merv was employed as an Assistant Valuer. Registration as a Valuer was achieved in 1990 after completing a valuation qualification through the University of Queensland. In 1992, he was appointed to the Queensland Government and progressed to Valuer for the Brisbane CBD in 1998. Merv's current position is with the Department of Public Works as a Senior Property Analyst. The awards of a Bachelor of Applied Science (Property Economics) and Master of Property Economics were received in 1997 and 2003 respectively.



David Luxmoore

"This scholarship will provide me with the opportunity to gain additional credibility to consult within the housing and land development industries."

David Luxmoore

Degree: Masters by Research, Queensland University of Technology

Commenced: April 2003

Funding: CRC for Construction Innovation

Supervision: Academic: Professor Mahen Mahendran, Queensland University of Technology
Industry: Rob Ball, Delfin Lend Lease

Title: Evaluation of GreenSmart Housing

Research Focus:

Four GreenSmart houses are being constructed at Springfield Lakes within Ipswich City Council. These houses will be researched to deduce the relationship between resource use and environmental and economic benefits of energy and water use efficiencies, waste minimisation and best practice site and construction management. The houses will be completed by December 2003 and will provide mainstream builders and the general public with examples of healthy comfortable homes with substantially reduced environmental impact.

Aligned to: 2002-075-B

Biography:

David, who trained as a Land Surveyor in Adelaide in 1975, has been involved for some 30 years with the land development industry. He worked with consultant surveyors until 1990 when he joined a land development company as their Project Manager. He was involved in the creation of several master planned projects of up to 5000 lots. David is now the Director of his own consultancy company, Sustainable Development Strategies Pty Ltd, which he formed in 1999.

Ned Wales (deferred)

Degree: PhD, Queensland University of Technology

Commenced: February 2002

Funding: CRC for Construction Innovation

Supervision: Academic: Professor Keith Hampson, CRC for Construction Innovation
Industry: TBA

Title: Economic Development for Greenfield Masterplan Communities

Aligned to: TBA

The refined strategies are:

Strategy 1

Commercial Exploitation of Intellectual Property

Activities associated with this strategy include:

- *educate and train key personnel to understand management of intellectual property and strategies for commercialisation*

Construction Innovation has developed its own Research Leadership Development program to, among other things; ensure that key personnel have an understanding of intellectual property issues. In November 2002, a legal perspective on intellectual property was delivered at Construction Innovation's 2002 Annual Retreat and further Intellectual property and risk assessment themes will be delivered to key personnel in September and November of 2003.

- *develop commercialisation plans for targeted projects*

Two projects have been identified as potential commercialisation opportunities: *Managing Information Flows with 3D Modelling and Virtual Environments* and *Environmental Assessment of Commercial Buildings*. Construction Innovation has undertaken market analysis prior to proceeding to a commercialisation plan to ensure appropriate resource utilisation.

- *partner with others in the commercialisation of research outcomes*

Construction Innovation has partnered with a number of external organisations to ensure research outcomes are exploited. As an example, Environment Australia has partnered on *Sustainability and the Future Building Code of Australia* in order to capture the research outcomes of this project and utilise them in its policy development for the Federal Government; the Australian Construction Industry Forum (ACIF) has partnered with *Innovation Potential, Directions and Implementation in the Building Industry and Construction Product System* in order to disseminate the findings on innovative companies to its national membership base; and Queensland's Department of Housing and Construction Training Queensland have partnered on *Integrated Sustainable Housing Development* to influence the domestic construction sector in the design and construction of sustainable housing systems.

Strategy 2

Technology Transfer to Industry, the Australian Community and Globally

Project outcomes will be initially transferred to partners and then applied more widely as the example set by our partners is followed by organisations collaborating with or emulating them.

Research outcomes from four Construction Innovation projects have already been used by industry. The Knowledge Advantage Framework developed in *Knowledge Management and Innovation Diffusion* is currently being used by a Construction Innovation industry partner to undertake a knowledge audit. The preliminary research outcomes from *Sustainability and the Future Building Code of Australia* were presented to local authorities throughout Australia from November 2002 to February 2003. The final research report providing options for including sustainability in the Future Building Code of Australia has been completed and will be provided to the Australian Building Codes Board shortly.

Construction Innovation has also just released its first book titled 'Measuring up to Success': *Creating a Benchmarking Service for the Australian Construction Industry*. The book outlines the best examples of benchmarking methodology from around the world and conceptualises a survey mechanism that is tailored to the needs of Construction Innovation, with the intention of surveying the uptake of Information and Communication Technology in the Australian Construction Industry. The book is available for sale through Construction Innovation.

Strategy 3

Smart and Streamlined Management Solutions

We will effectively manage research activities and budgets with smart and streamlined systems.

Construction Innovation has branded, through a trademark, one of its key projects. *LCADesign* is the marketing name for the technology developed through *Environmental Assessment of Commercial Buildings*. The branding allows the project team to refer to the technology when disseminating its early research findings to the property and construction industry and has allowed an effective market analysis to be undertaken for potential commercialisation activities. This branding is already being recognised by industry and is generating early demand and recognition from government agencies and industry bodies.

One other project has been branded for purposes of market recognition. *The BRITE Project (Building Research, Innovation, Technology and Environment)* is the marketing name for *Innovation Potential, Directions and Implementation in the Building Industry and Construction Product System*. This project will be developing best practice case studies and will be surveying over 1000 firms in the property and construction industry.

Our Technology Transfer/ Commercialisation Program has been further developed through the strategic planning process conducted throughout 2002-03. The Technology Transfer strategy document was approved by the CRC for Construction Innovation's Governing Board Meeting on 5 March 2003. The aim of the program is to enhance the transfer of research outputs into commercial or other outcomes of economic, environmental or social benefit to Australia.

The three guiding principles in achieving this are:

- *to ensure intellectual property management and strategies for commercialisation are targeted to potential commercial opportunities*
- *to transfer public good research outcomes to our partners, the construction industry and the broader Australian community*
- *to ensure that smart and streamlined systems are utilised to effectively manage research activities in a focussed and targeted manner, allowing easy identification and exploitation of commercialisation opportunities.*

Project Completion Strategies

In order to provide technology transfer and commercialisation direction early in our research activities, Construction Innovation has developed a process called Completion Strategies. Project Completion Strategies are being implemented to ensure the effective utilisation of our research outputs. Six to nine months prior to the completion date of a project, the Development Manager meets with the Project Leader and others to develop the completion strategy. This document comprehensively outlines the opportunities to exploit research outputs for the given project. This includes further research opportunities, beta testing of technologies or systems, professional development training opportunities, pathways into curriculum for the University and VET sector, and dissemination into the property and construction industry.

Technology Transfer Reference Group

We are developing a Technology Transfer Reference group. A workshop is planned for early 2003-04 to inform and seek feedback from key stakeholders on the strategies and ask for their participation in the program.

Once the results of the workshop have been fed into the Technology Transfer Program, approaches will be made to interested people to form a Technology Transfer Reference Group which will advise and make recommendations to the Board.

SMEs

The small to medium size enterprises (SME) sector is a major stakeholder in the Australian property and construction industry. Construction Innovation has already made in-roads into the SME sector through discussions and by forging links with organisations such as the Australian Construction Industry Forum (ACIF), Construction Queensland, Construction Training Queensland and Construction Training Australia. These organisations represent SME firms and will be a major conduit for disseminating Construction Innovation research outcomes to the property and construction industry.

Technology Transfer Activities

During 2002-03, the Technology Transfer activities have centred on the development of the Technology Transfer strategy, interactions with industry partners and public presentations. The strategy development has now been approved by Construction Innovation's Governing Board, and it includes extensive transfer activities leading from Construction Innovation industry partners through to the industry at large and the community.

Activities already undertaken with Construction Innovation industry partners include project-based workshops imparting knowledge gained through the research process. The dissemination of interim reports to project participants and regular project and program workshops have occurred throughout the year, with the goal of briefing partners of developments to date. In addition, a number of public presentations have been undertaken by key personnel to national and international conferences and Industry Association meetings and workshops. The first Construction Innovation book titled "Measuring up to Success: Creating a Benchmarking Service for the Australian Construction Industry" was published and a number of articles in refereed journals and industry trade magazines have also been published. We have gained media coverage in the Courier Mail, The Australian, The Sydney Morning Herald, and The Australian Financial Review, and have had airtime on regional radio stations for our work primarily in Environment Sustainability.



*Measuring Up To Success:
Creating a Benchmarking
Service for the Australian
Construction Industry
Edited by Graham Brewer*

construction innovationus and paperwork eight



Carole Green

is Business Manager with responsibility for the financial and contractual management of this CRC and its relationship with partners and the Commonwealth.



Michelle Coillet

is Education/Technology Transfer Officer with responsibility for education and training, and technology transfer strategies.



Kate Finlayson

is Communications Officer with responsibilities for media coverage, communication strategies and marketing.



Lauren Gubbin

is Research Officer with responsibilities for administration of the research program.

The CRC for **Construction Innovation** completed staff recruitment in 2002-03 and now has a full team servicing our five program areas: Research, Education and Training, Communication, Commercialisation and Administration.

Meet the team at Construction Innovation headquarters.

Dr Keith Hampson

is Chief Executive Officer of CRC for Construction Innovation with responsibility for overall management and reporting to the Governing Board



Peter Scuderi

is Development Manager with responsibility for our research programs and maximising the value of research outputs, commercialisation, and education and training strategies and implementation.



Brad Warner

is Finance Officer with responsibilities for financial administration and reporting of Centre activities and projects.



eight stafftables

The following table of Specified Personnel reflects the revised list included in the Commonwealth Agreement variation currently in circulation to Participants. The changes reflect the restructuring of the Research Program from five programs to three.

Title and Name	Contributing Organisation	% Working Time in CRC*	% Actual Time for Yr 02/03	Role in Centre
Professor Keith Hampson	CRC for Construction Innovation	100%	100%	CEO
Ms Carole Green	CRC for Construction Innovation	100%	100%	Business Manager
Mr Peter Scuderi	CRC for Construction Innovation	100%	100%	Development Manager
Professor Dennis Lenard	University of Newcastle	50%	34.9%	Program Director, Research Committee
Dr Peter Newton	CSIRO	50%	59%	Program Leader, Research Committee
Professor Tony Sidwell	Queensland University of Technology	50%	71.2%	Program Director, Research Committee, Project Leader
Mr Robin Drogemuller	CSIRO	50%	63.2%	Platform Director, Research Committee, Project Leader
Mr Don Allan	Queensland Department of Public Works	20%	11.6%	Deputy Program Director, Research Committee
Mr Ken Stickland	Arup Australasia	20%	4.4%	Deputy Program Director, Research Committee
Mr Gerry Shutt	John Holland	20%	18.1%	Deputy Program Director, Research Committee
Professor Mary-Lou Maher	University of Sydney	50%	36.8%	Research Committee, Project Leader
Ms Jeanette Clough	Rider Hunt	20%	2.5%	Deputy Platform Director, Research Committee
Professor Derek Walker	RMIT	50%	55.5%	Research Committee, Project Leader
Professor Chen Swee Eng	University of Newcastle	50%	18.8%	Project Team Member
Professor Jane Marceau	University of Western Sydney	10%	4.3%	Project Team Member
Mr John Oliver	Rider Hunt	22%	21.1%	Rider Hunt Projects Coordinator, Chair, Research Committee
Mr John Spathonis	Queensland Department of Main Roads	50%	17.3%	QDMR Projects Coordinator, Research Committee
Mr Dale Gilbert	Queensland Department of Public Works	10%	14.3%	QDPW Projects Coordinator, Research Committee

*In accordance with schedule 5 of the Commonwealth Agreement effective from 1 January 2003.

Arup Australasia

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Peter Bowtell	R	0.7%	0.7%	-	-	0.7%	-	-	-	-
Orla Coyle	R	0.2%	-	-	0.2%	0.2%	-	-	-	-
Dennis Dunn	R	0.8%	-	-	0.8%	0.8%	-	-	-	-
Richard Hough	R	10.0%	1.2%	3.2%	1.5%	6.8%	-	-	-	3.2%
Bruce Johnson	R	0.5%	-	-	0.5%	0.5%	-	-	-	-
Richard Karagania	R	0.3%	-	-	0.3%	0.3%	-	-	-	-
Emlyn Keane	R	2.4%	-	-	2.4%	2.4%	-	-	-	-
Simon Makeham	R	2.1%	-	-	2.1%	2.1%	-	-	-	-
Paul Raddatz	R	2.4%	-	-	2.4%	2.4%	-	-	-	-
Haico Schepers	R	0.2%	-	0.2%	-	0.2%	-	-	-	-
Sheldon Sherman	R	9.4%	-	-	9.4%	9.4%	-	-	-	-
David Singleton	A	1.0%	-	-	-	-	-	-	-	1.0%
Greg Smith	R	0.2%	-	0.2%	-	0.2%	-	-	-	-
Ken Stickland	A	4.4%	0.5%	0.5%	0.5%	1.5%	-	-	-	2.9%
PC Thomas	R	2.5%	-	1.3%	-	1.3%	-	-	-	1.2%
John Tsoukas	R	6.0%	0.5%	-	5.5%	6.0%	-	-	-	-
TOTAL CONTRIBUTED (% of PERSON YEARS)		43.2%	2.9%	5.4%	25.6%	34.9%	0.0%	0.0%	0.0%	8.3%

Bovis Lend Lease

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Richard Bate	R	8.3%	2.7%	2.7%	2.9%	8.3%	-	-	-	-
Ian Downes	R	1.6%	0.5%	0.6%	0.5%	1.6%	-	-	-	-
Des Dykes	R	2.7%	-	2.7%	-	2.7%	-	-	-	-
Brian McCloy	R	1.6%	-	-	1.6%	1.6%	-	-	-	-
Mark McSweeney	R	1.4%	-	-	1.4%	1.4%	-	-	-	-
Caroline Noller	R	0.7%	0.3%	0.3%	0.1%	0.7%	-	-	-	-
Lucie Roberts	R	0.7%	-	0.7%	-	0.7%	-	-	-	-
Gavin Stubbs	A	13.9%	-	-	-	0.0%	-	-	-	13.9%
TOTAL CONTRIBUTED (% of PERSON YEARS)		30.9%	3.5%	7.0%	6.5%	17.0%	0.0%	0.0%	0.0%	13.9%

DEM

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Peter Droege	A	0.6%	-	-	-	-	-	-	-	0.6%
Nanette Illing	A	0.5%	-	-	-	-	-	-	-	0.5%
David Slinn	A	1.5%	-	-	-	-	-	-	-	1.5%
TOTAL CONTRIBUTED (% of PERSON YEARS)		2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.6%

John Holland

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Peter Adlem	R	3.3%	-	-	1.5%	1.5%	1.1%	-	-	0.7%
Ric Barton	A	3.9%	-	-	-	-	-	-	-	3.9%
Chris Evans	R	4.0%	-	-	3.7%	3.7%	-	-	-	0.3%
Glenn Palin	A	0.2%	-	-	-	-	-	-	-	0.2%
Richard Pugh	A	0.3%	-	-	-	-	-	-	-	0.3%
John Reddie	R	1.0%	-	-	1.0%	1.0%	-	-	-	-
JH Miscellaneous	R	2.6%	0.8%	-	-	0.8%	-	-	-	1.8%
Gerry Shutt	A	18.1%	4.7%	-	-	4.7%	-	-	-	13.3%
TOTAL CONTRIBUTED (% of PERSON YEARS)		33.2%	5.5%	0.0%	6.2%	11.7%	1.1%	0.0%	0.0%	20.5%

eight staff tables

Kennards Hire

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Peter Lancken	A	0.03%	-	-	-	-	-	-	-	0.03%
TOTAL CONTRIBUTED (% of PERSON YEARS)		0.03%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.03%

Rider Hunt

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Stephen Ballesty	R	4.6%	-	-	4.6%	4.6%	-	-	-	-
Simon Broderick	R	15.6%	-	-	15.6%	15.6%	-	-	-	-
Mark Burrow	R	0.2%	-	-	-	-	-	-	-	0.2%
Eddie DeWett	R	0.5%	-	-	0.5%	0.5%	-	-	-	-
Nicholas Ferrara	R	4.1%	-	-	4.1%	4.1%	-	-	-	-
Tim Forster-Wright	R	4.1%	-	-	4.1%	4.1%	-	-	-	-
Kevin Goh	R	0.3%	-	-	0.3%	0.3%	-	-	-	-
Mimy Huynh	R	3.0%	-	-	3.0%	3.0%	-	-	-	-
Ian Kaye	R	0.1%	-	-	0.1%	0.1%	-	-	-	-
Russell Martoo	R	0.1%	-	-	0.1%	0.1%	-	-	-	-
Ewen McDonald	R	0.1%	-	-	0.1%	0.1%	-	-	-	-
John Oliver	R	21.1%	-	-	16.3%	16.3%	-	-	-	4.8%
Joel Shearer	R	0.6%	-	-	0.6%	0.6%	-	-	-	-
Reginald Streifler	R	3.8%	-	-	3.8%	3.8%	-	-	-	-
Steve Weatherhead	R	0.7%	-	-	0.7%	0.7%	-	-	-	-
Michael Williamson	R	0.9%	-	-	0.9%	0.9%	-	-	-	-
TOTAL CONTRIBUTED (% of PERSON YEARS)		59.9%	0.0%	0.0%	54.9%	54.9%	0.0%	0.0%	0.0%	5.0%

Springfield Land Corporation

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Ralph Fuller	R	3.4%	-	3.4%	-	3.4%	-	-	-	-
David Henry	R	6.8%	-	6.8%	-	6.8%	-	-	-	-
Andrew Whitson	R	4.5%	-	4.5%	-	4.5%	-	-	-	-
TOTAL CONTRIBUTED (% of PERSON YEARS)		14.7%	0.0%	14.7%	0.0%	14.7%	0.0%	0.0%	0.0%	0.0%

Woods Bagot

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
David Marchant	R	4.0%	0.4%	0.4%	1.3%	2.1%	-	-	-	1.9%
Caroline Mitchell	R	1.2%	-	1.0%	-	1.0%	-	-	-	0.3%
Kanyarat Nemprem	R	0.4%	-	0.1%	0.3%	0.4%	-	-	-	-
TOTAL CONTRIBUTED (% of PERSON YEARS)		5.6%	0.4%	1.5%	1.5%	3.4%	0.0%	0.0%	0.0%	2.1%

Australian Building Codes Board

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Brian Ashe	R	16.8%	-	9.8%	-	9.8%	2.0%	-	-	5.0%
Ivan Donaldson	R	2.5%	-	2.5%	-	2.5%	-	-	-	-
Matthew Patterson	R	50.7%	-	44.7%	-	44.7%	-	1.0%	-	5.0%
TOTAL CONTRIBUTED (% of PERSON YEARS)		70.0%	0.0%	57.0%	0.0%	57.0%	2.0%	1.0%	0.0%	10.0%

Building Commission

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Rob Enker	A	3.9%	-	1.7%	-	1.7%	-	-	-	2.3%
Roger Frith	R	8.7%	4.3%	0.3%	0.5%	5.0%	-	-	-	3.7%
Moshe Gilovitz	R	2.6%	2.0%	-	-	2.0%	-	-	-	0.6%
Dennis Hogan	R	1.9%	-	-	1.9%	1.9%	-	-	-	-
Peter Nassau	R	2.0%	-	-	1.9%	1.9%	-	-	-	0.1%
Jeff Norton	R	8.3%	2.3%	1.9%	-	4.2%	-	-	-	4.1%
TOTAL CONTRIBUTED (% of PERSON YEARS)		27.3%	8.6%	3.8%	4.3%	16.6%	0.0%	0.0%	0.0%	10.7%

Queensland Department of Main Roads

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Bob Barrett	R	0.2%	-	-	0.2%	0.2%	-	-	-	-
Max Burrows	R	0.2%	-	-	0.2%	0.2%	-	-	-	-
Geoff Caldwell	R	1.8%	-	-	1.2%	1.2%	-	-	-	0.6%
Louise Chandler	R	0.2%	-	-	0.2%	0.2%	-	-	-	-
David Clifford	R	1.8%	1.8%	-	-	1.8%	-	-	-	-
Ricky Cox	R	0.1%	-	-	0.1%	0.1%	-	-	-	-
Narelle Daniels	R	0.1%	-	-	0.1%	0.1%	-	-	-	-
Ross Guppy	R	0.3%	0.3%	-	-	0.3%	-	-	-	-
Arthur Hall	R	0.1%	-	0.1%	-	0.1%	-	-	-	-
Steve Hogan	R	2.2%	-	-	2.2%	2.2%	-	-	-	-
Lisa Lewis	R	0.3%	-	-	0.3%	0.3%	-	-	-	-
Mano Manoharan	R	2.5%	-	-	2.5%	2.5%	-	-	-	-
Ian Paskins	R	0.1%	-	-	0.1%	0.1%	-	-	-	-
Julie Peters	R	1.3%	-	1.3%	-	1.3%	-	-	-	-
Neil Robertson	R	1.3%	-	-	1.3%	1.3%	-	-	-	-
Peter Rotolone	R	0.1%	-	-	0.1%	0.1%	-	-	-	-
Bill Semple	R	0.5%	0.5%	-	-	0.5%	-	-	-	-
Larry Silver	R	0.1%	-	-	0.1%	0.1%	-	-	-	-
John Spathonis	A	17.3%	1.2%	-	5.7%	6.9%	-	-	-	10.4%
Mike Swainston	R	1.6%	0.9%	-	0.7%	1.6%	-	-	-	-
Glen Swalling	R	0.1%	-	-	0.1%	0.1%	-	-	-	-
Peter Syson	R	0.1%	-	-	0.1%	0.1%	-	-	-	-
Graeme Tessier	R	2.8%	2.8%	-	-	2.8%	-	-	-	-
David Thorpe	R	17.9%	1.8%	-	10.1%	11.9%	-	-	-	6.0%
John Ward	R	0.3%	0.3%	-	-	0.3%	-	-	-	-
Justin Weligamage	R	16.1%	-	-	16.1%	16.1%	-	-	-	-
Dennis Wogan	A	3.8%	-	-	-	-	-	-	-	3.8%
David Wright	R	0.2%	0.2%	-	-	0.2%	-	-	-	-
TOTAL CONTRIBUTED (% of PERSON YEARS)		72.7%	9.7%	1.3%	41.0%	52.0%	0.0%	0.0%	0.0%	20.7%

eight staff tables

Queensland Department of Public Works

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Don Allan	A	11.6%	3.7%	-	-	3.7%	-	-	-	7.9%
Ron Apelt	R	1.7%	-	1.3%	-	1.3%	-	-	-	0.4%
Michael Ball	R	0.6%	-	0.6%	-	0.6%	-	-	-	-
Craig Carpenter	A	1.1%	0.5%	-	-	0.5%	-	-	-	0.6%
Selwyn Clark	R	2.4%	-	1.2%	-	1.2%	-	-	-	1.2%
John Collin	R	7.9%	-	-	7.9%	7.9%	-	-	-	-
Mervyn Cowley	R	8.4%	-	-	8.4%	8.4%	-	-	-	-
Jeff Davidson	R	0.2%	-	-	0.2%	0.2%	-	-	-	-
Keith Eaton	R	-	-	-	-	-	-	-	-	-
Keith Farr	A	2.9%	0.2%	-	0.3%	0.5%	-	-	-	2.4%
Dale Gilbert	A	14.3%	-	2.9%	2.8%	5.7%	-	-	-	8.6%
Bob Giles	R	0.9%	-	-	0.9%	0.9%	-	-	-	-
David Harrison	A	0.4%	-	-	-	-	-	-	-	0.4%
Mark Haug	R	3.1%	-	-	2.9%	2.9%	-	-	-	0.2%
Kay Janis	R	6.1%	1.2%	-	4.1%	5.3%	-	-	-	0.7%
Delwyn Jones	R	31.0%	-	28.9%	-	28.9%	-	-	-	2.1%
Karen Lyon-Reid	R	0.9%	-	-	0.9%	0.9%	-	-	-	-
Ken Moschner	R	8.4%	-	-	6.8%	6.8%	-	-	-	1.6%
Craig Pearman	A	1.0%	-	-	-	-	-	-	-	1.0%
Ray Potts	R	1.3%	-	-	1.1%	1.1%	-	-	-	0.2%
Roy Sargent	R	0.4%	-	-	0.4%	0.4%	-	-	-	-
Tony Sgroi	R	6.0%	-	-	6.0%	6.0%	-	-	-	-
Teng Hee Tan	R	3.4%	-	-	3.1%	3.1%	-	-	-	0.3%
Frank Turvey	A	2.2%	-	-	0.8%	0.8%	-	-	-	1.4%
TOTAL CONTRIBUTED (% of PERSON YEARS)		115.7%	5.6%	34.8%	46.5%	86.9%	0.0%	0.0%	0.0%	28.9%

Queensland Department of State Development

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Tammy Bacon	R	0.6%	0.6%	-	-	0.6%	-	-	-	-
Terry Gibson	R	0.9%	0.9%	-	-	0.9%	-	-	-	-
Mike Hefferan	A	2.2%	-	-	-	-	-	0.3%	-	1.9%
Neal Muller	R	3.5%	3.0%	-	-	3.0%	-	-	-	0.5%
Rob Wilcox	R	7.5%	6.0%	-	-	6.0%	-	-	-	1.5%
TOTAL CONTRIBUTED (% of PERSON YEARS)		14.8%	10.6%	0.0%	0.0%	10.6%	0.0%	0.3%	0.0%	3.9%

CSIRO

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Michael Ambrose	R	41.6%	-	30.0%	10.2%	40.2%	-	-	-	1.3%
Steven Brown	R	1.3%	-	1.3%	-	1.3%	-	-	-	-
Ivan Cole	R	6.0%	-	4.8%	-	4.8%	-	-	-	1.3%
John Crawford	R	36.2%	-	2.7%	31.3%	34.0%	-	-	-	2.3%
Angelo Delsante	R	1.3%	-	1.3%	-	1.3%	-	-	-	-
Lan Ding	R	78.8%	-	50.4%	28.4%	78.8%	-	-	-	-
Robin Drogemuller	R	63.2%	0.3%	7.9%	43.3%	51.5%	-	-	-	11.7%
Greg Foliente	R	6.2%	-	3.4%	-	3.4%	-	0.3%	-	2.5%
Shawn Foo	R	18.0%	-	-	18.0%	18.0%	-	-	-	-
Wayne Ganther	R	2.5%	-	2.5%	-	2.5%	-	-	-	-
Chloe Heath	A	0.7%	-	-	-	-	-	-	-	0.7%
David Johnston	R	60.9%	-	60.9%	-	60.9%	-	-	-	-
Larry Little	A	9.7%	-	-	-	-	-	-	-	9.7%
Grace Mitchell	R	4.2%	-	4.2%	-	4.2%	-	-	-	-
Stephen McFallen	R	21.5%	12.2%	9.2%	-	21.5%	-	-	-	-
Cheryl McNamara	R	47.4%	-	-	47.4%	47.4%	-	-	-	-
Sherif Mohamed	R	10.1%	3.1%	-	3.0%	6.1%	-	1.0%	1.8%	1.3%
Peter Newton	R	54.0%	-	54.0%	-	54.0%	-	-	-	-
Phillip Paevere	R	15.8%	-	12.8%	-	12.8%	-	-	-	3.0%
Lam Pham	R	33.9%	-	33.3%	0.6%	33.9%	-	-	-	-
Kwesi Sagoe-Crenstil	R	1.0%	-	1.0%	-	1.0%	-	-	-	-
Steven Shaw	R	20.9%	-	-	20.9%	20.9%	-	-	-	-
Paul Tilley	R	27.9%	-	-	23.2%	23.2%	-	-	-	4.8%
Gerry Trinidad	R	13.3%	-	8.3%	5.0%	13.3%	-	-	-	-
Selwyn Tucker	R	43.6%	-	41.1%	1.2%	42.3%	-	0.1%	0.2%	1.0%
Kowk-Keung Yum	R	41.4%	-	-	41.4%	41.4%	-	-	-	-
TOTAL CONTRIBUTED (% of PERSON YEARS)		660.9%	15.6%	328.9%	273.8%	618.2%	0.0%	1.4%	2.0%	39.4%

Newcastle University

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Graham Brewer	R	51.3%	37.5%	-	8.8%	46.3%	1.3%	-	-	3.8%
Prof Chen Swee Eng	R	18.8%	6.4%	1.3%	9.8%	17.5%	-	-	-	1.3%
Thayaparan Gajendran	R	20.0%	16.3%	-	3.8%	20.0%	-	-	-	-
Rod Gameson	R	19.3%	-	-	14.0%	14.0%	-	4.4%	0.9%	-
Marcus Jeffries	R	16.9%	8.0%	-	2.5%	10.5%	-	-	-	6.4%
Chris Landorf	R	3.0%	3.0%	-	-	3.0%	-	-	-	-
Dennis Lenard	R	34.9%	29.9%	-	2.5%	32.4%	-	-	-	2.5%
Kerry London	R	7.7%	5.3%	-	-	5.3%	-	-	2.4%	-
Jamie MacKee	R	4.5%	-	4.5%	-	4.5%	-	-	-	-
Willy Sher	R	10.5%	0.2%	-	7.8%	8.0%	-	1.8%	0.7%	0.1%
Tony Williams	R	3.8%	3.7%	-	-	3.7%	-	-	-	0.1%
TOTAL CONTRIBUTED (% of PERSON YEARS)		190.7%	110.2%	5.8%	49.1%	165.1%	1.3%	6.2%	4.0%	14.0%

University of Western Sydney

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Paul Berry	R	1.3%	-	1.3%	-	1.3%	-	-	-	-
Russell Cooper	R	0.8%	0.8%	-	-	0.8%	-	-	-	-
Alan Jeary	R	11.8%	-	-	10.6%	10.6%	-	0.5%	-	0.7%
John MacFarlane	A	1.0%	-	-	-	0.2%	-	-	-	0.9%
Jane Marceau	R	4.3%	4.3%	-	-	4.3%	-	-	-	-
Graham Miller	R	3.7%	-	1.2%	-	1.2%	-	-	-	2.5%
TOTAL CONTRIBUTED (% of PERSON YEARS)		22.9%	5.1%	2.4%	10.6%	18.3%	0.0%	0.5%	0.0%	4.1%

eight staff tables

QUT

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
John Bell	R	11.6%	-	9.1%	-	9.1%	-	-	-	2.5%
Terry Boyd	R	34.1%	0.3%	-	27.7%	28.0%	0.3%	0.9%	-	4.9%
Richard Brown	R	1.5%	-	1.5%	-	1.5%	-	-	-	-
Sam Buculo	R	0.9%	-	0.9%	-	0.9%	-	-	-	-
Albert Chan	R	6.4%	-	-	6.4%	6.4%	-	-	-	-
Nur Demirbilek	R	1.3%	-	1.3%	-	1.3%	-	-	-	-
John Gough	A	0.8%	-	-	-	-	-	-	-	0.8%
Matthew Humphreys	R	7.5%	-	-	7.5%	7.5%	-	-	-	-
Milan Jamriska	R	0.8%	-	0.8%	-	0.8%	-	-	-	-
Stephen Kajewski	R	19.8%	-	-	19.3%	19.3%	-	0.3%	-	0.3%
Anthony Maeder	A	3.2%	-	-	-	-	-	-	-	3.2%
Lidia Morawska	R	2.0%	-	2.0%	-	2.0%	-	-	-	-
Stuart Ross	R	15.0%	-	-	15.0%	15.0%	-	-	-	-
Steve Rowlinson	R	16.8%	10.7%	-	5.6%	16.3%	0.1%	0.1%	0.1%	0.1%
Tony Sidwell	R	72.7%	8.9%	-	46.1%	55.0%	-	-	-	17.6%
Martin Skitmore	R	3.3%	-	-	3.3%	3.3%	-	-	-	-
Ned Wales	R	0.6%	-	0.6%	-	0.6%	-	-	-	-
Rod Wissler	A	1.5%	-	-	-	-	-	-	-	1.5%
Jay Yang	R	4.0%	-	3.7%	-	3.7%	-	-	-	0.3%
TOTAL CONTRIBUTED (% of PERSON YEARS)		203.6%	19.8%	19.9%	130.9%	170.7%	0.4%	1.3%	0.1%	31.1%

RMIT

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
John Dalrymple	R	2.5%	-	-	2.5%	2.5%	-	-	-	-
Saman de Silva	R	15.0%	-	5.0%	10.0%	15.0%	-	-	-	-
Andrew Finnegan	R	13.0%	13.0%	-	-	13.0%	-	-	-	-
Arun Kumar	R	42.0%	-	1.3%	33.5%	34.8%	3.5%	-	-	3.7%
Bill Martin	R	5.3%	5.3%	-	-	5.3%	-	-	-	-
Sujeeva Setunge	R	27.9%	-	1.3%	26.0%	27.3%	-	-	-	0.6%
Ashish Shah	R	100.0%	-	-	100.0%	100.0%	-	-	-	-
Derek Walker	R	55.5%	45.0%	-	10.5%	55.5%	-	-	-	-
Andrew Wilson	R	100.0%	100.0%	-	-	100.0%	-	-	-	-
TOTAL CONTRIBUTED (% of PERSON YEARS)		361.0%	163.3%	7.5%	182.4%	353.2%	3.5%	0.0%	0.0%	4.4%

University of Sydney

Name	Main Activity	Total % of Time	Program A	Program B	Program C	Research Total (%)	Education (%)	External Comms. (%)	Commercialisation (%)	CRC Admin. (%)
Kirsty Beilharz	R	9.4%	-	6.9%	-	6.9%	-	-	-	2.5%
Andy Dong	R	5.0%	-	5.0%	-	5.0%	-	-	-	-
John Gero	R	32.0%	-	8.4%	19.9%	28.3%	1.3%	-	-	2.5%
David Gunaratnam	R	0.8%	-	-	0.8%	0.8%	-	-	-	-
Vladimir Kazakov	R	7.5%	-	-	7.5%	7.5%	-	-	-	-
Mary Lou Maher	R	36.8%	-	16.8%	12.5%	29.3%	1.3%	-	-	6.3%
Gary Moore	A	2.6%	-	-	-	-	-	-	-	2.6%
Rabee Reffatt	R	16.8%	-	-	16.7%	16.8%	-	-	-	-
Mike Rosenman	R	14.5%	-	13.0%	1.5%	14.5%	-	-	-	-
Julia Rosenblatt	R	25.0%	-	-	25.0%	25.0%	-	-	-	-
TOTAL CONTRIBUTED (% of PERSON YEARS)		150.2%	0.0%	50.1%	83.8%	133.9%	2.5%	0.0%	0.0%	13.8%

Staff Table 2 – CRC Paid Program Staff

Name	Employing Organisation	Main Activity	Total % of Time	% Spent on Research Program				% Spent on Education Program	% Spent on External Comm.	% Spent on Commercialisation	% Spent on CRC Administration
				Subprogram			Total on Research				
				A	B	C					
Michael Ambrose	CSIRO	R	22.5	-	-	22.5	22.5	-	-	-	-
Robert Bergman	QUT	R	55	-	55	-	55	-	-	-	-
Xaser Bilda	US	R	1	-	1	-	1	-	-	-	-
Aletha Blayse	UWS	R	8.3	8.3	-	-	8.3	-	-	-	-
Fanny Boulairé	CSIRO	R	29	-	-	29	29	-	-	-	-
Peter Boxhall	CSIRO	R	2.5	-	2.5	-	2.5	-	-	-	-
Angela Bradbury	CSIRO	R	9	-	9	-	9	-	-	-	-
Dedi Budiawan	QUT	R	15	-	-	15	15	-	-	-	-
Fiona Cheung	QUT	R	25	25	-	-	25	-	-	-	-
Betul Dal	CSIRO	R	50	-	-	50	50	-	-	-	-
Jesse de Leon	CSIRO	R	25	-	-	25	25	-	-	-	-
Stephen Egan	CSIRO	R	100	-	-	100	100	-	-	-	-
Shawn Foo	CSIRO	R	75	-	-	75	75	-	-	-	-
Rodney Fraser	QUT	R	4	-	-	4	4	-	-	-	-
Emad Gad	CSIRO	R	50	-	50	-	50	-	-	-	-
Peter Goldsmith	RMIT	R	100	100	-	-	100	-	-	-	-
Ms Carole Green	CRC HQ	A	100	3.3	3.3	3.3	10	10	10	15	55
Ling Gu	US	R	35	-	-	35	35	-	-	-	-
Dr Keith Hampson	CRC HQ	R	100	8.3	8.3	8.3	25	10	20	20	25
Janine Irons	QUT	R	75	-	-	75	75	-	-	-	-
Julie Jupp	US	R	9	-	9	-	9	-	-	-	-
Vladimir Kazakov	US	R	15	-	15	-	15	-	-	-	-
Rosemary Kennedy	QUT	R	80	-	-	80	80	-	-	-	-
Katie Kieth	UWS	R	50	-	-	50	50	-	-	-	-
Mijeong Kim	US	R	5	-	5	-	5	-	-	-	-
Phillip Kimmet	QUT	R	25	-	-	25	25	-	-	-	-
Loretta Kivlighon	CSIRO	R	100	-	50	50	100	-	-	-	-
Paksan Liew	US	R	66	-	-	66	66	-	-	-	-
Oliver Yi Lin	RMIT	R	75	-	-	75	75	-	-	-	-
John Mabb	QUT	R	25	-	25	-	25	-	-	-	-
Kathryn McCabe	UNC	R	100	100	-	-	100	-	-	-	-
Judith McCann	RMIT	R	100	50	-	50	100	-	-	-	-
Kevin McDonald	CSIRO	R	50	-	-	50	50	-	-	-	-
Karen Manley	QUT	R	50	50	-	-	50	-	-	-	-
John Mashford	CSIRO	R	75	-	-	75	75	-	-	-	-
Deb Messer	QUT	R	17	-	-	17	17	-	-	-	-
Daniyal Mian	QUT	R	25	-	-	25	25	-	-	-	-
Wei Peng	US	R	21	-	21	-	21	-	-	-	-
Anthony Piyatrapoomi	RMIT	R	100	-	-	100	100	-	-	-	-
Patreeya Prasertsittikul	RMIT	R	25	-	-	25	25	-	-	-	-
Ebony Rea	RMIT	R	50	50	-	-	50	-	-	-	-
Todd Remmers	CSIRO	R	4	-	-	4	4	-	-	-	-
Julio Rosenblatt	US	R	50	-	50	-	50	-	-	-	-
Mr Peter Scuderi	CRC HQ	R	100	20	20	20	60	10	10	10	10
Seongwon Seo	CSIRO	R	100	-	100	-	100	-	-	-	-
Tony Sheng-yu Shih	US	R	2	-	2	-	2	-	-	-	-
Len Stevens	CSIRO	R	2.5	-	2.5	-	2.5	-	-	-	-
Marcelo Tonelli	QUT	R	25	-	-	25	25	-	-	-	-
Archim Weippert	QUT	R	100	-	-	100	100	-	-	-	-
Angela Williams	CSIRO	R	30	-	30	-	30	-	-	-	-
Andrew Wong	QUT	R	19	-	-	19	19	-	-	-	-
TOTAL CRC			2377	415	459	1298	2172	30	40	45	90

Staff Table 3 – Summary of Contribution in Person Years

	Total Equiv. Person Years	Person Years Spent on Research Program				Person Yrs Spent on Education	Person Years Spent on External Comm.	Person Years Spent on Commer- cialisation	Person Years Spent on CRC Admin.
		Subprogram			Total on Research				
		A	B	C					
TOTAL CONTRIBUTED	20.8	3.6	5.4	9.2	18.2	0.1	0.1	0.1	2.3
TOTAL FUNDED BY CRC	23.8	4.1	4.6	13.0	21.7	0.3	0.4	0.5	0.9
GRAND TOTAL	44.6	7.8	10.0	22.2	39.9	0.4	0.5	0.5	3.2
Proportion of total professional staff resources	100%	17%	22%	50%	90%	1%	1%	1%	7%

Staff Table 4 – Support Staff

(1) Contributed No. Staff (person years)	
Rider Hunt	0.03
Qld Department of Public Works	0.14
Newcastle University	0.14
Qld University of Technology	0.16
TOTAL	0.47

(2) CRC Funded (person years)	
CRC National HQ	3.3
Prog. Admin Support	1
TOTAL	4.3

nine construction innovation patent and publish

The early stage of CRC for **Construction Innovation** has provided a strong foundation for future publications and intellectual property, and development and protection of intellectual property.

In 2002-03 Construction Innovation published one book rising out of early research project completions. It is anticipated that with the completion of additional research projects in 2003-04 there will be a significant increase in refereed publications and identified intellectual property.

Books and Refereed Journal Articles

- Brewer, G (ed) Measuring up to success: *Creating a Benchmarking Service for the Australian Construction Industry*, 2003, CRC for Construction Innovation
- Manley, K. 'Frameworks for Understanding Interactive Innovation Processes', *International Journal of Entrepreneurship and Innovation*, February 2003.
- Walker, DHT and Hampson, KD, *Procurement Strategies: A Relationship-Based Approach*, Blackwell Science, Oxford, 2002

Refereed Conference Papers

- Alwi, S; Hampson, KD and Mohamed, S, "Non Value-Adding Activities: A Comparative Study of Indonesian and Australian Construction Projects", *International Group of Lean Construction Conference*, Gramado-Brazil, pp627-638, 6-8 August 2002
- Alwi, S; Hampson, KD and Mohamed, S, "Waste in the Indonesian Construction Project", *First International Conference of CIB-W107 – Creating a Sustainable Construction Industry in Developing Countries*, Cape Town, 11-13 November 2002
- Boyd TP, *Property Cash Flow Studies: Focusing on model consistency and data accuracy*, Pacific Rim Real Estate Society, Australia, January 2003
- Boyd TP, *What will the Next Buyer Pay? The Key to Investing in Property*, Queensland Property and Lifestyle, 4: Summer 2003, pp 12-15.
- Cowley M, *Forecasting Trends in the Brisbane Central Business District Office Market*, Pacific Rim Real Estate Society, Australia, January 2003
- Drogemuller, RM; Hampson, KD; and Yum, KK, *An IT Infrastructure for Long Term Research and Development at the CRC for Construction Innovation*, Proceedings CIB W78 Conference – Construction IT Bridging the Distance, University of Auckland, New Zealand, 23-25 April, 2003, pp113-120
- Goldsmith, PW and Walker, DHT, *Strategic Approach to Information Communication Technology Diffusion – An Australian Study*, CI -Construction Research Council Construction Institute – ASCS in Hawaii in 2003
- Hampson, KD; Drogemuller, RM and Manley, KJ, *Building an ICT Infrastructure for a National Research Centre*, eSMART Conference, Salford University, Manchester, 18-21 November, 2002
- Irons JJ and Armitage LA, *The Future of Office Property*, Pacific Rim Real Estate Society, Australia, January 2003
- Li, DeSilva and Kumar, A, *A Hybrid Deterministic-Probabilistic Approach for Pavement Deterioration Modeling*, 7th International Conference on Applications of Advance Technology in Transportation, Massachusetts, USA, August 3-5, 2002

- Li, DeSilva and Kumar, A, *A Life Cycle Model for Asset Investment Decision Making*, 7th International conference on Application of Advance Technology in Transportation, Massachusetts, USA, 3-5 August 2002
- Piyatrapoomi, A, Setunge, S, Kumar, A, *Framework for Investment Decision-Making under Risk (Reliability) and Uncertainty for Infrastructure Asset Management*, RTE Volume, USA, accepted for publication January 2003
- Tucker SN, Ambrose MD, Johnston DR, Newton PW, Seo S and Jones DG, *LCADesign: An Integrated Approach to Automatic Eco-efficiency Assessment of Commercial Buildings*, CIB W078 conference, Auckland, New Zealand, April 2003

Conference Papers

- Boyd, T, *The Real Value of Triple Bottom Line: Institutions, Social Metrics and the Market*
- Foliente, Greg, Presentation of Project *Smart Building for Healthy and Sustainable Workplaces*, Smart Building Workshop, Sydney, 23 May 2003
- Hampson, Keith, University of Salford Conference, Manchester, UK, 18-20 November 2002
- Manley, K. and McFallan, S., 'Innovation Adoption Behaviour in the Construction Sector: The Case of the Queensland Road Industry', *2nd International Conference on Innovation in Architecture, Engineering and Construction*, Loughborough University, United Kingdom, 25-27 June 2003.
- Manley, K. and McFallan, S., 'Knowledge Flows in the Road Industry: Queensland's Experience', *21st ARRB and 11th REAAA Conference*, Cairns, Australia, 18-23 May 2003.
- McCarthy, John, *Building for Growth in Australia: Industry Reform and Cooperative Research*, Rethinking Construction Conference, UK, 3 February 2003
- Newhouse, Kevin (ABCB), Green Building Council Conference, Sydney, June 2003
- Ross, S, *The Role of Decision-maker Preferences in Tenancy Selection of CBD Office Accommodation; Preliminary literature review*, delivered at the PRRES conference, January 2003, Brisbane, Australia
- Rowlinson, Steve, Presentation to CMP Research Seminar: Queensland Teams and Culture, 14 April 2003
- Rowlinson, Steve, Presentation to CRC CI Workshop: Construction Project Delivery Strategies – Rowlinson, Steve, Value in Project Delivery System: Facilitating a Change in Culture, 10 April 2003

Keynote Speaker

- Hampson, Keith, Keynote Address, *The Unholy Alliance: Collaboration and Innovation in Property and Construction*, Facility Managers Annual Conference, Sydney, 8 May 03
- Manley, K. and Swainston, M., *Innovation Processes: A Case Study of the Queensland Road Industry*, Harnessing Innovation in the Pursuit of Competitive Advantage, Sydney, February 12-14, 2003
- Newton, PW, *Green Building Innovation: the CRC CI's Program of Research for Sustainable Built Assets*, Green Building Conference, Sydney, June 2003

International Visitors

- 11 June – 29 August 2002 Professor Peter Brandon, The University of Salford, UK
- 9 September – 8 November 2002 Professor John Bennett, University of Reading, UK

Industry and Academic Presentations by CRC for Construction Innovation

Presentations by Dr Keith Hampson, CEO of CRC for Construction Innovation:

- 1 July 02 – Queensland University of Technology Corporate video
- 25 July 02 – Queensland Department of Innovation and Information Economy
- 16 August 02 – Queensland Investment Corporation
- 30 August to 3 September 2002 – Department of Civil and Environmental Engineering, and Centre for Integrated Facility Engineering (CIFE), Stanford University, and Senior Technology Manager from Bechtel Construction. Advanced opportunities for international collaboration.
- 5-6 September 2002 – MIT, Boston, Centre for Technology, Policy and Industrial Development, Department of Civil and Environmental Engineering, and Department of Architecture.
- 11 September 2002 – Construction and Innovation Global Competitiveness Seminar, Cincinnati, Ohio, CIB Organisation and Management of Construction. Presented to Task Group 47 – Innovation Brokerage in Construction as founding member of group on R&D policy development in the Australian property and construction industry and progress through CRC for Construction Innovation.
- 8 October 02 – Philips Fox – Law, Sydney
- 11 November 2002 – VTT Building and Transport Research Group, Espoo, Finland. Advanced opportunities for international collaboration.
- 12 November 2002 – National Technology Agency of Finland (TEKES), and Finish Association of Building Owners and Construction Clients (RAKLI).

- 14 November 2002 – Department of Trade and Industry, London, UK.
- 14 November 2002 – Movement for Innovation (M4i), London, UK. Advanced opportunities for international collaboration.
- 15 November 2002 – Department of Construction, Management and Engineering, University of Reading, Reading, UK.
- 18 November 2002 – The University of Salford, Manchester, UK. Advanced opportunities for international collaboration.
- 19 November 2002 – University of Manchester, Institute of Science and Technology (UMIST), CIB Task Group 47 – Innovation Brokerage in Construction activities.
- 4 December 02 – Neumann Contractors, Brisbane
- 20 February 2003 – Lund University, Sweden – CIB Meeting. Confirmed support for CRC for Construction Innovation being highlighted as a case study chapter in upcoming *International Innovation Brokers in Construction* publication.
- 24/25 February 2003 – The Stanford Centre, Berlin – Inaugural meeting of Foundation Partners of the International Construction Alliance (ICALL) with key representatives from Stanford University, The University of Salford, VTT and CSTB. Signed Memorandum of Understanding for international collaboration for initial period of three years.
- 9 April 03 – Queensland Department of Housing
- 16 April 03 – Queensland Department of Public Works re Iconic Demonstration Project
- 27 May 03 – *Technology Gateway: Driving Technology for Competitive Advantage*, Techlink, Canberra
- 4 June 03 – Stanford University presentations
- 5 June 03 – Lawrence Berkeley National Laboratories, Berkeley, CA
- 19 June 03 – Brisbane City Council Advisory Board Presentation.

Presentations by Peter Scuderi, Development Manager of CRC for Construction Innovation:

- 19 September – ABCB Technical Summit in South Australia
- 9 October – Addresses the CRC for Construction Innovation Retreat.
- 25 November – University of Western Sydney Research Opportunities
- 10 December – University of Sydney Research Opportunities
- 6 February – RMIT Research Opportunities
- 17 February – ABCB Workshop
- 20 May – UDIA Queensland Chapter

ten construction innovation present, relate, communicate

*The Australian property and construction industry comprises 230,000 firms employing 740,000 employees. This past period has seen considerable interest from organisations as to the activities of the CRC for **Construction Innovation**. In most instances Construction Innovation has provided information packs highlighting our activities and the leading partners and where significant industry associations have provided large group access for Construction Innovation to outline its role in research development, and education and training transfer for the property and construction industry. Keynote presentations and invitations to present at various industry and professional conferences and workshops have increased substantially this past twelve months as the relevance of Construction Innovation is better clarified in the industry. For example, a keynote presentation to the Facility Management Association (FMA) in Sydney in June 2003 provided an audience of 150 people with substantial interest and ongoing follow-up from FMA members for involvement in Construction Innovation activities.*

The development of our public website and provision of presentation material on-line for interested parties to download has provided a strengthened arm to our community education and technology transfer role.

Media Presentations, Press Releases and Interviews

In 2002-03 Construction Innovation designated our communications role to full-time status for the first time. With this change of emphasis, our media and communications activities have been vastly expanded and are further allowing us to meet the outputs of our External Communications Strategy. We have also developed and are continually refining our Internal Communications Strategy, designed to honour our partners and be a medium for information diffusion, internal reports and publications.

Internally, our communications achievements include:

- A bi-monthly newsletter for research leaders, researchers, partners and key stakeholders on CRC for Construction Innovation containing internal news and research and reporting requirements and achievements, with a members-only distribution of 250
- Our intranet site continues to grow to absorb all reporting requirements, news, member details, presentations, and is increasingly the focal point of all of our researchers
- Continued relationship building with partner organisations, including joint media releases, presentations, information sharing, etc
- Organisation and promotion of Research Conference for members only, held July 2003

Externally, our communication achievements include:

- Development and production of a new-look, new-audience target, bi-monthly hard copy/e-newsletter (1st Edition June 2003) about the CRC for Construction Innovation, its partners and its research projects, for a national and international audience, with a distribution of 2500 and growing
- Production and print of our first book (for sale) which is based on a final report from the research project *Critical Success Factors for ICT Mediated Supply Chains*. The book is called 'Measuring up to Success: Creating a Benchmarking Service for the Australian Construction Industry' and is edited by Graham Brewer from the University of Newcastle
- Design, production and print of our primary brochure describing CRC for Construction Innovation activities, titled 'Building our Future', for dissemination to stakeholders, interested parties and the broader community
- Design, production and print of our first Strategic Plan 2003-2008 brochure for dissemination to stakeholders and interested parties
- Development of Corporate-look PowerPoint slides, for use by all partner members to the CRC for Construction Innovation
- Design and production of two new corporate posters on CRC for Construction Innovation for member use at conferences, presentations, seminars, etc

- Decision to alter the branding of our name, from CRC CI to CRC for **Construction Innovation**, where Construction Innovation is the shortened version, for marketing, promotional, literature and media purposes
- Continual refinement of our website to include more current, relevant and easy-to-access information for a broader audience, and is being further developed as a text only version for accessibility by the sensory impaired.
- Numerous public presentations and keynote addresses to conferences and small audiences
- Creation of 'sister web sites', logos and brochures by three research projects intent on spreading the message about their projects and creating dissemination benchmarks (*Environmental Assessment Systems for Commercial Buildings; Innovation Potential, Direction and Implementation in the Building and Construction Product System; Value in Project Delivery Systems: Facilitating a Change in Culture*)
- promotional material including pens, mugs, card holders and caps, all with CRC for Construction Innovation logo, are being dispersed amongst stakeholders, partners and interested persons.
- Numerous articles in print, electronic, and broadcast media to specialist audiences and the broader community, as demonstrated below:

Print

- July 2002, **Cooperative Research Centre for Construction Innovation – Building design innovation** *Building Science Forum of Australia – NSW Division*, John Oliver
- 9 July 2002, **IT builds a better system**, *The Australian*, Keith Hampson
- July 2002, **Building a better world** *The Courier-Mail*, Keith Hampson
- July 2002 **World-first software cuts costs**, *ausinvent*, Keith Hampson
- July/August 2002 **Innovative estimating tool embodies efficiency** *Building Australia Magazine*, Keith Hampson
- July/August 2002 **New research centre unveils design innovation** *Inside QUT*, Keith Hampson, Federal Science Minister Peter McGauran
- July/August 2002 **Software saves energy costs** *Energy – Source and Distribution*, Keith Hampson
- August 2002 **Communications solution for building-site workers** *National Building News Monthly* Keith Hampson
- August 2002 **Communication solution for building-site workers** *bsfaNews*, Keith Hampson
- August 2002 **BCA introduces national energy efficiency measures in push towards sustainability** *Building Australia*
- December 2002 **Arup becomes founding partner of Construction Innovation Centre** *Arup Profile*

December 2002 **New research into 'smart building' will make workplaces healthier** *National Building News Monthly* Keith Hampson, Greg Foliente

December 2002 **New research into 'smart building' to make workplaces healthier** *The Designer* Keith Hampson, Greg Foliente

December 2002 **New research for healthier workplaces** *Connections* Keith Hampson, Greg Foliente

Summer 2003 **Smart building** *SPECnews #32*

January/February 2003 **The Value of buildings** *Building Australia* Keith Hampson, Terry Boyd, Merv Cowley

March 2003 **Innovation** *Connections* Keith Hampson

15 March 2003 **Hunt is on for healthy buildings** *The Age* Stephen Brown, Keith Hampson

17 March 2003 **Hunt for toxic office cure** *West Australian* Steve Brown, Keith Hampson

17 March 2003 **Sick of work? It could be the building** *Sydney Morning Herald* Steve Brown, Keith Hampson

April 2003 **Chairman of the board...and loving it** *Building Australia* John McCarthy

April 2003 **The BLIS Project: Driving the building and construction industry towards integration** *FM Magazine* Keith Hampson, Robin Drogemuller

1 April 2003 **Construction CRC in international alliance** *Australian R&D Review* Keith Hampson

May 2003 **An interview with Dr Keith Hampson, CEO, Cooperative Research Centre for Construction Innovation** *FM Magazine* Keith Hampson

May 2003 **Art and Science: building functionality** *QMB Magazine* Keith Hampson, Terry Boyd

May 2003 **CRC already driving innovation in the Australian construction industry** *National Building News Monthly*

May 2003 **DISCOVER smart, sustainable housing** *The Compass – New Directions in Queensland Industry* Jay Yang

May 2003 *Environment Business*

24 May 2003 **Students building blueprint for future** *The Courier-Mail* Jay Yang

May/June 2003 **Hidden Injuries: Exposing environmental impacts of commercial buildings** *Building Australia* Keith Hampson, Peter Newton

Autumn 2003 **The CRC for Construction Innovation CRCs: Success through innovation** Alan Jeary

June 2003 **Briefs** *Building Australia Magazine* Keith Hampson

9 June 2003 **Students discover design first** *Queensland Times (Ipswich)* Jay Yang, David Henry

11 June 2003 **Students get sustainable** *Satellite Newspaper (Sherwood-Centenary)* Jay Yang, David Henry

27 June 2003 **Construction Innovation Researcher wins medal** *infolink.com.au* Dale Gilbert, Keith Hampson

Radio

11 February 2003 **Building a safer Australia** *Paddington Radio*, NSW talking to Alan Jeary

17 March 2003 **Smart buildings** *3AK Melbourne Radio Drive*, Vic talking to Keith Hampson

17 March 2003 **Smart buildings** *ABC Radio Darwin Drive*, NT talking to Keith Hampson

17 March 2003 **Smart buildings** *ABC Radio Adelaide Drive*, SA talking to Keith Hampson

17 March 2003 **Smart buildings** *ABC Statewide NSW Drive*, NSW talking to Keith Hampson

19 March 2003 **Smart buildings** *612 ABC Radio Brisbane Morning Show*, Qld talking to Keith Hampson

20 March 2003 **Smart buildings** *ABC West Queensland (Longreach) Morning Show*, Qld talking to Keith Hampson

Press Releases

5 July 2002 **Communication solution for building-site workers**

14 November 2002 **New research into 'smart building' will make workplaces healthier**

29 November 2002 **Workshops on sustainability and the Building Code of Australia**

11 February 2003 **Building a safer Australia** *Joint release CRC for Construction Innovation and CRCA*

28 March 2003 **CRC for Construction Innovation already driving innovation in the Australian Construction industry**

28 March 2003 **Enjoying world player status in the new International Construction Research Alliance (ICALL)**

28 March 2003 **Australia ensures world player status as founding member for International Construction Research Alliance (ICALL)**

6 May 2003 **QUT scholar to study green building** *Springfield Lakes' Greensmart Village* *Joint release CRC for Construction Innovation and Springfield Lakes*

19 May 2003 **QUT develops first sustainable housing development** *Joint release CRC for Construction Innovation and QUT*

20 May 2003 **CRC's safeguard Australia** *Joint release CRC for Construction Innovation and CRCA*

25 June 2003 **Sustainability still a dirty word in residential development**

26 June 2003 **Construction Innovation researcher wins medal**

30 June 2003 **Need a public toilet? Find one using a way-finding tool**

CD Rom

10 June 2003 **Smart solutions, smart state** *Queensland Government* (CRC for Construction Innovation Contributor)

Conferences/Awards Sponsored

CRC for Construction Innovation sponsored the *Pacific Rim Real Estate Society (PRRES)* conference January 2003. PRRES is an annual conference that brings together the main researchers in property in the Pacific Rim region. The attendance was approximately 120 researchers and included several American and European presenters. We also sponsored a presentation delivered by Construction Innovation Project Leader Professor Terry Boyd for partner organisations and interested community members on project outcomes from Evaluation of Functional Performance in Commercial Buildings. The presentation was delivered by the research team at Queensland University of Technology in May 2003 to an audience of forty.

eleven **construction innovation** grants and awards

To supplement the existing commitments from industry, government and research partners to the CRC for **Construction Innovation** we have embarked on a program of additional grants and awards applications with some success.

The Information Technology Online (ITOL) Program has provided a partnership with a telecommunications developer, B-Site, with some developing funding from which Construction Innovation will benefit through a funded research and benchmarking activity as the technology is road-tested on a Bovis Lend Lease construction site in 2003-04.

Additional applications for further funding through the Innovation Access Program have been submitted with results to be announced in the next period.

We have recently submitted a number of industry award submissions, the outcomes of which will be known during 2003-04.



Dale Gilbert, Queensland Department of Public Works, and member of Construction Innovation's Research Committee, was recently awarded the Public Service Medal in the Queen's Birthday Honours. Mr Gilbert has been an active participant in the field of research and development in the property and construction industry for many years. He was awarded the medal for his 'outstanding public service in the field of built environment research'.

Construction Innovation Researcher Wins Medal

Dale Gilbert, a member of the Cooperative Research Centre for Construction Innovation, has been awarded the Public Service Medal in the Queen's Birthday Honours.

Mr Gilbert is a member of Construction Innovation's Research Committee, and has been an active participant in the field of research and development in the property and construction industry for many years.

He was awarded the medal for his 'outstanding public service in the field of built environment research'.

Dr Keith Hampson, CEO of Construction Innovation, says Mr Gilbert's medal highlights the industry's increased profile in the area of research and development. "Dale's award heralds a great moment for the research and scientific community of Queensland, and indeed Australia," Dr Hampson said.

*Infolink.com.au
27 June 2003*

construction innovationperformance indicators

twelve

The CRC for **Construction Innovation's** Research Program has been significantly restructured in 2002-03, from five to three program areas, each of which is underpinned by an Information and Communication Technology (ICT) platform. At the same time as the Research Program was being evaluated and redefined, Construction Innovation's Performance Indicators were also refined through the same consultative process.

The Performance Indicators addressed in this Annual Report 2002-03 are those agreed to in the current Commonwealth Variation.

QUALITY RESEARCH		2001-02	2002-03
1. Satisfaction of partners and users with research quality and value to industry	No indicator		The recent Executive Report Card interviews with Construction Innovation stakeholders have confirmed the broad satisfaction of partners and users with early results from research projects and early engagement in technology transfer activities. Some participants are providing increased in-kind support in recognition of the value of research to their business activities while others are focusing their efforts to ensure the benefits to their business activities are maximised.
2. Increase volume of research contribution to CRC			Participants have overall provided substantially increased levels of in-kind support in this our second year of operations compared to the inaugural year. We expect that year 3 will again surpass these early levels of in-kind contributions, reflecting increased confidence in the developed processes and relevance and satisfaction of the partners with the direction and management of the research initiatives.
3. Adoption of research results / Benefits of result by partners	As research is in initial stages, it is too early to demonstrate application of research to business. It remains Construction Innovation's objective to ensure all research programs demonstrate industry-readiness in outcomes. Feedback from industry following press coverage of prototype demonstration software at the CRC launch is very encouraging.		One significant adoption is the ABCB's utilisation of the environmental sustainability research outcomes from Project 2001-013-B to shape its recommendations for the Future Building Code of Australia. The recent seminar on Property Performance delivered by Professor Terry Boyd had strong participation from Partner representatives. The 2003/2004 year will see the trialling of several technologies and management systems within partner organisations. More substantial outcomes of Construction Innovation projects will emerge in the next period. However indications from preliminary results and track testing of initial outcomes on a number of our projects provides confidence that the adoption of research results will significantly benefit research users.

4. Increase national and international collaborations	<p>Construction Innovation sponsored a visit from Professor Peter Brandon from the UK's University of Salford in 2001-02. His visit is contributing to ensuring relevance of research to Australia's (and international) construction industry. Negotiations are in place for an international alliance with key educational partners in European and American universities, and for further International Visitors to spend time with Construction Innovation.</p> <p>One additional government agency has contributed towards a research project. Only those participants named in the Commonwealth Agreement have been involved in projects in the first year. It is expected that this will increase in year two.</p> <p>No additional collaborations were established in this first year of operation.</p> <p>It is too early for repeat collaborations to have occurred.</p>	<p>This year has seen the development of the Education / Training and Technology Transfer Programs including collaboration with several industry groups such as Construction Training Queensland, Master Builders Association and the International Alliance for Interoperability to name a few. This involvement ranges from participation in the Education or Technology Transfer Committee to providing on-the-ground support for industry technology transfer.</p> <p>International visitors through Professor Peter Brandon and Professor John Bennett contributed to international exposure and provided input to research projects, research management and strategic activities. The formalisation of the International Construction Research Alliance with European, Scandinavian and North American research institutes now provides the base for further targeting of international visitors and collaborations and will contribute to Construction Innovation's expanding international profile in the upcoming period.</p>
5. Increase in industry innovations and shifts in the knowledge base	<p>The specific project that will measure this has been delayed and will commence in January 2003.</p>	<p>One project contributing towards this is the BRITE project, which has the aim of promoting the incidence and quality of innovation in the Australian building and construction industry. In March and April 2004, an innovation survey will be undertaken covering strategies to maximise value-added and the generation of new ideas within the industry.</p>
6. Increased recognition of the CRC's contribution to improved standards of design and construction	<p>Standards are being addressed in some of the research projects but it is too early for the contribution to be quantified.</p>	<p>One significant adoption is the ABCB's utilisation of the environmental sustainability research outcomes from Project 2001-013-B to shape its recommendations for the Future Building Code of Australia.</p> <p>The other very significant the development of specifications for IFC standards that has been undertaken in Project 2001-007-C. The researchers have developed specifications for 30 new IFCs that have now been included in the <i>2X2 IFC Specification</i>. This specification will ultimately be developed into IFC software by the International Alliance for Interoperability. This is a global organisation developing IFC for the industry in its adoption of object oriented technology. It is also important to note that of the 300 IFCs in existence, project 2001-007-C uses 100 of them.</p>
7. Contribution by CRC participants in developing public policy initiatives	<p>This remains an aim of Construction Innovation however in its first year of operation participants had little involvement in public policy initiatives.</p>	<p>The value of projects that have QDPW, QDMR, ABCB and BC indicate we are making a strong contribution to public policy. In addition, Professor Tony Sidwell's projects in Program Area C major input to public procurement decisions.</p>
8. Strength of collaboration achieved in research development between researchers and industry		<p>This is exemplified in the policy of each research project, whereby there must be a minimum of two researchers and two organisations from industry and/or government. The Research Conference and upcoming Second Year Review will highlight the strong nature of the research/research user interface. This has been achieved in an industry renowned for its traditional cynicism of research.</p>
9. External recognition of CRC for Construction Innovation as a leader in collaborative and innovative research in Australia		<p>Inquiries from community members, industry personnel and journalists has increased significantly via phone, email, and face-to-face about the CRC for Construction Innovation and associated projects.</p>

EDUCATION & TRAINING		2001–02	2002–03
1. Uptake of Construction Innovation inputs to curriculum	Nothing		With the establishment of the Education and Training Advisory Group in the next period, uptake of Construction Innovation inputs into curriculum will increase markedly.
2. Co-supervision of students by industry partners	Both students who are currently enrolled are working towards securing an industry supervisor.		All nine CRC scholars have industry supervisors. The three scholarships in the process of being filled at the end of the year also have nominations for industry supervisors who provide valuable perspective from research users.
3. Uptake of Construction Innovation Research Scholarships by quality candidates	AS two students were enrolled in 2001 financial year, it is too early to report on their completion dates. A further three scholarships have been advertised and another five scholarships will be advertised in 2002-03.		Nine scholarships have been granted to date. The total is now seven PhD scholars (one deferred until September 2003) and two Masters by Research scholars. One more PhD and two more Masters by Research scholarships will be granted early next year.
4. Growth in numbers of industry users involved in research training	It is difficult to assess this at this early stage.		Two scholars were selected from our industry partner organisations following rigorous selection interviews, one each from QDPW and QDMR. It is a requirement that each scholar has an industry associate supervisor from the CRC for Construction Innovation partners.
5. Number of alliances delivering Construction Innovation research outputs to industry			There are no alliances delivering research outputs yet, but 2003/2004 will see a significant increase due to the Education and Training and Technology Transfer programs being developed. Project Outcomes will be delivered to industry via in-house training courses, professional development courses, curriculum development and industry workshops. Organisations like Construction Training Queensland, ACIF and others will partner with the CRC for Construction Innovation to deliver these outcomes.
6. Growth in value of research training sponsorship awarded by government and industry for research and/or study related to CRC projects	Five scholarships worth \$30 000 each were made available in 2001-02. To date, two of these have been taken up. A further five \$30 000 scholarships have been confirmed for 2003.		Nine scholarships have been granted to date. Each scholarship is worth \$30,000 a year, which includes a \$24,000 stipend and a \$6,000 allowance for support such as project management and applied research management skills. Two of the nine scholars are also receiving top up salaries or assistance from their employers during the period of their scholarships.

EXTERNAL COMMUNICATION		2001–02	2002–03
1. Press releases raising profile of Construction Innovation and its partners in the promotion of collaboration and innovation	12 articles were published in the media during 2001-02.		13 press releases were distributed to specialist and general media, resulting in 25 articles and 7 radio interviews
2. Growth in impact of publications recognised as key by industry and academic partners	6 articles in refereed journals were published. One book for industry was produced in 2001-02.		3 books and refereed journal articles. 13 refereed conference papers were presented. 26 articles/papers were published in industry-relevant publications in 2002-03. 2 books for industry was published in 2002-03.
3. Numbers of papers presented to national and international conferences and promotional activities	8 papers were presented at national and international conferences. A further 16 papers were presented at workshops.		56 papers were presented to national and international conferences, workshops and promotional activities by CRC staff and members.
4. Number of presentations to partners, industry and community groups	6 people presented at 8 conferences.		56 presentations were made in 2002-03.

COMMERCIALISATION	2001-2	2002-3
1. Diffusion activities undertaken by CRC audience indicated by number of project initiated seminars and workshops		21 project initiated seminars and workshops were held by 6 projects
2. Invitations as keynote speaker to industry conferences, seminars, etc	22 invitations were received for staff and participants to speak at conferences, workshops and other presentations.	Researchers from three Construction Innovation projects were invited to present as keynote speakers.
3. Increase in participation in industry, trade and academic conferences	CRC for Construction Innovation representatives participated in 25 industry and trade conferences	Representatives from CRC for Construction Innovation participated in 53 industry and trade conferences.
4. Increase in publications for industry users	One publication for industry was produced in 2001-02.	Since November 2002, a bi-monthly newsletter has been produced for CRC members, distributed to 250 people. As of June 2003, another bi-monthly newsletter was formed, distributed to a national and international audience of 2500. Executive Report Cards have been produced for partners on CRC activities and deliverables. Four brochures have been produced, including <i>Building our Future</i> , <i>Strategic Plan 2003-8</i> , <i>Project Summaries</i> , and <i>Biographies of the CRC Leadership Team</i> . One project has produced a brochure on their activities (<i>LCADesign</i>), and two projects have developed project-related websites for public access. One book has been published as a result of research outcomes, for sale to industry and the broader community. Our internet site is being constantly updated for industry and the broader community, and includes media releases, reports, presentations, news and projects.
5. Increase in number of media clippings / appearances		35 media clippings were produced in 2002-03, a substantial increase from last year. In addition, CRC personnel conducted 7 radio interviews. The CRC also provided footage/stills for a CD promoting Queensland as the Smart State.
6. Growth in income and industry uptake from commercialisation of IP	At this stage of establishment, no income has been received from commercialisation of IP.	At this stage of establishment, no income has been received from commercialisation of IP.

ADMINISTRATION	2001-2	2002-3
1. Satisfaction of Participant and Commonwealth with financial and research management systems		The CRC has initiated a formal rigorous reporting and feedback process (Executive Report Card) to report to each of the Participants progress highlighting areas of interest to each Participant. Written reports are followed by a face-to-face discussion which seeks feedback according to a specific agenda.
2. Effective Centre operations across all Commonwealth programs		The Executive Report Card process has confirmed an overall satisfaction of Participants with the Centre's operations across all program areas. Significantly, it was identified that the CRC is delivering increased profile for the CRC and its Participants. The Participants recognised the value of this promotion and support increasing promotion activities. The Commonwealth has indicated its satisfaction by acceptance of last year's Annual Report with only one specific comment referring to the need to increase in-kind contributions where shortfalls existed.
3. Collaborative transactions with industry or government partners, including research projects	One additional government agency has contributed towards a research project. Only those participants named in the Commonwealth Agreement have been involved in projects in the first year. It is expected that this will increase in year two.	We have had interest at proposal level from the Queensland Department of Health and have projects approved that include Construction Training Queensland, Australian Construction Industry Forum and Queensland Department of Housing. Third parties include Environment Australia on some of our environment activities, ACIF on our competitiveness and innovation work, the tele-technology company "B-Site" for our IT activities, and also Construction Training Queensland and Queensland Department of Housing on our Integrated Sustainable Housing Development project.
4. Growth in number of additional collaborations annually, particularly with industry	No additional collaborations were established in this first year of operation.	We have brokered two consultancies between our Researchers and a Commonwealth Department.
5. Growth in repeat collaborations with partners on projects and related activities	It is too early for repeat collaborations to have occurred.	Satisfaction level of partners is strong with existing partners confirming their on-going support and fresh interest from potential new partners.

