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## 03 CONTENTS

---

## 04 CHAIRMAN'S MESSAGE Peter North

---



---

## 06 THE WARREN CENTRE TODAY

---

06 Enduring Themes

07 Significant Outcomes

---

## 10 A BRIEF HISTORY

---

---

## 16 LOOKING FORWARD

---

---

## 17 MAJOR PROJECTS, MAJOR IMPACT

---

18 Marine Works for Bulk Loading

19 Local Area Networks

20 Computer-Aided Design

21 Management of Macro-Projects

22 Advanced Surface Mining Technology

23 Major Industrial Hazards

24 Winning by Design

25 Advanced Process Control

26 Preparing Australians for a Future with Technology

28 Economic Recycling and Conservation of Structures

30 Fire Safety and Engineering

32 Energy Management in the Process Industries

34 Engineering the Future with High Performance Computing

36 Underground Space

38 Industrial Energy Efficiency

40 Sustainable Transport in Sustainable Cities

42 Building Construction Technology Roadmap

44 Steel - Framing the Future

46 Low Energy High Rise

47 Professional Performance Innovation and Risk

---

## 48 CREATING LIVING NETWORKS

---

48 The Australian Microelectronics Network

48 Medical Device Network

49 Asia Pacific Smart Card Forum

49 Photonics in Australia

50 10,000 Friends of Greater Sydney

51 Embedded Systems



---

## 52 THE INNOVATION LECTURE SERIES

---

---

## 56 BUILDING AWARENESS

---

56 Electric Vehicles

56 Coal Bed Methane Extraction

56 Engineering Enterprise Growth

57 Syndicated Research & Development

57 Information Society Lectures

57 Australia's Great Engineers

57 Enterprise Innovation 2000

58 The Clusters Approach to Wealth Creation

58 Engineering Icons

60 Volunteer Awards

62 Innovation Hero Awards

64 The Rolls-Royce Qantas Award for Engineering Excellence

65 The Warren Centre - Corporate Patrons Program

66 Governor's Program

68 Qantas



---

## 69 CAST OF THOUSANDS

---

70 John Holland

71 Founding Committee

71 Centenary Committee

71 First Board of Directors

71 Patron

71 Chairmen

72 Current Directors

72 Past Directors

72 Honorary Governors

73 Executive Officers/General Managers

73 The Warren Centre Committee Members

75 Arup

76 Foundation Donors

78 Tyree

79 Donations to the Warren Centre Capital Fund

80 Key Professionals and Sponsors

90 Creating Living Networks

91 Building Awareness

92 Sponsors of Pushing the Envelope

# CHAIRMAN'S MESSAGE



Adjunct Professor Michael Dureau

Twenty-five years ago, in 1983, a dedicated group of visionaries launched Australia's first engineering-based strategic centre from within the University of Sydney.

Its aim was to address the challenges facing our country by harnessing the collective strengths of industry, academia and government.

Christened, The Warren Centre for Advanced Engineering, it was dedicated to the memory of Professor William Henry Warren, who gave the first engineering lecture in 1883 and went on to lead the Faculty of Engineering for its first 42 years.

Among his outstanding achievements was the founding of the Institution of Engineers Australia (Engineers Australia) where he was the first President.

The ambition of The Warren Centre, located within the Faculty of Engineering was to create an industry-led collaboration with academia and government in the form of temporary think-tanks that would analyse potential roadblocks and opportunities in Australia's progress to prosperity and sustainability.

This incredible intellectual force would be directed to developing innovative solutions based on advanced engineering, systems thinking and emerging technologies.

Our tag line, Networking Innovation, encapsulates our activities since that time and is the key to our success in the ambitious projects we have tackled since we invited Sir Alan Harris, the master planner of the D-Day invasion of France in 1944 and our first visiting fellow, to give the opening address.

## RESEARCH AND THE CREATION OF WEALTH

This book celebrates 25 years of outstanding achievement through projects that have changed the history of Australia and helped prepare us for the future. It is also a tribute to those individuals living and dead who built The Warren Centre and made it happen. In the past year we have farewelled Malcolm King AM, and have honoured Warren Centre pioneers Sandy Longworth, Hugh Ralston AM and Peter North AM.

In the first edition of this book Peter North captured succinctly The Warren Centre approach when he wrote:

"The book also pays tribute to the unique way in which the Centre undertakes its work, and the way in which every initiative undertaken is so dependent upon the commitment of individuals to the aims of the initiative and to the achievement of worthwhile outcomes.

"Each initiative involves the commitment and dedication of many highly skilled individuals from companies and the professions, almost all of whom volunteer their time and expertise. These initiatives also involve the commitment and dedication of many other volunteers who give their time freely and intensively to create and sustain an environment in which the assembled expertise can benefit from the Centre's unique culture, to help ensure they work productively and effectively towards pushing the envelope of the chosen topic."

As the new chairman of this prestigious and dynamic organisation, I acknowledge and thank Peter North and my board colleagues for the mentoring and support they have given me, and their commitment to the ongoing success of the Centre.

I would also like to acknowledge the incredible support of our corporate sponsors who understand the leadership given by The Warren Centre as an independent and objective centre of excellence.

To quote from one of my project directors in ABB/ALSTOM, "The way ahead is challenging but the road behind is strewn with solutions".

# PETER NORTH AM

When The Warren Centre for Advanced Engineering was conceived in 1979 Peter North AM FTSE was one of those visionary captains of industry who saw an opportunity to apply engineering systems thinking and innovation to national challenges hindering ongoing wealth creation and sustainability.

He led the successful fundraising committee, which provided a \$2 million foundation for the Centre's operations, and has been incredibly generous with his time and energy as a Board Director and Chairman since 1996. Peter's influence on the Centre's activities and programs has been profound.

In recent times he has been a driving force for the Professional Performance Innovation and Risk Project, the transition of The Warren Centre to a company limited by guarantee and the proposal to establish The Warren Centre Chair of Engineering Innovation.

Although he retired from the Board in December 2007 his wisdom and leadership will still be available as an Honorary Life Governor and a hero of The Warren Centre.

## Peter North AM

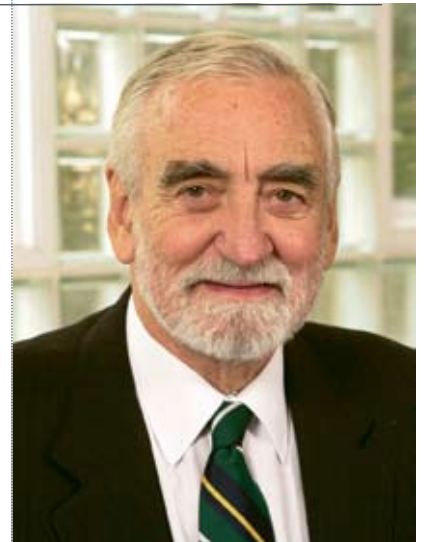
HONORARY LIFE GOVERNOR

CHAIRMAN 1996-2007

DIRECTOR 1982-2007

CHAIRMAN FUNDRAISING COMMITTEE 1981-1985

CENTENARY COMMITTEE FROM 1979



# THE WARREN CENTRE

## TODAY

### ENDURING THEMES – SIGNIFICANT OUTCOMES

Guiding the choice of projects undertaken by The Warren Centre over the last 25 years have been ten enduring themes. They still serve today as the criteria by which each new project is selected and they ensure that the contribution by The Warren Centre remains far-sighted, relevant and professional.

#### ENDURING THEMES

**1 UNIQUE FOOTPRINT:** The Centre sets out to ensure that whatever it proposes to undertake will make a unique footprint. This means in essence that the Centre specifically avoids operating in areas where the needed outcome is likely to be accomplished equally well by others.

**2 ENGINEERING PERSPECTIVE:** An integral part of the 'unique footprint' theme is that the Centre should seek to ensure that its initiatives and activities make a contribution from the engineering perspective.

**3 NATIONAL SIGNIFICANCE:** Each selected initiative or activity must deal with an issue of national significance and thus be likely to make a worthwhile contribution to technology and wealth creation.

**4 INDEPENDENCE AND OBJECTIVITY:** The Centre has developed a strong reputation of independence and objectivity. This is an important asset which enfranchises the Centre to work in many situations which might otherwise become too difficult because of the conflicting commercial and/or professional interests of those most closely associated with the issues. Hence, an essential criterion in selecting an initiative or activity is that this reputation is preserved and enhanced.

**5 SELF-INTEREST:** Experience has shown that the most practical way to ensure the viability of an initiative or activity is to ensure that it is effectively supported and funded by those with a special interest in the issue and in the outcome of the Centre's work. This provides an important measure of the commercial significance of the issue and the initiative. At the same time, the approach must ensure that notwithstanding this self-interest of the participants, the initiative or activity does not compromise - and preferably enhances - the Centre's reputation for independence and objectivity.

**6 CHAMPIONS:** Every initiative or activity must have a Champion who is strongly committed to the issue and is prepared to play the necessary leadership role until the initiative or activity is well-established and fully operational. A central feature of the Champion's role is to be the principal advocate of the issues involved and of the importance of exploring them. It is however equally important that the Champion be responsive to the concerns and perspectives that emerge once the 'leading edge' participants become involved.

**7 OPERATIONAL LEADERSHIP:** In major undertakings, it is important to set in place from the outset strong operational leadership, both for the undertaking as a whole and for its principal component parts. Such leadership helps to ensure that the project aims and themes are maintained with integrity and helps to deal effectively with the inevitable fragmentation in the roles, geographies and interests of individual contributors characteristic of a typical project team.

**8 AMBITIOUS AIMS:** In working within a typical Warren Centre project, the 'leading edge' specialists usually bring unique individual perspectives which, when considered together, invariably lead to important advances in their shared knowledge. It is therefore important to ensure that the project scope and aims are able to respond effectively to the opportunities and potential technology advances thus presented.

**9 FINITE LIMITS:** It is important to set a relatively fixed timeframe for each project to ensure its aims and scope remain focused on the core issues. Having met its main objectives, the degree and significance of a project's 'unfinished business' will then determine whether it should be further pursued, and by whom.

**10 OPEN INTELLECTUAL PROPERTY:** In major projects, all participants must be prepared to table without fee or royalty their intellectual property, on the basis that apart from the centre's exclusive initial publication rights, the intellectual property generated within a project is freely available to all participants.



## CENTENARY COMMITTEE

The Engineering Centenary Committee first met on 11 June 1980, under Chairman Dr Keith Brown, a former Deputy General Manager of CSR. There were twenty Founding Members of the committee, including six Professors of the Faculty and engineers from a wide range of industry backgrounds.

After several months of meetings, a clear concept of a unique institution emerged, with the central objective of...

fostering excellence and innovation  
in advanced engineering  
in all fields of Australian engineering.

The concept was later described by Peter North, Appeal Chairman, at the launch of the fundraising appeal:

“ The Centre's role will be to bring together for short periods, under distinguished Visiting Fellows, selected groups of experienced, practising engineers from industry, experts from Australia and overseas, and research and teaching engineers. Each Project Group thus formed will be committed, by a decision of the Centre's governing body, to focus on particular aspects in selected fields, important to the development of engineering skills in Australia.

The duration of each Project Group's work will vary, but generally, it will be in the range of two to six months. The approach taken by each Project Group will also vary, but essentially, the aims of each Group will be to:

- ▼ Consolidate existing know-how from industry, research and training in their particular field, both from within Australia and from overseas
- ▼ Discuss and study advanced engineering techniques in that field
- ▼ Develop an improved understanding of the approaches that need to be taken to particular problems in engineering and technology in that field
- ▼ Disseminate the outcome of their deliberations and work, through seminars and demonstrations, open to engineers and technicians from all parts of Australian engineering and industry. ”

The Centenary Committee decided that there would be a small permanent staff under a faculty Professor as part-time Executive Director. The Faculty agreed to locate the Centre within the Faculty buildings and to fund the Executive Director position.

Under the draft constitution proposed by the Centenary Committee, the relationship between the Centre and the University was to be quite unusual: it would be an independent institute affiliated with the Faculty, with its relationship with the University and the Faculty set out to ensure it would remain independent and committed solely to 'fostering excellence and innovation in advanced engineering'.

To ensure that these aims would be achieved and persist, the constitution provided for the Board to comprise a majority of industry representatives and to be empowered to undertake 'the entire control, management and conduct of the business and affairs of the Centre'. Moreover, the constitution explicitly stated that its provisions could only be changed by a proposal from the Board, thus ensuring that any changes would be agreed by the Board's industry majority. The draft constitution was approved by the University Senate without change.

In the early 1990s, the financial pressures on the University and the Engineering Faculty intensified and the constitution was modified so that the Centre would reimburse the Faculty for the services of the Executive Director. In most other respects, the principal provisions of the original constitution and its related arrangements remain in place.

In developing the funding strategy, the Centenary Committee decided to raise sufficient capital to provide investment income to cover the Centre's operating costs, but stipulated that each project should raise the funds needed for its own purposes to be achieved. This was seen as an important test of the value of each project, in terms of its relevance to the interests of the targeted segment of industry or the profession.

The Committee estimated that, in the dollar values of the early 1980s, the Centre's investment income would need to be of the order of \$200,000 per annum, so an appeal was launched to raise \$2 million in capital funds for investment.



### LANDMARKS ALONG THE WAY

There have been many notable landmarks as The Warren Centre has developed and grown. Most importantly, it has maintained its philosophy of 'pushing the engineering envelope' and 'working at the leading edge' and shifted its emphasis in response to evolving technologies and changing issues.

Of course, each major project has been by itself a significant landmark, reflecting the issues of the time and the remarkable insights achieved. Such outcomes have always been assured by the Centre's unique approach to developing and launching each project:

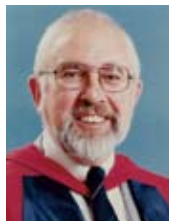
- ▼ Isolating a technological issue of contemporary importance to Australia
- ▼ Identifying the industrial, professional and academic expertise in the field, both in Australia and overseas
- ▼ Focusing the project scope narrowly on core aspects of the issue of critical self-interest to the participants
- ▼ Designing and guiding project tasks that lead to the sharing of existing expert knowledge in that field and the development of new knowledge and insights

### EXECUTIVE DIRECTORS' INFLUENCE

Over the years, the selection of projects has been inevitably opportunistic, identifying issues that were both significant at the time and capable of attracting the necessary professional and financial support. Nevertheless, the influence of each executive director during its first two decades has indelibly stamped the range of topics and issues that the Centre has pursued.

## 1982

#### Professor Bob Bilger



(pictured), who was deeply involved from the very beginning of the Centenary discussions and meetings, was appointed the first Executive Director in April 1982. Although his professional interests at that time were in the rapidly developing field of computer-aided design and manufacturing (CAD/CAM), he understood that the Centre's very first project should have a wide commercial appeal for existing and potential supporters, and help create a reputation for achieving outcomes of international significance. So he worked closely with two of the Faculty's civil engineers, Professor Emeritus John Roderick and Professor Denison Campbell-Allen, helping guide their development of the Marine Works project proposal.

Professor Bilger encouraged Professor Trevor Cole to join the Centre's project committee. This started a long relationship between Professor Cole and the Centre and led to the second project, Local Area Networks. Professor Bilger then, in his own professional field, initiated the CAD/CAM project, which created very significant improvements for Australia's ailing manufacturing industry.

## 1985

#### Professor Trevor Cole



(pictured) succeeded Professor Bilger as Executive Director in February 1985, starting the first of two terms, and immediately focused on new areas of interest.

Like Sir Alan Harris, Professor Cole's passionate interest was wealth creation through technology, and he gained approval for the Winning By Design project, the Centre's first attempt at taking a broader view of engineering by exploring issues such as 'gaining a competitive advantage', 'adding value' and 'making money' out of technology - a significant evolution of the Centre's thinking and the first of many projects and activities with this theme.

Most importantly, it has maintained its philosophy of  
'pushing the engineering envelope' and  
'working at the leading edge'

# 1986

## Associate Professor John Glastonbury



In July 1986, Engineering Dean, (pictured) took over from Professor Cole as Executive Director. The scope of project topics broadened even further during his seven years at the helm, reaching into such diverse areas as process control, the role of technology in education, recycling of buildings, and high-performance computing. Also included was

one of the Centre's most famous projects, Fire Safety and Engineering, which led to revolutionary changes in building design and management in Australia from 1989 onwards and which, more than a decade later, following the World Trade Center disaster in New York, continues to influence this field in Australia and overseas.

During Professor Glastonbury's term, The Warren Centre agreed to take over funding of the executive director position, thus helping the Faculty respond to increasing financial pressures brought about by the Federal Government's new university funding policies. The Centre also organised the establishment of the Chancellor's Scholarships to encourage talented students to pursue engineering, funded by some significant donors to the original Warren Centre fundraising appeal. During this time, the Centre involved itself in initiatives championed by Professor Glastonbury and Professor Cole, including the Australian Technology Park and the Australian Graduate School of Engineering Innovation.

# 1993

## Professor Trevor Cole

Returned as Executive Director in June 1993, and continued to lead the Centre along new paths. He developed and delivered Engineering Enterprise Growth, where the Centre played a key role helping smaller companies - particularly in the regional areas of NSW - adopt more effective approaches to manufacturing and business strategy. He also led the establishment of several industry networks that have become significant forces in the technological development and commercial success of the photonics, smartcard and microelectronics industries.

In the mid-1990s, the role of the general manager broadened, as the level of The Warren Centre activity increased and its breadth of interests expanded even further. As general manager, Angus Robinson took a leading role in initiatives culminating in the Underground Space project in 1995 and the Industrial Energy Efficiency project in 1998. He also initiated the Centre's interest in the debates on managing fresh water supplies for industry and agriculture and explored the role of field robotics in agriculture, mining and stevedoring. Angus Robinson's successor Robert Mitchell took a similar role from 1999 in the Sustainable Transport in Sustainable Cities project and in 2002 initiatives to rekindle the project proposal in the field of fresh water supplies. Professor Cole's second term as Executive Director saw in 1995 the first Warren Centre Innovation Lecture, which has since become an annual public event attracting significant audiences. Professor Cole also represented the Centre at the Commonwealth

Government's National Innovation Summit in 2000, and during 2001, initiated a major strategic review of the Centre's aims and approach. The strategic review confirmed the fundamental objectives set at the Centre's founding and led to the adoption of the Fields of Endeavour organisation structure aimed at ensuring that the Centre continues to operate effectively in the most relevant fields yet constantly refreshes its prime areas of interest and activity.

Another landmark was the establishment in 1997 of The Warren Centre Governors for Advanced Engineering program, which responded to two concerns: that the Centre needed to forge closer links with emerging technology-driven companies with their differing commercial and technical perspectives compared to those in industry generally; and that additional operating funding was needed to cover the increasing costs of the Centre's growth and broadened range of activities. By creating a unique network among technology leaders and convening regular activities in relevant fields, the Centre has successfully addressed both concerns.

# 2003

## Adjunct Professor Michael Dureau



The retiring Managing Director of ALSTOM Power, took up his appointment as Executive Director of The Warren Centre for Advanced Engineering in April 2003.

Mike Dureau has focused on building the influence of the Centre through strategic alliances with Engineers Australia, The Academy of Technological Sciences and Engineering, the Melbourne Business School and even the Californian Government in the US.

He has also concentrated on the promotion of Faculty research and expertise to his wide industry network (the Corporate Patrons Program is one such initiative)

## ROLE OF VOLUNTEERS

A central feature of The Warren Centre's operating approach has always been the voluntary resources provided by alumni, engineers and related professionals. The Board members act in an honorary capacity, and the Centre today has several standing committees consisting almost entirely of volunteers, who advise on and become involved in operating functions such as events, communications and finance, and strategic work in areas such as energy, sustainability and technology, ICT, manufacturing and innovation.

In addition, each project attracts many volunteers and pro-bono services from the leading professionals needed to carry out its work, and to help the management team raise the funds for other purchased services and expenses, including Visiting Fellows. In the largest project to date - Sustainable Transport in Sustainable Cities - the project team, led by volunteers, worked over a three-year period and included more than 200 leading-edge professionals providing their services without fee. This project also attracted three Visiting Fellows from overseas, including the chairman of the US President's Transport Research Board.



# MAJOR PROJECTS ▶▶▶▶▶▶▶▶

## MAJOR IMPACT

# 25

## YEARS OF INSPIRING RESULTS

The Warren Centre achieves its objectives primarily through its Major Projects.

The Warren Centre can - and does - have a major impact on the community, firstly by recognising (indeed often anticipating) its needs, and then by promoting the development of specialist engineering perspectives, based on thorough research, to meet those needs.



The Warren Centre's ability to provide a neutral forum is a real and very significant asset. For many projects, there were simply no other means by which stakeholders could meet, work together and effectively drive overall change.

Even in mature fields, such as structural engineering, opportunities exist for step change improvement. The success of The Warren Centre approach to projects is that we have accepted nothing short of that.



Each project has relied on a world-leading Visiting Fellow to bring insights and experience that complement local knowledge and there are considerable benefits in retaining the fruits of their collaborative effort in Australia, particularly where they can facilitate ongoing work in the field.

Projects provide an important opportunity to develop young professionals in the project topic and in management. For example, two Project Fellows were awarded the Young Transport Professional of the Year award by the Chartered Institute of Transport for their work on Warren Centre projects.



All the Warren Centre's Major Projects have grown from a perceived opportunity for Australia to improve its performance. The Centre's skill at bringing together leadership resources from industry, academia and government, and facilitating them through the project process, has led to the creation of new knowledge, the acceleration of technology transfer and many outcomes that have helped to create wealth in the nation.



The following pages document the objectives, outputs and known outcomes from each of the Centre's twenty Major Projects.

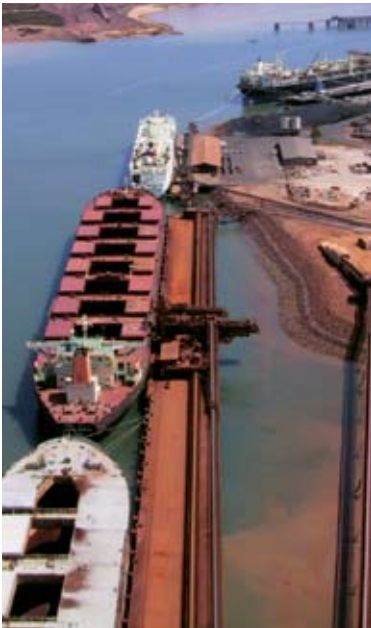
# Project

## MARINE WORKS FOR BULK LOADING

VISITING FELLOW: **Professor Sir Alan Harris**, CBE, UK

STEERING COMMITTEE CHAIRMAN: **Professor Denison Campbell-Allen**, University of Sydney

IN 1983, AUSTRALIAN COMMODITY EXPORTS, particularly coal, were facing severe competition. Costs and reliability of supply had become major concerns for our most important customer. The objectives of this project, therefore, were to study the operational techniques, transport systems and types of structure appropriate for Australian conditions used to move bulk materials from shore to ship berth.



**Above:** Iron ore vessels loading at Port Hedland which remains as one of Australia's largest iron ore exporting ports. Picture courtesy: Port Hedland Port Authority.

**Below:** Loading coal at Abbot Point, Bowen, Queensland. Picture courtesy: Ports Corporation Queensland.



## BROAD RANGE OF EXPERTISE

Eighteen people contributed papers that covered:

- ▶ The future of coal exports
- ▶ Developments in shipping
- ▶ The planning of bulk ports and offshore terminals
- ▶ Slurry technology, and slurry loading and unloading of ships
- ▶ The industrial relations implications of new marine works
- ▶ Best-practice design, maintenance and operational principles.

The broad thrust of the project was the transfer from shore to ship and the importance of links upstream and downstream in the transportation chain. However, the industrial relations climate prevailing in Australia could not be ignored. The project concentrated on coal because it was the highest export revenue generator, it was the most difficult material to handle and improvements made to coal handling could be transposed to other bulk materials to produce similar benefits.

## OPPORTUNITIES FOR IMPROVEMENTS

Against these circumstances, the project team revealed a number of technologies that had the potential to meet and overcome the above challenges. These included:

- ▶ **ACTIVE MOORING DEVICES** - The growth in vessel size and the associated development of offshore berths brought new demands on mooring systems. Active mooring devices could overcome many difficulties by increasing berth availability, but signal processing, servo control systems and improved devices for controlling mooring lines required further investigation.
- ▶ **BULK PORTS AND OFFSHORE TERMINALS** - The planning of bulk ports and offshore terminals generated major dilemmas about the dimensions of a maximum-sized ship with a life of several decades and the trade-off between capital investment and operating costs.
- ▶ **BEST PRACTICE** - The project outlined numerous best practice principles for future green-field developments as well as expansion of existing facilities.

## POSITIVE OUTCOMES AND BENEFITS

- ▶ The project brought together for the first time experts associated with the handling, transportation and export of bulk materials at a time of fierce competition
- ▶ It promoted a number of innovative ways for safer berthing and mooring of ships, even under extraordinary loading situations. These included the use of prestressed concrete in conjunction with expanded polystyrene foam, and novel caisson designs, with emphasis on the rapid repair and replacement of berths and moorings
- ▶ Its extensive survey of the maintenance and design requirements of wharves, jetties and ship loading structures produced a number of design recommendations that would lead to more efficient and reliable structures
- ▶ Leighton Holdings became aware of and purchased IPCO Marine, a rapid installation pier technology company, as a direct consequence of the project. This company proved to be very profitable for Leighton.

# Project LOCAL AREA NETWORKS



**Above:** Trading rooms make good use of LANs. Picture courtesy: Commonwealth Bank

VISITING FELLOW: **Dr John Limb**, Bell Laboratories, Murray Hill, New Jersey, USA  
 PROJECT LEADER: **Professor TREVOR COLE**, University of Sydney  
 PROJECT MANAGER: **GEOFF BUTLIN**, University of Sydney

**IN 1983, COMPUTING WAS DOMINATED** by the mainframe computer, the PC was only just becoming a reality. Communication was by “dumb” terminal access to the mainframe computers connected by low speed coaxial cables. A new technology was emerging, that of the local area network (LAN). This enabled a large number of terminals and computers to share and to communicate at much higher speeds.

## RECOGNISING IT NETWORKING POTENTIAL

The Warren Centre was quick to recognise the power and potential that emerging network information technologies held for commercial applications and other organisations. Such a network was Ethernet, which could operate at speeds of up to 10 megabits per second. Ethernet was just being deployed within the Faculty of Electrical Engineering and would make the power and services of its mainframe VAX1 1/780 computer more widely available. A Warren Centre project on LANs was therefore both topical and potentially of great impact.

The project brought together a broadly based team led by an international expert in the field of data networking, Dr John Limb. Its aim was to gather the latest information on emerging technologies and translate that information into solutions and opportunities relevant to Australia.

## DISTINGUISHED FIRSTS

The project gained strong involvement of academic staff in the Faculty of Electrical Engineering. It obtained the services of Geoff Butlin on secondment from the University as Project Executive Officer. Its case study approach provided relevance and significant engineering analysis and design. It also fully exploited emerging technology in its operations. In other words, “it walked the talk”.

Within its first year of activity, The Warren Centre was therefore “on the map” in relation to the Faculty of Engineering and the University of Sydney. It also made its mark for the first time in the burgeoning information technology industry, through a strategy that was to be repeated in numerous other fields with continued growing success.

## NEW KNOWLEDGE GUIDED DEVELOPMENT AND IMPLEMENTATION

The new knowledge generated by the LAN project led to a wide range of outcomes, developments and implementations that impact to this day:

- ▶ It clearly enhanced the profile of data networking in research and teaching within the University of Sydney
- ▶ The results of the case studies prompted significant change and investment within those organisations that offered themselves for the studies
- ▶ The Project Fellows considered the relationships that developed as well as the knowledge they acquired to be of long-term value
- ▶ A Project Fellow from AWA credited the project with stimulating the development and subsequent commercialisation by his company of a new Australian networking product, AWANET
- ▶ The presence in Australia of the leading international networking expert Dr Limb had consequences that spread beyond the project team. This standard was exploited commercially in Perth through a new company QPSX, which was eventually acquired by Telstra. Even today, the microelectronics and data community in Perth has many professionals who developed their skills within QPSX.

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# THE INNOVATION LECTURE SERIES ▶▶▶▶▶▶

The Innovation Lectures, which commenced in 1996, have played an important role in raising awareness of technology and innovation in Australian industry and in creating role models. Three central themes appear consistently and are supported by the experience of each of the eminent Australians who have delivered the Lectures. Those themes highlight the need for:

- A company champion or management team with the vision, mindset and desire to create a company with a global customer base for its products or services
- An organisational culture that actively encourages and supports innovation
- An ongoing desire to invest in knowledge and internationally targeted research and development, thus ensuring sustainable revenue streams and a competitive position into the future

In the very first lecture John Bertrand captured the essence of all presenters' thoughts when he stated Australia needed to add another core value to those we already held, namely the "development and acceptance of an innovative culture".

## 1996



DRIVING FORWARD AN  
INNOVATION CULTURE  
IN AUSTRALIAN  
BUSINESS & INDUSTRY

*"Australians need to embed  
Innovation into the core values I  
believe that we hold as a nation."*

### John Bertrand

Chairman, Industry Research and Development Board

Mr Bertrand impressed the need for Australians to embed a new value into the core values he believes we already hold as a nation.

He strongly suggested that we need to embrace and adopt technology and the development of an innovative culture, to ensure that Australia can sustain and enhance its economic prosperity and maintain its social welfare into the future.

He believes the key areas to focus on and make this happen include:

- ▶ An improvement in technology diffusion, whereby organisations take up new technology and use it in a wide range of applications
- ▶ Development of linkages, so that a firm sits at the centre of a web of contacts, relationships and information sources
- ▶ Increasing business investment in research and development, to improve a firm's current and future competitiveness

## 1997



INNOVATION DRIVES  
SUCCESS

*"Innovation is at the heart of business  
success. It is where newness, wealth  
creation and speed intersect."*

### Jerry Ellis

Chairman, BHP Limited

Mr Ellis maintained that innovation should be seen as the entire value creation process, and not be limited to the inventive element. It may in fact come from any part of a business.

He put forward four requirements for successful innovation:

- ▶ Patience, and the active management of the entire wealth-creation process.
- ▶ A supportive management team, with the willingness and ability to accept new paradigms
- ▶ The continual assessment and management of the risk-reward profile of an organisation's developments
- ▶ An entrepreneurial approach in analysing the business opportunities and markets for the innovation

He summarised by saying that Australia has had very few heroes in innovation, and that we need an educated population which values curiosity and approaches any subject with an open mind.



## 2005



### "WHERE'S WALDO?... TENIX'S GLOBAL SEARCH FOR INNOVATIVE SOLUTIONS"

*"Innovation is not just a concept, but a practice and process at Tenix."*

#### **Paul Salteri**

Group Managing Director of Tenix Limited

Mr Salteri described how innovation was "not just a concept, but a practice and process" at Tenix. It had allowed the group to establish itself as a technology force since it was hived off from the Transfield Group in 1997 as a separate entity. How we imbue a culture of innovation is the question to be asked by CEOs and Boards today.

Mr Salteri spoke of his belief in Australia as the "clever country", our successes and the imperative to continue producing them. The lecture linked the challenge of spotting a winning idea in a sea of opportunities to the philosophy of US writer Ralph Waldo Emerson: "If a man can make a better mousetrap than his neighbour, ... the world will make a beaten path to his door." To succeed, Mr Salteri said innovation must permeate throughout the culture of the organisation, through hard innovation (R&D) and soft innovation (partnering, risk management and people).

## 2006



### INNOVATION: CHILDHOOD DREAMS MADE REAL

*"If you have an idea and you believe it is possible, then do it."*

#### **Don Fry AO**

Owner and Chairman of AIMTEK

Mr Fry, one of Australia's leading innovators and most accomplished engineers, spoke with passion about how following his dreams has enabled him to achieve phenomenal success in delivering substantial engineering projects around the world.

Most of Mr Fry's work was performed out of Cairns (NQEA) and largely centred around ship building (hovercraft, naval patrol boats, low-wash ferries), but also included significant innovation in support of the mineral industry (alumina benefaction plants) and agricultural industry (bagasse handling, fugals, harvesting machines).

It is a strong fundamental understanding of engineering principles and practice that has allowed Mr Fry to successfully back the right projects: "Nothing beats practical experience"; "The best results come from a combination of practical experience and theoretical knowledge". His passion continues with his support of many new fields, including the scramjet. "Research those things you find interesting. Something good will always emerge even if far from the objective," he says.

## 2007



### TECHNOLOGY MAGIC - SPITTING CHIPS AND GLOBAL SUCCESS

*"Creative researchers and engineers are magicians."*

#### **Dr Chris Nicol**

Chief Technology Officer, Embedded Systems, NICTA

Dr Nicol has built and led one of Australia's most successful research teams; working at the meeting point of leading-edge technology and application to the consumer – mobile phone technology

He spoke of the inspiration and spark that was fostered in him through his time at AT&T Bell Laboratories. At the Bell Labs, he learnt the art of setting goals beyond expectation and then meeting them. Time and again fantastic results were achieved – only to find they never made it to market.

He then brought the team to Australia, where practical achievement blossomed, driven by delivering high business impact and underpinned by academic recognition and excellence. The team was awarded numerous international awards, including presentations at ISSCC in 2003 and 2004. He remembers seeing a phone which included their chip "... for the first time – on a billboard at Rome airport in 2004. I was so proud I issued one to every member of the SIP team".

Dr Nicol then presented a challenge – his view of Australia's ICT innovation performance. The innovation gap was shown to be large and the country to be lacking in e-leadership.

The lecture was finished with some practical advice on achieving excellence from high-performance teams:

"identify your customers, hire people better than you are, self motivated to drive their own performance, extend the notion of team to include "significant others", it is better to be different than it is to be better ..."

# BUILDING



# AWARENESS

All of the activities listed in this section contribute to the key role of The Warren Centre in raising awareness.

In its role of pushing the engineering envelope, The Warren Centre continually seeks to identify engineering and technology-based topics that have the potential to create major benefits to Australia, and it has found that seminars and workshops are a most effective way of testing the potential of a project idea.

Not all these ideas proceed to full project status; some, such as Fuzzy Logic, Autonomous Aircraft and Fast Marine Transport, fall at this first hurdle, while others produce useful information but do not receive the broad support necessary to proceed. In general the output from such seminars, and seminars held for other reasons, are documented and published as part of The Warren Centre's contribution to engineering knowledge.

## 1991

### ELECTRIC VEHICLES

At the time David Gosden from the Department of Electrical Engineering had developed a significant project which converted standard Holden cars to electric vehicles. This was combined with the work at the University of Technology, Sydney on high-efficiency electric motors exploiting new, high-intensity magnets and expertise in power electronics.

It was thought that the timing would be appropriate for further work in this area in preparation for legislative and other changes that would make electric vehicles more environmentally acceptable and available.

Lack of broad industry interest did not justify further work by The Warren Centre. However, the proceedings of the workshop were collated and published.

## 1992-1995

### COAL BED METHANE (CBM) EXTRACTION

Steering Committee Chairman: Sandy Longworth, Clutha Limited

The southern coal region of New South Wales contains significant quantities of high-quality coking coal, but at increasing depths and with increasing methane content. High methane levels greatly inhibit continuous high output and jeopardise mine safety.

The aims of this proposal were twofold. The first was to drill and field-test a series of trial gas drainage wells to develop CBM extraction techniques. The second was to demonstrate a thorough trial of at least one technique for stimulating CBM extraction that would permit future coal mining without the need to use 'in-seam' mine drainage.

The proposal took the form of an unincorporated joint venture for R&D field-trial purposes. The steering committee brought together

a diverse group of participants from mining, oil and gas producers, energy utilities, government, research institutions, universities and engineering providers.

For the field-testing itself, BHP Collieries Division offered access to its Appin Colliery site, which gave an opportunity to evaluate the effectiveness of CBM pre-drainage.

The proposal stimulated industry and government awareness, but when one of the major participants, respected by industry as a world leader in CBM, announced it was withdrawing from Australia, several of the project's major supporters reappraised their involvement. The steering committee reluctantly terminated the project in early 1995.

The Warren Centre learned from this project the importance of involving a key player with a strong knowledge base and ensuring their continuing participation..

## 1994-1996

### ENGINEERING ENTERPRISE GROWTH

The Centre established a seminar series that would address issues significant to the success of a manufacturing organisation through case study presentations, discussion and reporting, with the primary objective of influencing practice in the manufacturing industry. The secondary objectives were to raise the profile of the manufacturing industry as an important element in Australia and also to widen the exposure and raise the visibility and profile of The Warren Centre. The key outcomes were presented to the relevant government ministers.

The following 20 subjects were each addressed and summarised in a published booklet. As a consequence, the Centre was able to influence the creation of the Advanced Manufacturing Centre at the Australian Technology Park and the Centre's relationship with Canberra developed in a number of ways beneficial to industry development and innovation.



# THE WARREN CENTRE

## CORPORATE PATRONS PROGRAM

The Corporate Patrons Program was established in 2004 to provide a bridge linking the University of Sydney's extensive research capability to the technological needs of and the commercial opportunities available within the private sector. The primary role of The Warren Centre (TWC) is to promote excellence and innovation in all fields of engineering in Australia, and it is thus uniquely placed to facilitate this linkage by inviting selected private sector companies to join the program for an annual fee. Although no company is excluded from joining the program, as far as possible invitees are selected from different fields of endeavour to avoid conflicts of interest.

### CONTRIBUTION TO "LEADING EDGE"

The objectives of the program are to:

- ▼ Identify a number of substantial organisations in Australian industry that rely on technology to a significant extent
- ▼ Develop a special relationship with a select group of leaders from the technology side of those organisations
- ▼ Customise programs to suit the business needs of individual patrons
- ▼ Enhance the Centre's public profile and strengthen its constituency
- ▼ Provide contribution to the Centre's operating income

The Corporate Patrons Program gives patrons an opportunity to contribute to the Centre, to engage with the University of Sydney (USyd) and to work closely with its engineering faculty.

Tenix, an Australian company with diverse technology interests and capability, was the inaugural corporate patron, building on a long-established relationship with the Centre. Subsequently, Transfield Services and Sumitomo joined the program, with all three companies providing conduits to overseas technologies.

The Corporate Patrons Program is still in its start-up phase, but already opportunities have been created with potential mutual benefits to the patron, to the Centre and to the University.



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John Holland has enjoyed incredible growth through our operational diversity, wide capabilities and industry experience. Our strategy is to evolve our multidisciplinary approach and to expand our influence within our various operating sectors.

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## OUR STAKEHOLDERS

Our stakeholders range from clients, government and partners through to the local communities near our various projects. Our understanding of stakeholder needs remains a critical part of the success of our projects and our ongoing communication with these groups remains a key focus for John Holland across Australia.



## OUR PEOPLE

We employ almost 4,500 people across Australia, each playing a vital role in our projects and our metropolitan and regional offices. From site supervisors and graduate engineers through to IT support personnel and employee relations managers, John Holland employs the full spectrum of industry personnel.

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At John Holland we understand the value of innovation and initiative. John Holland Group strongly supports initiatives that assist our industry and our ability to deliver effectively for our clients and the communities within which we work. We are proud to be a long-standing sponsor of the Warren Centre for Advanced Engineering.

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## FOUNDING COMMITTEE

The Founding Committee met on the 20th September 1979 to decide how to celebrate the coming centenary of the foundation of the Faculty of Engineering. It was decided to establish a centre to promote excellence in engineering. The Foundation Committee members were:

Professor Bruce Williams, Vice-Chancellor  
 Associate Professor Phillip Jones, Dean  
 Professor Bob Bilger, Convenor  
 Mr Francis Brady  
 Mr James Davidson AO  
 Mr Peter North  
 Mr Wallace Pilz OBE  
 Professor Rolf Prince AO  
 Sir John Proud  
 Professor Emeritus John Roderick

## CENTENARY COMMITTEE

The Centenary Committee was formed to oversee the establishment and funding of a centre of engineering excellence and met for the first time in June 1980. The Centenary Committee members were:

### CHAIRMAN

Dr K O Brown

### EX-OFFICIO MEMBERS

Sir Hermann Black, Chancellor, The University of Sydney  
 Sir Bruce Williams, Vice-Chancellor, The University of Sydney  
 Professor J M Ward, Vice-Chancellor & Principal, The University of Sydney (from December 1981)

### MEMBERS

Mr F Brady  
 Mr N Chidgey  
 Mr J Davidson  
 Mr J Hannes  
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Professor R W Bilger  
 Professor D Campbell Allen  
 Associate Professor P B Jones  
 Professor H K Messerle  
 Professor R G H Prince  
 Professor R I Tanner

## FIRST BOARD OF DIRECTORS

The first Board of Directors of The Warren Centre was appointed by the Senate of the University at its meeting on 2 February 1982. Details of the Board are:

### EX-OFFICIO MEMBERS

Sir Hermann Black, Chancellor  
 The Hon Mr Justice D M Selby, Deputy Chancellor  
 Professor J M Ward, Vice-Chancellor and Principal  
 Professor M G Taylor, Deputy Vice-Chancellor  
 Associate Professor J R Glastonbury, Dean of the Faculty  
 Professor R W Bilger, Executive Director

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## PATRON

	FROM	TO
Sir James Rowland, AC KBE DFC AFC	12/87	5/99

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	FROM	TO
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Neville Chidgey	1984	1991
C R (Sandy) Longworth	1991	1996
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Professor Mike Dureau	2007	current

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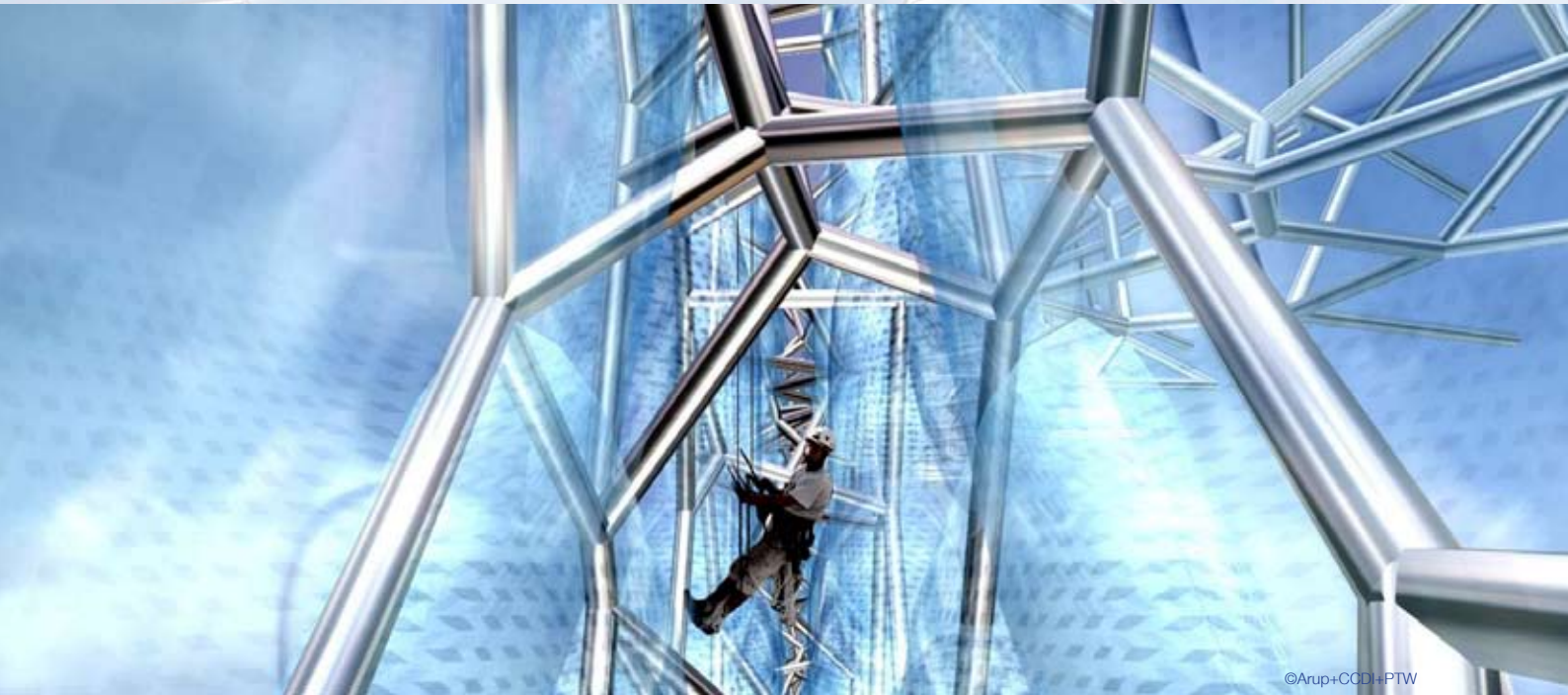
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	B V Hamon	1941	W J P Goodman	1948	J K Rae	1950
	W Downes	1942	R F Halliday	1948	K M Stevenson	1950
	J K Formby	1943	H Kobler	1948	F B Wolff	1950
	P O Miller	1943	R Langevad	1948	B N Kelman	1950
	K E Halley	1943	A R McK Langley	1948	J R Allen	1951
	E M Brown	1944	G M Scott	1948	R Taylor	1951
	J P Messner	1944	B G Wileman	1948	J A Clinch	1951
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	K S Watson	1944			R J Fairley	1951
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I C Storie	1951	Dr R A M Wilson	1960	D Russell	1967	G R Edwards	1975
C P Pickup	1951	P M L Blazey	1960	R R Attridge	1967		
		J C Copley	1960	T M Little	1967	D G Eccles	1976
J M Hamilton	1952	Dr B A Cornish	1960	Dr J Challen	1967	V Feingold	1976
G B Nelson	1952	Visiting Prof R H Frater	1960	B K Mahony	1967	C G Nicholson	1976
D Allum	1952	J Kit	1960	R DeVries	1968	R M Mackow	1976
G E Failes	1952			J Diesendorf	1968		
J P Fleming	1952	R L Smith	1961	V B Hyde	1968	A D Corrigan	1977
A Ross	1952	L P M Ballantyne	1961	H E Josse	1968	R N Marsh	1977
F M Shepherd	1952	K H Dredge	1961	J T Paterson	1968	R C Halgren	1977
A N Thiele	1952	Dr G E Fortescue	1961	R Funke	1968	G P Harrison	1977
		P Helms	1961	E G B Lane	1968	P W Woof	1977
G R Drewe	1953	F J Mullen	1961	Dr P J Mulhearn	1968		
J Marsh	1953	Dr H G Poulos	1961	G C Scott	1968	G Georgiadis	1978
M S Nicklin	1953	R Silinis	1961	J Trowbridge	1968	D R Butler	1978
Brig P A W Stevens	1953						
Dr P T Brown	1953	B F C Cooper	1962	G A Hughes	1969	K S Chan	1979
Dr J R Ward	1953	G J Hall	1962	P Cleary	1969	D A Pellegrino	1979
W R Lachs	1953	P H J Mallesch	1962	D Eden	1969	L Brice	1979
T R Marish	1953			D G Low	1969	L C Lawrence	1979
C J Roctor	1953	J L Goldberg	1963	R Mewton	1969	J P Volkofsky	1979
Brig E S Swinbourne	1953	U K R Handel	1963	D M Nolan	1969	G A Wylie	1979
		R W Hutchison	1963	K M Pasley	1969	P T Lark	1979
A M Abicht	1954	J N Kerrigan	1963	W C Pong	1969	R K Williamson	1979
R W S Carlson	1954	A C Locke	1963	Dr Ing C R Symes	1969		
P D Isaacs	1954	J D Russell	1963	M B Uhlherr	1969	R Fletcher	1980
Assoc Prof P B Jones	1954	G L Evans	1963	J McQuarrie	1969	D Roffe	1980
Prof J R Glastonbury	1954	W Stewart	1963				
D A Weatherley	1954	M S Traves	1963	G J Castle	1970	OTHER INDIVIDUAL	
		I H E Barraclough	1963	M S Boyd	1970	FOUNDATION DONORS	
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J P Hill	1955	S D G Cumming	1964	V J Essey	1970	Ms S Dobrzynska	
J E Gare	1955	J L Fullagar	1964	M P Le Cornu	1970	Mrs S Hawkins (in memory of	
C R Longworth	1955	R S Hales	1964	R C Mesley	1970	C A Hawkins 1924)	
B J Padman	1955	C K P Leung	1964			Dr L F Henderson	
J N Procter	1955	D P R Bailin	1964	G D L Costin	1971	Prof H K Messerle	
I D Reid	1955	C K P Chung	1964	G M Malone	1971	Professor Emeritus J W Roderick	
		R Lions	1964	C W Nunn	1971	Prof R I Tanner	
Prof G Mishalow	1956	D P Roberts	1964	A Sarafian	1971	C H Warman	
B F McKay	1956	Seow Lim Thia	1964				
R P R Chadwick	1956	G Tribe	1964	R J Lee	1972		
R L Halloran	1956			H J Crawford	1972		
J Pilarcik	1956	S W Brooke	1965	J K H Leung	1972		
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J D Kaleski	1957	Dr D K Sweeting	1965				
J G Willis	1957	J G A Verco	1965	R A Butler	1973		
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Mr Bruce Thomas, Frankipile Australia Pty Ltd

Dr Charles Tranberg, MacDonald Wagner & Priddle

##### PROJECT FELLOWS

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Dr Russell Bridge, University of Sydney

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Mr Don Ross, MacDonald Wagner & Priddle

Mr Alek Samarin, BMI Ltd

Mr Graham Sharp, CSR Ltd

Mr Ray Toomey, BHP Engineering

Dr Ian Wallace, BMI Ltd

##### PROJECT AUTHORS

Sir Alan Harris, CBE

Mr John Betty, MacDonald Wagner & Priddle

Dr Russell Bridge, University of Sydney

Mr Neville Bryant, BHP Engineering

Mr Alfredo Bustos, Soros-Longworth & McKenzie

Mr Ron Callus, University of Sydney

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Mr Ray Toomey, BHP Engineering

##### PROJECT ENGINEER

Mr Carl Ginger, NSW Department of Public Works

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##### PROJECT MANAGER

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