

# **Inspiring industry to inspire Australia: Business and Science Outreach**

An Inspiring Australia Report

Prepared by The Council for Humanities, Arts and Social Sciences

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## About Inspiring Australia

Inspiring Australia is an Australian Government Initiative that aims to deliver a more scientifically engaged Australia where:

- Australians are inspired by and value scientific endeavour
- Australia attracts increasing national and international interest in its science
- Australians critically engage with key scientific issues
- Young Australians are encouraged to pursue scientific studies and careers.

As seen in this report, the combined efforts of science and research agencies, education providers, industry and business, cultural and community organisations are key to achieving these aims.

To talk about how your business can connect to science and the community, contact our team on +61 2 6270 2800 or [inspiring.australia@innovation.gov.au](mailto:inspiring.australia@innovation.gov.au)

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## Science is the spark...

Stories of business and science outreach:

- Gladstone Industry Leadership Group
- SAGE Automation
- Queensland Seafood Industry Association
- Shell Australia
- Jasco
- Dow AgroSciences
- Google
- BHP Billiton Mitsui Coal
- Australian Plastics and Chemicals Industries Association
- University of New South Wales Science Advisory Council
- Rio Tinto
- Alcatel-Lucent
- 3M
- Power and Water Corporation
- GlaxoSmithKline

## Inspiring industry to inspire Australia: Business and science outreach

Throughout Australia, businesses large and small are connecting to their customers, employees, communities, and industry partners – through science.

Science is the spark that drives innovative and ingenious outreach programs that deliver:

- Better understanding of technology and its applications
- Answers to real-life challenges for business and communities
- Staff with high-level science and communication skills, and
- A fresh, business-aligned approach to corporate social responsibility.

This report highlights some of the new and diverse ways in which industry is inspiring Australia to think about science: not as an activity that just takes place in a lab, but a collaborative effort by industry, research and communities to solve the complex challenges facing us all.

Companies like **Power Water Corporation** and **Rio Tinto** are reaching into regional Australia through school science education programs, employee-driven sustainability initiatives, and local consultations. It's a proven way of showing consumers and communities that they're listening – and learning.

**BHP Billiton Mitsui Coal's** partnership with **Queensland Museum**, and the **Shell Questacon Science Circus** are taking the wonder of scientific discovery to thousands of Australians every year - including their own employees, who are finding science outreach adds an extra dimension to their professional practice.

Showing industry leadership through science awareness promotion, the **Plastics and Chemicals Industry Association** and the **Queensland Seafood Industry Association** have found that raising scientific literacy in the workplace is an investment that pays returns including safer workplaces and higher quality products.

Science engagement, like business itself, can happen through informal and formal networks. In the case of the **Alcatel Lucent/Bell Labs**, an ongoing conversation with the **University of Melbourne** became a cutting-edge partnership: the **Centre for Energy Efficient Telecommunications**, now on its way to being a leading global influence. The industry representatives on the **University of New**

**South Wales Science Advisory Board** are directly influencing Australia's next crop of science graduates, ensuring they are 'real-world' experienced as well as laboratory trained.

Further north, the **Gladstone Industry Leadership Group** has completely changed its approach to community engagement by explaining the science behind its local industries. In only four years, this open approach has dispelled the myths and created a positive operating environment for the region's businesses.

Recognising that thinking about a science career needs to start early, companies including **Google**, **3M** and **Dow Agrosciences** are investing time, employee expertise and company resources in school-aligned programs that will build the skills of our future engineers and agricultural researchers. In so doing, they're making themselves employers of choice among future graduates.

And it's not just big companies getting on board with science outreach: family-owned art supply business **Jasco** has thrown itself behind one of Australia's most inventive art-science collaborations, **InsightRadical**. And specialist firm **SAGE Automation**, in Adelaide, is inspiring students to pursue exciting careers in manufacturing and engineering through the **Concept2Creation** challenge.

Awards play an important role in celebrating Australia's success in scientific research and engaging the wider world with our science. The **Glaxo Smith Kline Awards for Research Excellence** have recognised the best biomedical discoveries in this country for over 30 years. They rank among the highly coveted industry-backed prizes that have inspired and rewarded the big breakthroughs in Australia's research community.

For business, the message is clear: science communication is an investment that pays dividends in terms of company profile, employee satisfaction, and the important job of building positive local relationships. For several of the companies featured in this report, involvement in science communication has led to commercial opportunities that would not have happened with other types of community engagement.

Companies and industry groups who inspire others to learn, apply, innovate, and simply wonder out loud, are building upon one of Australia's greatest natural resources: our innate curiosity about how things work. Science communication takes that curiosity and gives it direction, ultimately creating the invaluable partnerships that lie at the heart of innovation.

## Open Science: Gladstone Industry Leadership Group

In 2008, community concerns over air quality in Gladstone reached an all-time high. To make matters worse, both industry and environmental groups had difficulty finding and understanding the data about cumulative industry emissions needed to answer the local community's questions.

Realising that it was time for a new, collaborative approach to understanding and managing industry impacts in the region, the 'Big Six' of Gladstone – Boyne Smelters Limited, Cement Australia – Fishermans Landing, the NRG Power Station, Orica - Yarwun, Queensland Alumina Limited, and Rio Tinto Alcan Yarwun - formed Gladstone Industry Leadership Group (GILG). Their combined aim was to reduce community concern about air quality by making the science behind their industries easily accessible - and clearly explained.

Over the past five years, GILG has worked consistently to build better local relationships and ensure the provision of timely, clearly presented scientific information to all interested parties. The effort has been worth it, as Kurt Heidecker, CEO of GILG, explains.

'Previously, a lot of data about emissions, licences and related issues was difficult to obtain - in some cases, you could only obtain it through FOI. When the data was released, it was too technical to be useful to a non-specialist. What the Gladstone Industry Leadership Group decided to do was go completely in the opposite direction. We made industry data freely available, and not only that, included Plain English explanations with every release.'

As Kurt points out, making data more accessible was only half of the equation.

'We also consulted closely with the community about their concerns, and their understanding of the problems. What we found was that among the general population, there was a need to improve science literacy overall. So we started a campaign that included publishing a fortnightly column in the local newspaper, blogging through our website, conducting industry tours, and attending local events where we could talk to people directly.'

Consultations also revealed that the 3,500 people directly employed by the 'Big Six' wanted regular briefings about the science of their combined industries.

'We had to find a way to provide all our employees with consistent, up-to-date information about issues raised in our local media, so that when these employees were quizzed by their friends, they felt confident about their responses,' says Kurt. 'It may seem a small measure, but it had a big impact. We have found that most people in the Gladstone community know locals who work in industry and they trust those workers to explain their industry.'

GILG communicates with its employee base in a two-step way. It firstly brings together representatives from each member site to share and align their information and then draft briefings on industry-wide issues. These briefings are then communicated by each of the member companies in the format that best suits their workplaces. This can range from morning 'tool box' meetings and weekly management meetings, to emails and newsletters.

'Through all these strategies, community and employee-based, we've managed to create a good shared understanding of the science,' says Kurt. 'For example, it's helpful to compare Gladstone to other cities, in order to know what 'good' and 'bad' air quality look like. It has been a surprise to some that Gladstone actually performs pretty well, except for natural events like bushfires and dust storms which affect all Australian towns'.

Kurt says the change in Gladstone as a result of GILG's work has been remarkable. In 2008, the local newspaper received about six letters every day complaining about air quality. It now receives around one per month.

'Gladstone is Queensland's industry hub, and that's a strong part of the community's identity. We have built on that by creating greater trust in, and better understanding of, industry's activities in the area. Now we find that the public has moved on to other issues of community concern. There's no doubt that that big change is a direct result of the open approach we've taken.'

## **SAGE Automation gets behind the wheel in science and technology education**

Not many people leave high school knowing how to assess, modify, test, disassemble and assemble an energy-efficient vehicle. But for students in northern Adelaide, the GM Holden-sponsored Volt Eco Challenge is giving them the opportunity to do just that. The program is just one of Adelaide's Northern Advanced Manufacturing Industry Group (NAMIG) 'Concept2Creation' initiatives developing science, technology, engineering and maths skills in the future local workforce.

Brett Sandercock, Group Business Manager of SAGE Automation, a national leader in industrial automation and control system integration, thinks the Volt Eco Challenge is ideal for anyone thinking of a career in the manufacturing or building industry.

'At first, it all sounds simple,' says Brett. 'The students are given a Scalextric model car and track, and told to measure the car's efficiency and to improve it. But they are soon faced with the same challenges any manufacturer faces: how do we measure efficiency accurately? What systems can improve performance? And –crucially – how can we work in a team to solve problems and build better products?'

As Brett explains, SAGE Automation provides the Volt Eco Challenge students with the technology to answer these questions.

'We supply instruments to test efficiency, so that students can take a baseline measure and decide how to modify their cars. When my colleagues and I go to see the students race their vehicles, we're always amazed at the weird and wonderful solutions they've tried. But that's the point of the exercise. Finding out what works, and what doesn't and why, is exactly what our business does in the real world.'

The other challenge of the racing days – the complete disassembly and reassembly of the vehicles by student teams, under time pressure –develops a skill set Brett sees as 'fundamental'.

'Production management techniques aren't taught in schools, but they apply to almost any science or technology-based business you can think of. Our business is about developing industrial systems, from conveyer belts, to robotic arms, to the software that drives the plant. This means we don't just need engineers, but electrical and other trade-based professionals, all working as a team to deliver a product that works on site.'

Teresa Janowski, General Manager of NAMIG, says that the support of medium businesses like SAGE Automation is fundamental to the success of the Concept2Creation program.

'NAMIG started in 2003 with the aim of lifting the science, technology, engineering and maths skills of high school students in Northern Adelaide, to give them a better chance in the employment market,' explains Teresa. 'It has evolved into something much bigger than that, thanks to the invaluable contributions of different companies, including cash donations, expertise in mentorship, and in-kind support. SAGE's involvement has been fantastic, because they provide us with specific efficiency measuring tools designed and built just for NAMIG'.

For Brett, a room full of excited students racing model cars makes it all worthwhile.

'A lot of our employees are community-minded and want to "give something back" as well as keep local manufacturing industries alive and kicking. Through the Volt Eco Challenge, we can meet both aims with negligible cost to our core operations. To see these young people get involved and exceed their own expectations is really inspiring to us.'

## Sea Change: the Queensland Seafood Industries Association and the Great Barrier Reef Marine Park

Sometimes it takes a natural disaster to realise what you're up against. The damage inflicted by Tropical Cyclone Hamish in March 2009, and Yasi in February 2011, had a deep impact on all those who studied, fished and made their livelihoods on the Great Barrier Reef.

'Whether you were a fisherman, a scientist, a tour operator, an aquarium supplier - it confirmed that things had to change in the way industry looked after the reef and its long term future,' says Eric Perez, Executive Officer of the Queensland Seafood Industry Association (QSIA).

From 2008, QSIA and the Great Barrier Reef Marine Park Authority (GBRMPA) had been moving towards a closer relationship, based on the joint realisation that industry and government needed to work together if the Reef was to stand a chance. In the wake of the cyclones, another key consideration for industry was the question of adapting to climate change.

'Communicating a clear message about climate change is difficult not only because of conflicting media coverage, but also because climate science comes with its own jargon. People understand that most scientific fields of endeavour have a language unique to them, but there still needs to be resources to translate that knowledge into simple terms,' comments Eric. 'This is easy to say, but not surprisingly, difficult to do.'

'QSIA is very fortunate to work with scientists who are prepared work with us closely in communicating their findings. For example, GBRMPA recently published research on ocean acidification and banana prawns. The great thing was we were then able to describe it to our members in terms of direct business impacts.'

Eric points out that people working on the reef also have important information to share with researchers. After Yasi, for example, many fish migrated to deeper water, and have been unfishable since. Observations like this have implications for future climate adaptation patterns.

‘There is a huge amount of information to be exchanged from both sides in this relationship,’ says Eric. ‘QSIA works with the GBRMPA, the University of Queensland, University of Tasmania and James Cook University to share knowledge and develop best practice. In terms of two-way science communication, I really do think we are conducting world’s best practice’.

In 2011 and 2012 the QSIA brought together industry, industry body leaders, the GBRMPA and researchers to discuss the impacts of climate change and the introduction of carbon pricing on the seafood industry. The conferences presented an opportunity for industry to engage the scientific community and government.

‘The conferences were designed to get a range of individuals into a room to discuss the challenges posed by a changing climate and implications for industry at a business level,’ says Eric. ‘What has become clear is that the seafood industry needs business-oriented solutions to issues such as reducing electricity and fuel use, access to technologies that will allow for lower fuel and electricity use, and demonstrated use of technology. It all adds up to a sustainable future for Australian fisheries’.

## Shell Australia: science communication is a lasting investment

Shell Australia has been a partner with the Shell Questacon Science Circus since it was established in 1985. It's a relationship that Shell's Manager of Social Investment, Jenny Odgers, agrees is 'unusually long' in the corporate sphere.

'Shell has evolved as a business in Australia over the past 27 years, and our social investments have needed to keep pace with our business aspirations,' explains Jenny. 'Fortunately, the Shell Questacon Science Circus remains as relevant to our needs as it was at the start, in engaging communities, and promoting the important skill set we seek in our own staff'.

Made up of trucks, cars, cartons of science equipment, science communicators and support staff, the Science Circus crosses the entire continent of Australia to bring exciting, engaging programs to thousands of school children, teachers and community members. It is a highly regarded program, not only in terms of distances covered, but the quality of the experiences offered.

At the core of the Science Circus's success is the strong relationship between its founders: Shell in Australia; Questacon—Australia's National Science and Technology Centre; and the Australian National University (ANU). The 16 science communicators who travel with the Science Circus are all ANU Science Communication Masters students, their time with Science Circus forming part of their Masters qualification.

Shell employees have the opportunity to travel with the Science Circus or organise and participate in visits to their own children's schools. In 2012, Shell economist Robert Miller joined the tour for a week, and is still reflecting on what he learnt in that time.

'What hits you is the scale of the outreach – the sheer area it covers – and how needed it is,' says Robert. 'Questacon in Canberra is an amazing place, but how will a kid from Derby ever get there? Now I understand the Circus's commitment to cross Australia every three years, and the massive scale of such an undertaking'.

For Robert, the enthusiasm and expertise of the science communicators was the most memorable aspect of the tour.

‘As soon as they got off the bus, the science communicators started talking about science, to kids, to teachers, to senior citizens. No matter what the audience, they had the right way of saying it. And wherever we went, people were so engaged, and had so many questions - it just worked on every level.’

Robert’s work on upstream activities in Western Australia gave him a special sense of connection to the regional tour.

‘I haven’t done that for years, taken off my “official business” hat to talk to a local community. It was great practice to talk about what I do in an informal way, and to take a cue from the science educators and simplify my language without losing accuracy. That is something I have taken back into my everyday work.’

Jenny Odgers feels that the evolution of the Shell Questacon Science Circus three-way partnership is an excellent example of a win-win-win in science communication.

‘We’re now at the point where Shell can lay its objectives on the table beside Questacon’s and ANU’s, so we can all see how to align our interests in the best possible way. This level of openness means we handle change together, and can incorporate new ideas quickly. The success of the Shell Questacon Science Circus over such a long time is proof that science communication is a really lasting form of social investment.’

## Painting a bigger picture with science: Jasco and Insight Radical

‘My business philosophy is straightforward,’ says Barry Stuart, CEO of Jasco, a family-run company that has provided Australia’s artists with quality products since 1960. ‘If you have great people who are passionate about what they do, the rest takes care of itself’.

It’s this belief that has taken Jasco on an incredible journey into the world of science over the past four years. Why? Because artists’ paint, just like plastics, metals and the human body itself, suffers ‘materials failure’ through the action of molecules with unpaired electrons – otherwise known as free radicals.

Barry recalls how it all started. ‘In 2010, we learnt that researchers at the University of Melbourne were looking into artists’ materials. As the Australian manufacturers’ agent for Winsor & Newton, who make high quality artists’ materials, we were interested in finding out more’.

Before long, Barry was on a plane to Melbourne to meet people from the ARC Centre of Excellence for Free Radical Chemistry and Biotechnology, and shortly afterwards, the Centre embarked on a bold community engagement project, called Insight Radical. The project’s aim was to create dialogue in the broader community about free radicals and their impact, both positive and negative, on health, materials, and the environment – through art.

‘Straightaway, I could see this was an amazing opportunity for our business, a chance to be involved at another level with the community and the art world itself. I also saw the passion in the scientists and recognised that quality I look for in our own staff,’ says Barry. ‘So naturally, I had to get involved’.

Jasco’s commitment has come at many levels. One of its major contributions has been the time of staff member, Natalie O’Connor, who, apart from being a product representative for Jasco, is herself a practising artist. Natalie has worked closely with Insight Radical Outreach Coordinator, Dr Renee Beale, to expand the science engagement program to reach out into the visual arts community.

From supporting artist residencies in the Centre's laboratories, running public workshops in regional areas and working with Indigenous communities in the Northern Territory, and holding public exhibitions of resulting science-inspired artwork – including one in the United Kingdom in August 2013 – Natalie and the Jasco team are helping create a new portrait of science.

Barry finds each new development inspiring.

'It's been a great result on many levels. We've given artists a unique opportunity to interact with scientists, and to show their work in the UK. It's definitely a vindication of my business philosophy. If you invest in good people, they repay you ten times over – and that includes scientists as well as artists.'

## Home-grown talent: Dow AgroSciences and the Primary Industry Centre for Science Education (PICSE)

Of all the science-based sectors in Australia facing a decline in suitable graduates, primary industries are among the most concerned. Enrolments in tertiary agricultural science courses fell 31 per cent between 2002 and 2010, and the national shortfall of graduates required by food and fibre industries is running at 4,200 per year.

Jim Phimister, Marketing Specialist at Dow AgroSciences, has witnessed the impact of the decline in agricultural science graduates first-hand.

‘Both sides of the agricultural business – supply and rural retail – are having problems finding suitable candidates. Research based supply companies like Dow AgroSciences, Syngenta and Bayer need people who can develop products for farmers, while rural retailers like CRT , Landmark and Elders need people who can service those products for Australian farmers,’ says Jim.

In 2009, Dow AgroSciences R&D Director Dr Matt Cahill met with the Primary Industries Centre for Science Education (PICSE) to see how they could jointly encourage promising secondary students to consider agricultural sciences as a pathway to a rewarding career. The resulting partnership, launched in 2010, plays to the strengths of both parties.

‘With science education officers based at nine different locations across Australia, PICSE is exceptionally good at identifying high school students who are considering a career in science but are undecided about exactly which direction to take,’ says Jim. ‘What Dow AgroSciences can offer is hands-on experiences in industry. We’re offering placements in our facilities, supporting the PICSE Science Education Officers and providing an on line science project tool for science teachers requiring students to submit projects for assessment.

Jim says the middle high school years are ‘pivotal’ in a student’s career decision-making.

'PICSE has found that by Year 12, it's too late to be asking the question "what would I do if I pursued a career in science?". The foundations for the decision are set much earlier, in Years 9 and 10. So it's very important to set up opportunities for these students to know what is possible.'

In 2012, as a pilot, Dow AgroSciences supported the Science for Growth Awards, which are managed by PICSE. To participate, Year 9 and 10 students choose a scientific topic that interests them, pose a hypothesis, carry out experiments and work to answer their question using scientific methodology. Teachers and students enjoyed the program, which culminated in finalists showing their work to a pair of PICSE and Dow AgroSciences judges in an on-line interactive interview. The on-line format allowed remote and urban students alike to demonstrate the principles of good science, as well as showcase their talents in presenting the objectives, methodology and conclusions with good supporting charts in an oral format. Jim describes the presentations as 'outstanding', adding that for Dow AgroSciences, 'good science communication is as important as good science'.

Evaluations from PICSE show that its targeted approach does work. Approximately 30 per cent of students in contact with the program who were unsure about committing to a career in science went on to commit to studying science at tertiary level. And in only three years, Dow is seeing a change as students complete their science degrees.

Jim says, 'We are absolutely delighted that we are now attracting talented graduates who have sought us out as an 'employer of choice' because of their awareness of PICSE. We didn't expect this so early in our involvement with the program, but it already shows we're taking the right approach.'

## From consumers to creators of technology:

### Google's Computer Science for High Schools program

While the next generation of Australia's workforce enthusiastically embrace smartphones, tablets, and social networks, not enough are translating their love of the latest technology into technical careers. It's this big disconnect that Google has decided to tackle with a program called Computer Science for High Schools (CS4HS).

'There's a fundamental difference between using a smartphone, and developing an app for it,' explains Alan Noble, Engineering Director for Google Australia. 'The continued decline in high school enrolments in maths and science has shown that we need to make science, technology, engineering and maths more relevant to students'.

CS4HS connects classroom science to students' lives by supporting their teachers with the latest tips, training and materials.

'We often hear from staff that it's hard enough to keep with the latest advances in technology, let alone create compelling classroom content for it,' says Alan. 'CS4HS gives teachers the professional development they need to stay ahead of their increasingly tech-savvy students.'

Google is currently working with nine universities in Australia and New Zealand to develop workshops for high school teachers, and estimates the program will reach 20,000 students in one year alone. While the program promotes computer science and computational thinking, Alan believes that it forms part of a greater drive to develop the science, technology, mathematics and engineering skills Australia needs if it is to be home to a thriving startup ecosystem.

'Careers in sciences don't have a great reputation and we need to reverse that. I come across many students who show a keen interest in working for Google, but balk at being a software engineer, despite Google being an engineering company at heart.'

With Google and other engineering and technical industries having a healthy demand for workers, there clearly needs to be a better match between what employers want and what future employees want to do. CS4HS, by encouraging students to experiment with one area of science and technology, opens the door to a whole new world of career possibilities.

‘We realise that not everyone wants to be a software engineer, but we can show that science, technology, engineering and maths are the building blocks of a whole range of industries, including healthcare, finance, manufacturing, and resources,’ Alan says, adding, ‘But being Google, we do like to point out that many of the world’s best-known entrepreneurs are engineers!’

Supporting teachers to inspire a future generation of scientists and entrepreneurs contributes to developing the innovation culture that Google and companies want to grow in Australia.

‘Speaking as someone who never saw an actual computer until two years into computer programming, I look around and see the tools for creating more accessible than ever. CS4HS shows students that if they’re prepared to build on the technology they already know, try new ideas and take risks, they too can be creators of the future.’

## **BHP Billiton Mitsui Coal and Queensland Museum: inspired by a chance find**

When representatives from the Barada Barna people found a fossil during a cultural heritage clearance on the BHP Billiton Mitsui Coal Pty Ltd (BMC) site at South Walker Creek, it was to prove to be a major discovery for science.

Invited by BMC to investigate the site further, Queensland Museum's Vertebrate Palaeontologist Dr Scott Hocknull and his team unearthed some of the biggest examples of megafauna ever found. They include a six-metre long lizard, komodo dragons, the world's largest land-dwelling crocodiles, a forebear of today's grey kangaroos that stood 2.5m tall, a giant forest wallaby (ancestor to today's swamp wallabies) and the largest marsupial known, diprotodon, which looked like a wombat and was the size of a small car.

Recognising the importance of the find, BMC partnered with Queensland Museum to preserve and showcase the natural and cultural heritage of the site, through exhibits, educational megafauna loans kits for Queensland schools, and support of an annual dig.

BMC President Michael Rosengren says of the partnership, 'We wanted to ensure the regions were able to engage with the knowledge base at the Queensland Museum'.

BMC's financial support has also ensured that the new collection of fossils is part of the permanent dinosaur and megafauna exhibition at the Queensland Museum. It has also enabled the development of site-related resources for the Isaac and Mackay regions, including the appointment of a Museum Development Officer, regular community updates, and a display for the historic Nebo Museum.

In September 2012, employees from BMC, along with students from Moranbah State High School's Earth Science class and Nebo State School, as well as members of the local community, participated in the site's annual dig. This direct engagement with the research process, as well as the local community, strengthened relationships with regional stakeholders.

'Our employees at South Walker Creek are excited to learn what their workplace was like thousands of years ago,' comments Michael. 'We all have that natural curiosity about why the megafauna went extinct, and this joint project may well explain their fate'.

Michael adds, 'Someone once joked that all geologists secretly want to be palaeontologists. Whether or not that's true, when Dr Hocknull and the QM team come to our office to give updates on their research, our engineers and geologists are keen participants in the discussions. It's a great reminder that it doesn't matter what your scientific background is, or if you're research or industry-based – we all want to contribute to a better understanding of the Earth and its changes through time'.

## Creating good chemistry:

### The Australian Plastics and Chemicals Industries Association

‘Our job is to let people know “the business of chemistry”’, says Margaret Donnan, Chief Executive of the Australian Plastics and Chemicals Industries Association (PACIA). ‘And since all but two of the 111 industry codes in Australia rely on products produced by our sector, the business of chemistry is very big indeed’.

Over the past few decades the chemicals and plastics industry has embraced product stewardship, where manufacturers, distributors and users share responsibility for the product through its entire lifecycle. PACIA supports its members in meeting strict safety and sustainability guidelines.

‘Product life cycle is an area of science literacy we are interested in promoting with our members,’ comments Margaret. ‘Because if we are saying a product or design is “sustainable”, it’s important that manufacturers and the community are talking about the same principles.’

To support its members in achieving best practice, PACIA administers Responsible Care® in Australia, an initiative of the international chemical industry to improve the health, safety and environmental performance of its operations and to increase community involvement and awareness of the industry.

PACIA member companies who commit to the Responsible Care® program are required to demonstrate their leadership in health, safety, environment and product stewardship management to their employees, business and supply chain partners, and external stakeholders. The aim of programs like Responsible Care® is to drive continuous improvement and provide open, transparent communication with communities and other stakeholders.

In November 2012, PACIA joined with Monash University, CSIRO, Environment Protection Authority Victoria and with funding from the Victorian Department of State Development, Business and Innovation launched the Victorian Centre for Sustainable Chemical Manufacturing (VCSCM). The Centre supports business outcomes using more efficient chemistry, closer ties between manufacturers and researchers through access to practical scientific outcomes and innovative solutions. It promotes 'hands-on' outreach and skills training activities, and a green chemistry web portal.

'Our involvement with the Centre is about promoting more elegant, efficient chemistry to drive business outcomes,' says Peter Bury, PACIA's Director, Strategy and Innovation. 'The more we can encourage industry to deploy more sustainable manufacturing processes, the better we can deliver the benefits of green chemistry for the production of existing and new materials, products and processes'.

Peter remarks that PACIA's previous work in promoting the latest research findings among industry members has been a positive experience.

'We've been in the fortunate position that we've been able to progress some initiatives in Australia to bring about best practice faster than in some countries with larger economies,' says Peter. 'It shows us that peak bodies like PACIA are an effective way of informing businesses about the latest research and technology that could be helpful to their operations and customers'.

Peter points out that VCSCM enables Victorian and Australian manufacturing industries and other companies to become globally more competitive with skilled workforces. It also brings schools outreach into the mix.

'We are excited about this initiative because it will involve industry training and professional development, and even go a bit further by bringing in senior secondary school students to be mentored by researchers. If we can inspire a future generation of chemists, that will make the investment even more meaningful.'

## **'It works because everyone wants to see science succeed': business and science meet at the University of New South Wales Science Advisory Council**

What brings representatives of One Steel, OPSM, Cosmos Magazine, Obelisk Capital, Powerhouse Museum and law firm Corrs Chambers Westgarth together? The answer is a love of science.

The 16 members of the University of New South Wales (UNSW) Science Advisory Committee represent Australia's science, industry, government, education and business sectors. The Committee began in an informal way, in 2008, when UNSW Science decided that, to pursue its vision as a leading science institution, it needed a source of advice, support and information from a diversity of stakeholders.

'Within our faculty we have an enormous range of disciplines, from aviation, to optometry, physics to psychology,' explains UNSW Professor Merlin Crossley. 'We decided to ask a representative from each relevant industry, as well as leading scientists and science communicators, to join the committee, with a view to making our science program relevant and real-world focussed'.

Council Member Trevor Danos, a partner with law firm Corrs Chambers Westgarth, thinks the Science Advisory Council is an 'incredibly timely' initiative.

'Where I work, it's very much "city thinking" about business, legal and professional services,' says Trevor. 'We often don't think of ourselves as connected to science - but so many of our legal clients have science, engineering and technology based businesses. In the area of patents, for example, it is crucial that lawyers have an understanding of biotechnology'.

For the business and industry representatives, the Council is a chance to influence the skill set of future scientists.

'The broad interests represented on the Council can communicate to the faculty what we want to see in their graduates,' adds Trevor. 'Not just technical and theoretical training, but

broader engagement with real world problems. This year, the faculty is offering its first Bachelor of Science and Business, a significant step towards building stronger links between research and the commercial world’.

In its five years of operation, the Council has developed into a successful model for two-way science engagement, where scientists and non-scientists work together understand common problems.

‘The reason the Council works is because everyone on it is a natural science advocate,’ explains Professor Crossley. ‘They love science and sharing knowledge, and they all want science to succeed’.

Trevor Danos agrees. ‘For the business and legal people on the Council, there’s a genuine sense of excitement. We all studied science at high school, and we still want to know “the unadorned facts”, whether it be climate change, or quantum computing’.

Since being on the Council, Trevor has worked with the Office of the NSW Chief Scientist and the Physics Foundation to promote science within Sydney’s business community.

‘What I’ve learnt is that science is a fundamentally different way of thinking to the law, or politics. Initiatives like the Advisory Council build better understanding between the board room and the laboratory, by bringing together motivated individuals who can share ideas and networks. That’s not only positive for the scientists, it gives business people an insight into the possibilities ahead’.

## Rio Tinto: reaching out with science

For the past ten years, Rio Tinto's partnership with Scitech, Western Australia's premier science education centre, has been the driving force behind a suite of programs that has taken science, maths and technology to all corners of Australia's largest state.

'For us, science communication is about showing people "the business of the business"', says Trisha Comerford, Manager, Community Investment, for Rio Tinto. 'Not only in terms of our current operations in Western Australia, but as a way of communicating where we see our future in the world of science and innovation'.

Rio Tinto's Mine of the Future™ technology is part of that future vision, introducing next-generation technology for mining operations, including driverless haul trucks, automated trains and advanced tunnel boring and drilling systems. It's the kind of advanced technology that maintains Rio Tinto's leading and competitive advantage - as well as informing Rio Tinto's strategic directions with Scitech.

'Scitech motivates students to be interested in science from an early age,' explains Trish. 'They employ bright, enthusiastic people who know how to connect to people and make science come alive. From Rio Tinto's perspective, investing in students this way is an important part of encouraging the skills and creative minds we need in our future employees'.

Trisha Comerford says Rio is 'enormously proud' of its achievements with Scitech, including RoboCup, a high school initiative that inspires students to explore and create robotics; and Beijing Bound, where Rio Tinto sponsors three top WA secondary science students to travel to participate in the Beijing Youth Science Creation Competition. It also supports Scitech's popular Outreach Program, which promotes science awareness through schools, visits to shopping centres, and travelling science kits.

Rio Tinto invests in Scitech's Aboriginal Education Program, which has been in operation since 2007. The program engages Aboriginal students in science and helps build the skills of

their teachers, an approach designed to create pathways for professional careers in the mining and resources sector. A recent evaluation by Edith Cowan University showed the program had numerous positive impacts, and it was recognised internationally in 2012 when it won the US-based Association of Science and Technology Center's Leading Edge Award for Visitor Experience.

The Aboriginal Education Program is co-funded by the WA Government, BHP Billiton, and Woodside, showing that science communication not only builds understanding between different cultures, it can lead to shared goals among corporate competitors.

'It might surprise some people that businesses perceived to be rivals are working together in this way,' says Trisha, 'But things are changing a lot in the way businesses connect to communities. We're far more interested in collective impact; all of us saying, here's a science engagement program that works, so let's join forces to take it even further'.

In early 2013, Rio Tinto's Community Investment Fund signed on to a new major project with Scitech, an interactive hub located in Perth's City West precinct. Called Innovation Central, the hub will be a place where the general public can find out for themselves, as Trisha says, what the 'smart scientists out back' are doing.

'The new partnership will continue Rio Tinto's long-term support for Scitech's Outreach Program, Aboriginal Education Program, Robocup and Beijing Bound,' adds Trisha. 'It continues our emphasis on creativity and the future, and our vision that inspiring people to come up with different angles and ideas – whether they be employees, the general public, or school children – all helps build an "innovation culture" in the West'.

## Who is going to stop the internet power drain?

### Alcatel Lucent/Bell Labs and the University of Melbourne

The Centre for Energy Efficient Telecommunications (CEET) was launched by Alcatel-Lucent, the University of Melbourne, and the Victorian State Government in 2011 as the world's first research centre exclusively dedicated to energy-efficient telecommunications technologies.

CEET came about through the joint realisation in industry and university research that while today's communications technology only consumes around 2 per cent of the world's supply, that could grow to 5-to10 per cent of the world's electricity supply and associated emissions by 2020.

'Alcatel Lucent and the university's Institute for a Broadband Enabled Society had long been in contact,' says Professor Rod Tucker, Director of CEET. 'Then in 2009, we realised we were researching the same area of energy efficiency, and decided to solidify our efforts in the one research centre, which is CEET'.

CEET has a unique governance structure that promotes a genuine shared partnership between the University of Melbourne and Alcatel-Lucent. Not only does it facilitate knowledge transfer, it gives research staff valuable industry experience on a daily basis. Three patents have already been registered, proof of the success of the model.

Through CEET, Alcatel-Lucent has positioned Australia at the centre of its global eco-sustainable network innovation agenda. CEET research is already being incorporated into Alcatel-Lucent's global business planning and operations, including Bell Lab research programs and product development.

The reach of CEET is expanding rapidly.

'CEET's work informs GreenTouch, a global consortium committed to increasing telecommunications energy efficiency by a factor of 1000,' says Séan O'Halloran, CEO, President and Managing Director, Alcatel-Lucent Australia. 'And many big companies are signing on not just to be good corporate citizens. Energy represents up to 20 per cent of their operational costs, with network elements responsible for about 75 per cent of the total. Those are significant costs they want lowered'.

Alcatel-Lucent and CEET researchers share the responsibility of raising awareness of energy efficient telecommunications through industry-based and public fora and publications. A summit in Melbourne in 2012 drew overwhelming interest from industry and the public.

'In a world as complex as the internet, incorporating literally millions of network elements, applications, devices and users, collaboration is the only way to fully understand the problems and to implement solutions,' says Séan. 'In CEET, we have the beginnings of a really significant agent for change – and part of that change is continuing to inform the industry and the public about what our research means for them'.

## **‘Science isn’t serendipity’: innovative science outreach with 3M**

Since 2009, innovative manufacturer 3M has enjoyed a successful partnership with the Australian Museum in promoting science to the general public. Currently, the partnership supports the Australian Museum Science Festival (formerly called Science in the City) during National Science Week, as well as the high-profile Australian Museum Eureka Prizes, through its sponsorship of the Eureka Prize for Emerging Leader in Science.

For 3M, committing to an ongoing science outreach program made complete business sense.

‘Up until 2009, we did one-off sponsorships for different causes’, says Damien Jones, General Manager, 3M Australia and New Zealand. ‘Now we’ve realised that science communication is a great vehicle for us, because the activities resonate with our business. We can show the public that science is not serendipity, and that what really happens is that a scientist works on a problem, senses an opportunity, and sees how the properties of a certain discovery can be applied and how the benefits might impact people’s lives’.

At the 2012 Australian Museum Science Festival, 3M scientists ran one-hour hands-on workshops for 431 students. Primary school students participated in fun chemistry experiments, while high school students made their own simple electrical circuits and motors.

More than 5000 students and paying Museum visitors went through the Festival’s expo, where 3M scientists demonstrated how they utilised microreplication technology to create sandpaper with the same abrasive qualities as a shark’s teeth. Evaluations of the Festival showed a high recognition of the 3M brand among participants, many of whom were seriously considering a science career.

Damien observes that communicating directly with the public through events like the Australian Museum Science Festival gives 3M scientists a particular edge in their research and development work.

'What our scientists have is the ability to look into the needs of the community to resolve fundamental problems. So communicating with the public face-to-face through events like science festivals and expos is not just about positive brand awareness, it's building that capacity of knowing what problems people want solved'.

Damien believes that 3M's science outreach activities not only build a positive image of the company, but shows young people how the world of science is all around them.

'At the most recent Eureka Prizes Award Dinner, one of the winners stressed the importance of having mentors at a young age - someone, not just a parent, encouraging an interest in science. That's why family days at museums and festivals are so important, and encouraging teachers to make science fun in the classroom,' adds Damien. 'As "the innovation company", 3M wants to encourage the belief that great ideas can come from anywhere'.

## Power and Water Corporation: science makes powerful connections

For Power and Water Corporation, participating in the annual DesertSMART EcoFair is a direct line to its customer base in Alice Springs. It's also a chance to connect directly to a community where sustainability isn't a catchphrase, it's a way of life.

'Alice Springs is a unique community in a unique situation,' observes Steve Sawyer, Engineering Manager South for Power and Water. 'It's not part of the national grid and has to generate its own power, as well as power for other towns in the desert region. That means energy efficiency, and exploring alternative energy sources, are high priorities for residents'.

As the Northern Territory's largest utility provider, Power and Water Corporation faces complex challenges in providing electricity and water services to remote areas. To be able to explain these challenges face-to-face with consumers is, as Steve says, a way of putting a 'human face' on Power and Water activities.

'It's a fair question to ask why your bills are going up, and we as a company need to be able to explain the reasons. At DesertSMART EcoFair, people can talk to our employees, interact with scale models, and learn about how energy and water work. They also give us suggestions for improvement and repair, and now and then, those useful "why don't you..." comments that filter back to head office'.

The size of Alice Springs – around 25,000 people – is key to the desertSMART EcoFair's success. It brings together a closely-knit, motivated community with a significant number of people working in alternative energy, water conservation, low-impact housing, and desert ecology. Among its resident organisations are the Centre for Alternative Technologies, Ninti One, CoolMob - with whom Steve volunteers - and the Arid Lands Environment Centre (ALEC), which organises the EcoFair itself.

Steve comments, 'For Power and Water, having our local employees known on a first-name basis is part of working in a town where everyone knows everyone. That level of connection

is important for knowing what matters to the community, and what we can bring to the table for solving its problems’.

The desertSMART EcoFair is just one way Power and Water Corporation interacts with the Territory knowledge network. It has close ties with the Alice Springs Community Solar Plant, is a sponsor of the NT Model Solar Vehicle Challenge, and experiments with solar hybrid solutions for Tennant Creek and other isolated communities.

‘Solar hybrid technology is proven,’ says Steve. ‘But the challenge for everyone in this industry is the application of that technology, and getting systems to work together. In the desert, there is a high pressure to resolve this, and our success depends on good relationships with communities and alternative technology developers. That’s why our presence at local events like desertSMART EcoFair counts for so much.’

## GlaxoSmithKline: celebrating scientific discovery

Since 1980, the GlaxoSmithKline Awards for Research Excellence have recognised and rewarded the important contributions medical researchers make to the future health of Australians. One of the most prestigious awards in science in the country, the awards shine a spotlight on the most promising discoveries emerging from laboratories around the country.

‘We consider research and development the “life blood” of everything we do,’ says Geoff McDonald, General Manager, Pharmaceuticals GSK Australia. ‘In 2012, we invested over \$54 million in local research and development, and supplied \$491 million to Australia’s pharmaceutical and medicinal exports. Without R&D, none of this would be possible’.

In 2011, GSK increased the value of the Award for Research Excellence from \$60,000 to \$80,000, reaffirming its commitment to the 33-year-old prize.

‘GSK has long supported innovation, research and development for the wellbeing and economic benefit of all Australians,’ comments Geoff. ‘We consider the Awards for Research Excellence an ongoing investment in the research community’.

The list of past recipients of the award includes many of Australia’s most respected scientists in medical research, including Professor Ian Gust, renown for the development of the Hepatitis A vaccine. Professor Chris Goodnow, of the Australian National University, is the latest member of the Research Excellence Alumni, honoured in recognition for his pioneering work on autoimmune diseases.

On receiving the award in 2012, Professor Goodnow stated, ‘It is an honour and a very exciting time to be recognised for my work. While there is still a long way to go in this area, this award has come at a very exciting stage of our research, and will help take us to the next level’.

GSK's mission to improve the quality of human life by enabling people to 'do more, feel better and live longer' requires investment, and re-investment, in scientific research. The Awards for Research Excellence are a highly visible - and highly esteemed - way of demonstrating those values to the wider community.

### **GSK and the National Youth Science Forum**

GlaxoSmithKline has also been a long term supporter of the National Youth Science Forum, the only program in Australia that offers Year 11 students the chance to test-drive a wide range of universities and careers in the sciences.

The Forum's 26 government and industry partners – including biotech, energy, and essential services - provide not only financial support, but also interactive presentations to forum participants. As many as 2,000 students may compete for 432 places each year – the most popular program of its kind.

Geoff McDonald, General Manager, Pharmaceuticals GSK Australia says, 'We continue to support the NYSF because we believe it is important to nurture and encourage the next generation of researchers and scientists – across all disciplines.'

## Appendix

### What do we mean by 'science'?

The Australian Government's Inspiring Australia Strategy uses the term 'science' or 'the sciences' to refer to the following:

- the natural and physical sciences, such as biology, physics, chemistry and geology
- the applied sciences, such as engineering, medicine and technology
- newly emerging and interdisciplinary fields, such as environmental science, nanotechnology and phenomics
- mathematics, a field of study in its own right, as well as an essential tool of the sciences
- the social sciences and humanities, critical to the interface between science and society.

Inspiring Australia also includes 'science-related areas', which are fields that are not strictly science, but need to draw on science knowledge or expertise. This includes health promotion, science teaching, nursing, agriculture, and science and environmental policy development.

### **'Science outreach', 'science engagement' and 'science communication'**

Science outreach, science engagement and science communication all refer to activities that aim to improve the uptake of scientific information by general audiences.

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