INQUIRY INTO BUSINESS COMMITMENT TO RESEARCH AND DEVELOPMENT IN AUSTRALIA

SUBMISSION BY THE INDUSTRY, RESEARCH AND DEVELOPMENT (IR&D) BOARD

Introduction

The recent ABS statistics on Business Expenditure on Research and Development (BERD) show an overall increase in BERD for financial year 2000-01. Despite the increase, private sector expenditure on R&D is significantly behind that of other OECD nations. In fact, we are in a situation where Australia's largest companies are devoting only 1% of their total employment to R&D activities[1]. R&D is a fundamental driver of innovation and we need to strive for increased business investment in R&D if Australia is to enjoy sustained economic growth and prosperity. There are a number of factors peculiar to the Australian environment that hinder business investment in R&D and the Government has taken a number of significant steps to address these impediments. The Board fully supports these measures and would encourage the maintenance of a robust package of financial incentives to build business commitment to R&D. While acknowledging the important role played by Government in this area, the Board also notes that it is equally important that industry recognises the imperative for industry, itself, to play an active role in raising the level of R&D in Australia.

In support of the claim that there have been useful advances through government support for innovation, this submission will focus on some of the successful R&D outcomes that have arisen with the assistance of government measures.

IR&D Board

The IR&D Board is responsible for the administration of a number of the Commonwealth Government's industry innovation programs, including: the Tax Concession for Research and Development; the R&D Start program; the Innovation Investment Fund; the Pre-Seed Fund; the Commercialising Emerging Technologies (COMET) program; the Biotechnology Innovation Fund; and, on behalf of the Australian Greenhouse Office, the Renewable Energy Equity Fund. Through these and earlier programs, the Board has established an extensive corporate understanding and experience of innovative culture within private firms. In addition, the Board's membership comprises individuals with business backgrounds, public sector research experience and private R&D and commercialisation experience.

In total, the programs administered by the Board will provide $682.4m in assistance (including the tax concession) to approximately 5250 Australian businesses in financial year 2002/03.

Assistance Measures and Outcomes

R&D Start Program

The R&D Start program was launched five years ago. It provides significant levels of support to Australian businesses for innovation and over the last five years has provided assistance to about 1000 companies.

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[1] ABS Report, Research and Experimental Development, Businesses Aust.; 1 July 2002; 8104.0., p.6

Over the last two years, interest in the program has accelerated significantly with the Board approving 374 grants to the value of $357.5m in financial years 2000/01 and 2001/02. Of the R&D projects assisted by the Board, the significant majority of them are being completed successfully with many of them reporting the successful commercialisation of the resulting R&D outcomes. From financial year 1999/00 to financial year 2001/02, 65% of projects have been successfully completed and only 5% of projects have failed to be completed. In 2001/02, 83% of projects report that they have successfully commercialised or are in the process of commercialising the outcomes from their R&D projects.

In November 2000, an evaluation of the R&D Start program conducted by the Allen Consulting Group revealed that:

- 29.2% of customers found that R&D Start had a high to very high impact on their ability to *raise capital*;
- 41.7% of customers found that R&D Start had a high to very high impact on their ability to *form strategic alliances*;
- 72.9% of customers found that R&D Start had a high to very high impact on their ability to *enter new product markets*;
- 60.4% of customers found that R&D Start had a high to very high impact on their ability to *enter new export markets*;
- 49.0% of customers found that R&D Start had a high to very high impact on their ability to *be more responsive to customer needs*;
- 70.8% of customers found that R&D Start had a high to very high impact on *the value of company expertise*;
- 81.3% of customers found that R&D Start had a high to very high impact on *the value of company intellectual property*;
- 58.3% of customers found that R&D Start had a high to very high impact on *the in-house skills of employees*; and
- 25% of customers found that R&D Start had a high to very high impact on their ability to *access other Government programs*.

The program is an appropriate complement to the R&D Tax Concession program and is now seen by industry as a very significant component of the innovation cycle in Australia, especially for early stage companies. The Start program will continue to be an important element of Government activities to encourage increased levels of private sector investment in R&D.

Commercialising Emerging Technologies (COMET) Program

The COMET program commenced in 1999 and, thanks to its expansion as part of the *Backing Australia's Ability* (BAA) suite of initiatives, will run until June 2005. The program is targeted at small, start up companies trying to commercialise innovative technologies. The program has assisted about 600 customers since November 1999.

As an indicator of the success of the program, COMET customers have reported high levels of successful commercialisation outcomes achieved through their participation in the COMET program. The commercialisation outcomes include:

- capital raisings of nearly $100 million;
- 104 COMET customers have either commenced manufacture or launched their product onto the market;

- 23 have entered into licence agreements;
- 81 have formed strategic or joint venture alliances; and
- 82 have entered commercial agreements for the distribution, manufacturing or market release of their product.

In addition, an evaluation of COMET customers conducted in May/June 2002 revealed that:

- 73% of customers who had completed the COMET program felt that their expectations of the program in terms of providing assistance to raise capital, conduct market research, establish a business/financial plan and/or obtain R&D funding had been met;
- participating firms exhibited higher growth in annual revenue, number of employees, annual expenses and total assets compared to a reference group;
- most COMET customers endorsed that participation in the program 'opened doors' for them; and
- 93% of the successful customers suggested they would recommend the program to others.

These extraordinary outcomes demonstrate the effectiveness of this program in meeting a previously poorly supported target market, very small early stage companies, with innovative ideas needing help to progress to commercialisation. This program is also helping connect the angel investor networks with innovative companies. The Board feels that further policy initiatives that improve the connectivity between angel investors and early stage innovative companies should be supported.

Biotechnology Innovation Fund (BIF) program

The BIF program builds on Australia's competitive strengths in biotechnology by providing support at the critical "proof of concept" stage of development. Attracting capital to fund this stage of an innovation in this sector, because of the long commercialisation lead times, can be difficult and is often a substantial impediment to realising the commercial potential of an innovation.

The program has been well received by industry with over 200 projects seeking assistance in the first three rounds of the program. Of these, 94 projects are being supported to the tune of $21.2m. Support has been provided to projects in a variety of biotechnology fields and include:

- a program to allow athletes to re-breathe their own air;
- a system to monitor the heart rhythms of heart surgery patients;
- development of a new wild wheat food;
- research into drugs that target inflammation and cancer;
- medical procedures for the control of urinary incontinence;
- laser treatment for lymph activation; and
- genotyping for the agricultural environmental and scientific communities.

A survey of BIF customers conducted in June 2002 indicated that 81% of successful applicants felt that the program fully, or mostly, helped them to commercialise their research. Continued and enhanced support for this sector will see impediments to growth of a viable biotechnology industry minimised.

R&D Tax Concession

The R&D Tax Concession was introduced in 1985 and is a broad-based, market driven incentive that supports much of the industrial R&D in Australia. While the program has always been well subscribed, current reported R&D expenditure for the tax concession is at record levels. At 30 June 2002, 3565 companies were registered for the tax concession for the 2000/01 financial year with reported R&D expenditure totalling $5.2 billion.

A range of new features was introduced to the Tax Concession during financial year 2001/02 to encourage Australian companies to become more R&D intensive. The measures include:

- a 175% Premium (Incremental) Tax Concession for additional investment in R&D;
- an R&D Tax Offset for small innovative companies, particularly those in tax-loss, to enable them to 'cash out' their R&D tax deductions; and
- a new R&D plant/asset depreciation regime that allows a 125% deduction for effective life depreciation of assets used in R&D activities on a pro-rata basis.

These form a very strong package of measures to encourage additional private sector investment in R&D. In addition the Board is pleased that the new requirements for R&D Plans have been introduced and sees this as an important step in reinforcing the need for companies to think strategically about their R&D activities. R&D plans are intended to support the successful management of R&D projects providing focus and structure to R&D activities and thereby enhancing the likelihood of successful outcomes.

Innovation Investment Fund (IIF) Program

The IIF program became operational in late 1998. It was established to promote the development of an Australian venture capital market for early stage, technology-based companies. The Commonwealth, in partnership with the private sector, establishes venture capital funds to invest in small technology-based companies.

From inception of the program until June 2002, $138.9 million has been invested in 55 companies. Of this total, $34.5 million was invested in 31 companies during financial year 2001/02. The Commonwealth Government contributed $22 million towards these investments.

During the 2001/02 financial year IIF program investments were made in the following sectors:

- $5.1m in 5 companies in the internet sector;
- $10.0m in 8 companies in the IT/software, telecommunications sector;
- $15.4m in 14 companies in biosciences; and
- $4.0m in 4 companies in other industries including environment, engineering and building materials.

By demonstrating the returns achievable from investing in these companies, the program will encourage additional private sector investment in this area thereby providing young Australian technology-based companies with the means to successfully commercialise the outcomes of their R&D efforts.

Renewable Energy Equity Fund (REEF) Program

The REEF program is a specialist renewable energy venture capital fund modelled on the IIF program. There are five investee companies in the REEF program representing investments totalling $6 m. The REEF program is delivered by the Board on behalf of the Australian Greenhouse Office.

Backing Australia's Ability

The Board notes that the Prime Minister's *Backing Australia's Ability* (BAA) statement of 2001, included a number of enhancements to these key Government initiatives to encourage private sector R&D. The initiatives have been warmly received by industry and are a positive step in encouraging higher levels of business investment in R&D in Australia by addressing market failures.

The Board also notes the establishment of the Pre-Seed Fund program, introduced as part of the BAA suite of initiatives. The program is designed to help increase the commercialisation of research outcomes from Commonwealth public sector research agencies. It seeks to encourage the private sector to take a more active role in funding and managing the pre-seed stage of the research developments of universities and public sector research agencies.

The PSF program establishes venture capital funds to invest in projects or companies spinning out from universities or Commonwealth public sector research agencies. The funds will be managed by private sector venture capital fund managers. This program is another welcome addition to the suite of measures designed to increase private sector R&D activities and the successful commercialisation of the outcomes of these activities.

Access to Programs

The Board also notes the success of having most of the Commonwealth Government's innovation programs delivered through the one agency. AusIndustry, a division of the Commonwealth Department of Industry, Tourism and Resources, provides access to and assistance with these programs throughout metropolitan and regional Australia. There seems to be significant benefit in co-locating the delivery of innovation programs, particularly when the delivery agency also provides valuable advice about which programs might best match the needs of the business depending upon where the business, or project, is in the innovation cycle.

Attachment

INNOVATION CUSTOMER PROFILES

ASSISTANCE PROVIDED THROUGH R&D START

ABALONE FARM ON THE BRINK OF SUCCESS

An incident of high oyster spat mortalities and 15 years of toil on the eastern coast of Tasmania in the tiny hamlet of Bicheno, is starting to show dividends for Morrie Cropp and son Miles, who is the Managing Director of Abalone Farms Australia.

While the Cropp's main interest has always been in abalone farming, supplying oyster spat to the local industry provided them with a cash flow to continue with their passion, abalone farming. Following the oyster spat mortalities in 1999, they decided to shut down oyster-spat production and go with the abalone. They changed their name from Marine Shellfish Hatcheries to Abalone Farms Australia to reflect their sole focus on abalone.

Abalone Farms Australia is now the largest supplier of abalone seed to the Tasmanian Industry and is conducting its own selective breeding program to further improve the growth rates of the abalone. Revenue from seed and entree size abalone is now starting to flow.

TASMANIAN COMPANY ON TARGET TO BECOME A WORLD LEADER IN SUPPLYING EELS.

Eels Australis has successfully operated an eel fishing, processing and exporting business in Deloraine, Tasmania, since the early 1970s, and is now the largest eel supplier in Australia.

Essentially the company consists of two separate businesses• the wild eel fishery in Tasmania, and an intensive eel farm in Queensland. The wild eel business is based exclusively on the short fin eel while the eel farm focuses on long fin eels. This is due to the natural abundance of the respective eel species in those states

The company successfully applied for a Commonwealth Government R&D Start grant to develop the aquaculture techniques in Tasmania for growing short fin eels in an aquaculture environment.

While Tasmania is renowned for its salmon industry, it is the aim of Eels Australis to make an impact on the seafood market, which will create employment in Tasmania, and boost export opportunities.

R&D Start cont...

GOOD OIL FOR OLIVE INDUSTRY

Inverell-based, Express Harvesting, a general engineering firm, with expertise in the manufacture and maintenance of orchard machinery, is developing a novel and cost-effective olive-harvesting machine, that will provide enormous benefits to Australia's olive industry.

This innovative project resulted from cooperation between olive consultant Peter Birch and engineer Steve Arentz to fill a major need in the Olive Industry. The project involves developing a fully integrated, self-propelled and easily transported olive harvesting machine. It will provide continuous fruit removal, gathering, conveying and bin unloading as the harvester moves along the rows of olive trees.

During the 2002 harvest the initial prototype was tested in the workshop and subsequently in the field. Four re-engineered prototypes will be tested in the principal olive growing regions in New South Wales, South Australia, Victoria and Western Australia during the 2003 harvest.

VEHICLE IDENTIKIT SYSTEM COULD REVOLUTIONISE POLICING PRACTICES WORLDWIDE

A former West Australian police officer, turned innovative software inventor, could change the way policing operations worldwide approach the issue of identifying the type of car used in a crime with the launch of the International Vehicle Identikit System (IVIS) in Perth.

IVIS, which is currently being offered to law enforcement agencies around Australia, was developed by Jason Barber through his company, Supersoftware, and has already been used successfully by West Australian police in a recent investigation.

The IVIS allows law enforcement agencies to identify vehicles used in crime by providing a database of 3-dimensional computer models which can used to help a witness in the identification process. It allows easy customisation of the computer models, allowing for colour changes and adding of features to the vehicles, and will facilitate better communication between police and the community on the description of a wanted vehicle. It can be installed in existing police desktop and laptop computers enabling instant broadcast of high-quality 3D computer models, greatly assisting the vehicle identification process.

R&D Start cont...

INNOVATIVE MARINE FISH FARM A FIRST ONSHORE

Perth-based company Marine Farms was formed in April 2000 to establish a commercial aquaculture enterprise to grow the marine finfish mahimahi, a species that is prized around the world as a game fish and premium-quality, high-value table fish.

With the support of a Commonwealth Government R&D Start grant, Marine Farms established a research and development facility near Perth and began an intensive two year research and development program.

Reliable procedures have now been developed for the mass production of ex-hatchery juvenile mahimahi suitable for stocking a commercial project with a high annual yield. Marine Farms has also undertaken a significant amount of work to determine the optimum growout conditions for the mahimahi produced under commercial conditions.

The mahimahi is a premium-quality, brightly-coloured tropical and sub-tropical finfish known in Australia as dolphin fish. Although mahimahi has been grown before in laboratories and on a small scale, they have never been farmed successfully on a commercial scale. The farm being developed will be the first to grow mahimahi on a commercial scale, and also the first onshore farm in Australia for growing marine fish.

CULTIVATOR SET TO REVOLUTIONISE AGRICULTURE INDUSTRY

Generations of Australian school children grew up on the legend of the practical and simple 'stump jump' plough, invented by an Australian farmer as the solution to cultivating his mallee-riddled soil. It's possible that the new Rotocult horizontal cultivator may be the 21st century's Queensland version of that earlier plough.

When some years ago an elderly canegrower first suggested his idea for the horizontally 'slicing' cultivator to Atherton-based John Wilkinson from Wilkinson's Blacksmiths, he was making his suggestion to an individual already known for his innovative approach to engineering and metallurgy.

In the cane country the Rotocult's horizontal orbital action slices the earth, incorporates trash and cultivates the inner space with significantly less soil disturbance and far greater moisture retention than standard ripping and rotary hoeing.

The Rotocult usually requires just the one pass to prepare the ground for cultivation and follow up with the planter almost immediately, compared with up to seven or eight passes by traditional equipment prior to planting. The Rotocult is now being used in a diversity of farming situations including an Australian soil reclamation company with outstanding success for reclaiming contaminated building sites by the incorporation of organic matter and microbial solutions.

ASSISTANCE PROVIDED THROUGH THE COMET PROGRAM

INNOVATIVE TECHNOLOGY A BUILDER'S DREAM

Bevis Corner's innovative approach to new building techniques has seen it emerge as a company with a product that could revolutionise the building industry in Australia. The Bevis Corner Modular Building System has multiple applications and has the potential to generate $200 million in sales of other Bevis Corner products.

The company's new system uses a set of interchangeable components that 'mated' with off-the-shelf timber and/or sheet steel frames, can virtually construct any small to medium building frame. Conventional building materials can then be used to complete the project.

It offers speed, safety, simplicity, economy and stability. The building products feature a new design that gives amazing flexibility to all joints of a building, including the ability to change the pitch of the roof, the angle and the height from the holding feet.

Perhaps for the first time, builders, contractors, do-it-your self and the like, are practically guaranteed a foolproof building product, that has a simple design, is easy to erect and most importantly, cost-effective.

NEW SOFTWARE AN INSTANT SUCCESS

An innovative software application that electronically aligns business planning, performance management and management reporting has been developed by brothers, Nick and Alan Bassal, who own the Sydney-based fledgling business planning software company Corpalign.

The software is unique as it supports everyone in organisations to facilitate the development, implementation and reporting of business objectives, measures and targets.

Managers can monitor the progress of individual projects, budgets and performance measures developed throughout their part of the organisation. The software is also compatible with Microsoft Word, Excel and Outlook which makes it easy to use and quick to learn.

The Corpalign package has been successfully installed or piloted in several organisations, including NSW Registry of Births, Deaths and Marriages; Borland Australia; NSW Police; Country Energy; and Honeywell Industrial Control Asia-Pacific.

COMET cont...

FUEL ADDITIVES A COST SAVER

In 1996 Tamworth-based Tye Atkinson and Ross Gibson, a computer programmer, recognised the potential for an accurate yet easy to use fuel additive dosing system, so they decided to establish FAT Systems to develop the project.

The resulting product is a low cost, highly accurate dosing pump for delivering fuel additives for diesel systems, which allows transport operators to enjoy the benefits of fuel additives, regardless of location.

FAT Systems offer diesel users, particularly in the transport industry, several advantages over the use of standard diesel, including improved combustibility which allows fuel to burn more efficiently, cleaning and keeping clean critical fuel system components such as fuel pumps, fuel lines and injector tips, and meeting emission control requirements by reducing carbon dioxide and other greenhouse gas output. Sales of fuel additives are increasing as more operators become convinced of the efficiency benefits they offer.

INNOVATIVE NEW TRAINING TECHNIQUES PUSH ELITE ATHLETES TO NEW HEIGHTS

Elite athletes, whether competing in track and field, swimming, or playing rugby league, rugby union, Australian rules, soccer, baseball, tennis and other sports, know one thing for certain, that to continue competing at the top level requires hours of training to increase speed, power and endurance.

South Australian-based company IsoSport Kinetic has the technology and is designing, manufacturing and marketing sport equipment employing iso-kinetic principles for the strength, speed and injury rehabilitation training of elite athletes. The company's success was recognised in March this year when they won the AusIndustry Innovation Award at the 2001 Australian Sports Awards in Canberra.

IsoSport Kinetic equipment is particularly innovative in its use of hydraulic iso-kinetic technology, which provides greater exercise speeds than other isokinetic systems. This now allows athletes to train at or near the speed of competition to maximise performance improvement but with the much lower risk of injury that is inherent with isokinetic training techniques.

COMET cont...

WEB TRAINING A GLOWING SUCCESS

Learning Seat is an innovative Melbourne based e-learning company specialising in internet systems for training and compliance management. Its solutions enable organisations to reduce cost and risk, while maximising flexibility in the delivery and management of training.

Focusing on the power of the internet as a medium for training and education, Learning Seat has developed the Learning Seat Training Environment. It is a turnkey, enterprise-wide system which contains designated training modules and may be directed towards all staff, including sub-contract and temporary personnel.

The Learning Seat Training Environment enables staff to access permitted company training from any internet-connected computer, 24 hours a day. The Environment also aids training administration since it enables training to be assigned and tracked quickly and accurately.

THIS TAP'S NO DRIP

Perth-based company Wavtech was established in 1996 to design a wide range of high tech products. In May 2002, the company capped off its innovative research and development program by winning a gold medal ahead of nine other countries at the International Exhibition of Inventions held in Geneva, in the Class E section, Sanitation, Ventilation and Heating for its tap product, Smartvalve.

Smartvalve offers many advantages over standard tap valves as it reduces wear by incorporating a clutch mechanism in the spindle, that allows the handle to rotate after reaching closure pressure. The valve is unique as it has a universal design that allows the valve to be fitted with international market leaders' dress fittings.

Smartvalve can be purchased independently and will fit into any garden, bathroom, shower and kitchen tapware, allowing consumers greater flexibility when choosing taps. Water leaking while the mixer is turned off is almost impossible, saving cold and hot water as well as energy. Maintenance is also reduced as the Smartvalve doesn't damage the brass valve seat, eliminating the need to reseat the valve.

COMET cont...

RUBBER BASE TURF A HIT IN ASIA

An innovative Australian company based in western Sydney is using discarded rubber vehicle tyres as a base for turf to be used on sporting and leisure fields—it is also the first company in the world to export grass to Japan, some of which will be used to combat heat stress on Tokyo skyscrapers.

Stratum Turf is a completely soil free rubber-based surface from 100mm thickness, with properties that allow turf growth. The base product contains, as the main ingredient, a large proportion of recycled rubber from used vehicle tyres, with proprietary emulsions and filler agents combining to form a rubber-based compound offering a diverse range of commercial applications. Depending on the size of the rubber granules, up to 70 discarded tyres are used per square metre.

Despite watering, playing fields in summer become very dry and hard and the opposite occurs when it rains making the fields unplayable necessitating fixtures to be abandoned or postponed. Stratum Turf addresses both these problems in one application, by absorbing concussion when it is dry, and when it rains, draining water immediately, irrespective of the level of moisture, ensuring cancellations are a thing of the past.

ASSISTANCE PROVIDED THROUGH THE BIF PROGRAM

GENOTYPING SERVICE FOR PLANT, ANIMAL OR MICROBIAL SPECIES A STEP CLOSER

Diversity Arrays Technology Pty Ltd, a company established by Canberra-based research institute CAMBIA, is a successful BIF applicant. Its project involves developing a competitive genotyping service for plant, animal or microbial species where little or no DNA sequence information exists, and where low cost and high throughput are absolutely essential for the technology to be widely adopted.

Until now, the high cost and low throughput of commonly used genotyping techniques has limited their deployment to the most profitable applications, mainly in the pharmaceutical sector. The largest plant breeding organisations are using genotyping to accelerate their breeding programs, but a much bigger market exists for cheaper genotyping technologies. Diversity Arrays Technology will offer a genotype of 500 genetic markers at a price lower than the cost of a genotype of 20 markers using current techniques.

Diversity Arrays Technology is developing genotyping arrays for a range of customers, applying the technology to seven different genomes. It is offering research and genotyping services to any organisation requiring fast, cost-effective and precise genetic testing. In parallel it is developing an integrated informatics package. In addition to R&D contracts and genotyping services, delivery of the technology will include genotyping arrays sold as research reagents and the rights to practice Diversity Arrays.

TECHNOLOGY TO DEGRADE PESTICIDES INTO INNOCUOUS PRODUCTS A BOOST TO THE ENVIRONMENT

While pesticides reduce the impact of weeds, pests and diseases and lead to improved productivity, better quality produce and more competitive export opportunities for the agriculture and horticultural industries, it also contaminates soil and waterways. Given the community and environmental concerns it is essential that effective remediation methods be developed.

Enzymatic Bioremediation, is a relatively new approach that holds promise. The technology uses enzymes to rapidly degrade pesticides into innocuous products. The catalytic nature of enzymes is such that only a relatively small amount of enzyme is required to treat a relatively large amount of contaminated water. An Orica-led consortium is developing this technology.

Progress over the past year has been good. The first milestone was the evaluation and comparison of enzyme expression in two high level expression systems. The outcomes of the work was a 400 per cent improvement in the enzyme production levels. The second was a field trial involving the use of enzymes to rapidly degrade pesticide residues in rinsate from the washdown of pesticide spray equipment.

In the trial, a 90 per cent reduction in pesticide level was achieved in 10 minutes, and after one hour, 99 per cent of the residue had been destroyed. Commercial release of the first enzyme product is anticipated in 2002-03.

BIF cont...

NEW TOOLS BEING DEVELOPED FOR MEDICAL RESEARCH

Gene Stream received BIF grant to develop a range of DNA-based research tools that have utility in both the commercial and academic aspects of medical research.

The proposed products are predicted to improve accuracy and provide substantial savings in labour, time and consumables. The pharmaceutical industry will benefit from substantial cost savings in their drug screening programs. Industry and the public will benefit from an improved ability to identify suitable drugs and bring them to the market more quickly.

In the first nine months of the project, Gene Stream has already achieved their first two milestones. The first range of prototype products demonstrated substantial improvements compared with the existing art. Construction of the second generation of prototypes is currently under way. Further improvements are anticipated.

PLANT-DERIVED PROTEIN FRAMEWORK PROGRESSING NICELY

Kalthera Pty Ltd has discovered a novel plant-derived protein framework that has exceptional chemical stability, is resistant to enzymatic breakdown, is potentially bioavailable, and is amenable to modification to graft a range of bioactive material onto it. Kalthera's mission is to exploit this framework in pharmaceutical applications to produce stabilised peptide therapeutics. Such applications may potentially overcome the major limitations of peptide-based drugs.

The company's intellectual property consists of two patent applications, the first relating to the general exploitation of the framework as a stable template onto which a range of medicinal, agricultural and industrial bioactivities may be grafted. The second patent relates to cyclisation of a particular class of therapeutically relevant peptides, the conopeptides. Cyclisation has the potential to stabilise conopeptides and enhance their range of therapeutic applications. Such applications include the management of pain and neurological disorders.

Milestones achieved in the first six months include the worldwide filing of the framework patent and further progression of the cyclised conotoxin patent through international examination processes. The technical development program has demonstrated that a range of different peptide epitopes (bioactive regions) may be grafted onto the framework.

BIF cont...

INTERNATIONAL ACCLAIM FOR AUSTRALIAN BIOTECH COMPANY

Perth-based company Grain Biotech Australia has developed the capability to produce transgenic wheat plants expressing novel genes. The company received a BIF grant to produce pharmaceutical compounds which will enable development of valuable synergies between the company and Australia's expanding biomedical research.

Its skilled staff and world-class technology will help growers to benefit from increased market value, reduced production risks and lower pesticide costs. Processors and consumers will benefit from better grain quality and the environment will benefit from reduced pesticide use.

The company's achievements over the past year have strengthened its position as the leader in commercial wheat transformation in Australia, and one of five finalists worldwide for the 2002 World Technology Award for Biotechnology in the Corporate Category in New York.

Grain Biotech has developed a world first transgenic line of wheat with resistance to Barley Yellow Dwarf Virus, the world's most serious virus disease attacking wheat, and a neutraceutical product with strong anti-oxidant properties that has potential human health benefits. Work is currently underway on developing salt tolerant wheat, and this has the potential to have a major impact on Australian agriculture.

ASSISTANCE PROVIDED THROUGH THE R&D TAX CONCESSION

COMPANY TECHNOLOGY NEEDS NO ANALYSING

In the mining and mineral processing industry, anything that saves time, money and wastage is bound to attract very positive attention. Adelaide-based company Thermo Gamma-Metrics, has certainly done that if its growth and export figures are anything to go by.

The company produces a range of analysis equipment for the mineral-processing industry. The instrumentation uses x-ray fluorescence technology for measuring elements such as copper, lead, zinc, gold and platinum in mainly mineral slurries.

Monitoring saves energy and reagent costs associated with grinding and other processing within these industries and contributes to a better understanding of the character and quality of particular process streams. In this way, mineral processing plant operators can make informed changes to ensure mineral product recovery specifications are met.

During the past three years Thermo Gamma-Metrics has chalked up more than $30 million in export sales.

INNOVATIVE CENTRAL COAST COMPANY REAPING SUCCESS WITH R&D PROGRAM

When Gustav Krone established his company 74 years ago in Berlin Germany, he wouldn't have envisaged that it would grow to one of the world's leading telecommunications equipment companies, with 29 subsidiaries in five continents of the world, including one on the New South Wales central coast at Berkeley Vale.

KRONE (Australia) Holdings Pty Limited has grown dramatically to become a dynamic manufacturing and marketing organisation, highly successful in the fields of communications networks and power distribution. It manufactures interconnection and distribution devices that connect cables used in voice and data communications networks and in power distribution. The products are used in copper cabling and fibre optics infrastructure.

The company is Australia's leading cable connectivity equipment supplier, employing more than 300 people and supplying network products that are used in buildings all over the nation. It is also the KRONE Group's regional head office and Manufacturing Centre of Competence for the Indo Pacific Region.

KRONE owes its significant growth during the past two decades to its high investment in successful innovation.

Tax Concession cont...

STRONG R&D BASE A WINNER FOR AUTOPAK

Autopak-Vetlab began life in 1967 as a manufacturer of veterinary products for the poultry industry, extending its product range to rodenticides and snail baits in the 1970s. Today the New South Wales based company provides a range of formulation and packing services to animal health, crop protection and other high-value, low-volume, specialty chemical markets throughout Australia and internationally.
In 1985 the company expanded into liquid formulations and synthesis for crop protection and industrial chemical products, and by the end of 1987 every major multinational company marketing crop protection chemicals had commissioned contract work by the Autopak division.

In 1991 the company reached a milestone with the building and commissioning of the Vetlab animal health toll manufacturing facility. In addition to contract manufacture and specialised packaging solutions, Autopak-Vetlab also offers product development, stability and improvement services, with some clients carrying out their own innovative development projects on the company's premises.

Over the past 10 years, benefits under the Commonwealth Government's R&D Tax Concession have enabled Autopak-Vetlab to build a strong R&D infrastructure, concentrating on projects that provide innovative process and product solutions.

Software company a global success

While the corporate identity may be new, the name Citect will be a familiar one to a broad range of industries around the globe. Launched in May 2002, Citect is the new face of Ci Technologies, an acknowledged leader in the field of industrial automation and information management and the company responsible for world-leading software products CitectHMI, CitectSCADA and CitectPlant2Business.

As Ci Technologies, the company had a long standing history of innovative product development, providing engineering services and software to the industrial automation market for more than 25 years. Citect's products are used in industries as diverse as water and wastewater, facilities monitoring, gas pipelines, mining, dairy, food processing, pharmaceutical and power distribution.

Currently the largest independent supplier of industrial automation software in the world, Citect can claim considerable success in a competitive global market. Headquartered in Sydney, the company has offices in the US, Europe, South Africa and China, and its products are distributed in more than 40 countries.

Tax Concession cont...

R&D NET ENNIO A SOUND FUTURE IN SMALLGOODS AND MEAT PACKAGING.

Given their limited resources, small family businesses are usually not the first to spring to mind when it comes to R&D, but South Australian-based company Ennio International is an exception. The company has thrived on an approach that combines commitment to meeting customer needs with a drive for world-class, innovative product development and design

Owned and operated by the Mercuri family since 1968, Ennio specialises in the manufacture and supply of high-quality, innovative nettings and casings for traditional smallgoods and meat products.

As a small company catering for a niche market it was difficult to commit significant staff resources and funds to R&D. At the same time there was little chance of the company expanding its presence beyond the limited local market without being able to develop products with significant market differentiation.

The Commonwealth Government's R&D Tax Concession has enabled the company to make that vital investment and undertake R&D projects that directly benefit the business.

ALUMINIUM TITANATE GIVES ROJAN THE COMPETITIVE EDGE

West Australian-based company Rojan Advanced Ceramics specialises in industrial ceramics. Its activities include designing, manufacturing, supplying and installing specialised wear, corrosion and heat resistant materials for arduous applications in a broad variety of industries.

From small beginnings producing brick extrusion cores, the company is now a world leader in its field, supplying products to the mining, brick/heavy clay, laboratories, foundry/molten metals, bulk materials handling, power generation and refinery industries.

To stay at the forefront of industry needs, Rojan has a dedicated commitment to technology development. Their approach to R&D programs, leading edge manufacturing processes, and strict quality control has transformed them into one of the most technologically advanced private ceramics company in the southern hemisphere.

Tax Concession cont...

TRANSTECH NARROWING THE TYRANNY OF DISTANCE

Australia relies on fast, efficient road transport to deliver many of life's essentials to its widespread communities. That's where Transtech Research comes in—providing the road transport industry with better, safer, and more efficient ways to meet customer needs and commercial goals.

Transtech Research is the R&D arm of MaxiTRANS, Australia's largest manufacturer of road transport trailers, with more than 50 years experience in designing and manufacturing premium road transport equipment.

The parent company's long-standing commitment to R&D is continued through Transtech Research, which has a number of successful innovative product developments, including an improved rack and pinion roll back mechanism, and the one-piece dividing wall Maxi-CUBE reefer, launched in January 2002.

The improved roll back mechanism features greater reliability, improved ease of movement, reduced point loads, and a suspension fitted with a standard raise/lower valve. The mechanism was specifically designed to simplify the unloading of lead B-Double trailers and to improve operator safety.

The one piece dividing wall Maxi-CUBE reefer assists transport operators to maximise equipment utilisation by being able to carry a mix of frozen and chilled goods in the one trailer. The wall's special feature is its power operated one piece design that maximises driver safety and makes loading easier.

FAMILY BUSINESS AND INDUSTRY LEADER

Well-known for its innovative product developments, Palmer Tube Mills is one of the world's leading manufacturers of quality steel products for structural, mechanical and low-pressure reticulation applications in a range of key industries. The company has grown to become an industry leader, supplying about 40 per cent of Australia's total market demand for welded steel tube.

Palmer Tube Mills' plants in Queensland and Victoria, produce a range of steel tube and pipe. The company has developed its own inline coatings technologies, including Palmer KleenKote and Palmer KleerKote, which provide a primer coating for ease of down-stream fabrication. Palmer Tube Mills has long identified the value of high-strength hollow sections and this is evident by the R&D and market acceptance of Palmer's DualGrade tubular products.

More recently, the development of SupaGaln has resulted in a new range of products protected by a smooth coating of zinc inside and out. The company's long-standing commitment to improving and advancing its products and processes has been at the core of it achieving its position as an industry market leader. Its investment in R&D enables it to study the needs of end users and develop innovative, high-quality products.

ASSISTANCE PROVIDED THROUGH THE IIF PROGRAM

PERSEVERANCE WINS THE DAY FOR POLYMERAT

Brisbane-based Polymerat's founding scientists developed the vision of a technology in which the nanotechnology (the branch of technology that deals with dimensions and tolerances of less than 100 nanometres, [one thousand-millionth of a metre]) and proteomics revolutions collided.

They believed that where these technologies converged, they could create at the nanoscale-level, novel high-tech polymers which, through clever informatics, could be used to manipulate medically important proteins. They also believed they could create world-beating products for use in drug discovery.

Convinced that there was a market for their technology, the scientists resigned from their former employment, founded Polymerat, and began the arduous task of searching for venture capital. A colleague referred them to CM Capital Investments, a fund manager for the Commonwealth Government's Innovation Investment Fund (IIF) program.

The CM Capital seed investment of $1.1 million allowed the three Polymerat founders to hire scientists and commence an aggressive technology development program.

INNOVATIVE DRILL A SEABED SUCCESS

With venture capital support from Momentum, a fund manager for the Commonwealth Government's Innovation Investment Fund program, Sydney-based company Benthic Geotech has developed an innovative device• the Portable Remotely Operated Drill or PROD, which can operate at depths to 2000 metres below sea level.

PROD is a self-contained rotary drill rig that is lowered to the seabed from a winch on a ship. Once on the seabed, the PROD can drill and recover core samples to a depth of 135 metres through a mix of soft and hard seabed layers.

Currently, this capability is only available by using very expensive drill ships, which can cost millions to mobilise and hundreds of thousands a day in rates. Since emerging from an extensive R&D phase, Benthic Geotech has won, and is completing, several contracts with the Australian oil and gas industry.

The company is also progressing relationships with international service providers in the oil and gas industry, and has entered into a joint venture deal with a European university to construct and operate a new PROD specifically for the scientific research market.

INQUIRY INTO BUSINESS COMMITMENT TO RESEARCH AND DEVELOPMENT IN AUSTRALIA

SUBMISSION BY THE INDUSTRY, RESEARCH AND DEVELOPMENT (IR&D) BOARD

Introduction

The recent ABS statistics on Business Expenditure on Research and Development (BERD) show an overall increase in BERD for financial year 2000-01. Despite the increase, private sector expenditure on R&D is significantly behind that of other OECD nations. In fact, we are in a situation where Australia's largest companies are devoting only 1% of their total employment to R&D activities[1]. R&D is a fundamental driver of innovation and we need to strive for increased business investment in R&D if Australia is to enjoy sustained economic growth and prosperity. There are a number of factors peculiar to the Australian environment that hinder business investment in R&D and the Government has taken a number of significant steps to address these impediments. The Board fully supports these measures and would encourage the maintenance of a robust package of financial incentives to build business commitment to R&D. While acknowledging the important role played by Government in this area, the Board also notes that it is equally important that industry recognises the imperative for industry, itself, to play an active role in raising the level of R&D in Australia.

In support of the claim that there have been useful advances through government support for innovation, this submission will focus on some of the successful R&D outcomes that have arisen with the assistance of government measures.

IR&D Board

The IR&D Board is responsible for the administration of a number of the Commonwealth Government's industry innovation programs, including: the Tax Concession for Research and Development; the R&D Start program; the Innovation Investment Fund; the Pre-Seed Fund; the Commercialising Emerging Technologies (COMET) program; the Biotechnology Innovation Fund; and, on behalf of the Australian Greenhouse Office, the Renewable Energy Equity Fund. Through these and earlier programs, the Board has established an extensive corporate understanding and experience of innovative culture within private firms. In addition, the Board's membership comprises individuals with business backgrounds, public sector research experience and private R&D and commercialisation experience.

In total, the programs administered by the Board will provide $682.4m in assistance (including the tax concession) to approximately 5250 Australian businesses in financial year 2002/03.

Assistance Measures and Outcomes

R&D Start Program

The R&D Start program was launched five years ago. It provides significant levels of support to Australian businesses for innovation and over the last five years has provided assistance to about 1000 companies.

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[1] ABS Report, Research and Experimental Development, Businesses Aust.; 1 July 2002; 8104.0., p.6

Over the last two years, interest in the program has accelerated significantly with the Board approving 374 grants to the value of $357.5m in financial years 2000/01 and 2001/02. Of the R&D projects assisted by the Board, the significant majority of them are being completed successfully with many of them reporting the successful commercialisation of the resulting R&D outcomes. From financial year 1999/00 to financial year 2001/02, 65% of projects have been successfully completed and only 5% of projects have failed to be completed. In 2001/02, 83% of projects report that they have successfully commercialised or are in the process of commercialising the outcomes from their R&D projects.

In November 2000, an evaluation of the R&D Start program conducted by the Allen Consulting Group revealed that:

- 29.2% of customers found that R&D Start had a high to very high impact on their ability to *raise capital*;
- 41.7% of customers found that R&D Start had a high to very high impact on their ability to *form strategic alliances*;
- 72.9% of customers found that R&D Start had a high to very high impact on their ability to *enter new product markets*;
- 60.4% of customers found that R&D Start had a high to very high impact on their ability to *enter new export markets*;
- 49.0% of customers found that R&D Start had a high to very high impact on their ability to *be more responsive to customer needs*;
- 70.8% of customers found that R&D Start had a high to very high impact on *the value of company expertise*;
- 81.3% of customers found that R&D Start had a high to very high impact on *the value of company intellectual property*;
- 58.3% of customers found that R&D Start had a high to very high impact on *the in-house skills of employees*; and
- 25% of customers found that R&D Start had a high to very high impact on their ability to *access other Government programs*.

The program is an appropriate complement to the R&D Tax Concession program and is now seen by industry as a very significant component of the innovation cycle in Australia, especially for early stage companies. The Start program will continue to be an important element of Government activities to encourage increased levels of private sector investment in R&D.

Commercialising Emerging Technologies (COMET) Program

The COMET program commenced in 1999 and, thanks to its expansion as part of the *Backing Australia's Ability* (BAA) suite of initiatives, will run until June 2005. The program is targeted at small, start up companies trying to commercialise innovative technologies. The program has assisted about 600 customers since November 1999.

As an indicator of the success of the program, COMET customers have reported high levels of successful commercialisation outcomes achieved through their participation in the COMET program. The commercialisation outcomes include:

- capital raisings of nearly $100 million;
- 104 COMET customers have either commenced manufacture or launched their product onto the market;

- 23 have entered into licence agreements;
- 81 have formed strategic or joint venture alliances; and
- 82 have entered commercial agreements for the distribution, manufacturing or market release of their product.

In addition, an evaluation of COMET customers conducted in May/June 2002 revealed that:

- 73% of customers who had completed the COMET program felt that their expectations of the program in terms of providing assistance to raise capital, conduct market research, establish a business/financial plan and/or obtain R&D funding had been met;
- participating firms exhibited higher growth in annual revenue, number of employees, annual expenses and total assets compared to a reference group;
- most COMET customers endorsed that participation in the program 'opened doors' for them; and
- 93% of the successful customers suggested they would recommend the program to others.

These extraordinary outcomes demonstrate the effectiveness of this program in meeting a previously poorly supported target market, very small early stage companies, with innovative ideas needing help to progress to commercialisation. This program is also helping connect the angel investor networks with innovative companies. The Board feels that further policy initiatives that improve the connectivity between angel investors and early stage innovative companies should be supported.

Biotechnology Innovation Fund (BIF) program

The BIF program builds on Australia's competitive strengths in biotechnology by providing support at the critical "proof of concept" stage of development. Attracting capital to fund this stage of an innovation in this sector, because of the long commercialisation lead times, can be difficult and is often a substantial impediment to realising the commercial potential of an innovation.

The program has been well received by industry with over 200 projects seeking assistance in the first three rounds of the program. Of these, 94 projects are being supported to the tune of $21.2m. Support has been provided to projects in a variety of biotechnology fields and include:

- a program to allow athletes to re-breathe their own air;
- a system to monitor the heart rhythms of heart surgery patients;
- development of a new wild wheat food;
- research into drugs that target inflammation and cancer;
- medical procedures for the control of urinary incontinence;
- laser treatment for lymph activation; and
- genotyping for the agricultural environmental and scientific communities.

A survey of BIF customers conducted in June 2002 indicated that 81% of successful applicants felt that the program fully, or mostly, helped them to commercialise their research. Continued and enhanced support for this sector will see impediments to growth of a viable biotechnology industry minimised.

R&D Tax Concession

The R&D Tax Concession was introduced in 1985 and is a broad-based, market driven incentive that supports much of the industrial R&D in Australia. While the program has always been well subscribed, current reported R&D expenditure for the tax concession is at record levels. At 30 June 2002, 3565 companies were registered for the tax concession for the 2000/01 financial year with reported R&D expenditure totalling $5.2 billion.

A range of new features was introduced to the Tax Concession during financial year 2001/02 to encourage Australian companies to become more R&D intensive. The measures include:

- a 175% Premium (Incremental) Tax Concession for additional investment in R&D;
- an R&D Tax Offset for small innovative companies, particularly those in tax-loss, to enable them to 'cash out' their R&D tax deductions; and
- a new R&D plant/asset depreciation regime that allows a 125% deduction for effective life depreciation of assets used in R&D activities on a pro-rata basis.

These form a very strong package of measures to encourage additional private sector investment in R&D. In addition the Board is pleased that the new requirements for R&D Plans have been introduced and sees this as an important step in reinforcing the need for companies to think strategically about their R&D activities. R&D plans are intended to support the successful management of R&D projects providing focus and structure to R&D activities and thereby enhancing the likelihood of successful outcomes.

Innovation Investment Fund (IIF) Program

The IIF program became operational in late 1998. It was established to promote the development of an Australian venture capital market for early stage, technology-based companies. The Commonwealth, in partnership with the private sector, establishes venture capital funds to invest in small technology-based companies.

From inception of the program until June 2002, $138.9 million has been invested in 55 companies. Of this total, $34.5 million was invested in 31 companies during financial year 2001/02. The Commonwealth Government contributed $22 million towards these investments.

During the 2001/02 financial year IIF program investments were made in the following sectors:

- $5.1m in 5 companies in the internet sector;
- $10.0m in 8 companies in the IT/software, telecommunications sector;
- $15.4m in 14 companies in biosciences; and
- $4.0m in 4 companies in other industries including environment, engineering and building materials.

By demonstrating the returns achievable from investing in these companies, the program will encourage additional private sector investment in this area thereby providing young Australian technology-based companies with the means to successfully commercialise the outcomes of their R&D efforts.

Renewable Energy Equity Fund (REEF) Program

The REEF program is a specialist renewable energy venture capital fund modelled on the IIF program. There are five investee companies in the REEF program representing investments totalling $6 m. The REEF program is delivered by the Board on behalf of the Australian Greenhouse Office.

Backing Australia's Ability

The Board notes that the Prime Minister's *Backing Australia's Ability* (BAA) statement of 2001, included a number of enhancements to these key Government initiatives to encourage private sector R&D. The initiatives have been warmly received by industry and are a positive step in encouraging higher levels of business investment in R&D in Australia by addressing market failures.

The Board also notes the establishment of the Pre-Seed Fund program, introduced as part of the BAA suite of initiatives. The program is designed to help increase the commercialisation of research outcomes from Commonwealth public sector research agencies. It seeks to encourage the private sector to take a more active role in funding and managing the pre-seed stage of the research developments of universities and public sector research agencies.

The PSF program establishes venture capital funds to invest in projects or companies spinning out from universities or Commonwealth public sector research agencies. The funds will be managed by private sector venture capital fund managers. This program is another welcome addition to the suite of measures designed to increase private sector R&D activities and the successful commercialisation of the outcomes of these activities.

Access to Programs

The Board also notes the success of having most of the Commonwealth Government's innovation programs delivered through the one agency. AusIndustry, a division of the Commonwealth Department of Industry, Tourism and Resources, provides access to and assistance with these programs throughout metropolitan and regional Australia. There seems to be significant benefit in co-locating the delivery of innovation programs, particularly when the delivery agency also provides valuable advice about which programs might best match the needs of the business depending upon where the business, or project, is in the innovation cycle.

Attachment

INNOVATION CUSTOMER PROFILES

ASSISTANCE PROVIDED THROUGH R&D START

ABALONE FARM ON THE BRINK OF SUCCESS

An incident of high oyster spat mortalities and 15 years of toil on the eastern coast of Tasmania in the tiny hamlet of Bicheno, is starting to show dividends for Morrie Cropp and son Miles, who is the Managing Director of Abalone Farms Australia.

While the Cropp's main interest has always been in abalone farming, supplying oyster spat to the local industry provided them with a cash flow to continue with their passion, abalone farming. Following the oyster spat mortalities in 1999, they decided to shut down oyster-spat production and go with the abalone. They changed their name from Marine Shellfish Hatcheries to Abalone Farms Australia to reflect their sole focus on abalone.

Abalone Farms Australia is now the largest supplier of abalone seed to the Tasmanian Industry and is conducting its own selective breeding program to further improve the growth rates of the abalone. Revenue from seed and entree size abalone is now starting to flow.

TASMANIAN COMPANY ON TARGET TO BECOME A WORLD LEADER IN SUPPLYING EELS.

Eels Australis has successfully operated an eel fishing, processing and exporting business in Deloraine, Tasmania, since the early 1970s, and is now the largest eel supplier in Australia.

Essentially the company consists of two separate businesses• the wild eel fishery in Tasmania, and an intensive eel farm in Queensland. The wild eel business is based exclusively on the short fin eel while the eel farm focuses on long fin eels. This is due to the natural abundance of the respective eel species in those states

The company successfully applied for a Commonwealth Government R&D Start grant to develop the aquaculture techniques in Tasmania for growing short fin eels in an aquaculture environment.

While Tasmania is renowned for its salmon industry, it is the aim of Eels Australis to make an impact on the seafood market, which will create employment in Tasmania, and boost export opportunities.

R&D Start cont...

GOOD OIL FOR OLIVE INDUSTRY

Inverell-based, Express Harvesting, a general engineering firm, with expertise in the manufacture and maintenance of orchard machinery, is developing a novel and cost-effective olive-harvesting machine, that will provide enormous benefits to Australia's olive industry.

This innovative project resulted from cooperation between olive consultant Peter Birch and engineer Steve Arentz to fill a major need in the Olive Industry. The project involves developing a fully integrated, self-propelled and easily transported olive harvesting machine. It will provide continuous fruit removal, gathering, conveying and bin unloading as the harvester moves along the rows of olive trees.

During the 2002 harvest the initial prototype was tested in the workshop and subsequently in the field. Four re-engineered prototypes will be tested in the principal olive growing regions in New South Wales, South Australia, Victoria and Western Australia during the 2003 harvest.

VEHICLE IDENTIKIT SYSTEM COULD REVOLUTIONISE POLICING PRACTICES WORLDWIDE

A former West Australian police officer, turned innovative software inventor, could change the way policing operations worldwide approach the issue of identifying the type of car used in a crime with the launch of the International Vehicle Identikit System (IVIS) in Perth.

IVIS, which is currently being offered to law enforcement agencies around Australia, was developed by Jason Barber through his company, Supersoftware, and has already been used successfully by West Australian police in a recent investigation.

The IVIS allows law enforcement agencies to identify vehicles used in crime by providing a database of 3-dimensional computer models which can used to help a witness in the identification process. It allows easy customisation of the computer models, allowing for colour changes and adding of features to the vehicles, and will facilitate better communication between police and the community on the description of a wanted vehicle. It can be installed in existing police desktop and laptop computers enabling instant broadcast of high-quality 3D computer models, greatly assisting the vehicle identification process.

R&D Start cont...

INNOVATIVE MARINE FISH FARM A FIRST ONSHORE

Perth-based company Marine Farms was formed in April 2000 to establish a commercial aquaculture enterprise to grow the marine finfish mahimahi, a species that is prized around the world as a game fish and premium-quality, high-value table fish.

With the support of a Commonwealth Government R&D Start grant, Marine Farms established a research and development facility near Perth and began an intensive two year research and development program.

Reliable procedures have now been developed for the mass production of ex-hatchery juvenile mahimahi suitable for stocking a commercial project with a high annual yield. Marine Farms has also undertaken a significant amount of work to determine the optimum growout conditions for the mahimahi produced under commercial conditions.

The mahimahi is a premium-quality, brightly-coloured tropical and sub-tropical finfish known in Australia as dolphin fish. Although mahimahi has been grown before in laboratories and on a small scale, they have never been farmed successfully on a commercial scale. The farm being developed will be the first to grow mahimahi on a commercial scale, and also the first onshore farm in Australia for growing marine fish.

CULTIVATOR SET TO REVOLUTIONISE AGRICULTURE INDUSTRY

Generations of Australian school children grew up on the legend of the practical and simple 'stump jump' plough, invented by an Australian farmer as the solution to cultivating his mallee-riddled soil. It's possible that the new Rotocult horizontal cultivator may be the 21st century's Queensland version of that earlier plough.

When some years ago an elderly canegrower first suggested his idea for the horizontally 'slicing' cultivator to Atherton-based John Wilkinson from Wilkinson's Blacksmiths, he was making his suggestion to an individual already known for his innovative approach to engineering and metallurgy.

In the cane country the Rotocult's horizontal orbital action slices the earth, incorporates trash and cultivates the inner space with significantly less soil disturbance and far greater moisture retention than standard ripping and rotary hoeing.

The Rotocult usually requires just the one pass to prepare the ground for cultivation and follow up with the planter almost immediately, compared with up to seven or eight passes by traditional equipment prior to planting. The Rotocult is now being used in a diversity of farming situations including an Australian soil reclamation company with outstanding success for reclaiming contaminated building sites by the incorporation of organic matter and microbial solutions.

ASSISTANCE PROVIDED THROUGH THE COMET PROGRAM

INNOVATIVE TECHNOLOGY A BUILDER'S DREAM

Bevis Corner's innovative approach to new building techniques has seen it emerge as a company with a product that could revolutionise the building industry in Australia. The Bevis Corner Modular Building System has multiple applications and has the potential to generate $200 million in sales of other Bevis Corner products.

The company's new system uses a set of interchangeable components that 'mated' with off-the-shelf timber and/or sheet steel frames, can virtually construct any small to medium building frame. Conventional building materials can then be used to complete the project.

It offers speed, safety, simplicity, economy and stability. The building products feature a new design that gives amazing flexibility to all joints of a building, including the ability to change the pitch of the roof, the angle and the height from the holding feet.

Perhaps for the first time, builders, contractors, do-it-your self and the like, are practically guaranteed a foolproof building product, that has a simple design, is easy to erect and most importantly, cost-effective.

NEW SOFTWARE AN INSTANT SUCCESS

An innovative software application that electronically aligns business planning, performance management and management reporting has been developed by brothers, Nick and Alan Bassal, who own the Sydney-based fledgling business planning software company Corpalign.

The software is unique as it supports everyone in organisations to facilitate the development, implementation and reporting of business objectives, measures and targets.

Managers can monitor the progress of individual projects, budgets and performance measures developed throughout their part of the organisation. The software is also compatible with Microsoft Word, Excel and Outlook which makes it easy to use and quick to learn.

The Corpalign package has been successfully installed or piloted in several organisations, including NSW Registry of Births, Deaths and Marriages; Borland Australia; NSW Police; Country Energy; and Honeywell Industrial Control Asia-Pacific.

COMET cont...

FUEL ADDITIVES A COST SAVER

In 1996 Tamworth-based Tye Atkinson and Ross Gibson, a computer programmer, recognised the potential for an accurate yet easy to use fuel additive dosing system, so they decided to establish FAT Systems to develop the project.

The resulting product is a low cost, highly accurate dosing pump for delivering fuel additives for diesel systems, which allows transport operators to enjoy the benefits of fuel additives, regardless of location.

FAT Systems offer diesel users, particularly in the transport industry, several advantages over the use of standard diesel, including improved combustibility which allows fuel to burn more efficiently, cleaning and keeping clean critical fuel system components such as fuel pumps, fuel lines and injector tips, and meeting emission control requirements by reducing carbon dioxide and other greenhouse gas output. Sales of fuel additives are increasing as more operators become convinced of the efficiency benefits they offer.

INNOVATIVE NEW TRAINING TECHNIQUES PUSH ELITE ATHLETES TO NEW HEIGHTS

Elite athletes, whether competing in track and field, swimming, or playing rugby league, rugby union, Australian rules, soccer, baseball, tennis and other sports, know one thing for certain, that to continue competing at the top level requires hours of training to increase speed, power and endurance.

South Australian-based company IsoSport Kinetic has the technology and is designing, manufacturing and marketing sport equipment employing iso-kinetic principles for the strength, speed and injury rehabilitation training of elite athletes. The company's success was recognised in March this year when they won the AusIndustry Innovation Award at the 2001 Australian Sports Awards in Canberra.

IsoSport Kinetic equipment is particularly innovative in its use of hydraulic iso-kinetic technology, which provides greater exercise speeds than other isokinetic systems. This now allows athletes to train at or near the speed of competition to maximise performance improvement but with the much lower risk of injury that is inherent with isokinetic training techniques.

COMET cont...

WEB TRAINING A GLOWING SUCCESS

Learning Seat is an innovative Melbourne based e-learning company specialising in internet systems for training and compliance management. Its solutions enable organisations to reduce cost and risk, while maximising flexibility in the delivery and management of training.

Focusing on the power of the internet as a medium for training and education, Learning Seat has developed the Learning Seat Training Environment. It is a turnkey, enterprise-wide system which contains designated training modules and may be directed towards all staff, including sub-contract and temporary personnel.

The Learning Seat Training Environment enables staff to access permitted company training from any internet-connected computer, 24 hours a day. The Environment also aids training administration since it enables training to be assigned and tracked quickly and accurately.

THIS TAP'S NO DRIP

Perth-based company Wavtech was established in 1996 to design a wide range of high tech products. In May 2002, the company capped off its innovative research and development program by winning a gold medal ahead of nine other countries at the International Exhibition of Inventions held in Geneva, in the Class E section, Sanitation, Ventilation and Heating for its tap product, Smartvalve.

Smartvalve offers many advantages over standard tap valves as it reduces wear by incorporating a clutch mechanism in the spindle, that allows the handle to rotate after reaching closure pressure. The valve is unique as it has a universal design that allows the valve to be fitted with international market leaders' dress fittings.

Smartvalve can be purchased independently and will fit into any garden, bathroom, shower and kitchen tapware, allowing consumers greater flexibility when choosing taps. Water leaking while the mixer is turned off is almost impossible, saving cold and hot water as well as energy. Maintenance is also reduced as the Smartvalve doesn't damage the brass valve seat, eliminating the need to reseat the valve.

COMET cont...

RUBBER BASE TURF A HIT IN ASIA

An innovative Australian company based in western Sydney is using discarded rubber vehicle tyres as a base for turf to be used on sporting and leisure fields—it is also the first company in the world to export grass to Japan, some of which will be used to combat heat stress on Tokyo skyscrapers.

Stratum Turf is a completely soil free rubber-based surface from 100mm thickness, with properties that allow turf growth. The base product contains, as the main ingredient, a large proportion of recycled rubber from used vehicle tyres, with proprietary emulsions and filler agents combining to form a rubber-based compound offering a diverse range of commercial applications. Depending on the size of the rubber granules, up to 70 discarded tyres are used per square metre.

Despite watering, playing fields in summer become very dry and hard and the opposite occurs when it rains making the fields unplayable necessitating fixtures to be abandoned or postponed. Stratum Turf addresses both these problems in one application, by absorbing concussion when it is dry, and when it rains, draining water immediately, irrespective of the level of moisture, ensuring cancellations are a thing of the past.

ASSISTANCE PROVIDED THROUGH THE BIF PROGRAM

GENOTYPING SERVICE FOR PLANT, ANIMAL OR MICROBIAL SPECIES A STEP CLOSER

Diversity Arrays Technology Pty Ltd, a company established by Canberra-based research institute CAMBIA, is a successful BIF applicant. Its project involves developing a competitive genotyping service for plant, animal or microbial species where little or no DNA sequence information exists, and where low cost and high throughput are absolutely essential for the technology to be widely adopted.

Until now, the high cost and low throughput of commonly used genotyping techniques has limited their deployment to the most profitable applications, mainly in the pharmaceutical sector. The largest plant breeding organisations are using genotyping to accelerate their breeding programs, but a much bigger market exists for cheaper genotyping technologies. Diversity Arrays Technology will offer a genotype of 500 genetic markers at a price lower than the cost of a genotype of 20 markers using current techniques.

Diversity Arrays Technology is developing genotyping arrays for a range of customers, applying the technology to seven different genomes. It is offering research and genotyping services to any organisation requiring fast, cost-effective and precise genetic testing. In parallel it is developing an integrated informatics package. In addition to R&D contracts and genotyping services, delivery of the technology will include genotyping arrays sold as research reagents and the rights to practice Diversity Arrays.

TECHNOLOGY TO DEGRADE PESTICIDES INTO INNOCUOUS PRODUCTS A BOOST TO THE ENVIRONMENT

While pesticides reduce the impact of weeds, pests and diseases and lead to improved productivity, better quality produce and more competitive export opportunities for the agriculture and horticultural industries, it also contaminates soil and waterways. Given the community and environmental concerns it is essential that effective remediation methods be developed.

Enzymatic Bioremediation, is a relatively new approach that holds promise. The technology uses enzymes to rapidly degrade pesticides into innocuous products. The catalytic nature of enzymes is such that only a relatively small amount of enzyme is required to treat a relatively large amount of contaminated water. An Orica-led consortium is developing this technology.

Progress over the past year has been good. The first milestone was the evaluation and comparison of enzyme expression in two high level expression systems. The outcomes of the work was a 400 per cent improvement in the enzyme production levels. The second was a field trial involving the use of enzymes to rapidly degrade pesticide residues in rinsate from the washdown of pesticide spray equipment.

In the trial, a 90 per cent reduction in pesticide level was achieved in 10 minutes, and after one hour, 99 per cent of the residue had been destroyed. Commercial release of the first enzyme product is anticipated in 2002-03.

BIF cont...

NEW TOOLS BEING DEVELOPED FOR MEDICAL RESEARCH

Gene Stream received BIF grant to develop a range of DNA-based research tools that have utility in both the commercial and academic aspects of medical research.

The proposed products are predicted to improve accuracy and provide substantial savings in labour, time and consumables. The pharmaceutical industry will benefit from substantial cost savings in their drug screening programs. Industry and the public will benefit from an improved ability to identify suitable drugs and bring them to the market more quickly.

In the first nine months of the project, Gene Stream has already achieved their first two milestones. The first range of prototype products demonstrated substantial improvements compared with the existing art. Construction of the second generation of prototypes is currently under way. Further improvements are anticipated.

PLANT-DERIVED PROTEIN FRAMEWORK PROGRESSING NICELY

Kalthera Pty Ltd has discovered a novel plant-derived protein framework that has exceptional chemical stability, is resistant to enzymatic breakdown, is potentially bioavailable, and is amenable to modification to graft a range of bioactive material onto it. Kalthera's mission is to exploit this framework in pharmaceutical applications to produce stabilised peptide therapeutics. Such applications may potentially overcome the major limitations of peptide-based drugs.

The company's intellectual property consists of two patent applications, the first relating to the general exploitation of the framework as a stable template onto which a range of medicinal, agricultural and industrial bioactivities may be grafted. The second patent relates to cyclisation of a particular class of therapeutically relevant peptides, the conopeptides. Cyclisation has the potential to stabilise conopeptides and enhance their range of therapeutic applications. Such applications include the management of pain and neurological disorders.

Milestones achieved in the first six months include the worldwide filing of the framework patent and further progression of the cyclised conotoxin patent through international examination processes. The technical development program has demonstrated that a range of different peptide epitopes (bioactive regions) may be grafted onto the framework.

BIF cont...

INTERNATIONAL ACCLAIM FOR AUSTRALIAN BIOTECH COMPANY

Perth-based company Grain Biotech Australia has developed the capability to produce transgenic wheat plants expressing novel genes. The company received a BIF grant to produce pharmaceutical compounds which will enable development of valuable synergies between the company and Australia's expanding biomedical research.

Its skilled staff and world-class technology will help growers to benefit from increased market value, reduced production risks and lower pesticide costs. Processors and consumers will benefit from better grain quality and the environment will benefit from reduced pesticide use.

The company's achievements over the past year have strengthened its position as the leader in commercial wheat transformation in Australia, and one of five finalists worldwide for the 2002 World Technology Award for Biotechnology in the Corporate Category in New York.

Grain Biotech has developed a world first transgenic line of wheat with resistance to Barley Yellow Dwarf Virus, the world's most serious virus disease attacking wheat, and a neutraceutical product with strong anti-oxidant properties that has potential human health benefits. Work is currently underway on developing salt tolerant wheat, and this has the potential to have a major impact on Australian agriculture.

ASSISTANCE PROVIDED THROUGH THE R&D TAX CONCESSION

COMPANY TECHNOLOGY NEEDS NO ANALYSING

In the mining and mineral processing industry, anything that saves time, money and wastage is bound to attract very positive attention. Adelaide-based company Thermo Gamma-Metrics, has certainly done that if its growth and export figures are anything to go by.

The company produces a range of analysis equipment for the mineral-processing industry. The instrumentation uses x-ray fluorescence technology for measuring elements such as copper, lead, zinc, gold and platinum in mainly mineral slurries.

Monitoring saves energy and reagent costs associated with grinding and other processing within these industries and contributes to a better understanding of the character and quality of particular process streams. In this way, mineral processing plant operators can make informed changes to ensure mineral product recovery specifications are met.

During the past three years Thermo Gamma-Metrics has chalked up more than $30 million in export sales.

INNOVATIVE CENTRAL COAST COMPANY REAPING SUCCESS WITH R&D PROGRAM

When Gustav Krone established his company 74 years ago in Berlin Germany, he wouldn't have envisaged that it would grow to one of the world's leading telecommunications equipment companies, with 29 subsidiaries in five continents of the world, including one on the New South Wales central coast at Berkeley Vale.

KRONE (Australia) Holdings Pty Limited has grown dramatically to become a dynamic manufacturing and marketing organisation, highly successful in the fields of communications networks and power distribution. It manufactures interconnection and distribution devices that connect cables used in voice and data communications networks and in power distribution. The products are used in copper cabling and fibre optics infrastructure.

The company is Australia's leading cable connectivity equipment supplier, employing more than 300 people and supplying network products that are used in buildings all over the nation. It is also the KRONE Group's regional head office and Manufacturing Centre of Competence for the Indo Pacific Region.

KRONE owes its significant growth during the past two decades to its high investment in successful innovation.

Tax Concession cont...

STRONG R&D BASE A WINNER FOR AUTOPAK

Autopak-Vetlab began life in 1967 as a manufacturer of veterinary products for the poultry industry, extending its product range to rodenticides and snail baits in the 1970s. Today the New South Wales based company provides a range of formulation and packing services to animal health, crop protection and other high-value, low-volume, specialty chemical markets throughout Australia and internationally.
In 1985 the company expanded into liquid formulations and synthesis for crop protection and industrial chemical products, and by the end of 1987 every major multinational company marketing crop protection chemicals had commissioned contract work by the Autopak division.

In 1991 the company reached a milestone with the building and commissioning of the Vetlab animal health toll manufacturing facility. In addition to contract manufacture and specialised packaging solutions, Autopak-Vetlab also offers product development, stability and improvement services, with some clients carrying out their own innovative development projects on the company's premises.

Over the past 10 years, benefits under the Commonwealth Government's R&D Tax Concession have enabled Autopak-Vetlab to build a strong R&D infrastructure, concentrating on projects that provide innovative process and product solutions.

Software company a global success

While the corporate identity may be new, the name Citect will be a familiar one to a broad range of industries around the globe. Launched in May 2002, Citect is the new face of Ci Technologies, an acknowledged leader in the field of industrial automation and information management and the company responsible for world-leading software products CitectHMI, CitectSCADA and CitectPlant2Business.

As Ci Technologies, the company had a long standing history of innovative product development, providing engineering services and software to the industrial automation market for more than 25 years. Citect's products are used in industries as diverse as water and wastewater, facilities monitoring, gas pipelines, mining, dairy, food processing, pharmaceutical and power distribution.

Currently the largest independent supplier of industrial automation software in the world, Citect can claim considerable success in a competitive global market. Headquartered in Sydney, the company has offices in the US, Europe, South Africa and China, and its products are distributed in more than 40 countries.

Tax Concession cont...

R&D NET ENNIO A SOUND FUTURE IN SMALLGOODS AND MEAT PACKAGING.

Given their limited resources, small family businesses are usually not the first to spring to mind when it comes to R&D, but South Australian-based company Ennio International is an exception. The company has thrived on an approach that combines commitment to meeting customer needs with a drive for world-class, innovative product development and design

Owned and operated by the Mercuri family since 1968, Ennio specialises in the manufacture and supply of high-quality, innovative nettings and casings for traditional smallgoods and meat products.

As a small company catering for a niche market it was difficult to commit significant staff resources and funds to R&D. At the same time there was little chance of the company expanding its presence beyond the limited local market without being able to develop products with significant market differentiation.

The Commonwealth Government's R&D Tax Concession has enabled the company to make that vital investment and undertake R&D projects that directly benefit the business.

ALUMINIUM TITANATE GIVES ROJAN THE COMPETITIVE EDGE

West Australian-based company Rojan Advanced Ceramics specialises in industrial ceramics. Its activities include designing, manufacturing, supplying and installing specialised wear, corrosion and heat resistant materials for arduous applications in a broad variety of industries.

From small beginnings producing brick extrusion cores, the company is now a world leader in its field, supplying products to the mining, brick/heavy clay, laboratories, foundry/molten metals, bulk materials handling, power generation and refinery industries.

To stay at the forefront of industry needs, Rojan has a dedicated commitment to technology development. Their approach to R&D programs, leading edge manufacturing processes, and strict quality control has transformed them into one of the most technologically advanced private ceramics company in the southern hemisphere.

Tax Concession cont...

TRANSTECH NARROWING THE TYRANNY OF DISTANCE

Australia relies on fast, efficient road transport to deliver many of life's essentials to its widespread communities. That's where Transtech Research comes in—providing the road transport industry with better, safer, and more efficient ways to meet customer needs and commercial goals.

Transtech Research is the R&D arm of MaxiTRANS, Australia's largest manufacturer of road transport trailers, with more than 50 years experience in designing and manufacturing premium road transport equipment.

The parent company's long-standing commitment to R&D is continued through Transtech Research, which has a number of successful innovative product developments, including an improved rack and pinion roll back mechanism, and the one-piece dividing wall Maxi-CUBE reefer, launched in January 2002.

The improved roll back mechanism features greater reliability, improved ease of movement, reduced point loads, and a suspension fitted with a standard raise/lower valve. The mechanism was specifically designed to simplify the unloading of lead B-Double trailers and to improve operator safety.

The one piece dividing wall Maxi-CUBE reefer assists transport operators to maximise equipment utilisation by being able to carry a mix of frozen and chilled goods in the one trailer. The wall's special feature is its power operated one piece design that maximises driver safety and makes loading easier.

FAMILY BUSINESS AND INDUSTRY LEADER

Well-known for its innovative product developments, Palmer Tube Mills is one of the world's leading manufacturers of quality steel products for structural, mechanical and low-pressure reticulation applications in a range of key industries. The company has grown to become an industry leader, supplying about 40 per cent of Australia's total market demand for welded steel tube.

Palmer Tube Mills' plants in Queensland and Victoria, produce a range of steel tube and pipe. The company has developed its own inline coatings technologies, including Palmer KleenKote and Palmer KleerKote, which provide a primer coating for ease of down-stream fabrication. Palmer Tube Mills has long identified the value of high-strength hollow sections and this is evident by the R&D and market acceptance of Palmer's DualGrade tubular products.

More recently, the development of SupaGaln has resulted in a new range of products protected by a smooth coating of zinc inside and out. The company's long-standing commitment to improving and advancing its products and processes has been at the core of it achieving its position as an industry market leader. Its investment in R&D enables it to study the needs of end users and develop innovative, high-quality products.

ASSISTANCE PROVIDED THROUGH THE IIF PROGRAM

PERSEVERANCE WINS THE DAY FOR POLYMERAT

Brisbane-based Polymerat's founding scientists developed the vision of a technology in which the nanotechnology (the branch of technology that deals with dimensions and tolerances of less than 100 nanometres, [one thousand-millionth of a metre]) and proteomics revolutions collided.

They believed that where these technologies converged, they could create at the nanoscale-level, novel high-tech polymers which, through clever informatics, could be used to manipulate medically important proteins. They also believed they could create world-beating products for use in drug discovery.

Convinced that there was a market for their technology, the scientists resigned from their former employment, founded Polymerat, and began the arduous task of searching for venture capital. A colleague referred them to CM Capital Investments, a fund manager for the Commonwealth Government's Innovation Investment Fund (IIF) program.

The CM Capital seed investment of $1.1 million allowed the three Polymerat founders to hire scientists and commence an aggressive technology development program.

INNOVATIVE DRILL A SEABED SUCCESS

With venture capital support from Momentum, a fund manager for the Commonwealth Government's Innovation Investment Fund program, Sydney-based company Benthic Geotech has developed an innovative device• the Portable Remotely Operated Drill or PROD, which can operate at depths to 2000 metres below sea level.

PROD is a self-contained rotary drill rig that is lowered to the seabed from a winch on a ship. Once on the seabed, the PROD can drill and recover core samples to a depth of 135 metres through a mix of soft and hard seabed layers.

Currently, this capability is only available by using very expensive drill ships, which can cost millions to mobilise and hundreds of thousands a day in rates. Since emerging from an extensive R&D phase, Benthic Geotech has won, and is completing, several contracts with the Australian oil and gas industry.

The company is also progressing relationships with international service providers in the oil and gas industry, and has entered into a joint venture deal with a European university to construct and operate a new PROD specifically for the scientific research market.