SCIENCE INDUSTRY AUSTRALIA INC.
SUBMISSION TO THE
PARLIAMENTARY INQUIRY INTO THE
FUTURE DIRECTIONS OF SERVICES INDUSTRIES

1. Introduction

On 3 May 2006 the Treasurer, The Hon. Peter Costello MP, asked the House of Representatives Standing Committee on Economics, Finance and Public Administration to inquire into and report on the current and future directions of Australia's service industry, particularly in regard to the export and import competing environment. The terms of reference for the inquiry are, but not limited to:

- the tourism and education service sectors;
- the impact of the resources boom on the service sector;
- future global opportunities for Australian service exports; and
- policies for realising these opportunities.

2. Science Industry Australia Inc – the science industry peak body

Science Industry Australia Inc is the peak body for the Australian science industry. Its members are responsible for more than half the science industry's exports and a significant proportion of science-related imports.

3. The science industry and the Australian economy

In February 2004, the Australian Government announced an Action Agenda for the science industry. The Department of Industry, Tourism and Resources and the Department of Education, Science and Training collaborated jointly with Science Industry Australia Inc to develop the SIAA and are continuing this collaboration in the implementation of the SIAA.

In launching the Science Industry Action Agenda (SIAA) and its report 'Measure by Measure' on 31 August 2005, Industry Minister Ian Macfarlane said:

> 'Australia's science industry punches well above its weight. It is outperforming many other sectors in its commitment to innovation, exporting and workplace excellence. And it is the kind of industry that Australia needs more of if we are to maintain our international competitiveness'.

To achieve its 10-year vision to 2015 of being export oriented and recognised world wide for its quality, innovation and commercialisation of leading edge technologies, the priorities of the SIAA are to:

- commercialise more Australian innovation;
- grow exports;
- improve quality;
- progress regulation reform;
- attract and retain a skilled and flexible workforce; and
- improve the industry's internal and external linkages.

The science industry is defined as research and development, design, production, sale and distribution of laboratory-related goods, services and intellectual capital used for measurement, analysis and diagnosis.

Australia’s science industry comprises manufacturers and importer/distributors of scientific equipment, laboratory and technical service companies and the scientific research community.

Measurement matters. Australia's science industry is a key enabler of many other industries. Its equipment and laboratory services provide for the measurement and identification of very low quantities of substances to ensure the quality of our food, water, air, environment, health and many other aspects of our daily lives. Its products and services are used by industries such as agri-food; resources; environmental monitoring; manufacturing; medical and health care; research and development and education.

Australia’s domestic market for scientific equipment and laboratory-related services was estimated to be $6 billion in 2002/03. Australia's market represents an estimated 2 per cent of the global market, compared with Australia's gross domestic product (GDP) being around 1 per cent of global GDP. Australia's production of science services is estimated to be one-half of its production of science goods and services. Employment, including researchers and laboratory and technology service providers, was approximately 47 000.

Science services production was $3070 million, of which exports were $110 million, and employment was 39 000. Australia’s publicly-funded researchers also provided significant services to the industry. Manufacturing production was $930 million, exports $670 million, imports $2820 million and employment 8 000. Australia’s scientific product manufacturers produce $260 million of the $3 billion domestic market for scientific products.

Australia's science industry is outperforming many other industries in terms of its growth, innovation, exports and workplace excellence.

The industry is growing at an annual rate of 10 per cent. Its laboratory and technical services companies invest 5.9 per cent of their turnover in R&D. Its manufacturers invest 7.9 per cent of their turnover in R&D, which is 10 times Australia's manufacturing industry average. This is consistent with high performing manufacturers in Canada and United Kingdom. The larger science manufacturing companies export up to 95 per cent of their production. Almost 50 per cent of the industry's workforce has a university degree, and the industry spends more than 5 per cent of its turnover on training.

The science industry is well integrated with global supply chains. Its scientific instruments, clinical diagnostics and laboratory services are globally recognised as the best available and used extensively in by the world's best companies. Its larger science manufacturing companies export up to 95 per cent of their production.

Australia’s laboratory and technical services companies provide a range of laboratory-related services that involve measurement, analysis and diagnosis. Companies that provide product maintenance and service are also included in this industry segment. The main types of services sold by laboratory and technical services companies are environmental and chemical analysis, technical services, and pathology/diagnostic services, and materials characterisation. The main customers of laboratory and technical services companies are environment, engineering, mining and healthcare (pathology testing and medical/health).

Significant Australian companies with international operations engaged in providing laboratory and technical services include Amdel Pty Ltd, Australian Laboratory Services Pty Ltd, Gribbles Group and Sonic Healthcare Ltd.

Case studies of successful Australian laboratory and technology services companies are included in **Attachment A**.

This knowledge-intensive global industry relies heavily on its investment in research and development and innovation more generally to provide a continuous supply of high value-added world-competitive products, processes and services. This investment must continue for the industry to remain globally competitive.

Innovation services, such as research and development (R&D) from universities and publicly funded research agencies (PFRAs), necessarily support the industry's sustainable competitive advantage. A current underpinning research direction is the development of 'lab on a chip' measurement devices that will take a low-volume high-value production to high-volume low-cost with the potential to spawn a new industry in Australia. Supporting the emergence of this technology are global security issues and the need to have cheap, mobile devices that can check for all types of contaminants.

With the growth in off-shoring of low technology manufacturing, Australia's science industry technology services offer significant potential to generate growth and prosperity of Australia during all economic cycles of Australia's resources industry. Laboratory and technology services either bundled with scientific equipment or as scientific services in their own right, are a growing component of science exports.

The SIAA priorities of particular relevance to this inquiry are commercialising more Australian innovation, growing exports, progressing regulation reform, and attracting and retaining a skilled and flexible workforce. The impediments and policy developments necessary for Australia to realise greater opportunities for its science industry laboratory and technology services are described below.

4. Impediments and policy developments needed

4.1 Commercialising more Australian innovation

Australia has a comparative strength in its high quality basic research. However, not all of this research will necessarily be of interest to the Australian science industry. Australia’s quality basic research gives us entrée to access foreign basic research, which may be of interest to the Australian science industry.

For the science industry to take advantage of Australia's global research expertise, government programs require more flexibility in facilitating such engagements.

The key issues affecting innovation services and the science industry's commercialisation of more Australian innovation are:

- Bridging the 'innovation gap;
- Eligibility of larger science companies for Australian Government R&D support; and
- Compliance costs of Government's innovation support measures.

4.1.1 Bridging the 'innovation gap'

An 'innovation gap' exists between the research side of Australia's innovation system and the commercial side which impedes the effective and efficient flow-through of ideas from public researchers to industry. In so doing, the 'innovation gap' impedes the full realisation of economic benefits from Australia's significant investments in R&D and innovation. The 'innovation gap' is created by the research outputs from universities and PFRAs not being adequately developed to the point of being 'investment ready'.

To improve the flow-through of ideas across the 'gap' to the Australian industry, the science industry is collaborating with commercialisation intermediaries and peak bodies in the research sector to develop a set of framework guidelines for a proof of concept metric.

These guidelines are aimed at assembling the evidence necessary to demonstrate the technical and commercial viability of a research idea to potential investors. The metric would, if implemented appropriately by universities and PFRAs, encourage researchers to develop their ideas to a stage where they are of more interest to industry, particularly Australian industry.

The guidelines would enhance the role of the commercialisation arms of universities and PFRAs. The proof of concept metric would work backwards through the research supply and value chains to provide a clear framework for the activities of research faculties and researchers and to increase their focus on market needs.

The proof of concept metric work builds on the substantial research by the Department of Education, Science and Training into commercialisation metrics.

The Government provides support for proof of concept work in the research side of the innovation system through schemes such as NHMRC's Development Grants. The Commercial Ready scheme provides support to industry for proof of concept work. To encourage universities and PFRAs to increase their focus on developing applied research to the proof of concept stage funding support would be necessary. The science industry endorses the intent of Recommendation 13 in the report of the recent Parliamentary inquiry *Pathways to Technological Innovation* which states:

> *The Committee recommends that the Australian Government introduce a funded proof of concept scheme, based on the Group of Eight Innovation Stimulation Fund proposal and providing the following for university research projects with high potential for commercial outcomes:*
>
> - *matched Australian Government and university funding investment in the suggested ration of 3:1;*
> - *a maximum funding per project of $100,000; and*
> - *funded for an initial three year period to a maximum Australian Government investment of $45 million.*

Any such funding scheme would need to be outcome focused with deliverables to ensure that universities and PFRAs did not redirect the funding into their basic and early applied research activities.

Universities and PFRAs engage in the commercialisation of their ideas with government support through start-up and spin-off companies. This can act as an impediment to the flow-through of ideas to industry.

The argument given for this activity is that universities and PFRAs are being driven to raise additional revenue from it. The down-side to this activity is that start-up and spin-off companies have a low survival rate. This is due in part to the lack of managerial expertise of the researchers who create the companies, the lack of adequate finance to develop, produce and market the product, process or service, and the attractiveness to cash-out the intellectual property (IP). These factors can lead to the IP being acquired by foreign interests, effectively creating a loss of the national benefits from Australia's public investment in the research and development of the idea. The countervailing argument is that Australia's established science companies are better able to commercialise research IP provided there is adequate evidence of the commercial potential of the idea.

The science industry endorses the intent of Recommendation 14 in the report of the recent Parliamentary inquiry *Pathways to Technological Innovation* which states:

> *The Committee recommends that the Australian Government implement additional support mechanisms to specifically assist the progression of innovation through pathways other than the formation of start-up companies.*

Cultural issues at the organisational and researcher level in universities and PFRAs impede the transfer of research IP to industry. These are more than adequately explained in the evidence and report of the recent Parliamentary inquiry *Pathways to Technological Innovation*. To encourage greater collaboration between universities and the private sector and develop positive pressures for cultural change, the science industry endorses the intent of Recommendation 11 in the report of the Parliamentary inquiry *Pathways to Technological Innovation* which states:

The Committee recommends that the Australian Government request the Business Industry Higher Education Collaboration Council to examine and develop the business case for third stream funding to universities.

Third stream funding need to be outcomes focused with deliverables to ensure that universities did not redirect the funding into other activities.

4.1.2 Eligibility of larger science companies for Australian Government R&D support

The Government provides a range of support for small and medium enterprises (SMEs). SMEs are broadly defined as having an annual turnover of less than $50m. The turnover applies to the SME and the group to which it belongs.

The science industry considers that this turnover criterion which confines eligibility for programs such as Commercial Ready to SMEs with an annual turnover of less that $50m is unrealistic for science industry companies that operate is the global business environment and rely on world-class innovation for their competitive advantages. The effect of this limit is that the relatively few larger Australian science industry companies that compete in world markets and contribute to Australia's economic and social welfare are denied access to many Government innovation support measures. The Australian subsidiaries of multinational companies are also denied access to these measures.

While it is certainly necessary to provide SMEs with innovation assistance, R&D is an on-going high risk process for larger enterprises as well.

The Government's R&D Tax Concession Scheme provides larger companies with support for their innovation activities. It provides a tax concession for eligible expenditure of 125 per cent, and up to 175 per cent certain other conditions.

Industry and commentators have argued that since the Government lowered the R&D tax concession from 150 per cent to 125 per cent in 1996, business expenditure on R&D (BERD) as a percentage of Australia's gross domestic product has declined.

Larger companies in the Australian science industry argue that the compliance costs of obtaining R&D support under the Tax Concession Scheme exceed the financial benefits it provides. With the recent reductions in company tax, any benefits have been eroded further. As a consequence, Australia's R&D support measures have little impact on the competitiveness of the larger Australian-based science companies. A more realistic turnover criterion would be in the range of $100m to $150m. Raising the turnover ceiling would also improve Australia's attractiveness to foreign investment in R&D with the accompanying contribution to economic and social outcomes.

Furthermore, the science industry endorses the intent of Recommendation 15 in the report of the recent Parliamentary inquiry *Pathways to Technological Innovation* which states:

The Committee recommends that the Australian Government asses the revenue implications and potential economic returns of extending the R&D Tax Concessions eligibility to include Australian based subsidiaries of multinational companies.

The science industry also endorses the intent of the following portions of Recommendation 17 in the report of the recent Parliamentary inquiry *Pathways to Technological Innovation* and proposes that:

The Australian Government review the effectiveness of the Commercial Ready Program by 30 June 2007, giving particular consideration to the following program amendments:

- *extending the eligibility to Australian based subsidiaries of foreign owned companies; and*

- *increasing the turnover threshold limits to between $100 million and $150 million.*

4.1.3 Compliance costs of Government's innovation support measures

The primary factor guiding the allocation of public funds to support innovation in the private sector should be the level of external benefits generated (that is national benefits beyond those captured by the firm funded). Australia ranks relatively lowly in its allocation of public funds to support innovation activity by firms, and for example graphs by Treasury and DEST (in the Mapping Report on Science) show an apparent correlation between the level of business performance on R&D and the level of public support for business performance of R&D. The few countries that are outliers on this graph (higher levels of business expenditure relative to the level of public support) include Japan, Israel and Switzerland which have a very different business-government relationship than that applying in Australia and other English-speaking economies.

Firms are required to provide a great amount of detail in applications. To quote one firm in the Australian Industry Group's "Manufacturing Futures" report:

> *"We've just finished an R&D Start Grant and the cost of applying for that was horrendous not in terms of having to pay for applying but in terms of the documentation required and the absolute finite detail that was applied."*

According to this report, many companies reported similar reservations about applying for grants. The additional workload in applying for grants, that is required to demonstrate that the company's R&D is adding value, instead can undermine the value being added, in terms of time and financial costs.

The view that Australia's industrial structure explains Australia's relatively low BERD can be only partly true. Australia has long had sophisticated chemicals, electronics, pharmaceuticals, aerospace, automotive, scientific instruments and medical devices industries that until the last decade were larger and more technologically advanced than those of countries like Ireland, Korea, Taiwan, Singapore and China. Innovation has driven the growth of many of these industries in other countries, and Australia has the potential to grow these industries also.

In terms of the application process for R&D grants, onerous and/or expensive application processes may provide a disincentive for companies to apply for funding. Firms are required to provide a great amount of detail in applications. This issue is raised in the Australian Industry Group's "Manufacturing Futures" report. Some of the administrative burden in applying for grants, is required to demonstrate 'additionality', that is that the R&D would not be undertaken without the grant. As the Productivity Commission's own work demonstrates, determining 'additionality' is very difficult and the additional costs associated with this reduce the value of the grants. It is not clear why the simple assumption cannot be made that if the cost of R&D is reduced, more will be undertaken. This would enable government R&D support to be allocated to the best ideas/projects, just as ARC and NHMRC grants are awarded to the best applicants without regard to 'additionality'.

Various R&D support agencies of the United States of America Government offer staged assistance for the development scientific instruments. Smaller grants are provided for the various stages and if the project proponent demonstrates their project to be viable, the government supports it to the next stage. This is enabled by a streamlined assessment and approval process and a risk management approach. Value and national benefits are generated by enabling resources to be allocated to initiating the project, rather than having them consumed in a complex and time consuming application process.

If the Australian Government were to redesign its program design and application processes, the objective would be to create a selection process with a lower administrative overhead that still ensured the integrity of expenditure of public money and managed the risks. A pilot program could

be conducted and evaluated to determine the appropriate settings for the program control mechanisms.

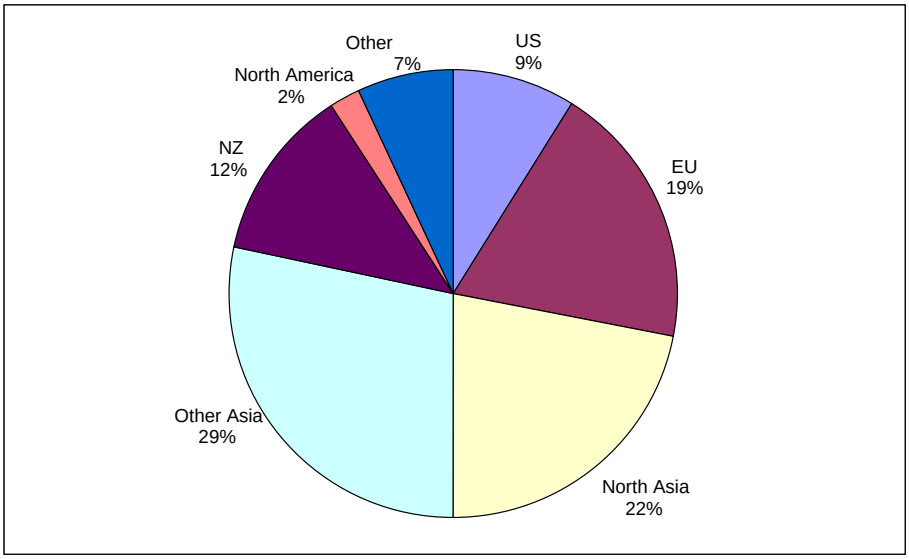
With the internationalisation of Australian industry, and industry's greater use of open innovation, government should provide additional support to encouraging international linkages between manufacturers and offshore R&D. The Australian Industry Group's "Manufacturing Futures" report supports this and states:

> *"…remaining globally competitive requires industry to make better use of global supply chains. This extends not only to maximising supply efficiencies in the production process, but also in taking advantage of global human resources, including innovation expertise."*

4.2 Growing exports of laboratory and technical services

A survey of the science industry in 2004 found that while laboratory and technical services are traded largely domestically, there are encouraging signs of growth in exports. Having established themselves in Australia and New Zealand, Australia's leading laboratories are expanding their operations into Asia, EU and the Americas, as shown by the case studies. Figure 1 shows the destination of exports of laboratory and technical services companies. 'North Asia', combined with 'Other Asia' now account for more than 50 percent of exports of laboratory and technical services.

Figure 1: Destination of the exports of laboratory and technical services companies



Source: Department of Industry, Tourism and Resources survey of Australia's science industry 2004.

Significant barriers to trade in services exist and exports of laboratory and technical services, as well as research and development activities, are no exception. These barriers take the form of regulations and standards. The European Union is particularly hostile to trade in services. Although it is understood that there are initiatives to harmonise the regulations and standards affecting trade in services.

Laboratory and technical services companies must comply with the globally recognised regulations and standards, as well as the local ones required by individual countries. Australia's global laboratory and technical services companies such as ALS, Intellection, SGS Australia Holdings Pty Ltd (see case studies) have overcome these barriers by establishing subsidiaries of their companies in foreign countries to be close to their customers.

Mergers and acquisitions are often the means by which this is achieved. For example, on 17 January 2006, Campbell Brothers (the parent company of ALS) acquired two laboratory groups: Enviro-Test Laboratory Group (ETL) in Canada and Ecochem a.s. in the Czech Republic. For further details see http://www.campbell.com.au/article_details.asp?Article_No=200601171.

Another option for Australian laboratory and technical services companies to export their services is to establish a 'bridgehead' in the foreign country. Agrisearch Analytical has recently established a presence in China with the aim of offering analytical testing services for the export of fruit and vegetables from China.

4.3 Attracting and retaining a skilled and flexible workforce – skills shortages

The science industry is a knowledge-intensive industry that is heavily reliant on its human capital to create its competitive advantages and respond to emerging opportunities. Almost 50 per cent of its workforce has a university degree, and the industry spends more than 5 per cent of its turnover on training. Surveys of the science industry indicate that the industry has shortages of laboratory technicians, technical trades, chemists, mechanical and software engineers, sales and management staff.

The SIAA has a working group for this issue. SIAA initiatives to increase the supply of skilled staff focus on improving the industry's profile as a potential employer and improving the content of course curricula. The SIAA has contributed to government's initiatives such as the National Skills Shortages Strategy (NSSS) and is leveraging on government initiatives such as the NSSS Science Careers Project, Careers Network, and Local Community Partnerships.

Of particular concerned to the industry is that while science graduates possess good theoretical knowledge, they do not have sufficient practical skills, and require further practical training to be job-ready. Even the industry's sales staff must have a high level of knowledge and understanding of science and the equipment. The SIAA is considering an accelerated practical laboratory skills course for university graduates as a solution to the industry's skills shortages.

Another feature of science graduates and migrants with science engineering and technical skills is their lack of and/or limited verbal and written English communication skills. This limitation can make them unemployable.

We note that the Australian Industry Group has recommended that science and engineering undergraduate programs should be a national priority for concessional HECS eligibility. Encouraging students to undertake courses in science and engineering will help to make the Australian science industry a more skilful global competitor. Designating science and engineering as national priority areas, exempt from HECS fee increases, in a similar way to nursing and education, would assist in encouraging students to take up science and engineering at university.

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Case study – Australian Proteome Analysis Facility

The **Australian Proteome Analysis Facility Ltd** (APAF), the birthplace of proteomics in Australia, is Australia's premier core proteomics facility. APAF was established in 1995 under the Australian Government's Major National Research Facility Scheme (MNRF).

Proteomics is the study and identification of the thousands of types of proteins found in humans, animals, plants, bacteria and other life forms. The expression of particular proteins can be used as 'biomarkers' of health, disease and assist in finding protein quality traits in agricultural crops.

APAF's four partner organisations - Macquarie University, University of New South Wales, University of Sydney and TGR Biosciences Pty Ltd (Adelaide) possess synergistic technologies and expertise. This enables the consortium to offer a far broader range of services to industry and researchers and provides maximum return on Australia's investment in this venture. APAF has received funding in the order of $45 million from MNRF and its four research partners.

APAF was the first dedicated proteome centre established in the world and continues to co-develop many of the laboratory 'tools' in use in proteomics research worldwide. Australian researchers developed the concept of proteomics and APAF has remained at the forefront of technological development in this field ever since.

APAF engages a plethora of Australian and international science industry partners (around 350 in 2004) as a provider of proteomic R&D expertise, discovery partner, technology developer/licensor, technology educator, and market appraisal source. APAF has generated significant export dollars through royalties from products licensed to multinationals and overseas contracts.

APAF adds socio-economic value to Australia by cooperating with international and local pharmaceutical, biotechnology, agricultural and academic bodies to discover unique and specific markers of disease, agricultural quality and for product development. To this end, APAF collaborates with life sciences technology developers to keep Australia at the cutting-edge of proteomics research and development.

As a Major National Research Facility with a focus on service provision, APAF provides expertise in proteomics, functional proteomics and protein analysis, including the following services:

- Biomarker discovery
- Proteomics education & training
- 1 and 2-dimensional gel electrophoresis
- Image analysis
- Advanced mass spectrometry
- Protein and cluster of differentiation antibody arrays
- New MALDI biochip (Surface Tension Segmented) platforms
- N-terminal sequencing
- High-throughput G-protein-coupled receptor screening
- Bioactive screening technologies
- Metabolomics
- Amino acid analysis
- HPLC
- Bioinformatics
- Multiplex (luminex) assays
- Therapeutic protein production
- High abundance protein removal

Case study – Rapid instrument development for Australia's wine industry

The Australian wine industry's rapid growth during the past decade is well documented with continued success in the export markets of the US, UK and Asia. Currently, wine is Australia's fifth largest rural export.

Driving this growth is the ability of Australian wine producers to deliver a quality product at a competitive price. While increased competition both internationally and locally looms large, technology is enabling Australian grape growers and winemakers to deliver quality wine grapes consistently with minimal inputs of water and chemicals.

The techniques for measuring grape quality using sugar content, pH and acidity are straightforward and can be done quickly and efficiently. However, the current technique for measuring the colour of red grapes, another vital indicator of potential quality, is slow and requires skilled technical staff. Finding a quick, reliable, accurate and cheap technique to enable Australia's hundreds of small wineries to measure red grape colour has proven challenging.

The first step to solving this challenge was to find a suitable technology. Research by the Cooperative Research Centre for Viticulture (CRCV) showed that near-infrared (NIR) spectroscopy offered the best potential for measuring the colour in the skins of red grapes using total anthocyanins as the indicator. To ensure the instrument yielded accurate results CRCV calibrated it against thousands of grape samples. This technology has been adopted by many of Australia's large wine producers and commercial laboratories.

The next step was to develop a cheaper, portable version of the instrument.

CRCV, in collaboration with the Sydney-based company, Integrated Spectronics, are currently developing a prototype of a portable instrument for measuring colour, pH and total soluble solids in red wine grapes. The instrument will be designed for use at the vineyard, the weighbridge and the winery, enabling the industry to monitor grape quality more closely and rapidly at each stage in the logistic chain. Integrated Spectronics is providing expertise in developing the hardware and systems for operating the equipment. The CRCV is developing the calibration, software and a sampling technique that will make it as easy as possible for the end users while providing quality data.

The prototype is expected to be completed in mid-2005, with testing to commence in the latter half of the 2005. The commercial product is expected to be ready in 2006.

Case study – Intellection and QEMSCAN

QEMSCAN is a new and highly innovative mineral analysis technology that is a prominent example of the successful commercialisation of CSIRO research. It combines x-ray detection equipment with sophisticated software to rapidly identify and analyse the different minerals in ore samples and process streams, improving the efficiency and profitability of mining and minerals processing operations. Intellection, a CSIRO spin-off company, is commercialising and licensing the technology to some of the world's mining giants. It is built on more than 20-year of rigorous scientific research and development by CSIRO in Brisbane.

By automatically analysing and characterising minerals 10 000 times faster and more accurately than traditional methods, QEMSCAN provides higher quality information that enables better commercial decision-making and problem solving.

Comprising a scanning electron microscope, four x-ray detectors and a software package, QEMSCAN is the fastest and most accurate particle analysis and quantification tool currently available. It eliminates the error-prone traditional method of a technician peering through an optical microscope to identify, quantify and estimate the composition of ore samples. QEMSCAN is also finding application in characterising minerals that reduce the efficiency of coal-fired power stations.

Global minerals companies such as Anglo Platinum (South Africa) BHP Billiton (South Africa), CVRD (Brazil), Falconbridge Noranda (Canada), Phelps Dodge (US), Rio Tinto (Australia) and SGS Lakefield have been using QEMSCAN for many years. A typical QEMSCAN system costs around $1 million, and these companies are achieving paybacks within a matter of months. Recognising the value that QEMSCAN offers, Phelps Dodge, the world's second largest producer of copper, and Anglo Platinum each purchased three systems in a three year period.

Intellection is aiming to be a global leader in the automation of the quantitative evaluation of minerals. It has developed a reputation of technology leadership and expertise which has allowed the company to develop a successful global business and valuable commercial connections.

Intellection has built strong relationships with its user companies by providing the highest standards of after-sales service. In 2003, this enabled it to partner with Phelps Dodge, Anglo Platinum and other 'power users' in a $500 000 program to accelerate the development of QEMSCAN's software. This improved QEMSCAN's user-friendliness by simplifying the time and effort needed to conduct analyses. In the future, Intellection will provide integrated systems support, consulting and testing services.

Technology such as QEMSCAN demonstrates CSIRO's excellent record of conducting world-class research ranging from basic to more commercially oriented research. The knowledge generated from such research has social and economic benefits, and reinforces Australia's reputation as a world leader in scientific research.

Case study - SGS Australia Holdings Pty Ltd

SGS Australia Holdings Pty Ltd is a significant player in the laboratory and technical services industry in Australia. It is a subsidiary of the Swiss-based SGS Group, founded in 1878. SGS Group provides independent inspection, verification, testing and certification services for international trade in agriculture, minerals, and petroleum and consumer products. SGS Australia's commitment in excellence in providing its services is backed by ISO 9002 quality certification.

The SGS Group operates around 1 000 laboratories with over 39 000 employees in over 140 countries in Africa/Middle East, America, Asia/Pacific and Europe. Its Australasian operations were established in 1950 and now have over 1 000 employees in 44 establishments in Australia, New Zealand, Papua New Guinea and Fiji. Lakefield Research Ltd, referred to in another case study, is also a member of the SGS Group. It is a CA$40 million per annum Canada-based company. Lakefield has facilities in Canada, Australia, South Africa, Brazil and Chile.

To build its brand, network and market presence, the SGS Group acquired the publicly-listed Scientific Services Ltd (SSL) in 2001. SSL's network of laboratories specialises in the testing of soil, mineral ores, water, agricultural commodities and food based products. SSL has become a major earner for SGS Australia with revenue of AU$58 million in the year ending December 2003.

Case study – Australian Laboratory Services

Australian Laboratory Services (ALS) is a diversified international analytical laboratory group with laboratories in 20 countries including Australia, North America (USA, Canada and Mexico), South America (Peru, Brazil, Bolivia, Ecuador, Chile and Argentina), Africa (South Africa and Tanzania), Europe (Sweden and Turkey) and Asia (Hong Kong, Singapore, China, Taiwan, Indonesia and Malaysia). After commencing operations in Brisbane in 1975, and joining with the Campbell Brothers Limited (market capitalization $400 million) in 1980, ALS has grown to be one of the largest analytical laboratory groups in the world with revenues in excess of $150 million in 2004. ALS employs 1700 staff globally, with over 750 of those being tertiary qualified.

ALS laboratories provide a broad range of sophisticated state-of-the-art services that help consulting and engineering companies, industry and governments to make better informed decisions. Their services include physical, inorganic, organic, bacteriological and toxicological analyses for mining and minerals exploration, environmental monitoring, equipment maintenance, commodity analysis and certification. ALS Environmental for example, can provide analytical information on more than 2 000 individual parameters to ultra low detection limits in a wide variety of sample types using a range of scientific equipment that includes:

- gas chromatograph mass spectrometers (GC-MS)
- high resolution gas chromatograph mass spectrometers (HRGC-MS)
- gas chromatographs (GC)
- liquid chromatograph mass spectrometers (LC-MS)
- liquid chromatographs (HPLC)
- inductively coupled plasma mass spectrometers (ICP-MS)
- inductively coupled plasma optical emission spectrophotometers (ICP-OES)
- atomic absorption spectrometers (AA)
- X-Ray fluorescence spectrophotometers (XRF)
- ion chromatographs (IC)
- infrared (IR) spectrometers
- ultraviolet and visible spectrophotometers (UV/Vis)
- flow-injection analysers (FIA)
- a variety of automated instruments for titration, colour, BOD, and other tests

ALS has grown organically and by acquisition. Between 1999 and 2001 ALS acquired key minerals testing service companies in Canada. Its strong growth in this market niche has been on the back of the mining boom. Miners like to deal with reputable analysts, particularly for work as sensitive as testing mineral exploration prospects. ALS' micro contamination testing services complement Campbell Brothers' other activities of the specialist food hygiene division Cleantec, which cleans critical equipment such at breweries and supermarket freezers. ALS' latest start-up location is in Shanghai (China) where it is initially offering environmental and commodity testing services and plans to move into minerals work. New laboratories are also currently under development in Taiwan and South Africa.

ALS now has in excess of 20 percent of the global market for laboratory testing of minerals. This has enabled it to achieve the economies of scale so essential where high fixed costs have to be spread over many services to achieve sustainable profits which small laboratories find difficult. ALS sees the growth prospects for environmental testing and general analytical services as extensive. Driving this is stronger demand for these types of services as well as the outsourcing of laboratory services that were previously performed by companies in-house.

ALS' services are backed by a solid commitment to quality and customer service. Its quality systems are based on ISO 17025. Its analytical methods are the well-established internationally recognized procedures of US Environmental Protection Authority, the American Public Health Association, as well as regionally and locally prescribed methods and regulations.

Other case studies are provided in the SIAA report 'Measure by Measure' available on the web at: http://www.scienceindustry.com.au/pdf/measure_by_measure_full.pdf.