

59-65 Gladstone Street
PO Box 1095
FYSHWICK ACT 2609
AUSTRALIA

Website: www.cea.com.au
E-Mail: cea@cea.com.au



TECHNOLOGIES PTY LIMITED
ACN 059 951 183
ABN 99 059 951 183

Domestic Callers

Phone: (02) 6213 0000

Fax: (02) 6213 0013

International Callers

Phone: + 61 2 6213 0000

Fax: + 61 2 6213 0013

File Ref: 2120-5

The Secretary
Standing Committee on Science and Innovation
House of Representatives
Parliament House
CANBERRA ACT 2600

Attention: Dr Anna Dacre

Dear Dr Dacre,

PATHWAYS TO TECHNOLOGICAL INNOVATION

Reference: A. Letter from Dr Anna Dacre to Mr David Gaul dated 23 March 2005.

1. Please find attached CEA's submission on Pathways to Technological Innovation to the House of Representatives Standing Committee on Science and Innovation as per Reference A.
2. Should you require any further information please contact Maria Stathis on (02) 6213 0012 or email maria.stathis@cea.com.au.

Yours sincerely,

David J. Gaul
President and Executive Director

Attachment: 1 Pathways to Technological Innovation Submission dated 2 May 2005

Submission No.8.....

***Pathways to Technological
Innovation***

**Submission to the House of
Representatives Standing
Committee on Science and
Innovation**

2 May 2005



CEA Technologies Pty Limited
ACN 059 951 183
ABN 99 059 951 183
59-65 Gladstone Street
Fyshwick, ACT 2609
Australia

ABSTRACT

CEA Technologies is a 23 year old private Australian-owned company specialising in innovative radar and communications technologies which has successfully sold its technologies to Australia as well as exported to Europe, the United States and the Middle East. These export successes are primarily in the Defence and law enforcement markets.

Success Factors

The *key success factors* experienced by CEA in accessing these markets have been:

- Developing unique *solutions* and the associated *affordable* technology & products to meet customers' operational requirements.
- Adopting technology solutions/streams that have *multiple, scalable applications* in different environments – better targetted investment in single streams or threads of technology that bring returns across multiple application domains.
- Nurturing the growth of staff engineering skills and capabilities through in-house career development.
- Building on successive technology development tiers to generate emergent products for global application – functionally and geographically.
- Funding the technology development through a combination of:
 - Own company, sales-generated Research & Development; and
 - Accessing Australian Government R&D funding (START/Commercial Ready Grants).
- Marketing and selling the various technologies/products:
 - Directly using own staff – domestically and internationally;
 - Indirectly through partnerships with foreign companies and agencies;
 - By identifying and supporting technology/capability “champions” in customer organisations;
 - Participating in ‘global supply chain’ campaigns (eg. the JSF Program);
 - ‘Partnering’ with Australian Government agencies; and
 - by accessing the EMDG scheme.
- Developing innovative approaches with Government to protect Intellectual Property and ensure its continued availability to generate national economic growth and security while accessing foreign markets.

Barriers

The main *challenges/barriers* addressed in the process have been:

- The “Not Invented *Here*” syndrome: perceived resistance by the overseas buyers to foreign-sourced technology – perceptions of risk in buying from foreigners, particularly from smaller companies.
- The “Not Invented *There*” syndrome: perceived resistance by home market buyers to Australian-sourced technology– “it must be better if it comes from overseas”.
- “Has your Government bought it?” – the perceived need by overseas buyers for ‘sales endorsement’ by one’s home Government.
- Practical understanding and application of the plethora of foreign Government procurement legislation and practices.
- Physical presence in the foreign countries to become perceived as a comfortable, accepted part of the supplier community.
- Protecting own Intellectual Property from unauthorised use, particularly when participating in overseas “comparative technology test programs”.
- Penetrating the technology “gate-keepers” who shield the overseas procurement and operational end customer from technologies that might threaten home suppliers. These “gate-keepers” include the array of lobbyists representing competitive home market suppliers and local government agencies pursuing their indigenous economic growth programs.
- While Austrade has a wide network across a number of market sectors, its ‘reach’ into the Defence and law enforcement markets has not generated the degree of penetration in these sectors as appears possible through directly supporting Australian companies.

Recommended Future Strategies

CEA considers the following strategies would provide enhanced pathways to more effective commercialisation and a better platform for Australian companies competing globally to achieve innovation success:

- In partnership with Industry, Government to create international collaborative programs based on Australian technology and invite participation by nations requiring the resultant operational capabilities.

Such international programs would be targetted in the defence, national security and law enforcement domains. In addition to commercialising the technology, it would reduce the overall cost to Australia through the engineering and program cost contribution by other nations.

- Government consider the broader “value for money” equation when assessing its own procurements in considering both the import replacement and export growth potential inherent in selecting an Australian technology solution.

Such consideration to be institutionalised by incorporation into Government procurement guidelines.

- Government closely examine the various existing bi-lateral Government to Government technology cooperation arrangements with foreign countries to investigate their potential leverage to generate major technology programs incorporating Australian developed technology.

Such programs to be viewed as creating genuine technology risk reduction, development schedule reduction and cost savings to the participating nations.

- In partnership with Industry, Government investigates the establishment of a legal/commercial program to support Australian SMEs in the area of Intellectual Property to generate innovative, Government-backed regimes to protect and leverage the IP to the national benefit while accessing global markets.
 - In partnership with Industry, Austrade to develop a separate business unit to focus specifically on the international Defence and law enforcement market.
 - While Australia has a wide range of cooperative programs and linkages with other nations’ militaries and Defence Departments, it is for consideration that a number of these that be further enhanced to strengthen foreign nations’ perceptions of Australian technologies and industries.
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BACKGROUND TO CEA

CEA Technologies specialises in the design, development and manufacture of radar and communications technologies. Founded in 1983, the company has an international reputation for innovative research, coupled with an ability to commercialise and market this research successfully in both domestic and export arenas.

CEA is a private wholly Australian owned company with 210 employees and offices in Canberra, Melbourne, Adelaide and San Diego.

The majority of CEA's research and development activities are conducted in Canberra. Melbourne and Adelaide provide critical mechanical research and development design and modelling capabilities.

CEA Technologies Inc. was formed in 1995 to supply the company's products to the US market.

For 23 years CEA has researched, designed, developed and provided unique adaptive solutions to a diverse international customer based.

CEA provides a complete service approach to system design, creating unique cost-effective solutions for its customers, and developing new and innovative technologies. This commitment to innovation creates an ever expanding range of unique product and capability, and ensures CEA's products remain relevant and are constantly renewed.

The company primarily sells to the domestic and international Defence markets, with exports averaging about 40 per cent per annum. The major export customer is the United States Navy.

CEA has accessed the R&D START and EMDG programs and used the services of the Export Finance and Insurance Corporation (EFIC).

PATHWAYS TO COMMERCIALISATION

CASE STUDY 1

CEA's first sale was to improve an existing communications system for the Royal Australian Navy (RAN). This led to further development work with Defence as well as developing their own systems for communications and radar applications. A radar system for port surveillance was developed, with the assistance of Commonwealth Government funding, for the ports of Melbourne and Brisbane.

This commercial application generated interest from the US military and subsequently led to significant overseas orders for CEA's radar and communication systems. These now represent a major portion of ongoing export sales and as a strong reference for future US sales.

Another application of this technology was then supplied as a Coastal Radar Surveillance System for the Bahrain Coast Guard – a law enforcement agency. This was supplied through the U.S. after an international competitive tender.

CASE STUDY 2

Solid State Continuous Wave Illuminator (SSCWI) Transmitter (1st to 2nd generation development)

This example is of CEA commercialising a product and moving it from a second generation product to a third generation product.

In 1995 CEA was awarded a direct contract by the Royal Australian Navy to design, develop and manufacture six Solid-State 2kW Continuous Wave Illuminator Transmitters (SSCWIT) for installation in the ANZAC Frigates. CEA was subsequently awarded a follow-on contract in 2002 to replace existing U.S. designed and manufactured Mk73 transmitters (the 1st generation, vacuum valve-based product) in the ANZAC Frigates.

(The SSCWIT provides target illumination for the Evolved Sea Sparrow Missiles (ESSM) by transmitting a powerful radar signal at an incoming target. This system has been operationally proven in service with the RAN, including successful missile firings in 2003 and 2004.)

While this RAN SSCWIT contract was an excellent contract for the RAN and provided CEA the opportunity to offer an upgraded product into the market place, the design was constrained by the specification that CEA had to work within (i.e. to replace an 'existing design'). It also provided CEA the expertise to then develop the major electronic component in a competing U.S. SSCWIT product. 100 of these components have now been sold into the U.S.

Further commercialisation of the SSCWIT product was achieved in November 2004 when a contract was awarded with the Abu Dhabi Ship Building Company for the manufacture and delivery of four 1kW Transmitters to the UAE Navy for the Baynunah Class Corvettes. This is CEA's first export to the UAE and its second major contract in the Middle East.

CEA-MOUNT (3rd generation product)

Building on this 2nd generation experience, CEA then sought alternative funds to allow it to commence a 'green-field' development on the next generation of this type of system. This product is named CEA-MOUNT and is a true 'market disrupter' and world leading product.

In March 1998 the Industry Research and Development Board, through the Research and Development (R&D) Start Grant, awarded CEA A\$2.8M to assist with the development and successful testing of the next generation of target illumination technology, the CEA-MOUNT Active Phased Array Continuous Wave Illuminator. This technology supersedes the conventional SSCWIT but with vastly greater operational capability and versatility in application.

The next step in this layered technology development chain is that CEA has now been awarded a further R&D Start Grant to develop and test an L-Band Active Phased Array Identification Friend or Foe (IFF) radar. This new radar is designed to complement the CEA-FAR active phased array radar which CEA had separately developed with its own R&D funds, which together with the CEA-MOUNT illuminator are currently being considered by the Department of Defence for the Anti Ship Missile Defence (ASMD) upgrade program for the ANZAC Frigates.

The success of these leading edge capabilities, particularly in export markets, will rely heavily on the confidence shown in Australian developed technology by Defence and Government.

RESEARCH AND MARKET LINKAGES

The U.S. and U.K. do not currently possess such radar technology and have multi-million dollar radar development programs in place. France has an initial system currently completing trials. However, these systems can only be fitted to quite large ships and not to Frigate or small Destroyer platforms.

CEA has maintained a strong focus on Research and Development (R&D). This is critical in terms of evolving 'next generation' products. The progression from SSCWIT to CEA-MOUNT (Case Study 2) was only achievable because of an R&D grant and our focus on research. The company is always looking forward and researching means to develop and enhance its products to keep them at the forefront of their markets.

The U.S. Department of Defense has recognised the unique nature of CEA's technology and is in the process of commencing a separate jointly funded R&D collaborative program with the Australian Defence Department. This will be for CEA to develop a more powerful version of its radar aimed at providing capability for the new generation of U.S. Guided Missile Cruisers and to provide ballistic missile defence.

There are over forty (40) programs world-wide, in twenty-three (23) countries, for which the CEA radar systems have been identified as highly applicable. These programs require their Government's decision in the next 3-5 years.

These countries include: Australia; NZ; Canada; US; UK; Europe (Germany, Sweden, Denmark, Finland, Italy, Spain, Portugal, Bulgaria, Turkey); Asia (Thailand, Malaysia, South Korea); Middle East and South America.

Under the Australian Department of Defence's Project SEA 1448 Phase 2B, ANZAC Ship Radar System Upgrade, Defence is proposing the installation of CEA's new and highly capable radars in all the ANZAC Class Frigates. The new radars will provide significantly increased protection against the threat of high-speed anti-ship missiles.

Thirteen (13) of the international programs, in ten (10) countries fitted onto 126 ships, have a very close similarity to the RAN's ANZAC Upgrade Project in terms of their operational capability requirements, allocated budget and in-service date.

Conservatively, the potential addressable market opened up for the radar technology alone is estimated at over A\$3.5Bn. A realisable share of this could be of the order of A\$1Bn.

Australian Government and military endorsement of the new radar technology, demonstrated by a commitment to adopt this upgrade path for the ANZAC Ships, will open up significant global export potential to one of Australia's premier electronics systems companies, as well as for its lower tier suppliers. It will provide tangible realisation of the investment to date by the Government and the company.

FACTORS DETERMINING SUCCESS

CEA's aim is to be successful in Australia, and to continue to grow its sales overseas. Its business strategy is consistent with these objectives and focusses on fostering partnerships in equity, product development and projects.

In summary, the factors determining success for the company include:

- unique products (CEA adapts products to the needs of its customers);
- scalable and adaptable products (same technology but in varying configurations to suit the functional and operational purpose);
- product capabilities (they are optimised for customers' capability needs);
- judicious use of own research and development investment plus Government grants;
- partnerships – with domestic and international companies and Governments;
- growing one's own skills and expertise in engineering and sales;
- the ability to provide solutions to customers needs; and
- understanding the customers and their procurement environment.

STRATEGIES IN OTHER COUNTRIES THAT MAY BE OF INSTRUCTION TO AUSTRALIA

The demand in Australian market niches in which CEA trades are not sufficient to support CEA's R&D investment, technology applications and products. To date there has been a perceived disinclination in the Australian marketplace to buy from local companies. These two factors make exporting crucial for survival and growth. The company's main competitors are major international primes involved in radar and communications systems, but they are also often partners for particular products and/or programs.

The US Department of Defence is CEA's most important international customer, and has assisted in establishing both agents in the Middle East by providing advocacy support.

GOVERNMENT SUPPORT

Major foreign companies generally receive more direct and indirect government support through the commercialisation stage than Australian companies. For example, the UK has Defence Exports Services Organisation (DESO) which has its sole aim being to sell UK defence product overseas, while the French DGA is a very active market participant. The closer working relationship between their Industry and Government is apparent, including the use of innovative funding programs to effect major, long-term sales programs.

The U.S. Government provides relatively significant amounts of military aid to various nations, generally related to counter-drug/terrorism. This is termed Foreign Military Funding (FMF). The natures of facilities supplied under these programs are: coastal/land border radar surveillance systems and high speed small boats. The government agencies involved and the U.S. companies that supply the equipment work very closely in ensuring these programs are efficiently delivered.

The U.S. State Department, in conjunction with the Department of Commerce and Defense Department, has a formal process/procedure to formally provide advocacy support to U.S. companies from their Embassy officials when they bid equipment into overseas countries.

In tendering for work in overseas countries, their tender procedures usually demand in-country manufacture, significant local work content, or mandatory partnering with local companies. While attempting to ensure that local companies share in the revenue from the projects, this policy also seeks to obtain meaningful technology transfer.

Singapore, through its assiduous, long-term investment in the Singapore Technologies group of companies, in closely-directed collaboration with its Defence Science Technology Agency (DSTA), has gradually built an industrial capability such that it now not only supports its military and national security capabilities, but also operates globally in Asia, the U.S. and Europe.

CONSIDERATIONS

Austrade CEA often works with Austrade when entering new markets. However, Austrade's broader market strategy and coverage versus its resources is somewhat at variance with the longer and slower procurement cycles inherent in the Defence and law enforcement markets. The latter usually require deeper and more detailed knowledge, contacts and influence chains than the commercial market. To address this market would require needs more people in Austrade with defined strategic goals and specialist Defence knowledge in order to realise the strategic and national security gains that could be achieved.

AusIndustry There were two main concerns with the AusIndustry R&D Start program:

- It helped through product development stages but not into commercialisation.
- The requirement for SME's to put in 50% finance – this sum can be difficult for companies to find.

AusIndustry Commercial Ready Program replaces the R&D START Program and is aimed at addressing early-stage commercialisation activities. While this should address the first concern, the latter remains as a significant hurdle.

To assist the commercialisation stage, CEA's recent experience of close collaboration with Government agencies to structure international collaborative programs which are designed to lead to broader commercialisation is perhaps relevant. By structuring at three levels: Government-Government; Research organisation to Research organisation; and company-company – this can particularly ensure greater protection of Intellectual Property, retention in Australia of the IP/technology to leverage its use in the interests of the nation's national security capability, while at the same time maximising the commercial return in the maximum number of markets.

Funding Focus The perception is that Australia doesn't actively encourage and fund its companies as much as the US and Europe. For example, if the U.S., France or U.K. need a radar, then they go directly to one of their indigenous primes. Australian companies receive some help in investment into technology, but the amounts are comparatively small.

For consideration is that Australia needs to recognise its high technology areas, be better at 'picking winners' and provide larger grants to fewer companies to assist with development and commercialisation. Australia's "gem" companies would be identified – those with global strategic competitive edge - and investment in them heavily targeted - perhaps to grow its first "Multi-National Enterprise (MNE)" in the electronics systems manufacturing sector.

SUMMARY

CEA Technologies is a relatively successful, growing, export-oriented technology (radar and communications) company, with several relevant case studies, beginning with an initial sale to the Australian Department of Defence in the 1980's and since grown to sell radar and communication systems to countries throughout the world. CEA's systems operate in Europe, the U.S. and the Middle East.

While the actual generation of the innovative ideas, concepts and technologies is relatively well-addressed (although perhaps the R&D quantum could be increased), to continue to grow and be successful, more joint private-sector and Government investment is required in the commercialisation stage.

CEA's pathway to commercialisation began with its initial sale of systems to the home Defence market, recognition of this as an excellent reference system by an overseas decision-maker, leading to further export sales of such systems. Government funding complemented CEA's re-investment of its profit into more R&D, thereby enabling the development of later generation radar systems to be sold locally and internationally.

CEA is an IP-rich company and its workforce consists primarily of highly skilled engineers and ex-military staff, enabling a solid understanding of its biggest customer – Defence. All profits are reinvested into the company.

CEA has a strong focus on research and development which is fundamental to its continuing success in ensuring its technology is at the leading edge.

A major factor determining CEA's success is providing *solutions* for its customers more than mere products or systems. The company's products and systems are adaptable and solutions are tailored to each customer, thereby making them unique, but flowing from a few generic technological streams.

Australia does support its companies in research and development stages. However, there are some effective commercialisation practices in countries such as the U.K., France and the U.S. that provide enhanced support to companies in the commercialisation stage. While these do not necessarily directly translate to Australia's way of doing business, it is for consideration that they be examined as a basis for developing a *more sophisticated and integrated* Government-Industry commercial *approach*. Such an initiative should provide a new initiative to Australia capturing a greater share of international markets and increasing national productivity, while at the same time increasing national security capability in a more affordable manner.