



James Fox,
Managing Director,
Vision Systems Limited (VSL)

Why is it so difficult to develop great ideas and inventions in Australia: Australia(ns) can make it.

Introduction

It is a great honour to be asked to give the 2002 Warren Centre Innovation lecture. The Warren Centre makes a significant contribution to the vitally important engineering and technology sector in our country and I am delighted to be asked to support the activities of the Centre in this way.

Australians have an international reputation for creativity across a wide spectrum from entertainment and the arts to science. Yet our country's track record for turning our scientific and engineering creative into a vibrant, growing and wealth creating industrial base participating in international trade of knowledge intensive products and services has been abysmal with very few exceptions.

The first and most critical missing link in the capture and conversion of this evident creative ability is a competent and sustainable industry-based research and development activity, given that while there can always be better and more science, we are not even capitalising fully on what we as a community are presently investing in public science.

Without such industry based activity, there is little hope that public science and private invention can be routinely commercialised in this country. With a tiny domestic market and vast distances to major international markets, only companies with a vision to target customers outside Australia as their number one priority will ever have the scale to invest in the required R&D and the international marketing costs that go with the territory. Very few Australian companies invest anything like their international counterparts on R&D and very few have a mind set that the world is their market.

While recent initiatives from the Federal Government have positive components, it is still clearly falling short in stimulating vitally necessary, industry-based R&D.

My particular corner of all this is being part of Vision Systems which is a business that actually takes Australian science and technology and creates products and R&D services that are sold all over the world.

Australia does have a few wonderful examples of what we should be striving for, such as Cochlear with its hearing implants and ResMed with its sleep apnoea products. They exist because there was leadership and a risk taker at the beginning. People. Australia's critical asset, even in commercialising science, is people.

Apart from our natural resources, the only competitive advantages we have are pockets of world competitive science skills and one of the lowest cost industrial R&D capabilities in the world.

Combine this with the necessary ingredients of people and leadership, available venture and seed capital, appropriate economic and taxation settings by Government and success will follow.

Vision Systems Background

Firstly, let me take you through the Vision Systems story by way of background to at least declare my bias!

Vision Systems, as it exists today, was founded in 1987 when, with \$5m of venture capital, we started Invetech. Invetech is a contract R&D company and as a first step, we set the objective of developing a world class R&D business (selling services to other companies) while at the same time using the resource to springboard ourselves into high value new product opportunities aimed at world markets. We were inspired to have a go at a start up by the availability of venture capital, and a strongly supportive R&D and incentive policy from the then Labor Government. This Government policy set an environment where the industrial landscape was waking up to the need for R&D and financiers started looking outside traditional areas of investment. So we had Government policy actively on our side and we had finance availability. To make it happen though we again needed people with drive and the engineering skills.

It was a high-risk venture given that it was a start up, but it was aimed at capitalising on Australia's low-cost R&D and the indigenous science base. So at startup we wrote down a number of rules which would keep us on this track:

1. Target at least 75% of sales from USA, Europe and North Asia

Given that our competitive edge was to be R&D, then clearly our products were going to have to be innovation-intensive. This meant high R&D spends on each product. Given that Australia represents only 2% of world's GDP, it is not possible to get an acceptable return on a market around the same size as New York. You just have to decide that you will sell in the major international markets and not focus on Australia. Market research is therefore also done in the USA, Europe and Asia as you define the products that will be developed.

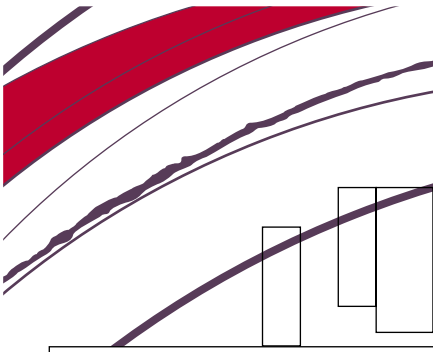
2. Base the business on both the manufacture and distribution of high value (>\$1,000) and high margin products (>50%) and contract R&D services.

High R&D spends need high margins to fund them. And if you want to compete in distant markets you must airfreight so high \$/m³ products are also essential.

continued inside

In this issue

The Warren Centre Innovation lecture delivered by James Fox, Managing Director of Vision Systems Limited.



3. Operate the company's R&D resource (Invetech) as a stand alone business serving both external customers as well as being the innovation engine for VSL.

We have achieved "1 + 1 = 3" out of this strategy by getting a sharing of overheads, world scale facilities on which to draw our new products, technology exposure and our staff have the stimulation of a wide variety of projects.

4. Revenue mix by geography and market sector.

Our core capability is our engineering capability and technology base, often common to a wide variety of products. What is always different is the route to market. For contract R&D this is not an issue for us. Diversity is a hedge to start-up activities and we promote it.

5. Invest 10%+ of sales in new product R&D.

If the key competitive edge is R&D and the extent of innovation is in the product, exercise it. I would also point out that we spend 20% of every sales dollar on offshore sales, marketing and technical support people and facilities. This is often overlooked at the planning stages of small companies you actually need to invest the \$s before you generate the sales. Route to market is actually the highest risk component of the process, higher than targeted R&D. In fact, this year VSL will spend \$30m on R&D. This will take us into the top 10 R&D spenders in the country which shows you what a barren landscape industry-based R&D is.

6. Create an environment where the top quartile of available people seek to work.

We have been fortunate to achieve this and we have been conscious of both individual rewards, peer group interaction and the environment where people work.

7. Invest in intellectual property and sales and marketing and be a virtual manufacturer.

We dedicate our capital to the creation of IP and to sales and marketing and we outsource the fabrication of all components and sub-assemblies. We do final assembly and test in-house only, thereby retaining the ultimate quality check and process intellectual property in-house.

We have stuck by these drivers and seen the pay-off. It needs to be remembered that all of this is in the context of being a long way from key decision markets and market dynamics. A competent "on the ground team in overseas locations" is therefore critical to achieving success from such a remote supply and R&D base.

Out of our contract R&D business, Invetech, we have developed two major divisions. One is Vision Fire and Security where we create and sell sophisticated and high-value laser based fire detection and video surveillance systems. Over 96% of what we make, we sell outside the country.

The other division is Vision BioSystems where we create and sell high value, complex medical instruments used in the detection of cancer and blood disorders. As you can hopefully sense from the product pictures, our products are high value, high margin and high \$/m³. And while much of the technology is generated by our 350 development staff, significant science has also been licensed in from public sector research groups and commercialised, including CSIRO, DSTO and Prince Henry's Hospital to name a few.

Since 1993 our sales have grown at over 30% per annum and well over 80% of our products and services are sold outside Australia.

Again very few Australian companies have a sales history like this based on engineering development. ResMed and Cochlear are even more spectacular examples and just look at the wealth that has been created in Australia for all of the stakeholders in these businesses. It can be done!

Measuring Wealth Creation

As a public company, Vision Systems is subject to regular scrutiny, in fact on at least a six-monthly basis. Yet most decisions and investments we make are on a 3-5 year and sometimes 10-year basis. Holding the line on our strategy and maintaining six-monthly delivery is a mainstream management task, and is a reason why going public too early for startups can be a destructive step.

One of the most visible measures of a company's performance is share price. Just before we backdoor-listed Invetech through VSL, in 1993, the share price was as low as one cent, and hovered around 14 cents for a number of years. The price jumped when we arrived, but it took eight years for it to accelerate by another 300%. Over almost a decade, the share price has risen by roughly a factor of 20, but it has taken a decade. As an investor, if you did not hang around for the decade, you missed out on the key returns. This is clearly a different perspective to six-monthly analysis and reporting.

Two other wealth creation measures involve market capitalisation and dividends. Ordinary dividends have grown by a factor of five over the last nine years and market capitalisation has grown from about \$4m in 1992 to close to \$300m presently.

I put these slides up not to blow our trumpet but to reinforce the examples of ResMed and Cochlear which show that it is possible to create significant wealth, jobs and Australian economic benefit out of Australian engineering. But it takes 10 years-plus per venture.

Take the \$125m per year (so far) that VSL exports, add in Cochlear and ResMed, add only another 250 companies like us and we, Australia, go into trade surplus. Another astonishingly small number yet apparently a very difficult one for Australia to achieve.

So what you ask is the take on all this. Firstly, let me go back a couple of steps.

Australia's History of Invention

It may surprise many of us to know that a century ago, Australia's standard of living was close to the highest in the world. As historian Geoffrey Blainey observes, the prosperity enjoyed by a typical family in the 1890s was not just because the continent was a vast half-tapped resource bowl, we prospered because we applied the latest machines and work skills enthusiastically. By 1891, Blainey notes that a network of railways penetrated the inland: in relation to population, Australia had five-six times the railway mileage of England, France and Germany. In 1891, we made more effective use of the latest transport technology than we do comparatively today. We made steam trains on a large scale and we even supplied one of Japan's first railway steam locos.

In 1891, Melbourne had taller office buildings than any city in Europe. In 1891, Australian farms at harvest time, were close to the most mechanised in the world with much of the machinery being of Australian design. Some of the world's deepest mines and biggest livestock farms were (and are) in Australia.

With our mining background, we were at the forefront of explosives development. Australia took the world from blasting powder and unstable nitro-glycerine to dynamite and gelignite. It took a scientist working in Australia, Alfred Nobel, to tame the Italian invention, nitroglycerine.



**ADPRO® Amux
advanced
multiplexer**



**Automated blood
film maker and
stainer**



SL50 Slide Loader

At the outbreak of the first world war, we were among the first to chemically decipher aspirin. Australia was amongst the first to put aspirin, penicillin and insulin into full scale production. Having made a great start to pharmaceuticals internationally, we failed to establish world-scale R&D and market presence in later decades.

Australia broke through in the 50s and 60s with major advances in scientific instruments (atomic absorption spectrometers) in which we still are a significant world player in specific sectors.

Australia was also

- the first to design and operate "mechanical" refrigeration (1851) and see the opportunity for frozen, long-life shipments (Harrison – Geelong)
- the first to develop spun concrete pipes (Humes)
- the third country to launch a satellite from its own soil
- a leader in metals technologies
- a leader in photocopier technology in the 50s
- the inventor of the thrust bearing without which cars, trucks, aircraft etc cannot operate
- the inventors of the black box flight recorder

... and the list goes on.

So we have always had the inventive capacity and we still have it, yet we have built very few world-scale science-based industries.

A Nation of Punters

How then can a country which was the richest in the world, a leader in resourcebased and key industrial technologies, with 6% of the world's identified natural resources and only 0.3% of the world's population, be scratching to hold on to wealth per capita levels and participate in a meaningful way in knowledge-intensive products and services across world trade? Obviously, the world has moved on and the products and services that are in demand are very different to what they were even a decade ago. Yet, while we are now strong appliers of the latest technology, we are weak in getting into the creation of businesses in these new areas.

In a nutshell, I believe that we have an underlying culture of asset speculation and punting on "El-Dorado", not one of systematically investing in knowledge based industries which can generate customers across the world, skilled employment and expert revenue.

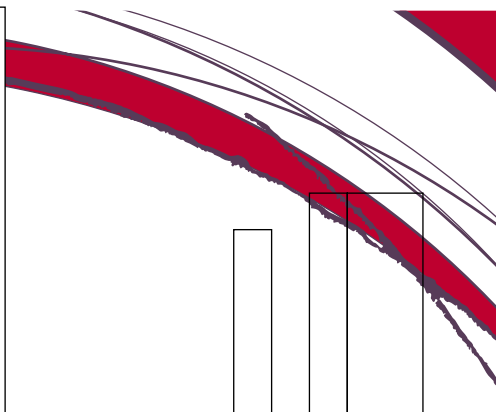
I strongly suspect that many company boards are more comfortable in authorising multi-million dollar advertising programs or outback drilling programs rather than targeted, market-driven R&D aimed at new products.

Our international debt is running up at \$2 billion per month and now stands at over \$360b. Our so-called business "entrepreneurs", lauded by the press in the 80s and 90s were asset shufflers and strippers, not builders. No mention of those people building real businesses based on real science, selling real products to customers all over the world. So every month we mortgage the farm to buy groceries – not a great long term strategy. Remember every working day, somebody some where around the world has to make a decision to invest \$100m in Australia to plug the deficit.

Does Our Government Help?

As further background to the state of the Nation, it is evident that Australia's Business Expenditure on R&D (BERD) has been in decline since the Federal Government cut the Tax Concession for R&D from 150% to 125% four years ago. This, combined with the welcomed cut in corporate tax rate to 30% (down from 46%) means that the value of the incentive has fallen from 26 cents in the R&D dollar to 7 cents. There is a feeling that, for tax based incentives to work and when weighed against the cost of compliance and reporting, the value of the incentive needs to be around 15 cents in the R&D dollar.

On top of this is the negative feeling towards tax based incentives being generated by the Australian Tax Office. At the outset, let me declare that much of the growth of VSL in the early years was accelerated by Government approved R&D syndicates. These syndicates



were all formally reviewed and registered by the Federal Industry Department of the day and had formal advance rulings from the ATO based on full disclosure of the investors, the R&D budget and the finance structure in total. As a company who has sold and exported over \$200m of R&D syndicate derived products, I am amazed by the ATO's retrospective attack on these structures. I have no problem with attacks on those who did not undertake bonafide R&D, but to go back and attack the few businesses that responded to the then Government's policy directions is deplorable.

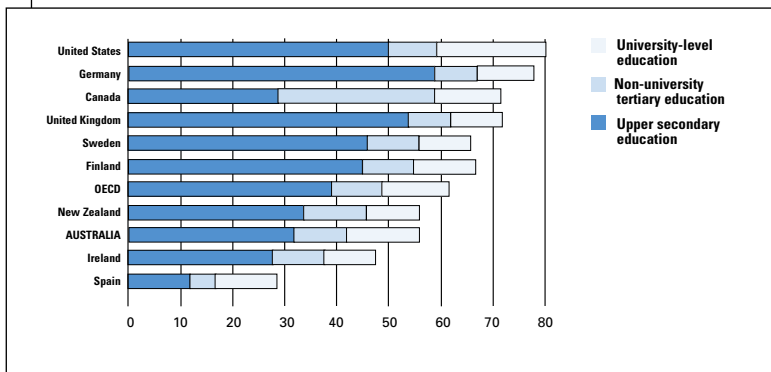
Aside from the specific issue of R&D Syndication, such a reversal goes to the core of trust that must exist between industry and Government if key industry initiatives and critical "seachange" developments are to be effective. It is simply not good enough for Government to say that it cannot blend an arm of government such as the ATO into published industry development policies whether the bureaucrats like them or not.

Industry Doesn't Do Enough R&D

For decades, Australia's spending on industry-based R&D has been way down the international league table. What is clear is that our spend in the Government/ higher education sector R&D is at least competitive (not so for science engineering based undergraduate funding) and indeed we run a world class basic and applied science outfit. What is equally clear is that business expenditure on R&D (BERD) is very low by world standards. Indeed out of a list of the top 24 OECD countries we ranked 17th on the BERD as a % of GDP list. Our BERD/GDP was 0.80% (now 0.64%), the average was 1.6% and Sweden topped the list at 2.7% or more than three times Australia's spend.

Fewer than 20 companies in Australia in 1998 spent more than 5% of their sales on R&D! Around 3000 companies registered for the 125% tax concession in 1998 – an astonishingly low number. It is sobering to compare our total R&D spend as a nation to major industrial companies where companies such as Siemens, IBM, Fujitsu and Dupont spend more or about the same as Australia does as a nation. For me this is not a negative, just a reminder of the way the rest of the world thinks and competes.

Poor commercialisation of our science base in Australia is not, in my view, the result of "un-commercial" science activities. Basic science, in the time frame of public company reporting, is by definition pre-commercial. Beating up on those agencies that are world class basic science operations to get "commercial" as a solution is a nonsense. When Alexander Graham Bell invented the first



International Comparison of Education Levels, (1996)

telephone, it was a great breakthrough, but what was the first phone worth? Not much - who are you going to call? As the network of operations grows, then the last phone of millions is very valuable. So in an Australian context, who are the scientists going to call? Without a healthy, world scale and diverse industrial R&D base which sells goods and services on the international market as a primary mission - there is nobody to answer. This in my view is the barrier to developing Australia's "great ideas". Not Venture Capital, not the ASX, just too few in industry showing the way.

I would also observe that, out of close to \$4b in Government outlays in science and technology in the last budget, only 17% was aimed directly at industry where we have the major problem. The latest innovation package from the Federal Government is a help, but still misses this critical imbalance.

We Must Develop Our Intellectual Capital

Could I also flag another long term issue that impacts on all of this. I was surprised to see an international comparison of education levels given that I had always promoted the thought... well at least we have a strong education base to start from. Admittedly old data from 1996, but it shows that Australia ranked 19th out of 24 countries on the basis of the percentage of the population aged between 25 - 64 with an education level of higher secondary or above. We may not be as well an educated country as we think. You can only speculate what the relative numbers for science based education might look like.

And Make Australia an Attractive Investment Destination

Another measure of our place in the world is the extent to which capital (foreign direct investment) providers outside Australia are willing to invest here. Global businesses link capital, technology sourcing and production seamlessly around the world, moving from place to place in response to output per dollar invested. International Superannuation funds and banks are also constantly on the look out for preferred investment locations.

Regrettably, Australia ranks way down the list. It is just another "barrier to entry" for Australian business (a "market failure" by any measure) that should push Government and Industry closer together in overcoming our distance from the "main game" and our lack of scale.

The Way Forward

My proposition is that it is entirely within our reach to capture, develop and grow international, science-based businesses in Australia. First, it is all about people - leadership, risk taking, celebration of success, support for the failures. People build businesses and people trade - not companies, not governments.

Yet government provide the environment for structural change and the basic elements of our competitive base and they can help shift attitudes and the rate at which investment occurs. When the industrial environment is right, commercialisation of science occurs systematically.

You only have to look at the remarkable story of Ireland where a 15-year, bipartisan approach to industry policy to completely overhaul its ailing economy has led to massive investment by major corporations, trade surpluses, employment growth and increasing per capita community wealth. The industries targeted were pharmaceuticals, electronics and software development.

This aggressive interventionist play aided in the turnaround of Ireland's debt resulting in wealth creation. The reality is that Australia is not far away from a flat earth approach to industry policy. Economic rationalists of course cry foul at any kind of investment encouragement and would hold New Zealand up as a model of the "dry" approach. In reality, the contrary economic progress of New Zealand to Ireland speaks for itself.

So governments can make a difference, but only if there are people willing to capitalise on whatever government makes available. Having said all of that, there is a tendency to focus too much on Government and on the science end of the process. Without "receptors" in industry, commercialisation of science to the benefit of the Australian economy falls back to high risk and isolated start ups where those that get through the normal rates of attrition take 10 years-plus to be up and going. And at the end of the day, a vibrant economy is not driven by the science base alone. As Joseph Shaw (CEO Ambri) noted:

- USA did not invent the jet engine but it has Boeing
- USA did not discover the DNA sequence, but it is the world's commercial biotechnology focus
- USA did not discover antibiotics, but it now has major healthcare companies
- USA did not invent the computer, but it is the dominant world supplier of computer software and hardware

It was the drive of a number of individuals in a sympathetic environment that sparked the start of these enterprises.

I mentioned Cochlear as an example to also draw from earlier. Cochlear Ltd is the world leader in hearing implant products. Based on science conceived in the 1960s at the University of Melbourne, it took until 1982 until the first implant was fitted. Nucleus Limited, founded by Paul Trainor, won the commercialisation tender in 1979. Today, Cochlear is a \$2 billion company which dominates its market sector. Catherine Livingstone, the previous CEO of Cochlear and a previous Warren Centre "lecturer", nominates some of the success factors as:

- Nucleus Ltd umbrella at the commercialisation stage (Nucleus of course needed a leader and entrepreneur to exist in the first place - and Cochlear was a new division, not a completely isolated start up)
- global perspective
- first mover advantage
- collaborative research around the world
- costs in A\$, revenues in US\$, Euro, Yen etc.

Do you see the common thread yet? So in my view, the extent of industry-based, internationally targeted R&D is a key driver of commercial success.

As part of a great team having a real go at this international game, clearly there are enough company examples to show that:

Australia(ns) can make it...we just need a few more to come and join the party.