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# THE INNOVATION DIVIDEND

## MORE FROM EMERGING TECHNOLOGIES

Increasing the innovation dividend from emerging technologies is a key challenge for Australia as it faces the need to move beyond the mining boom

# Biotech success? People, cash and infrastructure

## The local industry can achieve 'one-off' successes. What can be done to generate more 'one offs' but also, and more importantly, repeat successes?

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According to the Ausbiotech website, Australia boasts around 450 public or private biotechnology companies, around 600 medical technology companies and 111 ASX-listed life science companies. Impressive numbers!

According to the Victorian Bioportal, Victoria is home to 41 of those ASX-listed biotechnology companies, with a combined market capitalisation (at 1 June 2011) of $24 billion. Also pretty impressive (even noting that share prices have dropped significantly since 1 June).

However, dig a little deeper and the picture isn't quite as bouyant. CSL alone accounted for around $20 billion (more than 80 per cent) of the $24 billion. And of the 40 companies that represented the remainder, only 12 had a market capitalisation of more than $100 million.

Across the country the picture is similar – the sector is comprised mostly of minnows. Despite the fact that activity in the sector in Australia dates back more than 30 years, the emergence of medium-to-large, well-capitalised companies has been very 'hit or miss' (and mostly miss).

That's not to say there haven't been some significant successes. Recent examples include companies like Mesoblast, Acrux, Sirtex and Cellestis, which have created new platform technologies and entered into major international partnerships (Mesoblast and Acrux), or developed and internationally marketed successful niche therapeutic (Sirtex) or diagnostic (Cellestis) products.

And with success we've seen some 'cherry picking' of assets by overseas companies. Examples include Cephalon acquiring a significant equity stake in Mesoblast, Cellestis being acquired by Qiagen, Arana and ChemGenex being acquired by Cephalon, and Gropep being acquired by Novozymes.

Such transactions represent both a win and a loss for the sector – recognition of value created by the Australian companies but, at the same time, reducing the prospects for the emergence of a tier of sustainable, mid-size companies. Despite more than 30 years' experience, there is still no model for sustainability in the sector.

It's clear that 'one-off' successes can be achieved by the local industry. What can be done to generate not only more 'one offs' but also, and more importantly, repeat successes?

Core to the challenge are three basic requirements that are in limited supply in Australia (particularly for life science companies): people, cash and infrastructure.

### People

I've listed people first because everyone else tends puts cash first – but without good people the cash will be wasted. There is no doubt that there are good, experienced people in Australia. It just happens that they are too few and too thinly spread. And while the shortage is most apparent at executive management and board levels in companies, it is present at all levels and across all facets of the sector.

Associate Professor Ernst Wolvetang (rear), James Briggs and Rachel Horne at work in the AIBN laboratories.

Drug development and commercialisation is tough enough for experienced teams. Spreading limited experience across too many small companies just exacerbates the risk.

One obvious way of consolidating experience and building critical mass would be to have fewer (but larger) companies. Premature listing on the ASX has long been a problem, leading to the raft of chronically underfunded, sub-critical-mass companies noted above.

Maybe the time has come to tighten the listing rules to force some of the smaller companies to either bulk up or close down. A clean up at the bottom end of the ASX would be no bad thing for the sector. Additionally, if the rules regarding transfer of tax losses were relaxed there would be a further inducement for larger companies to mop up some of the smaller ones.

Of course, there's more to solving the problem than just consolidating the experienced people in the sector into fewer companies. There are not enough experienced people in the country in the first place. A source of great frustration is that there are many Australians in senior positions in life science companies overseas but that, in the absence of some external incentive, they are unlikely to return to Australia (except to retire). A package of financial and non-financial incentives needs to be developed to encourage these people back to their homeland.

Yalun Arifin and Dr Claudia Vickers working at AIBN.

Finally, there is a desperate need to leverage the academic scientific base. Australia ranks very highly in academic output but very lowly in converting good science into products and services.

We need to get our best scientific minds engaged with industry. We need systems that encourage scientists to move back and forward between academia and industry. We need to recognise and reward commercial achievement as much as academic achievement. We need dual-track positions and career paths. We need to emulate the US model of flexible boundaries between academia and industry.

That's a lot of needs – and they won't be met until a commercial outcome to an R&D project is recognised as being as valuable and as important an achievement as the initial scientific discovery (if not more so). A major re-think of recognition and reward systems is required within academic and government circles.

## Cash

**2** There is no avoiding the issue – drug and medical-device development programs consume huge amounts of cash over long periods of time. And most fail! In the absence of patient, risk capital, no new therapies would ever be developed. But patient, risk capital is a rare commodity in Australia.

It's not the 'capital' that's the problem; it's the 'patient, risk' part of the equation that's missing. Australia is awash in investment capital. As of 2010, there was $1.28 trillion in managed funds from compulsory superannuation alone. Australia has more money per capita in managed funds than any other country in the world. But only a trickle of that capital finds its way into life science companies. In 2010 publicly traded Australia biotech companies raised just $130 million – equivalent to a measly 0.01 per cent of the funds under management from compulsory superannuation.

While recognising that superannuation funds operate under strict fiduciary regulations, there must be some way of unlocking capital for investing in industries of the future.

Part of the answer is to change the perceived risk/value equation. When US bonds are not AAA rated and when banks require government guarantees, what is meant by a 'secure' investment anyway? There is also a need to encourage long-term thinking and a holistic view on technology investment.

The return for investment in emerging industries developing high-impact products is more than just an IRR equation. It's an investment in the future. And even the failures have long-term benefit. As has been evident in the US biotechnology sector, first time success is rare – it more often comes after a string of failures. Perseverance and a thick skin (not to mention unfettered optimism) are essential components for ultimate success.

At a more practical level, what can be done to increase the pool of risk capital available to life science companies? What about a 'future industries fund'? Where governments are now (or in the future) receiving large revenue streams from the resource industry through royalties or a mining tax (or equivalent), why shouldn't some of that money be invested into future industries? It seems only fitting that some of the profits from a current industry exploiting the nation's non-renewable resources be utilised for the creation of future industries that will be self-renewing.

Other practical government initiatives could include:

- creation of a grant scheme equivalent to the US SBIR scheme (which has been operating effectively in the US for around 40 years, irrespective of the party in power);
- enhancing the Innovation Investment Fund (IIF) program; and
- providing capital gains tax breaks for investment in emerging companies.

## Infrastructure

3 One place where governments have been prepared to invest heavily is in academic research facilities, but virtually no investment has been made into incubator space for emerging companies. These are left to fend for themselves in an open market with very limited supply of suitable facilities. Companies need the flexibility to expand (and contract) as required. They need access to shared facilities and capabilities. And they need world-class supporting infrastructure to help overcome the 'tyranny of distance' from their partners and markets.

Governments should require 'incubator space' in proposals for research infrastructure. They should encourage established companies to foster start-ups, maybe by providing incentives to sublease. And government-funded infrastructure, whether it's in universities or research agencies such as CSIRO, should be made available to SMEs at reasonable rates. Full-cost-recovery models effectively preclude SMEs from accessing such resources. A spin-off benefit from these initiatives would be increased interaction and collaboration between SMEs, universities and research organisations.

Addressing the people, cash and infrastructure challenges will allow Australian life science companies to focus their attention on the real task: developing new drugs and devices. Each success will be a step along the path to a sustainable industry.

But the benefits will not be restricted to the life science sector alone. Much of the experience should be translatable into other emerging industries, such as greentech and cleantech. The reality is that the challenges and opportunities for the Australian biotechnology sector are also the challenges and opportunities the industries of the future – a future based on innovation not excavation. ◀

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# $15 MILLION FOR NEEDLE-FREE VACCINATIONS

Investors have pledged $15 million – one of Australia's largest investments in a start-up biotechnology company – to develop a revolutionary new needle-free vaccine-delivery system.

The start-up company, Vaxxas Pty Ltd, will enable Professor Mark Kendall from the University of Queensland's Australian Institute for Bioengineering and Nanotechnology (AIBN) to continue his pioneering research and development of the Nanopatch.

The Nanopatch has thousands of small projections designed to deliver the vaccine to abundant immune cells in the skin, whereas the traditional syringe hits the muscle where there are few immune cells. Early stage testing in animals has shown a Nanopatch-delivered flu vaccine is effective with only 1/150th of the dose compared to a syringe and the adjuvants currently required to boost the immunogenicity of vaccines may not be needed.

In addition to improving the efficiency of delivery, the Nanopatch has the potential to dramatically improve patient convenience and reduce the complications associated with needle phobia, needle stick injuries and cross contamination, which are key global health issues. It is designed for thermostability not to require refrigeration, making transport cheaper and easier, particularly to developing nations.

The investment is led by OneVentures, with co-investors Brandon Capital, the Medical Research Commercialisation Fund (MRCF) and US-based HealthCare Ventures – and investment from the Government's Innovation Investment Fund. The $15 million investment was negotiated by UniQuest, UQ's main commercialisation company. UniQuest has led the commercialisation of the Nanopatch technology to date, and will hand over the responsibility to Vaxxas following this investment.

• Professor Kendall's team won a 2011 Eureka Prize – see page 41