

## Why Make This Submission?

The University of Melbourne invited me to join the Review Panel on the Department of Computing and Information Systems in 2014. The panel was chaired by Prof. Gerhard Weikum, Max Planck Institute for Informatics, Germany. The evaluation was conducted over 3 days with all the panel present in Melbourne and then the report was written through online collaboration over the following 3 weeks. Professor Weikum impressed me with his considerable support for business – research collaboration and encouragement to use my experience to help improve how business and industry work together with university research in Australia.

I then joined the board of NICTA and accepted DVCR Prof Jim McClusky's invitation to chair the National eResearch Collaboration and Tools (NeCTAR) project based at the University of Melbourne. NeCTAR joined with ANDS and RDS to form the Australian Research Data Commons Limited in 2019 and I have been on that board since its formation.

My career started at IBM, where I spent over 7 years in various roles learning about technology, business and management. This knowledge helped me start three businesses; Applied Learning/Decision Engineers, Acumen and Acumentum all involved leading edge multimedia technology and developed some of the first multimedia and later internet applications in Australia. Applied Learning was floated on the ASX in 1993, Acumen was sold to NASDAQ listed International Training Corporation Inc in 1996 and Acumentum was sold to a private investor in 2007. Since 2007 I have been involved in various investment and non-executive director positions mainly centred around technology and science-based start-up companies.

The reason I am making this submission is that my 45 year career has almost entirely been working at the forefront of technology turning new knowledge, innovation and capabilities into new products and services. Acumentum worked on the Victorian Government project Maxi project with Aspect Computing and designed the first [www.vic.gov.au](http://www.vic.gov.au) government portal in 1997 and Bill Gates wrote about these projects in his 1999 book *Business @ The Speed of Thought*. Over more than four decades I have worked with universities, CSIRO and governments and concluded Australia must focus on its strengths to substantially increase the level of collaboration between university research and business to build globally successful products and services.

## What is the Challenge?

Substantially increasing collaboration between businesses and universities has the potential to deliver significant benefits in terms of new knowledge, innovation, and capability. Both universities and businesses have different strengths and resources that can be combined to create powerful solutions to complex problems. There is substantial evidence that this improves global competitiveness of companies and develops a higher standard of research<sup>1</sup>. In this response, based on my experience, I would like to outline the benefits of improved

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1 Achieving Breakthrough Collaborations The New ABCs of Research: Achieving Breakthrough Collaborations by Ben Shneiderman Oxford University Press , Oxford , 2016 . 320 pp. Trade. ISBN: 978-0-19-875883-9 . Ernest Edmonds Author and Article Information Leonardo (2017) 50 (3): 331–332. [https://doi.org/10.1162/LEON\\_r\\_01433](https://doi.org/10.1162/LEON_r_01433)

collaboration between business and university research and provide a few suggestions on how to improve that collaboration.

## Benefits of Improved Collaboration

Improved collaboration between business and university research delivers benefits to both:

- Increased innovation** Collaboration between universities and businesses to solve real world problems can produce new ideas and technologies that are not likely to come from a research question alone. Businesses benefit from the expertise of university researchers, while universities benefit from the practical application of their research.
- Access to markets** Collaboration can open access to new markets, customers, and resources by connecting to global research and research centres. Universities can help businesses to identify new opportunities and provide them with the knowledge and expertise needed to enter these markets.
- Competitiveness** Collaboration between universities and businesses can improve the competitiveness of both parties. Businesses can gain a competitive advantage through solving hard problems and gaining access to new technologies and ideas, while universities can enhance their reputation and funding opportunities by working with successful businesses.
- Enhanced research** Collaboration between universities and businesses can enhance the research capacity of both parties. Businesses provide the real-world problem, some funding and commercial resources necessary for university research, while universities provide subject expertise and deep knowledge to businesses.

## Recommendations for Improved Collaboration

- Develop relationships** People build successful businesses not technologies. It's all about relationships. Building relationships is essential for successful collaboration between businesses and universities. Researchers can establish relationships with businesses by attending industry events, inviting businesses to visit the campus, but what really produces results is working together on joint research projects. What works is creating a physical space where business employees can work amongst researchers and researchers can work alongside commercial teams. Covid and new ways of working are making this style of space much easier to create.
- Common goals** Identifying common goals is crucial for successful collaboration. Businesses and universities must work together to identify shared objectives and align their research efforts accordingly. This will go a long way to breakdown the attitude with researchers that business want everything tomorrow and for nothing and with companies that universities are just too hard to work with and everything just takes too long.

- Clear expectations** Establishing clear expectations is important. Businesses and universities must communicate clearly about their expectations and responsibilities to avoid misunderstandings which cause inevitable conflicts.
- Resources** Goals and objectives will never be achieved without adequate resources. Providing those resources is critical for ensuring success. Businesses can provide some funding, resources and access to their customers, while universities can provide domain expertise, access to existing published research, links to international research teams and critical knowledge that can solve difficult problems for businesses.

## Existing Examples of Business – Research Collaboration

There are good examples of effective collaboration and through my membership of the Vice-Chancellor’s Industry & Business Advisory Board at the University of Newcastle I am aware of the Newcastle Institute for Energy and Resources (NIER). Its purpose is to conduct research in the fields of energy and resources, with a focus on finding sustainable solutions to global energy and resource challenges. NIER tackles complex issues in three main areas: energy, mineral resources, and sustainability. Industry partners are critical and the institute works closely with companies to identify real-world problems to develop solutions that are commercial and environmentally sustainable. A great example of cutting-edge research and collaboration with industry.

Also at the University of Newcastle is the University of Newcastle Research Associates (TUNRA) the Bulk Solids Handling Research Associates collaborates with the bulk solids handling in mining, agriculture, and food processing. TUNRA solves problems by bringing researchers, engineers, scientists, and industry partners together around design and optimisation of bulk handling equipment, testing and analysis of bulk materials, and collaborating on safety and environmental issues related to bulk solids handling.

## Effective Collaboration Requires an Exchange of Skills

The transfer of skills between universities and businesses at decision-making levels, from the board to the C-suite, is an essential aspect of effective collaboration and engagement. It allows for the integration of knowledge and expertise from both sectors, leading to the development of new products and services, and the creation of value for companies and ultimately deliver prosperity to the society. Importantly, this transfer of skills will bridge the gap between theory and practice, ensuring that academic research has practical applications in the business world.

An improved flow in the exchange of talent between the sectors is likely to increase the presence of highly qualified academics on boards and in the C-suite of major companies. Academics can bring a wealth of knowledge and expertise to decision-making processes, providing a different perspective and helping to ensure that decisions are based on sound research and analysis. Additionally, the presence of academics in decision-making positions

can help increase business competitiveness and most critically address the past two decades of anaemic productivity growth<sup>2</sup>.

The level of the presence of highly qualified academics on boards and in the C-suite of major companies varies across the leading economies and can be increased. In the United States the presence of academics in decision-making positions is relatively low, with only around 2% of Fortune 500 companies having a PhD on their board. In contrast, in countries like Germany and Switzerland, there is a higher presence of academics on boards and in the C-suite, with around 10% of board members in German DAX 30 companies holding a PhD. Australia is lower than the US.

## Both Business and Academics Benefit from Joint Research Projects

The DVCR at University of Melbourne, Prof James McCluskey AO introduced me to Professor Ben Schneiderman after Ben delivered a challenging and highly informative lecture on why academic researchers should engage with Industry. After discussing his book over dinner, I immediately downloaded it and read it thoroughly.

In his book "The ABCs of Research: Achieving Breakthrough Collaborations<sup>3</sup>," Professor Ben Schneiderman argues that collaborations between academic researchers and business organisations can lead to breakthrough discoveries and innovations that benefit both parties.

Through his analysis of successful collaborations, Schneiderman provides evidence that academic researchers bring unique perspectives, expertise, and resources to business research projects, such as cutting-edge technology and access to government grants. He also emphasises the importance of effective communication and collaboration between researchers and business stakeholders to ensure the success of the project.

Importantly, Schneiderman provides evidence that joint projects with universities can increase the IRR of the projects for such projects for those businesses as well as providing access to a pool of talented researchers, opportunities to stay ahead of the curve in terms of technological advancements and emerging trends, and improved credibility and reputation through association with a respected academic institution.

Overall, the book provides insights and guidance for academic researchers and business organisations looking to engage in successful research collaborations and highlights the mutual benefits that can be achieved through these partnerships.

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<sup>2</sup> Australia's productivity growth has slowed down with annual growth at its slowest rate in 60 years. The Productivity Commission's report suggests boosting productivity growth through improving skills, technology, competition, net zero emissions, and efficiency. Australia has fallen to 16th in the most productive OECD countries, and Australians will be 40% poorer by 2063 if the trend continues.

<sup>3</sup> Schneiderman, B. (2019). *The ABCs of Research: Achieving Breakthrough Collaborations*. Oxford University Press.

## Research Must be Commercialised to Benefit Australia

There has been a growing emphasis on funding university research to create successful commercial companies in recent years. In Australia, initiatives such as Breakthrough Victoria and Launch Victoria aim to support the development and commercialisation of innovative ideas and technologies coming out of universities. These programs offer financial support, mentorship, and networking opportunities to researchers and entrepreneurs to help them turn their ideas into profitable businesses.

In the United States, the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs provide funding to small businesses and start-ups to support research and development of new technologies, with a focus on commercialisation. Design Media Inc, a partner of Acumentum Pty Ltd was enormously assisted by these programs and their predecessors from the late 80's for over 20 years. The National Science Foundation's Innovation Corps (I-Corps) program provides training and funding to help researchers and entrepreneurs commercialise their ideas.

Whilst government funding is essential to drive the initial applied research it is private capital that brings the entrepreneurs and networks to create the amazing companies that have and are being created from world leading research.

Research Commercialisation funds have been operating in Australia fostering innovation and entrepreneurship in the academic community. These companies include Brandon Capital, Main Sequence Ventures, UniQuest, Uniseed, Tanarra Capital, Significant Ventures, Powerhouse Ventures, and others.

Brandon Capital<sup>4</sup> is a venture capital firm that specialises in the life sciences sector, with a particular focus on healthcare innovation. Its investment thesis emphasises the importance of addressing unmet medical needs, and it seeks to partner with companies that are developing innovative treatments and therapies that can make a significant impact on patient outcomes.

Main Sequence Ventures<sup>5</sup> set up with CSIRO is a venture capital firm that specialises in deep tech start-ups emerging from CSIRO, Australian universities and research institutions. Its investment thesis revolves around solving the world's biggest problems using science and technology, while its approach to capital markets is to leverage its network of industry experts and co-investors to support its portfolio companies.

Uniseed<sup>6</sup> is a pre-seed and seed stage venture fund that focuses on commercialising research from Australia's top research universities. Its investment thesis emphasises the development of intellectual property, and it works closely with the universities to identify promising technologies and provide early-stage funding and support.

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<sup>4</sup> <https://brandoncapital.com.au/about-us/>

<sup>5</sup> <https://mainsequencevc.com.au/about/>

<sup>6</sup> <https://uniseed.com/about/>

Associated with the University of Queensland UniQuest<sup>7</sup> is the main commercialisation company of the university and is responsible for managing the intellectual property developed by its researchers and commercialising that IP through licensing or start-up formation. UniQuest was established in 1984 and has since helped create more than 170 companies, which have generated over \$11 billion in sales revenue and created over 4,500 jobs. Importantly, UniQuest provides business development and commercialisation services to other research institutions, government agencies, and private sector organisations. Its mission is to accelerate the impact of research by identifying and developing commercially viable technologies that can improve people's lives and the global economy.

From the investment markets side, Tanarra Capital<sup>8</sup> is a private equity firm that invests in innovation-driven companies across Australia and New Zealand. It seeks to identify and partner with companies that have a strong competitive advantage and a sustainable business model, and its approach to capital markets involves leveraging its extensive network of institutional investors and industry experts. The Tin Alley Ventures Fund is a joint venture between Tanarra Capital and the University of Melbourne, designed to support and invest in start-ups and ventures affiliated with the university. The \$100 million fund has already received strong backing from professional investors. The fund aims to tap into the expertise of university alumni, strategic partners, and friends to help early-stage companies succeed.

Significant Ventures<sup>9</sup> is another venture capital firm that focuses on supporting early-stage start-ups in Australia and New Zealand. Its investment thesis emphasises the importance of sustainability and social impact, and it seeks to partner with companies that are addressing pressing global challenges in areas such as energy, food, and health.

Powerhouse Ventures<sup>10</sup> is an ASX listed venture capital firm that invests in early-stage technology companies emerging from research institutions and universities across Australia and New Zealand. Its investment thesis emphasises the importance of commercialising scientific research and turning it into innovative products and services, and its approach to capital markets involves working closely with its portfolio companies to support their growth and development.

### Major Findings After Chairing Powerhouse Ventures

Given my background in science and technology and connections with universities, in early 2017 I was asked by a group of investors who had invested in the 2016 Powerhouse Ventures ASX IPO to join the PVL board. The investors wanted a much more commercial focus on the approach to overseeing existing investment companies. In mid 2017 I became chairman of the company and was required to make a series of important announcements to the ASX on the accurate position of the NTA of the investment portfolio. This led to a complete restructuring of the company and four years reshaping the company's investment thesis. From this experience I concluded that very early, pre-seed investment funds should not be listed companies.

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<sup>7</sup> <https://uniquest.com.au/about-uniquest/>

<sup>8</sup> <https://tanarra.com.au/about-us/>

<sup>9</sup> <https://significant.vc/about-us/>

<sup>10</sup> <https://powerhouseventures.com/about/>

Spending almost 5 years as chairman of PVL has provided me with a deep understanding of this sector and I would like to share the publicly available information on PVLs experience to provide evidence to support this submission.

PVL was founded by Dr. Stephen Hampson, a former University of Canterbury academic, and Grant Ryan, an entrepreneur and former employee of Christchurch-based software company Orion Health. The company's initial focus was on commercialising research and technology from the University of Canterbury, where Hampson was based.

In 2010, PVL raised \$6 million in its first funding round, with investments from the New Zealand Venture Investment Fund, the Canterbury Development Corporation, and several private investors. This funding allowed the company to expand its operations and begin working with other research organisations, including the University of Otago and the Crown Research Institutes.

PVL's investment thesis was to provide seed capital and other support to early-stage start-up companies that were based on research and technology developed at New Zealand universities and research organizations. The company would typically take an equity stake in the start-up in exchange for its investment and would provide ongoing support and advice to help the company grow and succeed. That support and advice was significantly funded by government grants.

PVL made 31 investments in a range of start-up companies across various sectors creating several significant companies (from only publicly available information) some returning above 4 times investment to PVL, one 10 times their investment (as announced on the ASX):

**Invert Robotics** a New Zealand-based company that specialises in developing robotic inspection technology initially for use in the food industry. The company was founded in 2011 and has since grown to become a leading provider of inspection solutions for food processing plants and other industrial applications in Australasia, Europe and the USA.

Invert Robotics' founders developed their robotic inspection technology while conducting research at the University of Canterbury in Christchurch. The university's engineering and robotics departments provided the expertise and resources needed to develop the technology and helped to refine and test it in real-world applications.

Further research and development has been a key part of Invert Robotics' growth and success. The company has continued to invest in improving its technology and has worked closely with food processing companies to ensure that its robots meet their specific needs and requirements.

Initial funding came from PVL and a range of sources, including angel investors and a grant from the New Zealand Ministry of Science and Innovation. The company went on to raise additional funding from

investors including Fonterra Ventures, Yamaha Motor Ventures, and Finistere Ventures, among others.

The company's robots use high-resolution cameras to inspect equipment and surfaces in hard-to-reach areas, such as tanks and pipes, and can identify potential hazards and defects that might not be visible to the naked eye.

Invert Robotics has won several awards for its innovative technology, including the 2018 New Zealand Hi-Tech Awards for Best Hi-Tech Start-Up and Best Emerging Company, and the 2019 Frost & Sullivan Asia-Pacific Technology Innovation Award for Food Safety Inspection Robotics.

### **ArcActive**

Another New Zealand-based start-up company that develops advanced battery technology for use in electric vehicles and other applications. The company was founded in 2016 and has quickly established itself as a leader in the development of high-performance, low-cost battery solutions.

ArcActive was founded by a team of researchers and engineers from the University of Canterbury in Christchurch, New Zealand. The team had been working on developing a new type of battery technology that uses a thin-film lithium metal anode to improve battery performance and reduce costs.

Funding was received from PVL and a range of sources, including government grants, venture capital firms, and private investors. In 2017, the company secured NZD \$3 million in seed funding from New Zealand venture capital firm Movac, enabling it to continue its research and development and begin commercialising its technology.

ArcActive's battery technology has been recognised for its innovative design and potential to revolutionize the electric vehicle industry.

The company's major achievements include:

- In 2019, ArcActive announced a partnership with global electronics manufacturer Jabil to develop and commercialise its battery technology for use in electric vehicles and other applications.
- ArcActive's battery technology has won a number of awards, including the New Zealand Engineering Excellence Award in 2019 and the Energy Innovation Award at the 2020 Deloitte Top 200 Awards.

### **Syft Technologies**

Another New Zealand-based start-up that develops and manufactures real-time trace gas analysis solutions for use in a range of industries, including environmental monitoring, food and beverage, and medical research. The company was founded in 2002



and has since become a leader in the development of innovative trace gas analysis technologies that have the potential to improve accuracy and efficiency.

Syft Technologies was founded by Dr. Neil Spooner, who had previously worked at the University of Canterbury in New Zealand. Dr. Spooner saw an opportunity to apply his expertise in ion mobility spectrometry (IMS) to the development of innovative trace gas analysis solutions that could be used in a wide range of industries.

Syft Technologies has received funding from a range of sources, including government grants, venture capital firms including PVL, and private investors. In 2019, the company raised NZD \$7.5 million in a funding round led by Australian venture capital firm Main Sequence Ventures, enabling it to expand its operations and further develop its technology.

Syft Technologies' innovative trace gas analysis solutions have been recognized for their potential to significantly improve accuracy and efficiency in various industries.

**Ferronova**

Is a start-up based on science from Victoria University Wellington, University of SA and University of Sydney that develops and manufactures magnetic tracer materials for use in surgical procedures. The company was founded in 2016 and has since become a leader in the development of innovative technologies that help to improve the accuracy and precision of surgical procedures. Its impressive history is best captured in the table below.



## Lessons Learnt and Summary

1. As innovation speeds up achieving competitive advantage becomes more difficult, demanding increased investments in R&D and commercialisation of the solutions.
2. Solving real world problems requires quality research which in turn improves the commercial returns to business that engage with university research.
3. Collaboration between business and university research in joint ventures and research projects will not only produce the best research results and competitive advantage for business but will encourage the exchange of personnel at technical, c-suite and board levels of companies and universities.
4. Creating physical spaces located at universities and within businesses where people can collaborate and enjoy serendipitous connections will create new companies that will be very important in driving Australia's future prosperity.
5. It is a fallacy to think entrepreneurs can be created by a short course or participation in an accelerator program. If the heuristic made famous by Malcolm Gladwell is right each important role in any start-up will need to have spent 10,000 hours or more in honing their skills for that role, be it as inventor, CEO, CTO or CFO. Facilitating the matching game to create founders requires universities and business to bring these people and opportunities together.
6. Research commercialisation requires great research, a motivated diverse team, adequate funding, and effective governance.
7. Management of conflicts of interest is essential to create substantial returns on the investment in research commercialisation. Measuring real progress and ultimate impact of a company requires independence of thought and freedom from confirmation bias. Making the decision to quit is hard. Investors selling to other investors to join them at a higher share price contains a moral hazard when those initial investors book an uplift in their valuation. When board members continue to be paid board fees when the company may still be solvent but should be wound up because it is never going to be successful.
8. Skin in the game is vital for success and this may be more than just money invested it can include sweat equity, reputation and sunk costs of earlier research. Independence is important but often overrated as independent directors have never outperformed commercially invested boards.

This submission is based on my personal journey with business and universities starting when I joined the Review Panel on the Department of Computing and Information Systems at the University of Melbourne in 2014. I firmly hold the view that improved collaboration between businesses and universities can deliver significant benefits in terms of innovation and capability, which will lead to increased global competitiveness for businesses and higher standards of research for universities. There are good examples of business and research collaboration and effective collaboration that has led to exchange of skills between business and universities, this can be built upon. But for research to deliver value to Australia it must be commercialised and if that commercialisation is done in Australia the benefits will be very much greater.

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