PreSeed Accelerator Fund Outcomes

10 Year Review

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Executive Summary

THIS REPORT SUMMARISES DATA COLLECTED FROM FIFTEEN NEW ZEALAND RESEARCH ORGANISATIONS THAT IN TOTAL INVEST THE MAJORITY OF THE GOVERNMENT'S PRE-SEED ACCELERATOR FUND (PSAF).

These relatively small tax-payer funded investments are aimed at increasing application of New Zealand's much larger scientific research base to create economic benefit for New Zealand. PSAF has been used to leverage investment in developing new technology ideas to the point where they can be licensed to existing businesses or investment can be attracted to create new start-up ventures.

This is the first time data has been collated over multiple research organisations for the period since 2003, when government PSAF support was first made available.

The fifteen organisations in this report invested a total of $42.6 million of PSAF over the ten year period from 2003 to 2013. This was matched with a further $90.9 million of co-funding from research organisations and external investors. This adds up to a total of $133.5 million invested into 573 PreSeed[1] projects over the period.

These projects have so far resulted in excess of 386 commercial deals and have returned $188.2 million of actual revenue back to the research organisations, over four times the government PSAF contribution. PreSeed projects have generated over 460 jobs, some temporary and some permanent, and have estimated potential to generate export revenues of up to $3.0 billion.

The report aims to improve understanding of the overall performance of government PSAF investment. However, there are limitations to the data that has been collected and analysed for this report, and its further aim is to inform the development of improved data collection and recording.

[1] PreSeed projects refers to total investment made up of a combination of government PSAF support and co-funding from other sources.

Contents

Introduction

THIS REPORT HAS BEEN PREPARED BY AN INDEPENDENT CONSULTANT FOLLOWING A MINISTRY OF BUSINESS INNOVATION AND EMPLOYMENT (MBIE) REQUEST FOR DATA AS PART OF THE MOST RECENT REQUEST FOR PROPOSALS FOR PSAF.

MBIE's intent is to better measure and report on publicly-supported PreSeed investment activity in order to inform government policy and related decisions, and to assist researchers and those commercialising research.

MBIE and KiwiNet obtained data from 15 organisations[2]: AgResearch, Auckland UniServices, Auckland University of Technology (AUT), Cawthron Institute, Environmental Science and Research (ESR), Industrial Research (now part of Callaghan Innovation), Landcare Research, Lincoln University, National Institute of Water and Atmospheric Research (NIWA), Otago Innovation, Plant and Food Research, Scion, University of Canterbury, Viclink and WaikatoLink. KiwiNet commissioned the consultant and worked with MBIE to facilitate access to the data for the analysis and case studies. The report makes no distinction between data from any of the organisations involved other than identifying the distribution of total PreSeed activity across the contributing organisations.

This is the first time that an attempt has been made to bring together a substantial amount of PreSeed data normally held within individual organisations. There has, to date, been no systematic and consistent approach to gathering and recording such data across research organisations, and the data in this report should be seen as a starting point for further analysis. The author makes no guarantees as to the accuracy of the data which individual organisations have provided, although efforts have been made to ensure its completeness and internal consistency. Further, the inherent difficulty of separating out the impact of public PreSeed support from other factors that influence successful commercialisation and delivery of economic benefit makes interpretation of the data challenging. The report focuses mainly on presenting the data as provided and avoids extensive interpretation beyond identifying possible factors influencing the results.

Confidentiality

The data underpinning this report includes commercially sensitive information that if released publicly could affect the ability of research organisations and private sector investors to enter into technology transfer arrangements on commercial terms. In order to protect confidentiality, at the completion of this report the complete data set will be held only by the National Manager Commercialisation at MBIE. This will allow any subsequent issues raised by the analysis to be addressed, and to allow continuity with future data collection and reporting. KiwiNet will retain only its own data. Other data processed with the assistance of KiwiNet staff will not be retained by KiwiNet. The author will not retain any of the data.

Acknowledgements

The author acknowledges the time put in by research and technology transfer offices in making this data available, the support of Bram Smith, Antony Parnell and Sam Felton of KiwiNet for compiling the data and case studies, and Kjesten Wiig (MBIE) and Adam Jaffe (economist) for feedback on a draft of the report.

[2] KiwiNet allocates devolved PreSeed funds on behalf of 12 research organisations that provided data.

PreSeed History and Context

THE GOVERNMENT ESTABLISHED PSAF IN 2003. ITS PRINCIPAL GOAL IS TO ASSIST IN THE TRANSLATION OF EMERGING SCIENCE IDEAS IN UNIVERSITIES, CROWN RESEARCH INSTITUTES AND OTHER PUBLICLY-FUNDED RESEARCH ORGANISATIONS INTO COMMERCIAL VALUE OF BENEFIT TO NEW ZEALAND.

Evolution

The establishment of PSAF recognised that the risks involved in the development and commercialisation of very early-stage ideas from scientific research are often too high for businesses to justify fully funding the necessary development. This is because of the uncertainty of outcomes and the difficulty in fully capturing the benefits for businesses themselves. PSAF allows new ideas to be developed and proven (de-risked) to a stage where businesses and investors are more likely to be able to assess the potential for commercial opportunities.

There is an expectation that the successful projects will ultimately be picked up and carried forward in the private sector. For this reason, the rules for government support require "skin in the game" from the public research organisations generating the ideas and/or businesses with an interest in future earnings potential. Requiring skin in the game provides an incentive to identify the best ideas to fund and the most efficient and effective pathway to commercial outcomes.

Government PSAF requires at least a 50% co-funding contribution. At its inception, the government expected a significant co-funding contribution from private sector partners. However, this was found to be unduly difficult to fully achieve and this requirement has since been relaxed, although it is still strongly encouraged. Alongside this, greater flexibility has been given to research organisations in applying their own funds to support projects.

Government funding support through PSAF is now part of a larger appropriation and is subject to prioritisation within that, as directed and prioritised by the relevant Minister from time to time. The allocation is currently $5.3 million per annum.

Devolved decision making

The majority of PSAF is devolved to research organisations for allocation. In turn, these organisations satisfy the government funding body that adequate governance and investment processes are in place. Devolution has ensured that decisions are made where the maximum information advantage lies, and has helped keep transaction costs low and decision making fast, an important component of success. A number of KiwiNet partners now pool their PSAF through KiwiNet's Investment Committee in order to build scale and share costs, although accountability for project delivery remains with the investee, the relevant research organisation. MBIE directly allocates a minority of "non-devolved" PSAF funds competitively so that research organisations without devolved contracts have an opportunity to put forward potential projects.

Changing environment

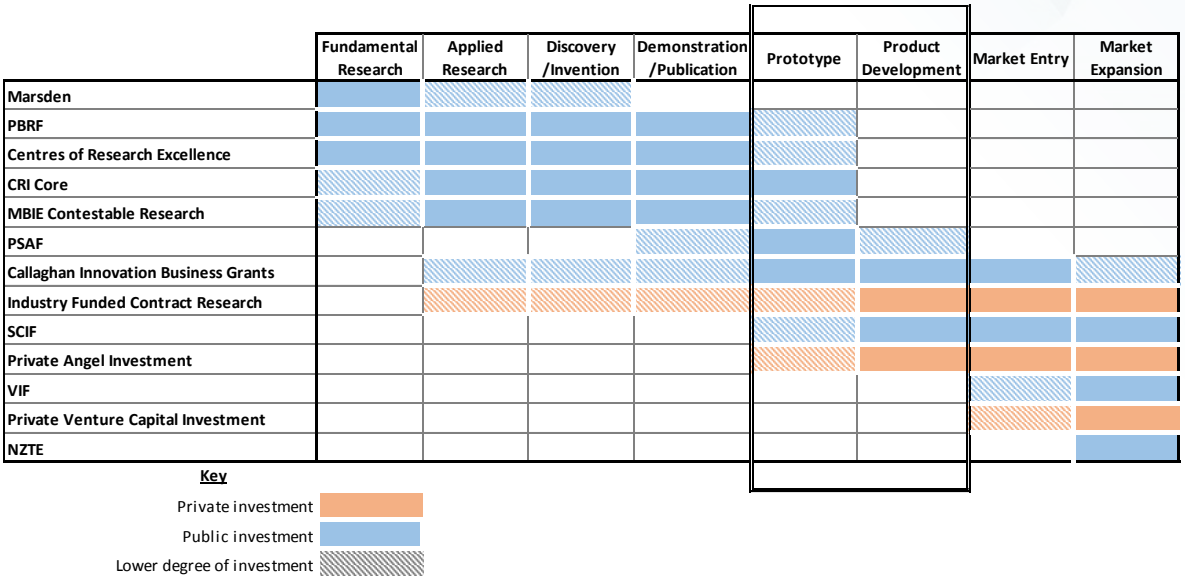
The environment in which PSAF investments are made has become more sophisticated. PSAF is now part of a spectrum of support that includes both founder-focused and technology-focused incubators, seed and venture capital funding, revamped science funding with a stronger focus on market demand

drivers, and a range of business research and development grant schemes. The angel and early-stage investment environment is also considerably stronger.

Most recently, the Government established Callaghan Innovation, a new Crown agent charged with facilitating and accelerating growth in private-sector led innovation and commercialisation.

The chart below shows the different funding streams (vertical axis) available to support the various stages along the innovation value chain (horizontal axis). The highlighted cells indicate the area of most interest for the PreSeed data in the area between Demonstration and Market Entry.

Figure 1: Government and private sector support for commercialisation of research



Source: KiwiNet

Commercialisation Partner Network (CPN)

The Commercialisation Partner Network (also previously known as the National Network of Commercialisation Centres) was established by the government in 2012 to build greater national cohesion and stronger capability in commercialisation of publicly-funded research. The CPN provides a range of services to research organisations and their technology transfer offices including: investment committee guidance; PreSeed allocation decision processes; training; and networking initiatives that increase information sharing and exchange. Current CPN partners are Auckland UniServices (Return on Science), KiwiNet, and CDC Innovation[3]. Each of the CPN partners provides specific, although complementary, services.

The allocation and application of PSAF funds is now closely tied to CPN. The most recent Request for Proposals for devolved PSAF required that expenditure beyond a certain level is to be approved by a CPN investment committee. Committees currently approved by MBIE are the KiwiNet Investment Committee and four specialist investment committees provided by Return on Science. Contract holders are able to select any one of the committees to obtain feedback or approval for funding.

[3] Previously known as Canterbury Regional Innovation System (CRIS).

PreSeed Investment

FIFTEEN ORGANISATIONS PROVIDED DATA COVERING ALL OR PART OF THE PERIOD FROM THE YEAR ENDING JUNE 2004 TO THE YEAR ENDING JUNE 2013.

Data collection and quality

The majority of the data analysed for this report was collected via a standard template as attached at Appendix 1.

Table 1: Definitions

Government PreSeed Accelerator Fund (PSAF)	Tax-payer funds contributed to PreSeed projects
PreSeed project	A project that meets the ministerial criteria for PSAF support
Co-funding from Research organisations	Research Organisations' own funds or reprioritisation of other government research funds contributed to PreSeed projects
Co-funding from external investors	Funds contributed by external investors to PreSeed projects
PreSeed project investment	Total of PSAF, research organisations' and external investors' funding contributions to a PreSeed project
Commercial deal	Deals that have resulted from the PreSeed project to date. This could include contract research, licence, spin-out or sale resulting from a PreSeed project. (It does not include a Non-Disclosure Agreements, Materials Transfer Agreement, or Memorandum of Understanding, etc.)
Revenue	Cash received by research organisations
Investment from external sources	Cash or capital from external sources arising as a consequence of subsequent development of a PreSeed projects

Some of the definitions in the template have been interpreted differently by organisations and in some cases qualitative data rather than quantitative data was supplied. This has required a level of judgement in interpretation. The ability to reconstruct history accurately is limited given the length of period covered, the many changes in systems and processes over that time, and the cost of finding and searching old records. Consistency and completeness of data is most apparent for research organisations with a history of managing data collectively such as through KiwiNet. It would be useful to standardise the approach to data collection and dissemination more widely in future.

Data has been provided or compiled in three forms: (i) individual PreSeed project data, (ii) annual data by starting year of project[4] and (iii) data aggregated across all years. Some organisations were only able to provide partial data so that it has not been possible to fully reconcile between the data types for all variables. The source of data is identified below each chart.

Indicative historical trend lines to visually highlight any general changes are not based on formal statistical analysis or intended to imply a particular relationship exists for the data in the past or future. There may be some impact on the historical trends from increased data coverage over the period.

[4] Some annual data is available by year of revenue received rather than year of project start. This has the effect of smoothing out some of the volatility in the data but does not materially affect the analysis.

However, most of the largest investors have provided data for the full period and the total PSAF pool has decreased rather than increased over the period.

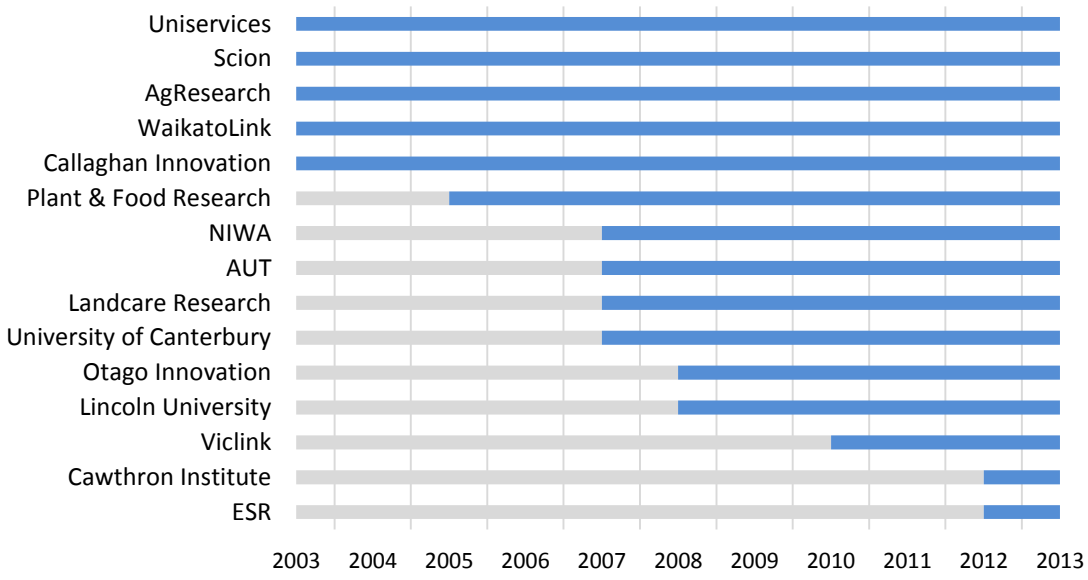
Treatment of GST

There have been changes to both the treatment of GST by government and the rates of GST over the ten-year period of this data set. The majority of PreSeed data is reported exclusive of GST. However, some of the data provided includes GST, and in some cases it was not possible to be certain either way, especially for data from earlier in the period. Where PreSeed data was verified as including GST, this has been removed at a rate of 12.5% as a proxy for the average over the period. Inconsistencies arising from varying treatment of GST in the data are not expected to have a material impact on the analysis.

Data Coverage

The contributing organisations are identified in Figure 2 and represent the majority of government-supported PreSeed investment. Five organisations provided data for the full period. The shorter periods of data coverage for some organisations reflect their more recent involvement in PreSeed, and/or the extent of data availability.

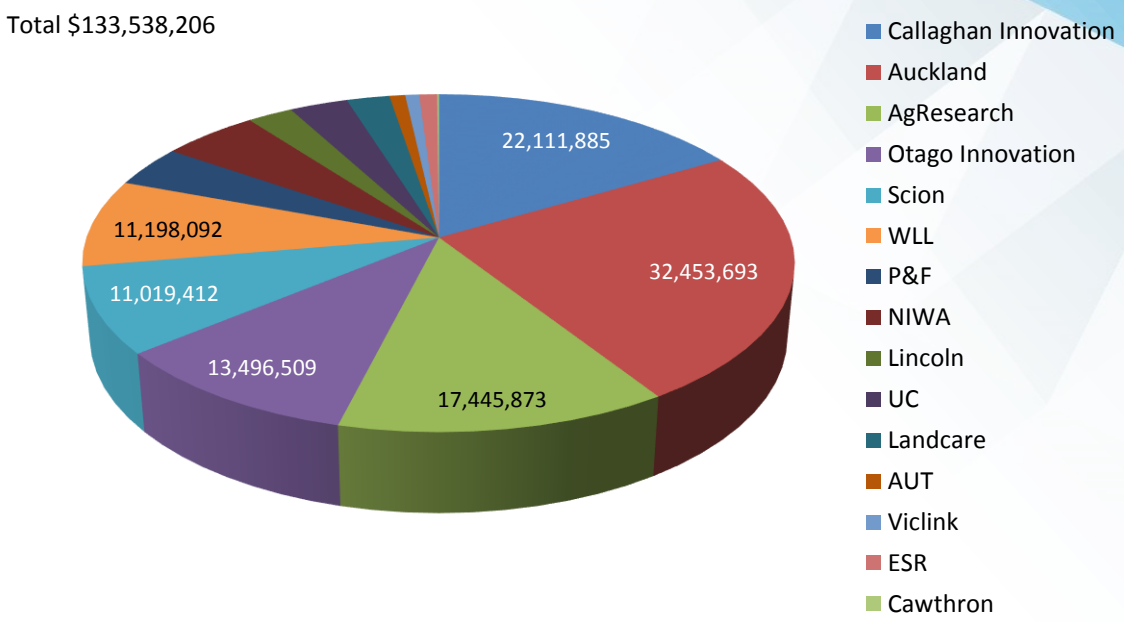
Figure 2: Data coverage



Source: PreSeed project and aggregate data

The fifteen research organisations invested a total of $42.6 million of PSAF, supporting 573 PreSeed projects with a total investment of $133.5 million. Figure 3 shows the total PreSeed project investment across all participating organisations aggregated across the full period. PSAF has been leveraged by most of the research community in New Zealand and no organisation dominates the investment.

Figure 3: PreSeed project investment 10-year aggregate



Source: PreSeed project data

The split is close to even between Crown Research Institutes and universities. Six research organisations account for around 80% of the total project investment, each with total PreSeed project investments of >$10 million.

Sources of funding for PreSeed projects

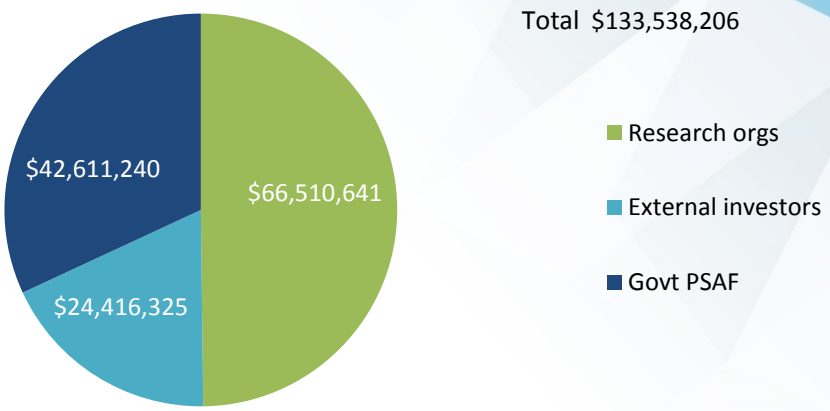
PreSeed projects are funded from five possible sources:

- The government's PSAF pool
- Contributions from research organisations' own non-government-derived funds
- Re-prioritisation of the research organisation's other government research funds as permitted
- Funds from other public or not-for-profit organisations e.g. regional councils, trusts or other government departments
- Private sector funds

Re-prioritisation of research organisations' other government research funds is reported as a small proportion in the data consistent with the PSAF rules that limit it, is highly variable and/or is not always identified separately. Therefore, this has been combined with research organisations' own funds for the analysis in this report. Funds from other public or not-for-profit organisations make up a small proportion of external co-funding; the majority is from the private sector.

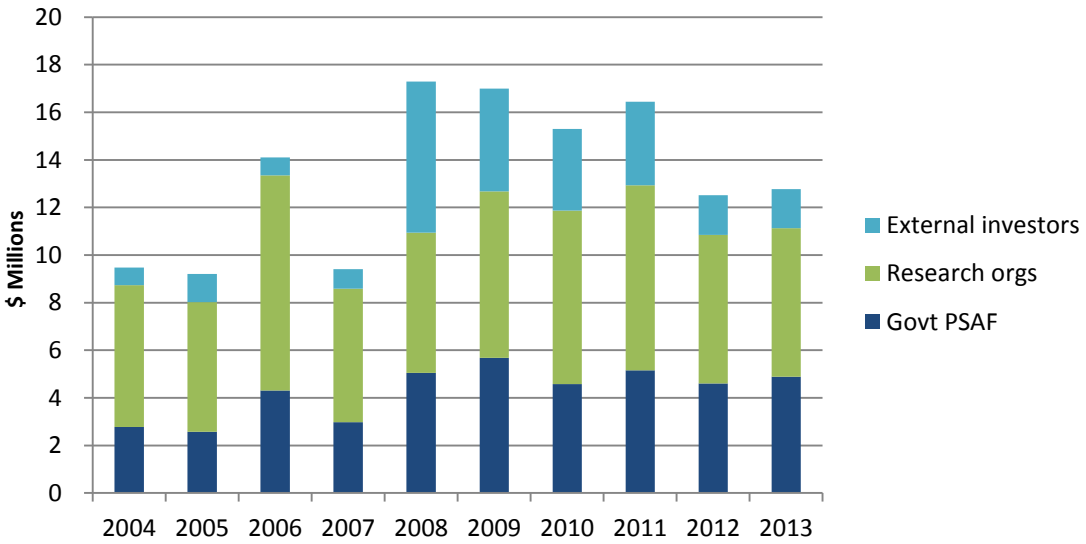
Figure 4 shows the relative contribution of the PreSeed investment sources aggregated across all organisations for all years. The government directly contributed about one third of investment and external investors, mostly private, about 20%. There is variability in relative contributions across years as shown in Figure 5, consistent with variation in project timing, length and success rate.

Figure 4: Funding of PreSeed project investment



Source: PreSeed aggregate data

Figure 5: Funding of PreSeed project investment



Source: PreSeed annual data

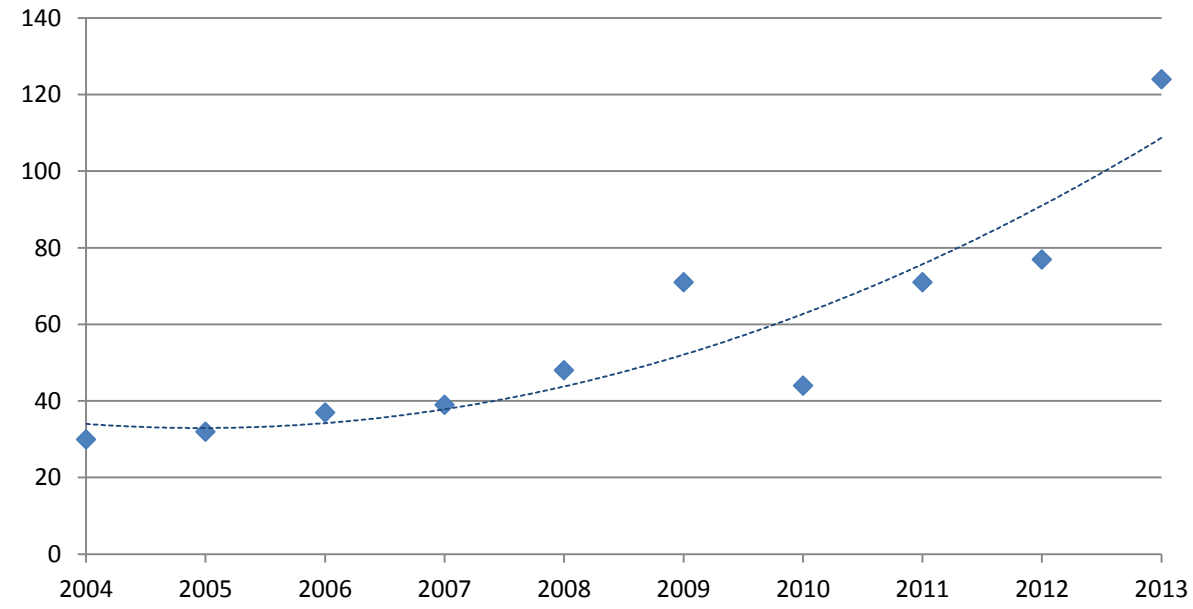
PreSeed project investment

Figure 6 shows a steady rise in the number of new projects started each year, and an increase in volatility in the latter half of the period.

The overall rise in the number of new projects is larger than can be explained just by new organisations entering the data set, especially given that total PreSeed project investment declined since about 2008 (see below). This suggests that there has been either increasing use of smaller projects or a higher abandonment rate, or both. Both would be consistent with the growth in experience, capability and sophistication of investing research organisations. A reported example of this is the use of rigorous stage gating, resulting in one activity being described in two or more projects as they progress through the various stages. The general volatility in new projects started is consistent with the general variability in, and serendipitous nature of, new project opportunities.

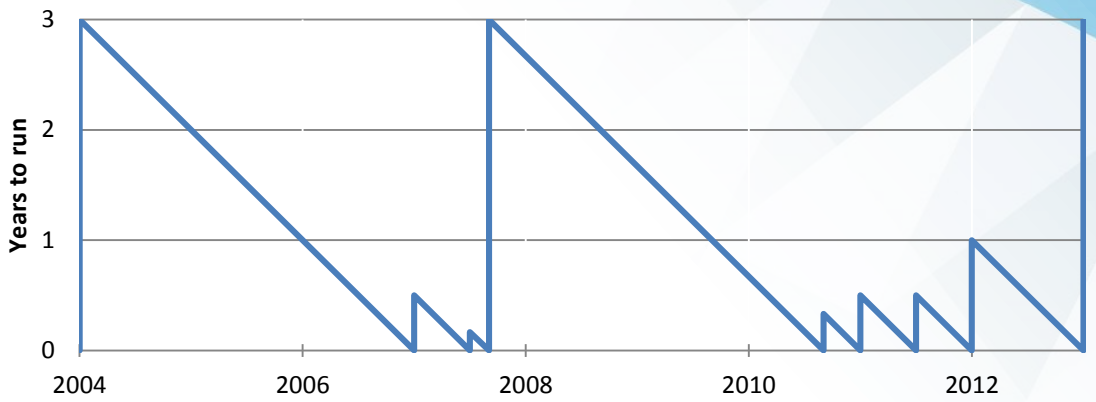
Volatility may also have been influenced by the government PSAF funding horizon or "runway" in any year – defined here as the length of time the current devolved contract has to run in any year. This is plotted in Figure 7. The smaller peaks reflect short term contract rollovers. For example PSAF contracts awarded in 2007 were rolled over four times before a new investment round was put together. Greater uncertainty about future funding availability towards the end of each contract period may have constrained the number of new projects started.

Figure 6: New PreSeed projects



Source: PreSeed annual data

Figure 7: Devolved contract years to run (runway) by year

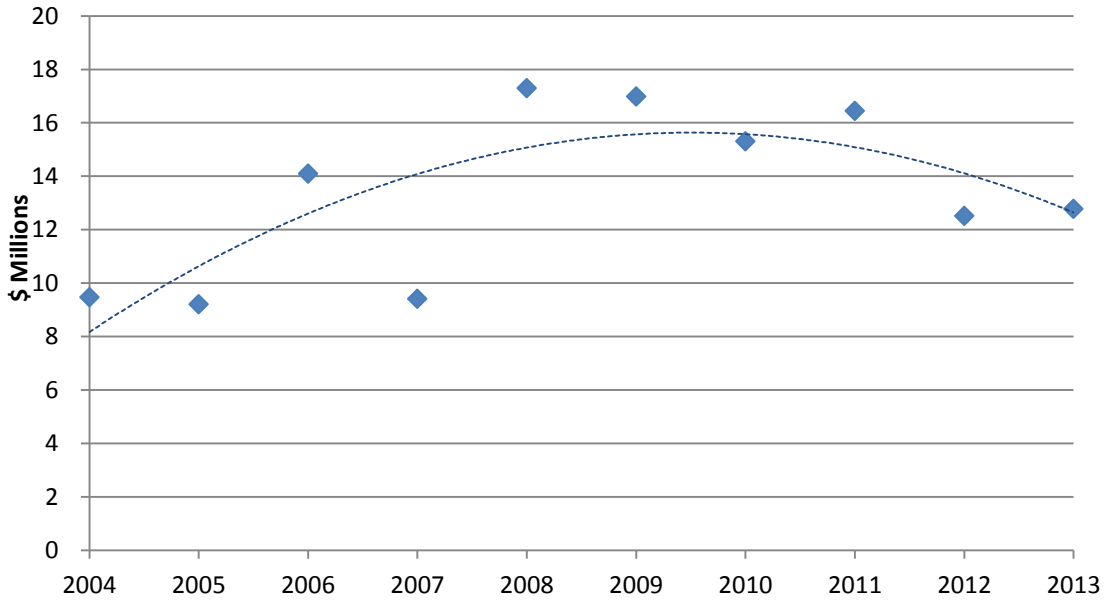


Source: KiwiNet and predecessors devolved contract data

Comparing Figures 6 and 7, it is apparent that the rise in the number of new projects in 2008 coincides with the start of new three-year devolved contracts. Pipelines then fluctuated about this level, during a period of short term contract extensions.

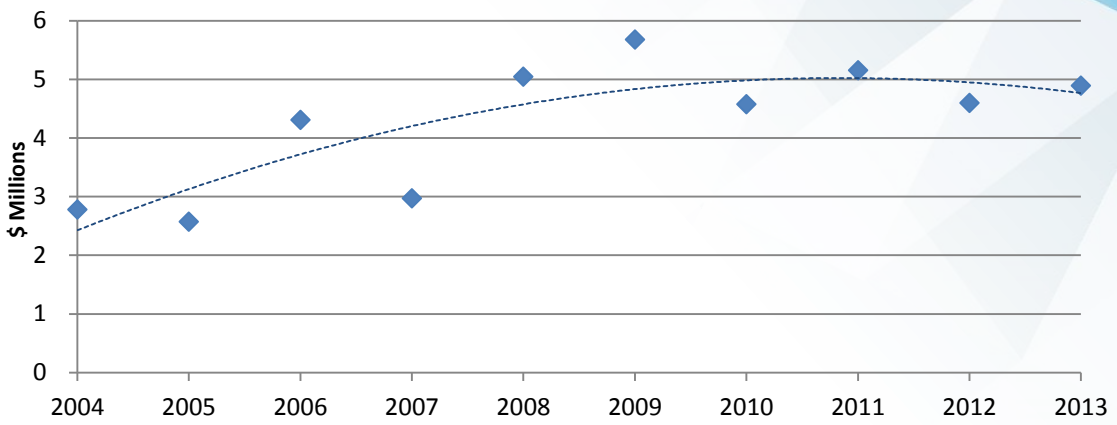
Figures 8 to 10 show the historical trend in total PreSeed project investment and two of the components: PSAF and the co-funding from research organisations. These charts indicate that after a period of steady growth, growth flattened or declined since about 2009. This would be consistent with the reduction in PSAF funds and government research funds following the global financial crisis. Anecdotally, uncertainty in devolved contract extensions and CPN contracting may also have contributed to this flattening by reducing focus on the pipeline of potential opportunities, although the number of new projects started did not decline (see Figure 6 above).

Figure 8: Total PreSeed project investment



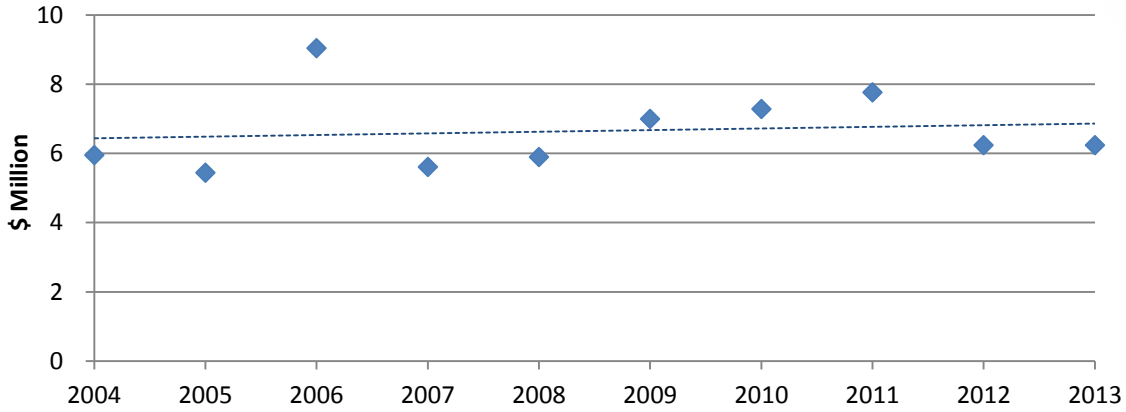
Source: PreSeed annual data

Figure 9: Government PSAF contribution to investment



Source: PreSeed annual data

Figure 10: Research organisations' contribution to investment



Source: PreSeed annual data

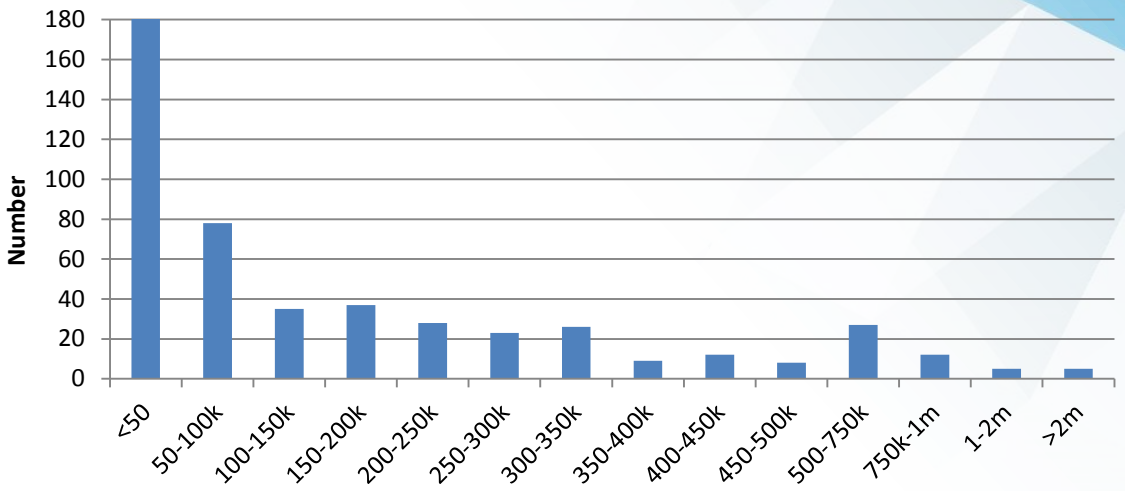
Co-funding from external investors similarly declined in the past few years. This would be consistent with the impact of the global financial crisis on business confidence.

Project size distribution

Figure 11 shows the number of PreSeed projects categorised by their total investment for the 514 projects separately identified in the project data. Note that the size categories have been partially aggregated above $500,000.

The majority of the projects are relatively small with about a third of them less than $50,000 in size. There is a small number of much larger projects. This is consistent with the growing sophistication of PreSeed investment as indicated above and may also have been influenced by the short-term contact rollovers.

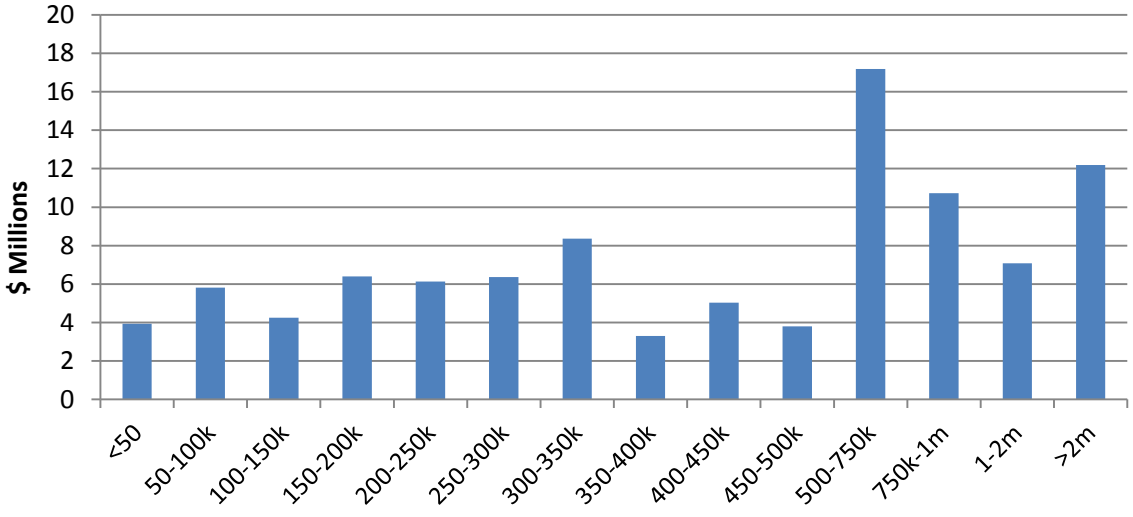
Figure 11: Number of PreSeed projects by category



Source: PreSeed project data

Figure 12 shows the total PreSeed project investment for all projects in each of the same categories. About half the PreSeed spend was on projects greater than $500,000 which means also that about half of government PSAF is supporting PreSeed projects of $500,000 or more. This distribution is consistent with the higher turnover and abandonment rate expected for smaller projects that may be used to investigate and test opportunities for their potential prior to more major scrutiny and funding commitment.

Figure 12: PreSeed project investment by category



Source: PreSeed project data

Economic Impact

THIS SECTION EXPLORES THE ECONOMIC IMPACT DATA PROVIDED BY RESEARCH ORGANISATIONS IN THE DATASET.

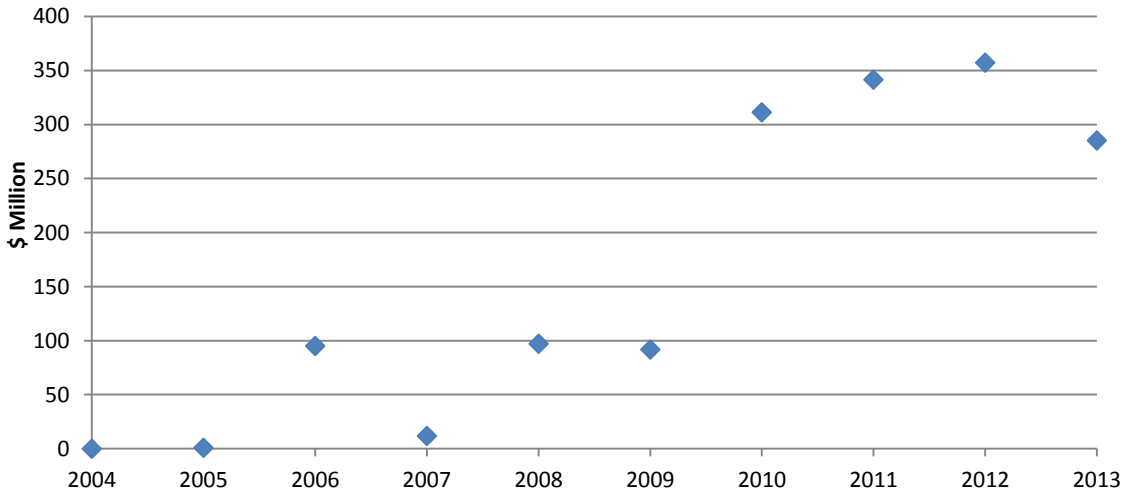
Potential export returns and jobs to New Zealand

The main outcome from government PreSeed support is expected to be more high-value goods and services export earnings and jobs in the private sector. In aggregate, research organisations reported 386 commercial deals from PreSeed projects.

PreSeed investments are reported to have so far generated over 460 jobs, some temporary, some permanent and many in the private sector, and have estimated potential to add up to $3.0 billion to New Zealand's export revenue.

Figure 13 shows the increase in currently estimated potential export earnings, with a prominent discontinuity between the first half and second half of the period. This would be consistent with increasing capability and experience in achieving successful commercial outcomes. Note that the vertical axis is the value of projects starting in a given year, so that more recent PreSeed investments are estimated to have higher potential export revenue than earlier investments.

Figure 13: Potential export revenue over five years



Source: PreSeed annual data

As apparent from considering actual examples such as the case studies accompanying this analysis, ten years is not long enough for many new ideas to be fully applied and earning the export revenue anticipated. Therefore, there is no baseline against which to compare the estimated potential export revenue data.

This is also the first time that such estimates have been collected systematically and research organisations have made best efforts, in consultation with their commercial partners, to realistically estimate the potential export revenue returns from their PreSeed investments. However, this is still likely to overestimate returns in aggregate given that a portfolio of investments is expected to have a

range of successful and less successful outcomes. So the aggregate figure should be treated with caution.

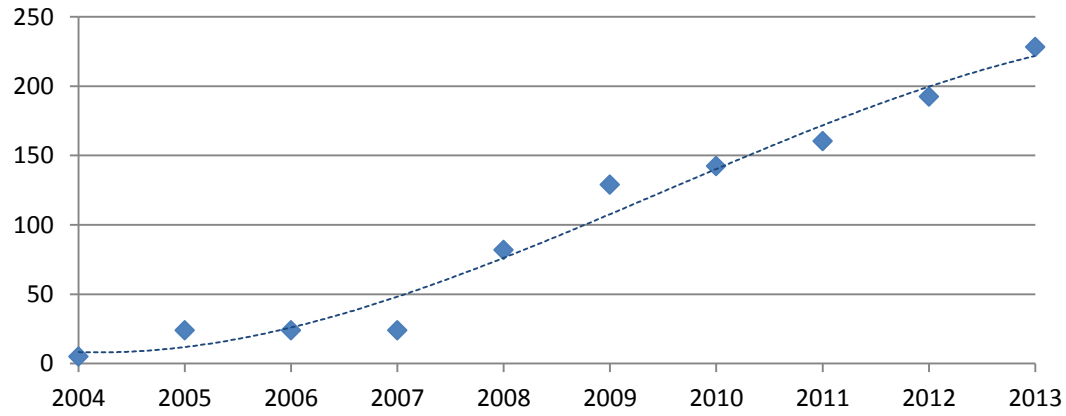
It should also be noted that:

- These estimates do not allow for additionality i.e. do not account for what might have happened anyway in the absence of the PreSeed investment; and
- The potential revenue estimates are gross of costs such as marketing, distribution infrastructure and other inputs, so are not indicative of net return.

One possible avenue for further work to test the potential export revenue estimates would be to construct a scenario based on the actual historical proportion of revenue back to research organisations from licensing arrangements, and projecting this into the future using suitable assumptions about the level and proportion of future licensing revenue and the level of private sector revenue that would be needed to generate it. Even conservative assumptions would imply several billion dollars of private sector export revenue over five years.

Figure 14 plots the cumulative number of jobs generated. A total of 463 jobs are reported in the aggregate data (around half that number is captured in the annual data).

Figure 14: Cumulative jobs generated



Source: PreSeed annual data

The data on jobs largely captures positions that are part of or closely related to successful PreSeed projects, reflecting the early stages of technology transfer and new private sector activity arising from PreSeed projects. Some of the positions identified are temporary and/or within the research organisations. A significant number, though, are within new or existing businesses and commercial arrangements, and likely to be ongoing subject to business success. The number of private-sector jobs actually generated in future is likely to be under-estimated for new businesses, where ownership and activities are increasingly embedded in the private sector and attribution to previous PreSeed projects becomes more difficult. Consistency with the estimates of potential export revenue suggests that an order of magnitude higher number of jobs would be generated compared to what has been already reported.

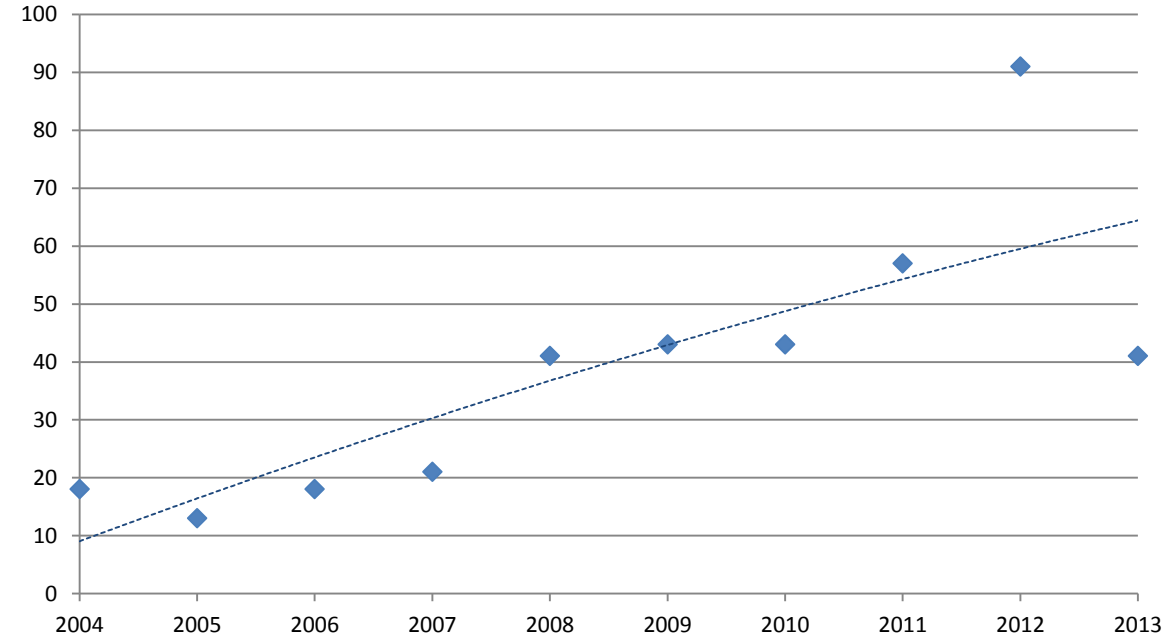
Actual and potential revenue to research organisations

The main outcome from government PreSeed support is expected to be more high-value jobs and export earnings in the private sector. However, data on actual revenue to research organisations as a consequence of commercial deals provides a partial indicator of PreSeed success by providing a proxy for value created through licenses and other commercial arrangements. This helps validate the benefits to New Zealand.

In aggregate, research organisations reported actual revenue of $188.2million returned as a consequence of commercial deals. This revenue includes licensing income and additional external investment such as research contracts following completion of PreSeed projects, and is greater than the $133.5 million of total PreSeed project investment. It is over four times the government PSAF support of $42.6 million.

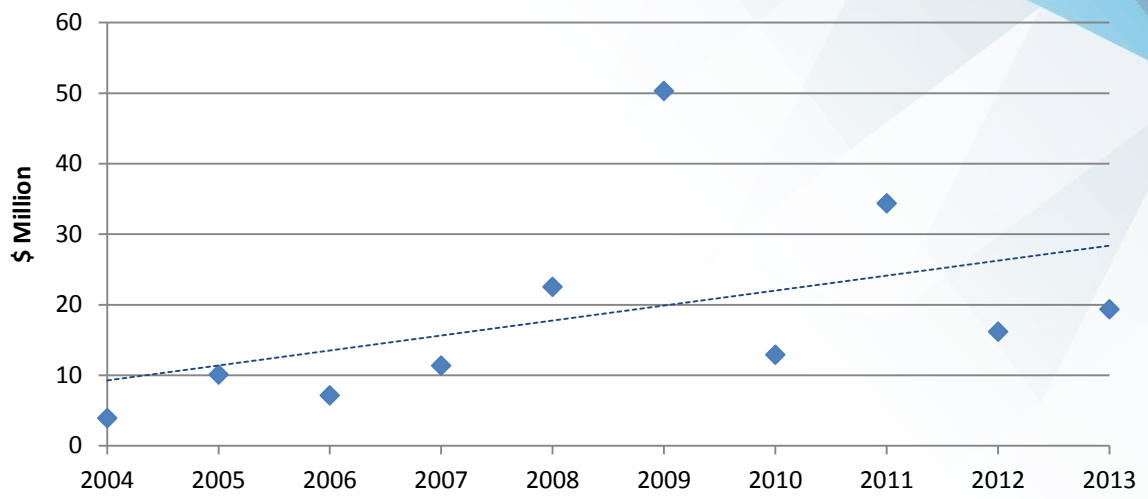
Available annual data is plotted in Figures 15 and 16. Both show a rising trend as well as an increase in volatility over the past five years. The higher returns from more recent PreSeed investments may reflect growing maturity and capability in commercialising research while the increase in volatility may reflect a broadening of the spectrum of risk and return within the portfolio of PreSeed investments and any rare, large transactions such as a major equity exit.

Figure 15: Number of commercial deals completed



Source: PreSeed annual data

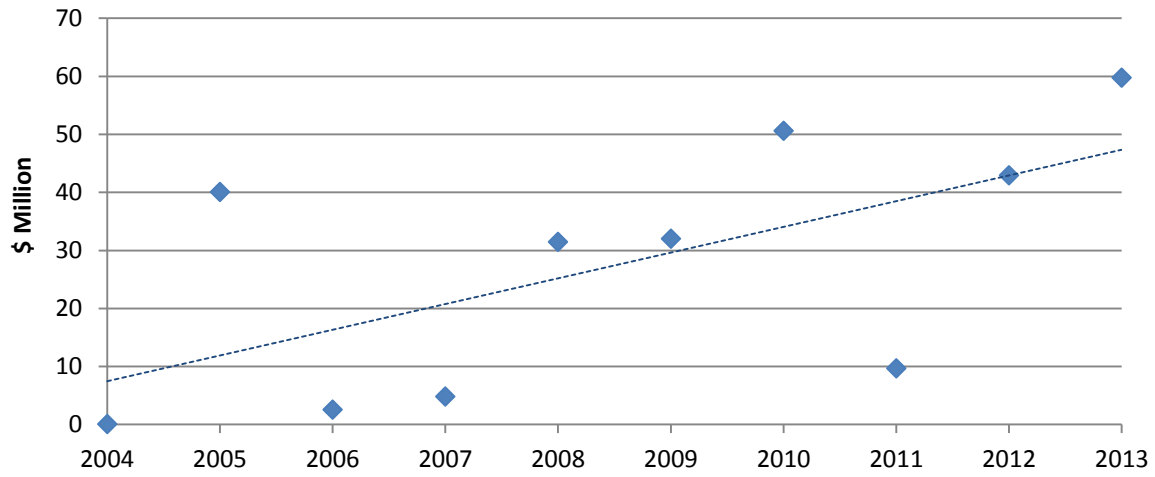
Figure 16: Actual revenue to research organisations



Source: PreSeed annual data

In addition to revenue back to research organisations, around $100 million of external investment was made into new ventures and commercial arrangements.

Figure 17: Potential revenue to research organisations



Source: PreSeed annual data

Research organisations have also estimated potential returns back to them totalling $923.7million over five years of sales. In the case of projects not yet completed this is based on estimated potential revenue in the five years following successful completion. In the case of completed projects it is the next five years. Available annual data is plotted in Figure 17.

(Note that the annual data does not include a relatively small number of significant projects with large potential returns that are captured in the aggregate data.)

The variability shown in Figure 17 reflects the one-off and sporadic nature of successful PreSeed projects. The general upward trend suggests that, on average, more recent projects are expected to return more revenue back to research organisations than earlier projects. This would be consistent with an overall increase in capability over time as research organisations have gained experience.

The estimated potential revenue back to research organisations of almost $1 billion represents a step change compared to actual revenue back to research organisations to date of $188.2 million. In line with the previous comments on export revenue estimates, this is likely to be an over estimate given the likely range of outcomes within the portfolio of investments. Also, anecdotally, research organisations are more likely to underestimate than overestimate the time taken to reach first sale.

Note that this potential revenue estimate does not account for the research organisations' costs of investment so is therefore not indicative of the net return to research organisations.

Conclusions and Recommendations

1

This analysis provides preliminary evidence that government PSAF:

- is meeting its intent to encourage increased economic activity from scientific research
- has successfully attracted matched co-funding, including a significant level of follow-on investment from the private sector
- is being effectively tailored to support a range of projects and project sizes with projects abandoned early if necessary
- has resulted in many licenses, successful start-ups and other commercial deals and outcomes that are starting to generate benefit to New Zealand
- has generated jobs, some adding to research commercialisation capability and many in high-tech within businesses
- has returned significant levels of revenue to research organisations to help offset their costs and increase their ability to invest in further research or commercialisation projects
- leveraged a substantial and growing potential export revenue base in the private sector
- has increased commercialisation capability in, and total engagement between, publicly-funded research organisations and third parties.

2

There appears to have been a flattening of PreSeed project investment in recent years, consistent with a reduction in the level of government PSAF. It may also have been influenced by a lower appetite for business investment following the global financial crisis. Frequent short-term rollovers of devolved PSAF contracts, rather than long-term commitments, have contributed to this.

3

However, despite this flattening, the actual and potential returns from PreSeed investment, along with commercial deals, have continued to rise over time, consistent with growing maturity and capability in leveraging commercial outcomes from scientific research.

4

Data on the economic impact to New Zealand is partly subjective and many projects could still fail to realise their potential, however the case studies illustrate that the projected benefits are not unrealistic.

5

It takes time to build substantial private sector returns, at least 10+ years. An effort should be made to track impact in the private sector over the next ten years. Subject to resources, there is an opportunity to improve data and understanding of job creation and export revenue generated by studying each deal more closely.

6

There is scope to examine the project data in more detail to obtain further insights, for example:

- Analysis of the breakdown between current, successful and abandoned PreSeed projects; how this has changed over time; and its distribution by project size
- Analysis of the different forms of actual revenue to research organisations from PreSeed projects to better inform the future impact of PreSeed investment on private sector revenue.

7

This would be aided by requiring all organisations to collect and provide consistent data at individual project level.

8

A priority is to systematise and improve the collection and publication of PreSeed investment data, building on this start, possibly along the lines of the approach adopted by Association of University Technology Managers (AUTM) http://www.autm.net/Home.htm

9

It would be useful to involve Statistics NZ in this work to leverage their skills and experience in data quality and collection, and exploit synergies with other official data and statistics.

10

It would also be useful to look at the connection between successful PreSeed projects and available data on follow-on support in capital markets through the likes of angel investment and Venture Investment Fund.

Case Studies

THE FOLLOWING CASE STUDIES PROVIDE EXAMPLES OF HOW GOVERNMENT PRESEED ACCELERATOR FUNDING (PSAF) HAS BEEN APPLIED TO REALISING NEW OPPORTUNITIES FROM RESEARCH.

Given the uncertainties and inherent difficulties in collecting and interpreting the quantitative data, the case studies provide an important source of supporting evidence.

The case studies are necessarily overviews, given the commercial sensitivity of some of the information. They are not intended to be representative of all the organisations that provided data for this report; rather they have been selected on availability of suitable data and information about the successful application of PSAF and their demonstration of:

- Successful research commercialisation where discoveries originating from publicly-funded research have been transformed into new business opportunities
- Whereabouts in the process PSAF and its matched co-funding are used to enable development of a new idea or course of action not otherwise available through existing research programs
- The types of activities PSAF has been used for
- The variety of channels through which New Zealand benefit is realised from PASF. Examples include products that are distributed to many enterprises within an industry to drive increases in productivity, licensing to existing businesses to enable new commercial opportunities off an existing but more limited capability, formation of new business spin-puts to take new disruptive technologies to market, licensing of a world-best data set already used in New Zealand for international use
- Adding to New Zealand's research and commercialisation capabilities.

The case studies chosen are not exhaustive – there are many more examples within the dataset that could be compiled.

Data and supporting information for the case studies has come from:

- Data collected for this report
- Additional information from the relevant research organisations
- Publicly available information on the Internet and in publication.

ADURO BIOPOLYMERS

PRESEED CASE STUDY

A novel technology for creating plastics from meat industry by-products has resulted in a spin out, Aduro Biopolymers which has attracted significant private sector investment.

2003 – Dr Johan Verbeek begins researching methods of manufacturing bio-plastics from waste proteins.

2007 – Dr Verbeek approaches WaikatoLink with a novel method for manufacturing plastic from blood meal.

2008 - 2010 – PreSeed is used to de-risk the technology and accelerate research in key areas of the project.

Now – Aduro Polymers is building a pilot plant for manufacturing with private sector backing.

Publicly funded research background

Dr Johan Verbeek joined the University of Waikato in 2003 and began researching methods of manufacturing bio-plastics from proteins, combining his materials science expertise with his passion for environmental sustainability.

In 2007, Dr Verbeek discovered a novel method of manufacturing plastics from blood meal. Blood meal is a natural waste product from the meat processing industry that Johan's research showed could be processed to create a compostable bio-plastic.

Impact of PreSeed

WaikatoLink secured PreSeed investment from the Unicom Investment Committee in 2008 to develop prototypes, secure IP and develop a business model for the technology. PreSeed supported recruitment of a commercial manager to lead the project and begin industry engagement, and students to develop a core formulation from which resin granules, the basis for product manufacturing, would be produced. The granules were turned into example products and shown to potential industry partners.

Wallace Corporation was impressed by the prototype products and agreed to significant investment, and the creation of Aduro Biopolymers. Aduro is now trialling products made from Novatein* resin with plans to establish resin production in New Zealand in 2015, with Australia and other territories following soon after.

Benefit to New Zealand

Aduro Biopolymers is a new company with significant growth potential and private sector ownership that is creating jobs as it establishes a pilot manufacturing plant. First generation products for export are being designed.

In addition, students employed on the project as a consequence of the PreSeed investment have gained valuable experience working on a real commercial project.

ARCACTIVE

PRESEED CASE STUDY

A novel technology for use in hybrid vehicle batteries that has used PreSeed investment to accelerate commercialisation. The result is a start-up company ArcActive, poised to reach global markets.

1979 – John Abrahamson's research results in the discovery of carbon nanotubes.

2000 – John Abrahamson develops a continuous production process for high quality, low cost carbon nanotubes.

2008 - 2010 – PreSeed is used to validate the market for the carbon nanotube technology – leading to a focus on improving lead acid batteries in hybrid vehicles. Additional PreSeed is then approved to commercialise the technology.

Now – a pilot plant is being established and high tech jobs are being created in New Zealand

Publicly funded research background

Associate Professor John Abrahamson had been conducting the research that led to his discovery of carbon nanotubes as part of publicly-funded research programs at the University of Canterbury since 1971. In 2000, John developed a continuous production process for manufacturing high quality, low cost carbon nanotubes. This was a dramatic improvement over existing batch production processes and opened up a variety of commercial applications.

Impact of PreSeed

In 2008 University of Canterbury secured $50k of PreSeed investment from the UniCom* investment committee to develop this early stage, high risk technology to an investor-ready proposition. Endeavour Capital matched the Government PreSeed investment.

PreSeed funding for market validation and IP protection allowed UC to explore commercial applications. Although supercapacitors were initially the target market, market validation uncovered a lucrative opportunity for the technology in the hybrid vehicle market. Once this new market opportunity was recognised, further PreSeed funding of $150k was approved for the project, again matched by Endeavour Capital to get the technology to an investor-ready stage.

At the completion of the PreSeed project, $3.5 million of private sector co-investment was invested into further development of the technology, firstly from powerHouse Ventures and then from Gallagher and Demi Holdings Ltd. This enabled the formation of a start-up company called ArcActive Ltd with private investors.

Benefit to New Zealand

ArcActive has created several high-tech jobs in New Zealand; the company now has 14 employees including 11 who are degree qualified.

Sales revenue back to New Zealand from the export of lead acid battery parts for the use in hybrid and electric cars is currently estimated to be in excess of $250 million in the first five years of sales. A pre-production plant for this technology is now being set up in New Zealand.

** UniCom was the consortium of PRO's that has now become KiwiNet. It originally consisted of WaikatoLink, AUT, Lincoln University and Canterbury University.*

CROPLOGIC

PRESEED CASE STUDY

A user-friendly rapid-response on-line crop management tool raising productivity in the potato growing industry with protected IP.

Before 2008 – A large body of accumulated knowledge in food and crop production spawns a sophisticated algorithm for optimising use of environmental, soil and water data in decision making.

2008 - 2009 – PreSeed enables the algorithm to be turned into a practical web-based decision support tool which is validated, and launched with support to existing NZ customers and new international customers.

2010 – Licence agreement is signed with new spin-out CropLogic Ltd.

Now – CropLogic is creating new jobs and has projected sales in 2014 of $3.8M.

$450K returned to research organisation for investment in new initiatives

Publicly-funded research background

The project has its origins in over 30 years of crop and food sector research at Plant & Food Research and its predecessors, in collaboration with international scientists and industry. This led to researchers developing an algorithm for optimised methods of generating high quality produce based on environmental, water and soil data.

The idea of CropLogic, a sophisticated decision support system based on this algorithm, came about following farmers' interest in a practical but effective method to help them schedule Irrigation and Nitrogen for optimal yield. Farmers sought more than scientific advice. They sought something they could use themselves, which delivered practical assistance and potential monetary benefits but didn't require loading of computer programs.

In early 2008, $338,000 of PreSeed funding ($169,000 of PSAF matched with research organisation funds) was allocated to a project to help bring this idea to commercial reality.

Impact of PreSeed

PreSeed investment enabled conversion of the know-how and algorithm into a web-based rapid-response decision support tool with a user-friendly interface meeting the needs of the potato industry.

PreSeed was also used to validate, launch and support the tool with customers, and to establish a client base within NZ and internationally including Frito-Lay, McCain Foods, JR Simplot, and ConAgra.

This project resulted in development of an IP asset, with patent protection in New Zealand, USA, Australia, Canada and Europe. A spin-out company CropLogic Ltd was created, and the new company licensed the technology in 2010.

Benefit to New Zealand

CropLogic Ltd had product sales in 2009 of $350K, projected to grow to $3.8m by 2014. CropLogic™ Ltd has attracted investment from a consortium of NZ investors, and is now accessing further capital as the business meets a set of development milestones. CropLogic™ has appointed a CEO, secured US based customer accounts and is now seeking R&D funds in its own right.

Benefit to New Zealand is via three channels: (i) productivity improvements in New Zealand's crop industries; (ii) exports sales and licensing income of the product allowing investment into new areas and (iii) the additional capability and commercialisation knowledge accrued to the research organisation.

ELECTRICAL VEHICLE WIRELESS CHARGING

PRESEED CASE STUDY

PreSeed investment allows rapid response to market signals for wireless charging of electric vehicles and leads to a successful technology exit and development of protected core IP.

1990's – Professor John Boys and colleagues invent wireless power charging

2007 – PreSeed investment allows Induction Power Technology for electric vehicles to be developed and core IP protected

2009 – 2011 - Spinout HaloIPT formed to develop technology for global market and subsequent sale of technology to Qualcomm

Now – Qualcomm EV R&D centre in NZ with significant R&D and trailing royalties benefits to NZ

Publicly funded research background

Curiosity-driven research by Professor John Boys and his colleagues at the University of Auckland led to the invention of wireless power charging in the early 1990's. The technology was licensed globally for materials handling, people-moving applications and to a New Zealand based company for lighting. UniServices used the proceeds of these licenses to fund the power electronics laboratory and a research programme at the University of Auckland to further develop wireless power applications built on this Induction Power Technology (IPT).

In late 2007, UniServices identified a growing trend towards the electrification of road vehicles and the potential application of IPT for safety, convenience, improved battery life, and aesthetics. However, in order for IPT to be more effective as a plug-in technology, the gap between the bottom of the car and the IPT charger needed to be 250-300 mm (the normal clearance of road vehicles), and address a regulatory barrier concerning the allowed strength of the magnetic field.

Impact of PreSeed

Devolved PSAF enabled UniServices to move fast, applying funding of $450,000, matched from its own funds, to develop a system that would reliably and efficiently transfer power over the required air gap as well as systems that could operate at low power (2 kW) and high power (15 kW), and that could pick up charge whilst the vehicle was moving fast ('dynamic charging').

In addition, the funding enabled the development and execution of a highly targeted IP strategy. The outcome of that phase of work was a prototype that would meet the specific market requirements, and with core IP protected.

Benefit to New Zealand

A spin-out company, HaloIPT, was formed to develop the world-leading technology, and received significant interest from a number of strategic and financial investors. A purchaser for HaloIPT subsequently emerged, and in October 2011 the assets of the company were purchased by Qualcomm, enabling HaloIPT's technology to be taken to world markets.

In addition to the world-leading capabilities developed through the original research and HaloIPT, Qualcomm has set up one of its Electric Vehicle R&D centres in New Zealand that employs 8 staff. In addition, the core IP generated through PSAF has enabled Auckland UniServices to retain a trailing royalty revenue stream and significant multi-million dollar research contracts.

ETHYLENE RELEASE CANISTER (ERC)

PRESEED CASE STUDY

A novel technology for the in-transit ripening of fruit creating additional export revenue and royalties from protected IP.

Pre 2005 - Researchers develop the idea of ERC™ to provide fruit distributors a portable technology for ripening small or large volumes of fruit

2006 - 2007 – PreSeed is to develop pre-commercial versions and run proof-of-concept trials demonstrating the technology to industry

2008 – A licensing and R&D deal is done with Balchem for North American markets

Now – NZ benefits from a substantial capability and royalty stream and an export opportunity provided for a NZ-based manufacturing company

NZ fruit companies show interest in the technology.

Publicly-funded research background

This technology has its origins in research carried out over many years, at Plant & Food Research and its predecessors, into improving productivity in New Zealand's horticultural industries and export markets. It grew from the need to ripen fruit for research purposes without the availability of ripening facilities, or requiring fruit to be ripened in-transit and ready to eat at destination for in market consumer trials.

Commercial interest from trials lead to requests for more flexible and efficient ways of ripening fruit such as kiwifruit, banana and pears in transit, rather than the traditional capital-intensive ethylene conditioning facilities, or ripening in isolated areas where conditioning facilities aren't available. The idea behind the Ethylene Release Canister (ERC™) technology was to allow fruit to be ripened in containers or in pallets under shrouds providing fruit distributors a portable flexible technology for ripening small or large volumes of fruit. This could be applied to both New Zealand products as well as globally.

Impact of PreSeed

In 2006, PSAF of $286,352 with matched funding from Plant and Food Research, was allocated to develop pre-commercial samples of the ERC™ canister valves, and conduct proof-of-concept trials in Costa Rica for ripening pallets of banana, in conjunction with Balchem Corporation and Dole Fresh Fruit Company.

PreSeed allowed the effectiveness of the technology to be proven to industry partners and its demonstrated use in a real-world commercial setting. It lead to Balchem pursuing further R&D and a formal protocol with Dole for use of the ERC™ technology for ripening containers of banana. A license agreement for the manufacture, marketing and sales of the ERC™ technology in Canada, USA and Mexico was signed with Balchem in June 2008.

Benefit to New Zealand

New Zealand has gained leading capability and stands to receive royalties well in excess of the original investment, along with further research contracts from Balchem.

Once ERC™ is established in the USA, a NZ company, Alto Packaging, is expected to gain revenue through the manufacture and supply of ERC™ valves to Balchem. Tooling and manufacture of the ERC™ valve components is complex and Alto Packaging has developed a unique capability for manufacturing these. If agreements can be secured for the Asian and European markets then total benefit to NZ through manufacture and supply of ERC™ valves and royalties is expected to be in excess of $2M p.a. Zespri and Freshmax have shown an interest in ERC™. In addition to banana, potential uses for ripening include early-season kiwifruit, pears, mango and avocado. Immediate market opportunities are Australasia, Asia and Europe.

FORECASTER DECISION SUPPORT SYSTEM

PRESEED CASE STUDY

A management tool for the forestry industry that is increasing efficiency and value in one of New Zealand's biggest export areas.

1990s and 2000s - Research with the forestry industry identifies opportunities for better forest management and use of advanced algorithms to model tree growth

2009 - Forest industry adopts Forecaster DSS tool as its preferred approach to transferring and embedding new technology from research

2009 - 2010 – PreSeed is used to catalyse development and full commercially-viable implementation of the Forecaster DSS tool, in partnership with industry

Now – Forecaster DSS is licensed by 23 forestry companies covering managements of 943,000 ha of NZ forests

Publicly funded research background

This project originated in research over many years at SCION and its predecessors aimed at lifting productivity in the forestry industry. A key role for forest managers is to promote as much as possible of the forest they manage into a higher-valued products. This ranges from the use of logs for pulp to structural classes, or into appearance (pruned) grades. Each grade improvement yields about $50 per cubic metre of additional revenue.

The idea behind the Forecaster Decision Support System (Forecaster DSS) is that carrying out thinning and pruning operations at the optimal time could create enormous additional value to forest companies. This required algorithms that enabled tree growth to be accurately modelled based on knowledge of the tree, its site and the history of its management such as pruning or tree spacing.

Impact of PreSeed

Development of a tool that could put this idea into practice required a commercially viable software prototype, and its jump to full implementation. It needed to achieve wide uptake in the forestry industry, and required focused effort, additional skills and funding outside of the research program itself.

$75,000 of government PSAF was invested into a project to catalyse development of Forecaster DSS for Radiata Pine, and its jump to full implementation. Industry contributed co-funding of $150,000 and $45,000 was reprioritised from forestry science and internal business development funds. The project was managed by a joint team of research and industry partners, enabling development of a product that met the specifications required to be useful and commercial viable.

Forecaster DSS enables forest managers to make critical decisions about forest management such as when to prune and thin, what yields they will recover from a stand of trees and also to test forest-growing scenarios for various land uses.

Benefit to New Zealand

The size of the forestry industry means that the benefits of Forecaster DSS can be leveraged across a wide base. Promoting just 5% of harvested logs by one grade through the use of Forecaster DSS is estimated by industry to yield about $24 million per annum additional export revenue.

Forecaster DSS is now licensed to 23 forestry companies and is used to support management of 943,000 ha of New Zealand's forests (55% of New Zealand's commercial forests). The software is used by two tertiary institutes to support training of foresters. The industry commits over $1.6 million per annum into ongoing support of further research and development into forest management tools including Forecaster DSS. A significant stream of licensing revenue also supports further investment.

NON-CONTACT ROBOT

PRESEED CASE STUDY

Development and commercial application of a novel climbing robot system with 500% greater payload and reduced risks compared to traditional manual industrial inspection methods.

2006 – Professor XiaoQi Chen joins the University of Canterbury, doing research in mechatronic engineering

2009 – A patent is filed for a "Non-contact lifting and locomotion device"

2010 - 2011 – PreSeed enables prototype development and testing for commercial application and leads to formation of Invert Robotics

Now – Christchurch-based Invert Robotics employs five people and provides a range of inspection services to the NZ dairy industry. Its niche technology is attracting strong offshore interest

Publicly funded research background

Professor XiaoQi Chen joined the University of Canterbury in 2006 as a founding member of the newly formed mechatronics programme. As part of this research Prof Chen began exploring technologies to enable robotic inspection vehicles to drive up walls. His research lead to the discovery of a novel method for creating suction cups that used high speed flow to attach to a surface without coming into contact with that surface.

Impact of PreSeed

The project secured around $100,000 of PSAF investment from the UniCom* investment committee in 2010, with additional project contributions totalling about $200,000 from the University and PowerHouse Ventures.

The goal was to secure a patent on the IP and explore commercial applications for the technology in two potential target markets: mobile robots for industrial inspection, and licensing the suction cup technology into other industrial robots. PreSeed enabled engagement with a variety of potential commercial partners in target markets. In particular, the dairy industry was interested in the technology for inspecting weld cracks in large stainless steel silos.

Powerhouse Ventures subsequently took over the project, investing their own money and working with the lead inventor to develop a prototype solution. A spin out company Invert Robotics was formed and led by a PhD student that had been working on the project. Invert Robotics has since developed its own IP.

Benefit to New Zealand

Invert Robotics is now significantly privately held. Its major shareholders are NZVIF Investments Ltd (32%), Guilford Investments Ltd (17%), and Powerhouse Ventures (14%).

Invert Robotics is currently early in a growth phase, providing inspection services to New Zealand's dairy industry and with plans to lease their robotic technology to overseas companies for industrial inspection applications. The potential export revenue in the first 5 years of sales of is estimated at $10 million, along with the creation of high-tech jobs.

** UniCom was the consortium of PRO's that pre-dated KiwiNet, consisting of WaikatoLink, AUT, Lincoln University and University of Canterbury.*

NZ DRIED BEEF

PRESEED CASE STUDY

Through strong engagement with a large overseas partner, this project looks set to generate substantial jobs and export revenue for New Zealand through the sale of high quality dried food products.

2009 – A PreSeed project is funded to develop a new technique for drying fruit snacks for the Japanese market.

2010 – Discussions with a Christchurch specialty food manufacturer/ exporter and its newly acquired Japanese partner identify dried beef for two-minute noodles as a major opportunity.

2012 - 2013 – PreSeed was used to answer five key questions around the scale up of technology. PreSeed support allowed these questions to be answered positively, resulting in initial investment in the process by a Japanese partner.

Now – Partners are being sought to invest in construction of a processing plant in NZ for export to global markets.

Publicly funded research background

Assoc. Prof Geoff Savage and Dr Lemuel Diamante are Food Science researchers at Lincoln University's Faculty of Agriculture and Life Sciences. In 2009 they were researching alternative methods for drying food such as meat, fish and fruit using low temperature vacuum frying.

The researchers approached the Research and Commercialisation Office for support in developing an MBIE research proposal. In the process of developing that proposal, the combined group including Dr Garth Carnaby and Dr Peter John discovered a revolutionary new method of drying that achieved substantial improvements in taste and texture over conventional freeze-drying. The 2009 MBIE research proposal was successful but a 2013 MBIE proposal to extend the research into lucrative export markets identified in an aligned PreSeed project was not.

Impact of PreSeed

PreSeed investment helped to further define the value proposition and to develop the business plan and connections to local partners. It was this work that resulted in a change of direction when it was discovered that dried meat, not dried fruit, provided the best initial target market. An opportunity to ally with a major supplier into the Asian dried noodle market also resulted, leading to a move from the initial focus on high value, low volume product to low value, high volume production - specifically locally dried New Zealand meats to service the higher quality portion of the massive global instant noodle market.

Benefit to New Zealand

Kisco Foods International Ltd, the Christchurch subsidiary of major Asian food supplier Kisco Foods Ltd. made an initial investment of $90,000 into the PreSeed project. At its completion, they contributed a further $25,000 for constructing an intermediate capacity processing plant. Lincoln University is now negotiating for a processing plant to be built in New Zealand, which will create jobs and export earnings from primary produce. Failure by Kisco Foods International Ltd to secure Technology NZ co-funding for this next step has delayed commercialisation and new partners are now being sought to make the investment needed. Lincoln is currently funding on-going work out of its own resources.

POWERBYPROXI

PRESEED CASE STUDY

PreSeed enables Induction Power Technology prototype development leading to successful creation of a NZ company selling new wireless charging technologies into global markets.

1990's – Professor John Boys and colleagues invent wireless power charging

2004 – PSAF enables development of low-power IPT prototypes for industrial application and leads to the subsequent creation of new company PowerbyProxy in 2007 and licensing of its new technologies in global markets

2012-2014 – PowerbyProxi works on new applications for IPT in consumer electronic devices, leveraging technology advantages gained through the PreSeed-supported electric vehicles IPT program

Now – PowerbyProxi is based in Auckland and employs 70+ staff.

New consumer electronic devices containing its charging technology are expected in global markets in 2015 and 2016.

Publicly funded research background

PowerbyProxi has its origins in the research led by Professor John Boys and his colleagues from The University of Auckland in the early 1990s into Inductive Power Transfer (IPT) technology. This research resulted in the development and subsequent commercialisation of wireless power technology for numerous applications.

In 2004, Patrick Hu and David Budgett received PSAF investment of $200,000 with matched funding of $400,000 from UniServices to develop low power, low cost but efficient wide gap IPT prototypes for consumer goods and laboratory equipment.

Impact of PreSeed

PreSeed support allowed work to progress to the point that a new company, PowerbyProxi, was formed in 2007, and established itself as a wireless technology design house using the licensed IPT technology. PowerbyProxi began developing products for its customers who needed solutions in industrial applications, including wind turbines and manufacturing plants, in the United States and Europe.

In 2008, Power-by-Proxi successfully raised seed capital and developed significant new products for the global slip-ring and industrial connectors market. In 2013, the company announced a number of major deals for its unique wireless industrial connectors market with the Fortune 500 company TE Connectivity. By now, PowerbyProxi had built more than 50 wireless power applications for Fortune 500 companies.

PowerbyProxi also began working on miniaturisation of IPT for consumer devices and AA batteries. Many of the challenges faced for IPT in electric vehicles of high efficiency, wide gap, vertical and lateral tolerance also applied to consumer electronics. UniServices was able to licence the 30 patent families generated by the separate PreSeed-supported electric vehicles programme to PowerbyProxi for use in consumer electronic devices.

Benefit to New Zealand

PowerbyProxi represents one of several streams of benefit and accumulated capability in NZ arising from the original research and IPT development platform. PowerbyProxi now employs over 70 staff and is based in Ponsonby in Auckland. It has successfully raised capital to support its growth, and is leading the development of the future resonant specification for the current standard for wireless charging – Qi (developed by the Wireless Power Consortium). New products containing this technology are scheduled to begin reaching the market in 2015 and 2016.

TOXINZ
POISONS INFORMATION

PRESEED CASE STUDY

TOXINZ is a world-class database for medical professionals, which contains comprehensive information on poisons. Through international licencing deals, TOXINZ is delivering value back to New Zealand.

1964 – The National Poisons Centre (NPC) is established as a central point of advice for medical practitioners and the general public in cases of poisoning or other toxic exposure.

2004 – Otago Innovation recognises an opportunity to commercialise the toxicology information collated by the University of Otago.

2009 – PreSeed funding helps move TOXINZ to a commercial platform, where it can be monetised through a subscription-based sales model.

Now – TOXINZ database is partnered with two publishing houses providing worldwide coverage, and is earning export revenue for New Zealand.

Publicly funded research background

The National Poison Centre's database, TOXINZ, has been developed over the past 50 years, leveraging advances in research and clinical knowledge. It is widely used by New Zealand clinicians and now it is gaining the respect of the international medical profession as well.

The TOXINZ database, developed at the University of Otago, today contains more than 190,000 documents with comprehensive and up-to-date information on poisonous chemicals, pharmaceuticals, plants, and hazardous creatures.

In 2004, Otago Innovation recognised an opportunity to commercialise the toxicology information collated by the University of Otago. In 2009, $24,343 of PSAF with $48,686 of co-funding was allocated to a PreSeed project to help move TOXINZ to a commercial platform where it could be monetised through a subscription-based model.

Otago Innovation is operating global subscription sales of the TOXINZ database. The University of Otago continues to operate the separate National Poisons Centre which is part-funded by the Ministry of Health.

Impact of PreSeed

PreSeed helped de-risk the financial commitment of commercialisation and was essential to assist with migration of TOXINZ onto a commercial platform that supported subscription-based sales. As part of that, PreSeed supported the update of the database to meet requirements of international markets.

Benefit to New Zealand

TOXINZ is a gold-standard database that is delivering benefit to New Zealand through its use in this country, and world-wide subscriptions currently being sold to Poison Centres, Hospitals, state governments and Health boards.

In 2009, the database was successfully extended to Australia, where it has been adopted by most states and last year received more than 56,000 searches. TOXINZ has been launched in North America, via EBSCO Publishing Inc., who has recently secured non-exclusive rights to distribute TOXINZ globally. Success in the US and Canada may lead to further global expansion.

The TOXINZ database is set to return close to $1M in export earnings back to New Zealand in its first 5 years of subscription sales.

WASSP – Electronic Navigation Ltd

PRESEED CASE STUDY

PreSeed enables commercialisation of advanced sonar technologies and opens new export markets for New Zealand company Electronic Navigation Ltd.

2000 - 2003 – early WASSP technology is developed jointly by IRL and ENL.

2004 - 2008 – *Forward Looking Sonar* research programme develops capability at IRL and leads to new sonar technology opportunities in global markets.

2007 – 2008 – PreSeed is used to prototype enhancements to ENL's WASSP technology and change it into a major high-value export product.

Now – ENL employs 45 people in Auckland selling world-leading sonar technologies into global markets.

Publicly-funded research background

Auckland-based Electronic Navigation Ltd (ENL) originally developed *Wide Angle Sonar Seafloor Profiler* (WASSP) technology with Industrial Research Ltd (IRL, now Callaghan Innovation) between 2000 and 2003, with the help of a government business grant and two commercial contracts. IRL subsequently further developed its capability in sonar technologies through a publicly-funded research program, *Forward Looking Sonar (FLS)*, from 2004 to 2008.

Two PreSeed projects, the first in 2007 to develop a prototype Wide Scan Sonar and the second in 2008 to develop a prototype Long Range Wide Scan Sonar, focused on refinements of the transducers from the *FLS* programme to meet commercial requirements. The aim was to to improve ENL's sonar offering at high (160 kHz) and low (80 kHz) frequency with transducer designs developed both for ease of manufacture and of installation. The two projects received a total of $35,825 of PSAF with matched co-funding from ENL.

Impact of PreSeed

PreSeed was crucial to de-risking the development of transducer technologies for ENL's global markets. ENL subsequently incorporated the new technology into their existing world-leading WASSP product through a license agreement with IRL. ENL acquired the transducer and beam forming IP in 2013.

ENL's export sales have grown significantly since 2009 because of WASSP: ENL has exported more than 750 systems (average $50,000 USD end-user price) in over 30 countries with three models. WASSP is recognised as the leader in Multi-beam Sonar in the global commercial fishing sector and it is now carving a niche in the Survey Mapping, Super Yacht and Defense sectors.

Benefit to New Zealand

ENL's shareholders have invested significantly in their own R&D since 1990 with the vision to grow the traditional import distribution business into a high-tech exporter which it is today with WASSP. The strategic R&D alliance with IRL gave ENL the confidence to continue to invest and grow. Since 2011, WASSP's world-class R&D resource has more than doubled in engineering capability and more than 40% of the team members have PhD's.

In 2014 FURUNO Electric Co. Ltd of Japan recognised ENL's R&D capability within a well-structured NZ High-Tech sector and invested in ENL's R&D as a minor shareholder. The intent is to grow ENL's R&D resource in New Zealand as the company looks to introduce a wider range of Multi-beam products designed and manufactured in New Zealand. Based in New Zealand ENL's R&D will also contribute to the global growth of FURUNO.

http://wassp.com/news-events/furuno-and-enl-join-forces/

Appendix 1: Data collection template

The table below summarises the data that was gathered for each project as part of the PSAF review.

PSAF Project Information	
Devolved contract holder	*Name of the PSAF contract holder with MBIE (FRST)*
Project Name	*A short title of the project*
Project ID	*Not applicable*
Public Research Organisation (PRO)	*List the research organisation that is leading the commercialisation project.*
Project Description	*Provide 1-3 sentences briefly summarising the project.*
PSAF project details	
Start Date	*The date that PSAF investment into the project started*
Finish Date	*The date that PSAF investment into the project finished (unless still in progress)*
PSAF Status	*Describe the status of this project in terms of PSAF investment: In Progress, Completed or Abandoned*
Total PSAF Investment to Date	*The total amount of PSAF invested into the project to date (since 2003)*
PRO Co-Investment matched against PSAF investment	*The amount of funding invested by the PRO during the term of PSAF funding.*
External Co-Investment matched against PSAF investment	*The amounts and the names of the organisations/people that provided co-investment during the term of PSAF funding into the project.*
Project Outcomes	
Project outcomes to date	*Provide 1-3 sentences describing the current commercial status of the project. If the project has been abandoned (as a PSAF project), briefly describe why.*
IP Protection	*A summary of IP protection that has been secured around the technology. List patents, patent numbers, trademarks, etc.*
Expected Year of Market Entry	*Provide the year of actual or expected market entry for the technology. If a project has been abandoned or closed, place an N/A in this column.*
Potential Revenue to PRO over first 5 years of sales	*Provide the potential amount of revenue likely to be received by your organisation in the first 5 years of sales. If a project has been abandoned or closed, place a $0 amount in this column, in spite of what it might have originally been estimated as. Give the best estimate based on the information you have available to you now.*
Potential Export Revenue generated over first 5 years of sales	*Provide the potential amount of export revenue likely to be received over the first 5 years of sales. If a project has been abandoned or closed, place a $0 amount in this column, in spite of what it might have originally been estimated as. Give the best estimate based on the information you have available to you now.*
Deals completed (e.g. licence, sale, start-up)	*Please list any deals that have resulted from the project to date. This could include licence, spin-out or sale.*
Actual Revenue to the PRO to date, not including co-investment against PSAF investment.	*Summarise the actual revenue that has been received by the PRO to date.*
Number of jobs created (during & after PSAF Project)	*Please list jobs created during and after this project including:* • *Position* • *Duration of employment, as at 30th June 2013.* • *Workload measured as a fraction of Full Time Equivalent (FTE) (e.g. 3 days per week = 0.6 FTE)* • *Whether on the 30th June 2013 whether their employment was "ongoing", or "completed".* • *Indicate whether they are a student or not.* *For example:* • *1 FTE Structural engineer, 6 months, ongoing.* • *0.2 FTE Student developer, 6 months, completed.* • *1 FTE Student Market Researcher, 3 months, completed.*

Appendix 2: Extracts from 2013 MBIE RfP for devolved PSAF

Purpose

The purpose of PSAF is to undertake early stage technology commercialisation activities to:

- maximise the commercial benefits to New Zealand from publicly funded research
- improve the commercial capability and skills of public research organisations
- promote linkages between public research organisations and potential private sector partners, including industry players and capital providers in New Zealand and offshore

These goals are achieved by progressing technology prospects through a commercialisation process towards a point of investor-readiness. The end goal of PSAF is to attract investor interest to publicly funded research and development.

Co-funding requirements

Devolved PSAF is available to support up to 50 per cent of the total costs of eligible projects. Any suitable mix of the applicants own and/or externally generated funds can make up the balance. Private sector in-kind contributions can be counted as part of the co-funding up to 60 per cent of the co-funded amount (or up to 30 per cent of the total project cost).

Reprioritisation of funds

The contract holder may reprioritise existing research funds up to a maximum of 12.5 per cent of eligible costs. Any research fund reprioritisation must remain consistent with the original purpose of the contracted research.

Appendix 3: Author Bio

Dr Roger Ridley has a background in the physical sciences and applied mathematics. He obtained his Ph.D. from Monash University, Melbourne in 1991 and subsequently worked as a senior atmospheric scientist and modeller at the National Institute of Water and Atmosphere (NIWA).

Roger then spent seven years in the Treasury including studying economics at the London School of Economics summer school, and eight years as General Manager of Investment and Performance at the Ministry of Research Science and Technology. More recently Roger spent three years at Industrial Research Limited and Callaghan Innovation following its establishment in 2013.

Roger has extensive experience in the machinery of government, science and innovation policy, investment and its evaluation, and working with Ministers and government officials to get results. Roger has represented New Zealand on the OECD committee on Science and Technology Policy and led the creation, support and subsequent Cabinet decisions arising from the CRI taskforce. Roger has been extensively involved in developing government business R&D initiatives and has supported the establishment of the Commercialisation Partner Network.