

# Unitec Research Report 2015

## Executive Summary

2015 was the first of five years which are covered by the new Research Strategy, taking us through to 2020. The strategy details three significant shifts in direction, aimed at engaging research and enterprise (R&E) into the Unitec transformation agenda;

<b>Increased staff capability</b>	<i>staff are equipped to undertake impactful research and enterprise</i>
<b>Increased external engagement</b>	<i>research links Unitec; building strategic relationships with industry</i>
<b>Greater focus</b>	<i>Unitec gains a competitive reputation in specific areas of R&amp;E</i>

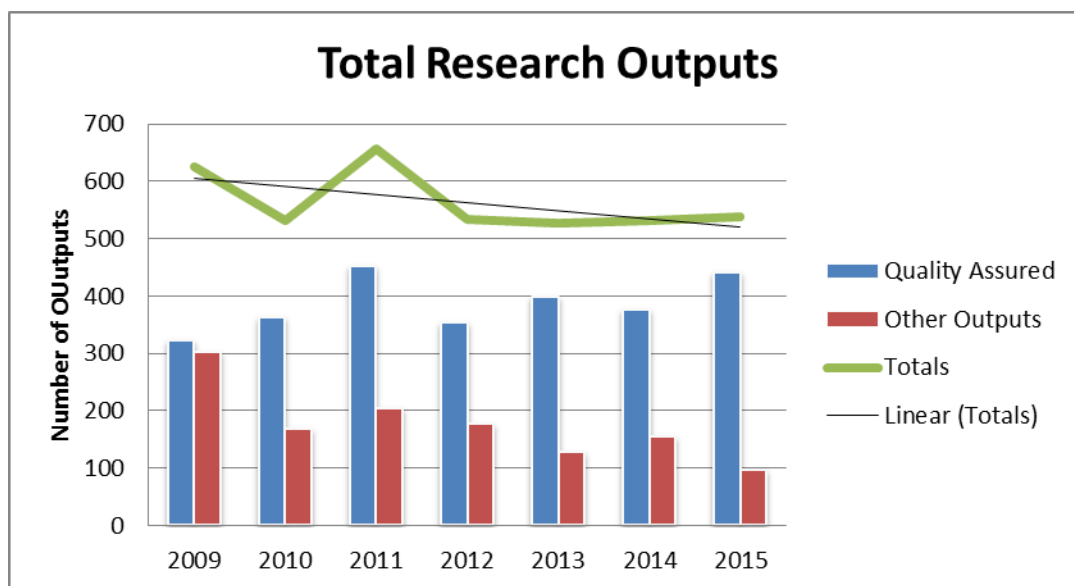
The first of these has been facilitated through the Research Development Project detailed below in Section One which provides funding to support staff who have no research qualification and/or have not conducted research before. This support has not existed at Unitec previously, which is surprising considering that the institute's primary KPI around research stems from the TEC requirement that most staff teaching on degrees should be research engaged. The second shift has been addressed through the Research and Enterprise Voucher Scheme detailed in Section Six, which provides a supportive framework for staff to engage in contract research while incentivising industry to contract its R&D to Unitec. This framework is already providing leverage for sector alignment by creating work based learning opportunities for students and numerous industry connections. The third key shift, a more focused approach to research, has been facilitated with the identification of Strategic Research Foci. This will achieve greater balance between curiosity and mission led research, accelerate capability in key areas of potential and develop momentum through high level achievement and concomitant publicity. Concentrations of highly capable staff and resources in particular areas of R&E, working collaboratively to achieve common goals will increase opportunity and effectiveness in meeting the objectives of the NZ Tertiary Education Strategy; (that research)...*"provides significant economic, social, cultural and environmental benefits. This includes helping us to better understand our unique culture and our place in the world, effectively manage our natural environment, and improve the health and wellbeing of New Zealanders"*<sup>1</sup>. The two foci identified so far are Cybersecurity and Applied Molecular Solutions; both of which have grown in reputation and productivity, the details of which are reported in Section Seven. The plan is to identify a third foci by 2017.

The funding of these new initiatives is being carefully handled to ensure that the traditional research productivity targets, particularly those associated with the Performance Based Research Fund (PBRF) are not compromised. An extensive "mock" PBRF portfolio review was implemented by the Tuapapa Rangahau in 2015, outlined in Section Two. Utilising the information gathered about the performance of staff so far and the productivity needed for them to achieve a PBRF ranking in the 2018 appraisal; a tactical plan with appropriate funding has been implemented, to assist these staff to succeed. This programme of support is particularly important at a time of change for the institute and to meet the Unitec Research Strategy target of 38% of eligible staff to be PBRF rated in the 2018 appraisal.

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<sup>1</sup> Tertiary Education Strategy 2014-2019, pg. 16

## Section 1: Research Outputs



**Graph 1 – Total Research Outputs**

In 2015 we can report a total of 538 outputs, with 82% of these being Quality Assured – this is a 10% improvement on the previous year. The total number of quality assured outputs has been on a gradual growth curve for the last few years and it is pleasing to see that quality assured outputs are almost equal to the numbers achieved in the year before the last PBRF appraisal (2011). The reason this is important is that productivity always increases significantly as the deadline approaches and in this cycle, the increase is happening earlier.

2015 was the last full year of the faculty structure at Unitec. Table 2 shows a break-down per faculty of outputs that have been entered into the Research Outputs Management System (ROMS) and verified by the Departmental Research Chairs and cross checked by Tuapapa Rangahau.

TOTAL	2009	2010	2011	2012	2013	2014	2015
CIB	398	271	342	249	201	219	232
SHS	183	225	250	220	270	270	250
TBE	45	36	51	45	46	35	52
Directorates			14	19	10	8	4
TOTAL	626	532	657	533	527	532	538

**Table 2 – Total Number of Research Outputs**

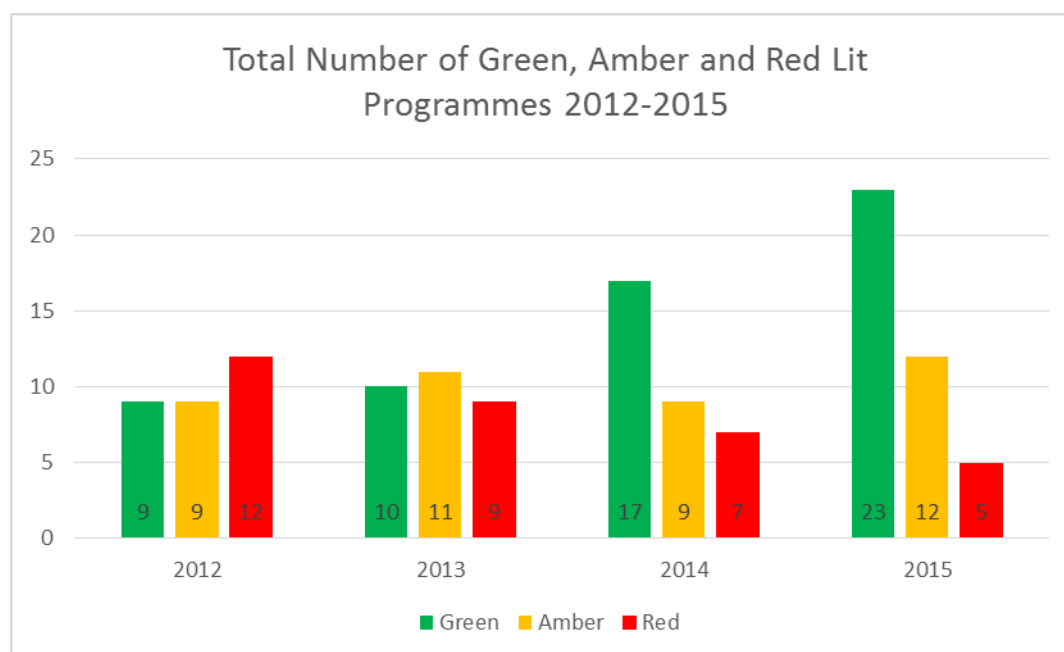
Table 3 shows steady increases in the number of Quality Assured outputs over each of the faculties.

	2009	2010	2011	2012	2013	2014	2015
CIB	212	205	251	167	156	171	194
SHS	79	128	147	145	200	180	203
TBE	32	30	44	29	35	21	42
Directorates			10	14	7	4	2
Total	323	363	452	355	398	376	441

**Table 3 – Number of Quality Assured Research Outputs**

### Research Traffic Light

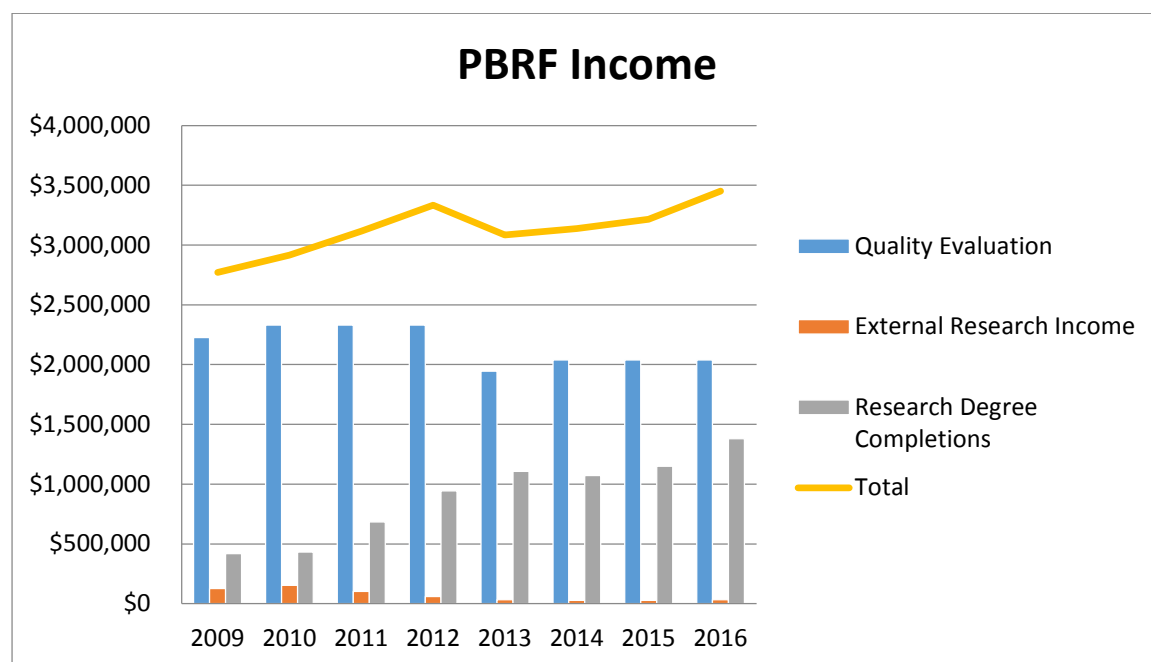
The Research Traffic Light is an internal mechanism for tracking the research productivity of degree programmes, developed in line with the TEC requirements. The Unitec Research Development Project (RDP) was implemented by Tuapapa Rangahau in 2014 to support programmes which were under-performing in the Traffic Light. Evidence of the impact of this is now very clear. In 2015, as shown in graph 2 below, the number of “green lit” programmes increased by 26% and the “red lit” programmes went down from 7 to 5. The Unitec Research Strategy 2015 – 2020<sup>2</sup> states that all programmes will be green lit by 2020.



**Graph 2 – Total Number of Green, Amber and Red Lit Programmes 2012-2015**

<sup>2</sup> Priority Area 3 - Improve and Support Researcher Performance: “Achieve 100 percent Green lit programmes by 2020” p8  
[http://www.unitec.ac.nz/sites/default/files/public/documents/unitec\\_research\\_and\\_enterprise\\_strategy.pdf](http://www.unitec.ac.nz/sites/default/files/public/documents/unitec_research_and_enterprise_strategy.pdf)

## Section 2 PBRF Income



**Graph 3 – PBRF Income**

**NOTE: 2016 is indicative only.**

PBRF income comprises three areas of funding, Quality Evaluation (allocated at the 2012 round), External Research Income (a 10% top up for every dollar won, calculated annually) and contributions for Research Degree Completions (calculated annually). The figures have remained consistent for the past three years, with slight trends upwards.

In 2016 the distribution between the three funds in the PBRF will change:

PBRF Distribution from 2016		Calculation Point
Category	Fund Distribution	
Quality Evaluation	55%	Fixed for 6 year PBRF cycle
Research Degree Completions	25%	Calculated annually
External Research Income	20%	Calculated annually

**Table 4 – 2018 PBRF Distribution**

As noted in Section 3, External Research Income has been prioritised in response to the signalling of this shift in fund distribution (from 15% to 20%).

In 2012, 181 portfolios submitted to the TEC for the PBRF Quality Evaluation. In the past increases in the number of portfolios submitted than in the previous round has been experienced, however the impact of staff changes in the transformation and the concomitant numbers of submissions for the 2018 PBRF Quality Evaluation is at this point, unknown.

The end of this PBRF round is 31 December 2017 and a comprehensive plan is well underway for supporting staff to strategically plan for their portfolios and increase their outputs in the final two years. This began in 2015, with a “mock PBRF review”. A total of 157 portfolios were reviewed during the 2015 Preparation Round.

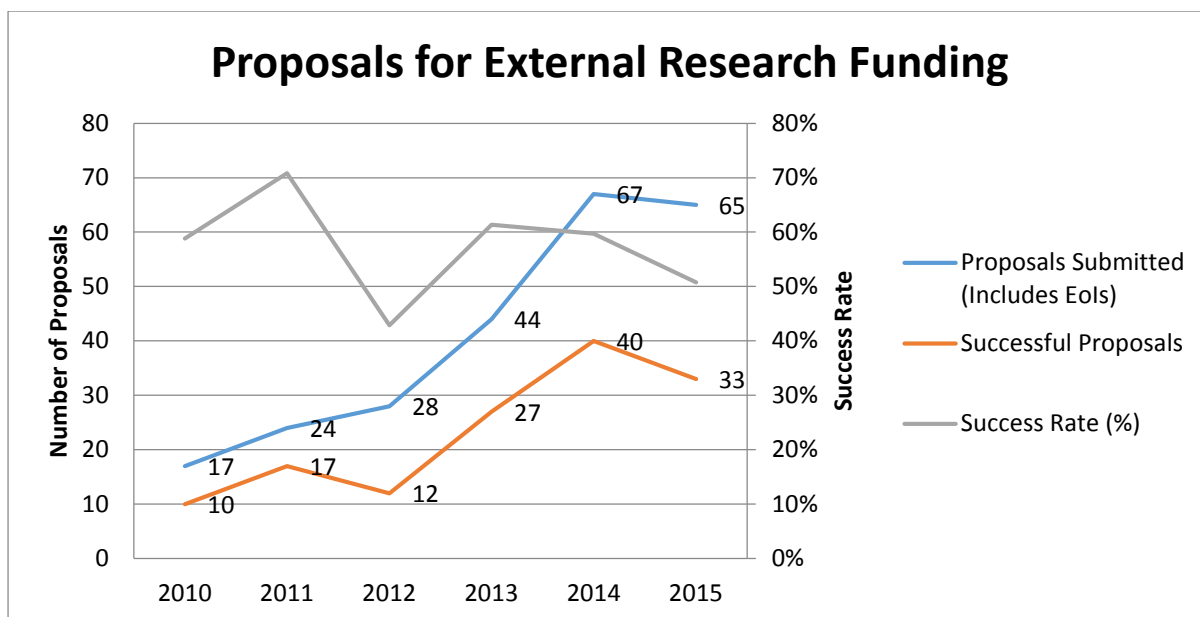
In the “mock PBRF review” portfolios were rated according to the following, NE - Not Rate, NE – Marginal, NE – Rate, Not rate, Marginal, Rate and Rate Highly (NE = New and Emerging). The below table shows how ratings were distributed across Unitec. As at the 2015 PBRF Preparation Round ratings assessment, 100 were rated marginal, rate or highly rate with 16 new and emerging research portfolios which were rated marginal (2) or rate (16). The total number of staff rated in 2012 was 114.77 (FTE weighted) or 33% of the eligible staff. This suggests Unitec has a chance of meeting the target detailed in the strategy of 38%, depending on the nature and impact of current staff changes. The table below outlines ratings by faculty followed by graphs which illustrate these ratings at faculty level.

Rating	CIB		SHS		TBE		Total Ratings	
NE - Not Rate			2	3.5%			2	1.3%
NE - Marginal	1	1.2%	1	1.8%			2	1.3%
NE - Rate	7	8.1%	6	10.5%	1	7.1%	14	8.9%
Not rate	26	30.2%	12	21.1%	1	7.1%	39	24.8%
Marginal	26	30.2%	14	24.6%	8	57.1%	48	30.6%
Rate	24	27.9%	18	31.6%	4	28.6%	46	29.3%
Rate Highly	2	2.3%	4	7.0%			6	3.8%
Total	86	100.0%	57	100.0%	14	100.0%	157	100.0%

**Table 5- 2015 Preparation Round Ratings**

## Section 3: External Funding

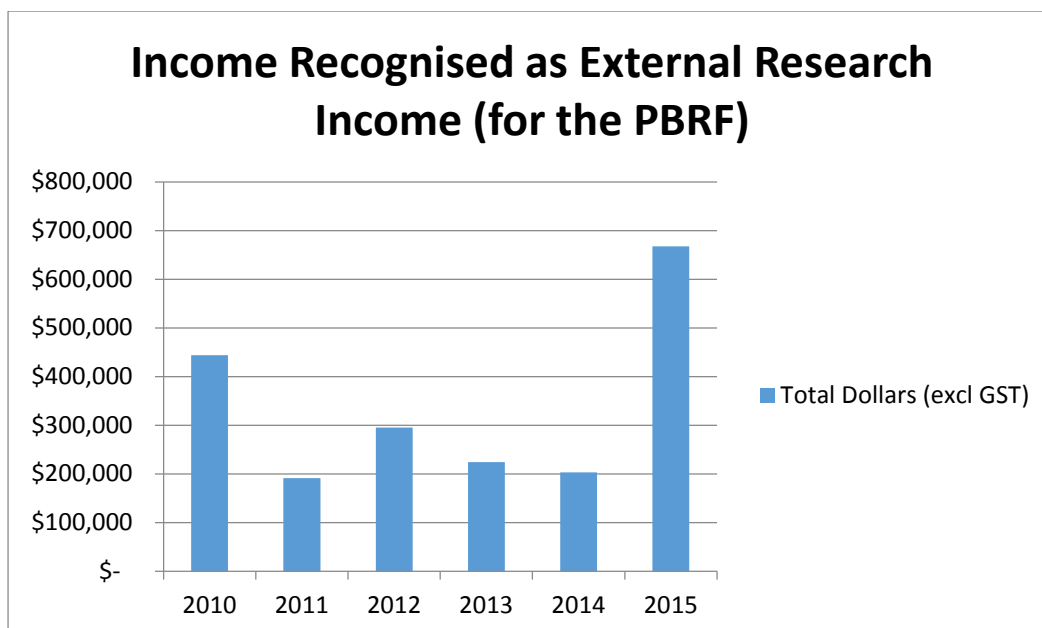
Sixty five applications for external research funding were made by Unitec researchers in 2015, down two on the number submitted in 2014 but still a considerable improvement on previous years. This indicates that despite many of our top researchers being busy delivering on the large research grants awarded in 2014, Unitec researchers persist in developing new projects and our research culture continues to flourish. Just over half of the 65 applications were successful. This indicates that external granting bodies have confidence in Unitec as a research provider, particularly as some funding schemes have success rates as low as seven percent.



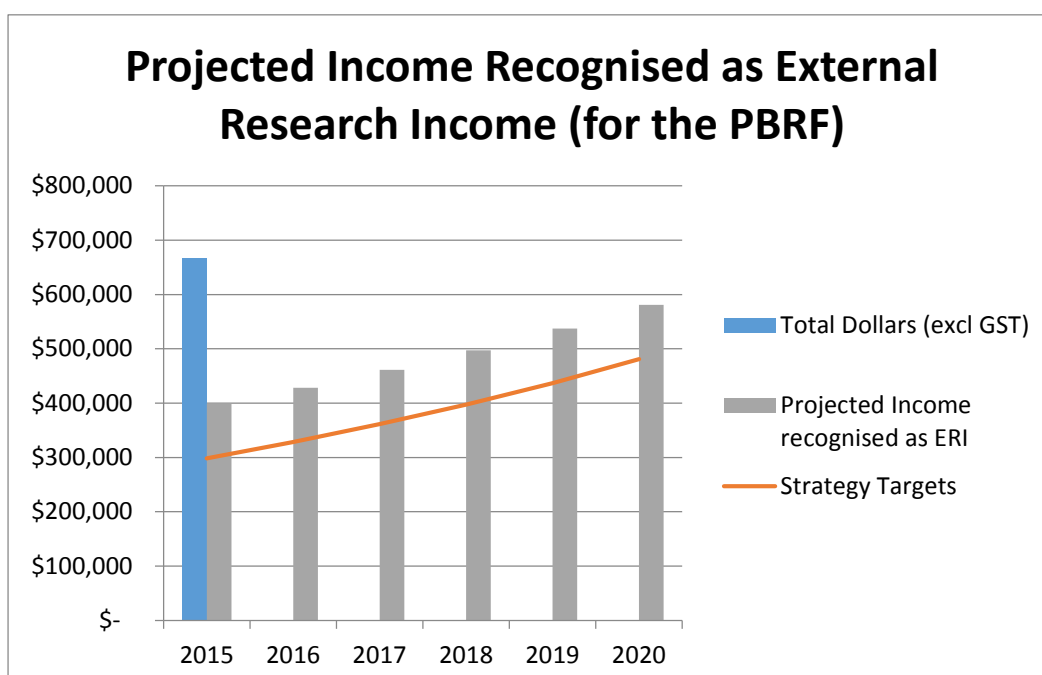
**Graph 4- Proposals for External Research Funding**

External Research Income (ERI) is included as a separately funded performance measure in the PBRF as it is a strong proxy indicator for knowledge transfer between tertiary education providers and industry. The PBRF metric is changing in 2016 to increase the incentives for Tertiary Education Organisations to win ERI, particularly from non-governmental sources. In addition, the PBRF fund component portions will change in 2016. The Quality Assessment portion will go down from 60 percent to 55 percent and the ERI portion will increase from 15 percent to 20 percent. In response to this Unitec has prioritised the growth of ERI. The performance measure for external research and related income (e.g. consultancy) of the Unitec Research & Enterprise Strategy 2015-2020<sup>3</sup> was that it would increase by 10 percent per annum, with the average of the last five years' of ERI (\$271,394) as a starting point. The ERI figure for 2015 is more than double what was targeted, as shown in graph 5 and graph 6 below. Based on current income levels, it is projected the target set out in the Unitec Research and Enterprise strategy will be significantly exceeded, as reflected in graph 6. Projections will be updated annually as actual income figures become available.

<sup>3</sup> Priority Area 3 – Improve and Support Researcher Performance: “The number of external grants awarded to Unitec staff increases 10 percent each year between 2015 and 2020.” P8  
[http://www.unitec.ac.nz/sites/default/files/public/documents/unitec\\_research\\_and\\_enterprise\\_strategy.pdf](http://www.unitec.ac.nz/sites/default/files/public/documents/unitec_research_and_enterprise_strategy.pdf)



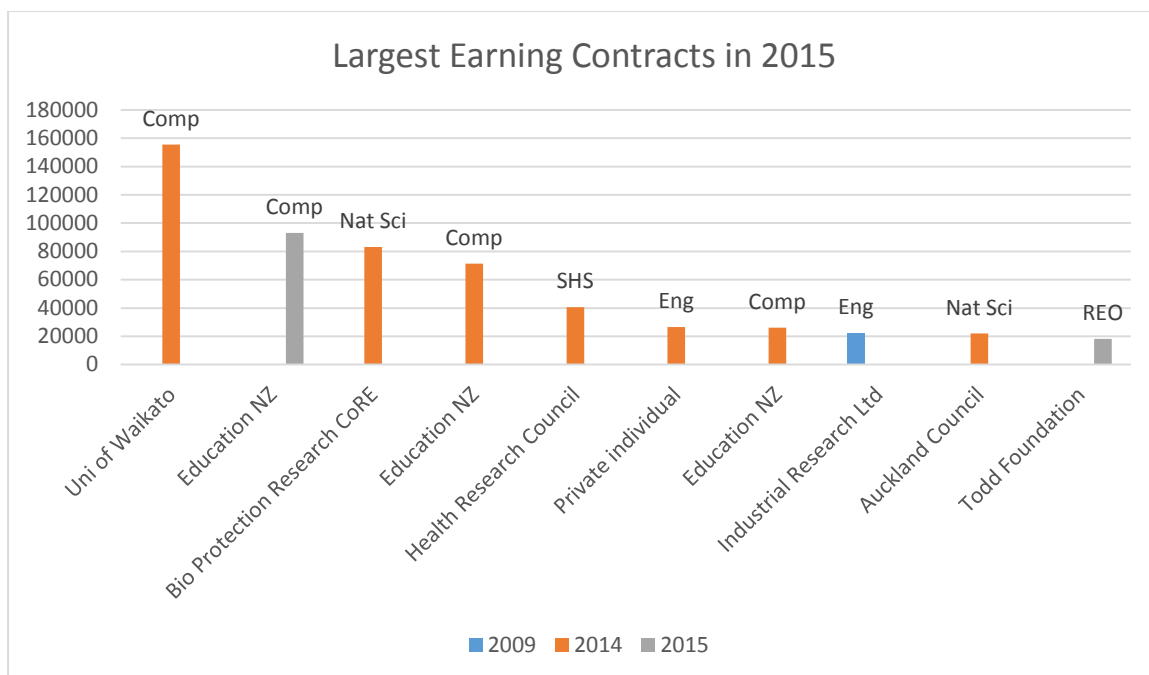
**Graph 5 – Income Recognised as External Research Income for the PBRF**



**Graph 6 – External Research Income Strategic Targets and Projections**

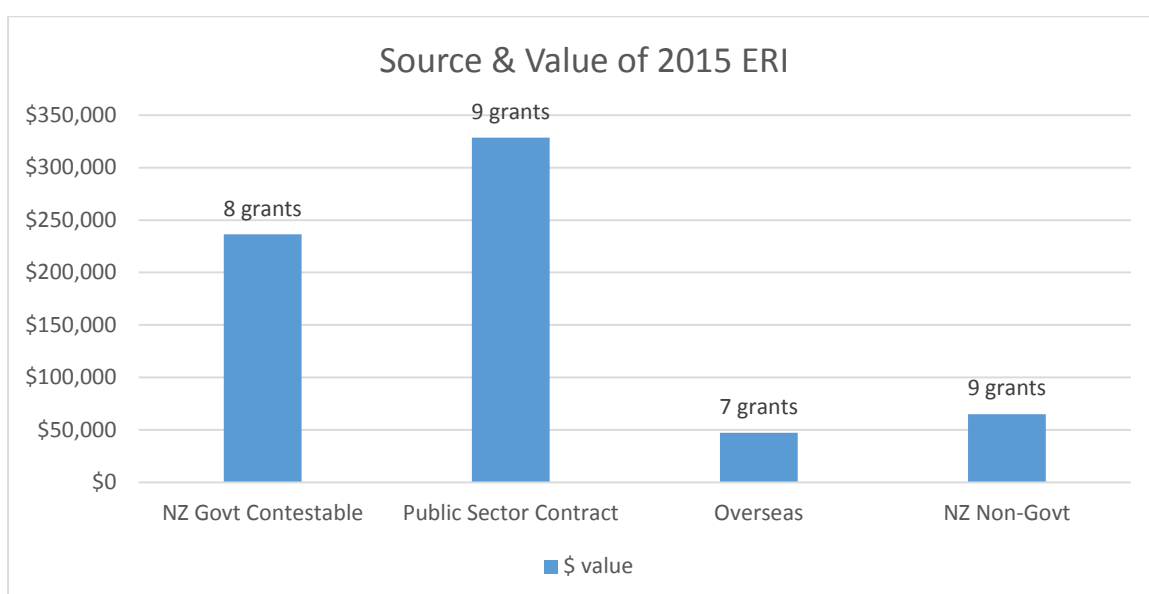
(Total Dollars represents actual income recognised as ERI in 2015. Projected income is \$100,000 above what was anticipated against the strategy targets).

The dramatic increase in ERI income in 2015 is mostly the result of a number of large grants that were won in 2014, which are now starting to generate income. Graph 7 shows the 10 contracts that generated the most income in 2015, the funding source and the year they were awarded. The largest contract is the six year STRATUS project, which demonstrates the importance of continuing to resource the development and management of large, multi-institutional projects which, if successful, will pay off over a number of years.



**Graph 7 – Largest Earning Contracts in 2015**

From 2017, New Zealand Government or public sector sourced research income will be weighted at 1, overseas income will be weighted at 1.5 and non-government sourced income (e.g. industry, private sector, non-government organisation) will be weighted at 2 for the purposes of calculating the ERI component of PBRF funding. As a consequence 2015 is the first year that the Tuapapa Rangahau has categorised ERI in this way. Graph 8 below shows ERI by source. It is pleasing to see that Unitec researchers are tapping into grants from a variety of sources, with the split between the different categories fairly even. However there is a significant difference between the amounts of funding from government and non-government sources which demonstrates that large government contracts are still an important source of funds for Unitec.



**Graph 8 – Source and Value of 2015 successful External Research Income applications**



## Section 4: Strategic Research Fund (Internal Funding)

In line with the strategy to increase ERI funding<sup>4</sup>, the Unitec Research Committee made external research income a priority criteria for achieving internal funding. In 2015 there were six proposals in total, five of which were funded, with a total investment of \$135,558.

Jonathan Leaver	Civil Engineering	Energy Independent Farming: UniQuad Stage 2	\$55,000
Dianne Roy	Nursing	Improving support for families/whanau of clients post stroke (phase three): Implementation and evaluation of a stroke navigator in post-stroke care services.	\$25,000
Gillian Whalley	Social and Health Sciences	New Echocardiography Reference Ranges for Aotearoa (NewERA)	\$20,000
Iman Ardekani	Computing	New generation of digital active noise control devices.	\$11,600
Arnja Dale & Jessica Walker	Natural Sciences	Stray Cats – the welfare versus predation risk of New Zealand’s unwanted cats.	\$23,958

Stats:

- Three applications involving government/local government partners
- Three applications involving non-government partners
- Estimated value of in-kind support from external sources \$271,500
- Financial contribution from successful applications involving government /local government partners \$199,974
- Financial contribution from successful applications involving non-government partners \$206,500

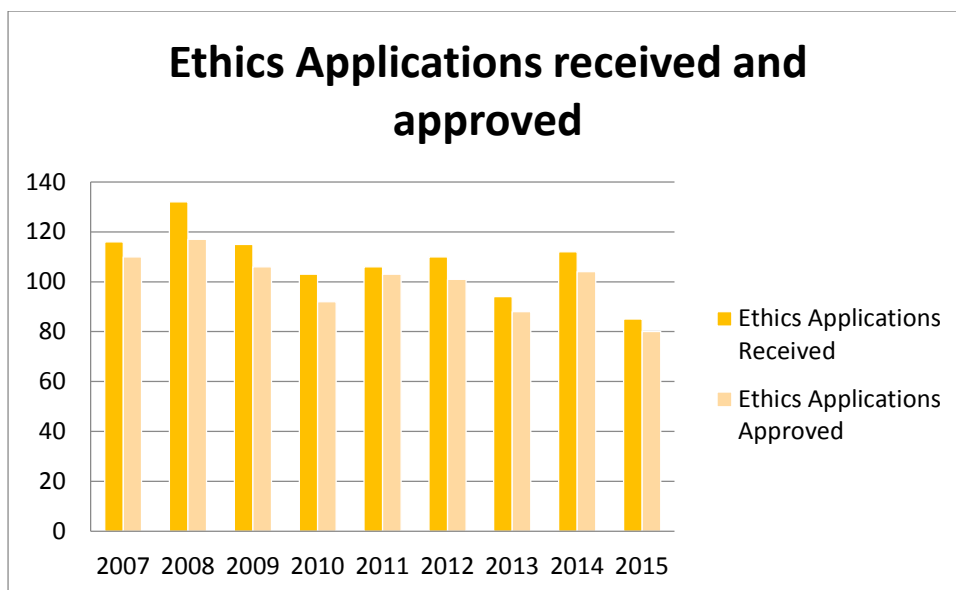
## Section 5: Ethics

The Unitec Research Ethics Committee (UREC) primarily assesses ethics applications for research projects involving human participants. Animal ethics proposals are contracted out to the University of Auckland.

In 2015 there were 85 applications received and 80 approved. This is a slight reduction from 2014 reflecting a small drop in ethics applications submitted by students and a significant drop in applications submitted for staff research. Student application numbers for 2015 are reflective of numbers from 2013, however staff research applications have decreased from 32 in 2013 and 38 in 2014, to 21 in 2015. It is difficult to predict why this is; the Dean is implementing a review to ascertain shifts at programme level in order to try and better understand the reasons for these changes.

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<sup>4</sup> Ibid



**Graph 9 – Ethics Applications Received and Approved**

## Section 6: Research and Enterprise Voucher Scheme

Launched in 2015, the scheme reached its target of 20 projects for the year; either under contract or completed. Projects from the “not for profit” sector considerably outnumbered those from SMEs at 75%. This is because most of the clients were referred to the scheme by staff and a fair proportion of these referrals came from Social Practice. We are expecting to see a shift in 2016 as the impact of the Research Partner Enterprise emerges. The scheme will be publicised into ATEED and Auckland Business Associations to increase SME engagement.

The scheme aims to increase responsiveness to external stakeholders by providing a professional development and networking framework for staff to respond to community and business needs, resulting in knowledge transfer through published reports. 31 organisations or companies were engaged in the scheme in 2015 with 21 projects complete or under contract, involving 17 staff from 10 disciplines and growing numbers of students as assistants. Essentially, Tuapapa Rangahau takes care of business, staff lead the research and students work with them, building strategic relationships with prospective employers of our graduates.

## Section 7: Strategic Research Foci

Cybersecurity was identified as a key research focus area for Unitec in 2014 and received acceleration funding for 2015. The outcomes have been significant and considerable opportunities continue to present themselves. Here are some of the achievements and publicity outcomes;

[http://www.nzherald.co.nz/unitec/news/article.cfm?c\\_id=1503887&objectid=11572119](http://www.nzherald.co.nz/unitec/news/article.cfm?c_id=1503887&objectid=11572119)

[http://www.nzherald.co.nz/sponsored-stories/news/article.cfm?c\\_id=1503708&objectid=11546083](http://www.nzherald.co.nz/sponsored-stories/news/article.cfm?c_id=1503708&objectid=11546083)

[http://www.nzherald.co.nz/sponsored-stories/news/article.cfm?c\\_id=1503708&objectid=11527809](http://www.nzherald.co.nz/sponsored-stories/news/article.cfm?c_id=1503708&objectid=11527809)

- Winning a \$2.2million grant for the STRATUS cloud security project developing new cybersecurity solutions.
- Winning a bid to host a top international cybersecurity conference at Unitec, the PST 2016: International Conference on Privacy, Security and Trust (PST).
- Launching the Red Alert system in partnership with NICT in Japan which will alert companies and organisations to a cyber-hack in real time.
- Attracting 22 Prime Minister's Scholarships for Asia for Unitec students to travel to China and Japan to study cybersecurity and the Internet of Things.
- Establishing the double doctoral degree programme with NARA Institute of Science and Technology in Japan.
- Developing a strong relationships with industry and government, including the Office of the Prime Minister and members of the Cabinet.
- Establishing the HealthCheck which provides Cybersecurity diagnostics for SME's by small teams of students led by staff; facilitating work based learning opportunity for computing students.

Applied Molecular Solutions was identified in 2015 and received partial acceleration funding in Semester Two. The foundations for meeting the aims of this strategic initiative have been laid down and a number of projects have been identified and initiated including;

- Developing a novel molecular method for the description of seabird diet. Describing the diet of Westland Petrels and compare this to earlier studies published in the 90s.
- Understanding how gut microbial communities can influence invasiveness in insects. Understanding the potential threat represented by invasive insect species currently on Pacific Islands.
- Measuring to what extent ecosystem-scale translocation conserves biodiversity at various levels (genetic, species and functional diversity) in a mining context.
- Identifying naturally-occurring fungal pathogens of the invasive African clubmoss (*Selaginella kraussiana*) and testing these for efficacy as biocontrol agents.
- Evaluating the accuracy of epigenetic analyses for assessing animal welfare in commercial chickens and establishing a methodology for analysing epigenetics from fresh meat.
- Locating and identifying some of the 900+ data deficient lichen species of New Zealand. Obtaining DNA sequence data to understand their relationships and confirming their identity.
- There are currently seven papers in submission to journals.
- New grants have been received from the Bio-Protection Research Centre, Department of Conservation, Auckland Council and Australia Pacific Science Foundation.

## Section 8: Unitec ePress

ePress continued to strengthen its presence at Unitec in 2015 with the appointment of an Associate Editor in September and the release of several specialist publications. An impressive 23 outputs involving more than 70 (mostly) Unitec staff from across nine departments in the reviews, editing and publishing processes.

Highlights include release of the inaugural volume of Whanake – the Pacific Journal for Community Development, the first of its kind in the region; the launch of Interdisciplinary and multi-format series Perspectives on Biosecurity, facilitated by the Natural Sciences department; and Building Tomorrow – Saving Today: Construction and Deconstruction Conference Proceedings. Further to the release of these publications, several significant events characterized the year including ePress's selection as a best practice case study for the book A Quiet Revolution: Growing Creative Commons in Aotearoa New Zealand and receiving its institutional membership to Digital Forum NZ (signalling opportunity to represent Unitec within this important forum).

ePress aims to stimulate innovation in scholarly communication in support of research and teaching at Unitec. It does this not only through facilitating a diverse range of digital, often multimedia outputs but also by working closely with Tuapapa Rangahau to help "first time" researchers to publish. 2015 saw the strengthening of this relationship through the allocation of space for ePress Associate Editor within Penman House where Tuapapa Rangahau and postgraduate student study commons are based.

Important functions of this online, Open Access, Creative Commons licensing, scholarly publishing house is to ultimately provide support for emerging researchers and a forum for disseminating the outcomes of projects funded under the Research Voucher Scheme.