



# Unitec Research Annual Report 2019

**Prepared by**

**Tūāpapa Rangahau, partnering research and enterprise**

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## 1 Preface

The Unitec Research and Enterprise Strategy 2015-2020 responds to a government directive that the tertiary education sector achieves greater connectivity and responsiveness to industry. This challenges us to forge a deliberate and unique place for Unitec in applied and impactful research for the benefit of iwi, community and business.

Our three strategic drivers are:

- To improve the quality of our research through staff **capability development** so that staff are equipped to undertake impactful research and enterprise activities.
- To **increase external engagement** by building more and deeper research relationships with industry to improve the relevance of our research and achieve greater transfer of knowledge, ideas and expertise to industry and wider society.
- To create **greater strategic focus** to our research, so Unitec gains a competitive reputation in specific areas of research and enterprise.

To respond to these strategic drivers, in 2019 we focused on four research targets:

- **Industry Funded Projects:** research and enterprise projects Unitec is receiving funding for, where the organisation is private sector or public sector and where the service Unitec is providing is applied contract research or consultancy.
- **External Research Income (ERI):** income received from external sources for research purposes.
- **Research Productivity:** most staff teaching on degree level programmes at Unitec are engaged in research.
- **Quality Assured Research Outputs:** research publications and creative outputs that have been through a peer-reviewed process or have been specifically commissioned.

The continued dedication of committed research staff, Research Leaders, Principal Investigators and Tūāpapa Rangahau colleagues ensured 2019 was a year of many successes for Unitec research. Here are some highlights, which are reported more fully in the body of the report below:

- Unitec recruited one of New Zealand's top kaupapa Māori researchers, Professor Jenny Lee-Morgan, who established a new research centre, **Ngā Wai a Te Tūi, Māori and Indigenous Research Centre**, and won numerous externally funded grants including a \$3.5m MBIE Endeavour Fund Research Programme grant for *Marae Ora, Kāinga Ora (MOKO): Marae-led housing interventions that develop kāinga*. Dr Leonie Pihama was also recruited to Unitec as a Professor, bringing her nationally significant project MBIE funded project *He Waka Eke Noa* with her.
- The number of programmes meeting the **Research Productivity Traffic Light (RPTL)** 'green-lit' standard, which measures the engagement in research of staff teaching on degree programmes, increased to 82%, with 93% of programmes meeting the NZQA requirement that most staff on degree programmes are research engaged.
- Associate Professor Terri-Ann Berry had her proposal for a new research centre accepted. The Environmental Solutions Research Centre is implementing a \$400k project looking at the biological remediation of asbestos, funded by the Ministry for the Environment.

Something that has been slowly emerging in the research space at Unitec is student integrated research and this has really flourished in 2019. It's a real point of difference in the ITP sector with many benefits

for students, teaching and learning, work integrate learning, industry/community partners and staff who are merged through the collaborations that inevitably develop. Some of these stories are detailed in sections 6 through to 6.5.4, including the IBM Postgraduate Scholarships for industry/community partnered projects, the Bold Innovators Scholarship for young entrepreneurs, through to staff led research projects which are integrated into credit bearing assignments in programmes like the Bachelor of Architecture and the Masters of Architecture(Professional). In 2019 the Unitec Research Committee made a start on, but delayed the finalisation of, the next five-year Unitec Research and Enterprise Strategy (2020-2024) due to the RoVE and the rapidly unfolding NZIST, with all the inevitable changes that would mean. Unitec worked closely with the other ITP Research Directors in preparation for the NZIST to ensure that the value proposition and potential of the community- and industry-partnered research that our sector does is continued. In both our emerging new strategy and our work with colleagues in the sector, we are preparing for a combined research capability that will make a profound contribution to the experience of our students and to the stakeholders that we serve.

A handwritten signature in black ink, appearing to read 'M Williams', is positioned above a faint, illegible stamp.

Associate Professor Marcus Williams

Director Tūāpapa Rangahau, partnering research and enterprise

## 2 Building staff capability in research

Unitec needs ‘engaged and inspired staff’ who have the capability and expertise to address and respond to a wide range of social, industrial and environmental challenges. Capable staff foster the development of ‘highly employable life-long learners’ who will contribute to a ‘highly skilled, innovative and enterprising New Zealand workforce.’

In 2019, Tūāpapa Rangahau continued to prioritise raising the capability of Unitec staff, particularly those teaching on degree-level programmes, to undertake research, disseminate their research findings and attract external research and development funding to progress their initiatives.

Unitec researchers are at various stages in their research careers, therefore capability-development initiatives were tailored to Unitec staff according to whether they were new and emerging (beginner), early career (well published, intermediate) or advanced (senior leader, professoriate) researchers. The capability-development initiatives were also targeted to respond to the requirement to lift Unitec’s research productivity (as measured by the Research Productivity Traffic Light [RPTL]).

### 2.1 Developing our staff – research professional development series

Tūāpapa Rangahau’s professional development series was founded in 2016 to improve the level of staff research capability, to encourage and assist staff to disseminate the results of their research and to link staff to industry-partnered opportunities. A part-time staff member at Tūāpapa Rangahau, in the role of Research Professional Development Liaison, organises the series each year and facilitates several of its components.

Figure 1 shows the numbers of staff who enrolled in research workshops and writing retreats in 2019. As in the past, uptake in 2019 indicates high levels of staff engagement across the Institute.



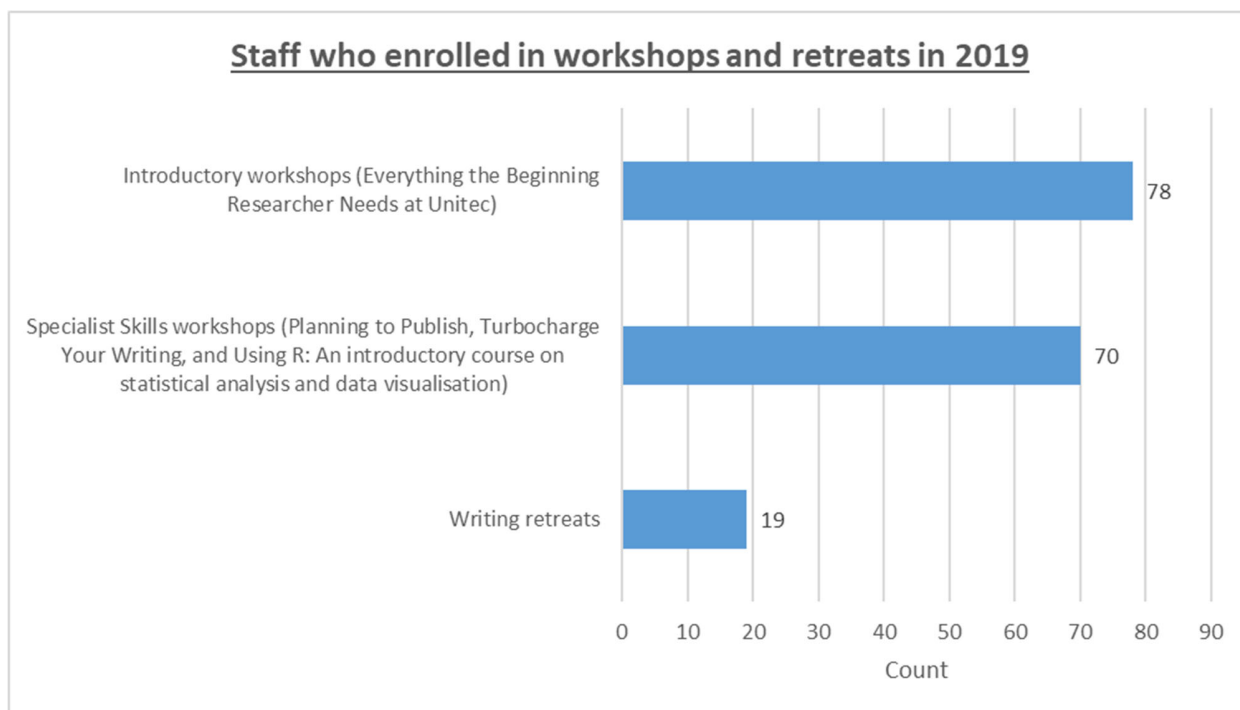


Figure 1: Staff enrolments in the research professional development series in 2019

Writing retreats are relatively inexpensive opportunities for staff members (upon application and selection) to devote dedicated time and energy to producing research outputs in a supportive and collegial yet intensive environment. Early indications are that specialist skills workshops on writing and publishing, alongside the writing retreats and the offering Using R: An introductory course on statistical analysis and data visualisation, led to increased levels of research activity and output dissemination. These events also served to lift staff morale and inspired greater confidence that research is supported and valued at Unitec.

Figure 2 shows the number of staff who enrolled in the specialist skills workshops.

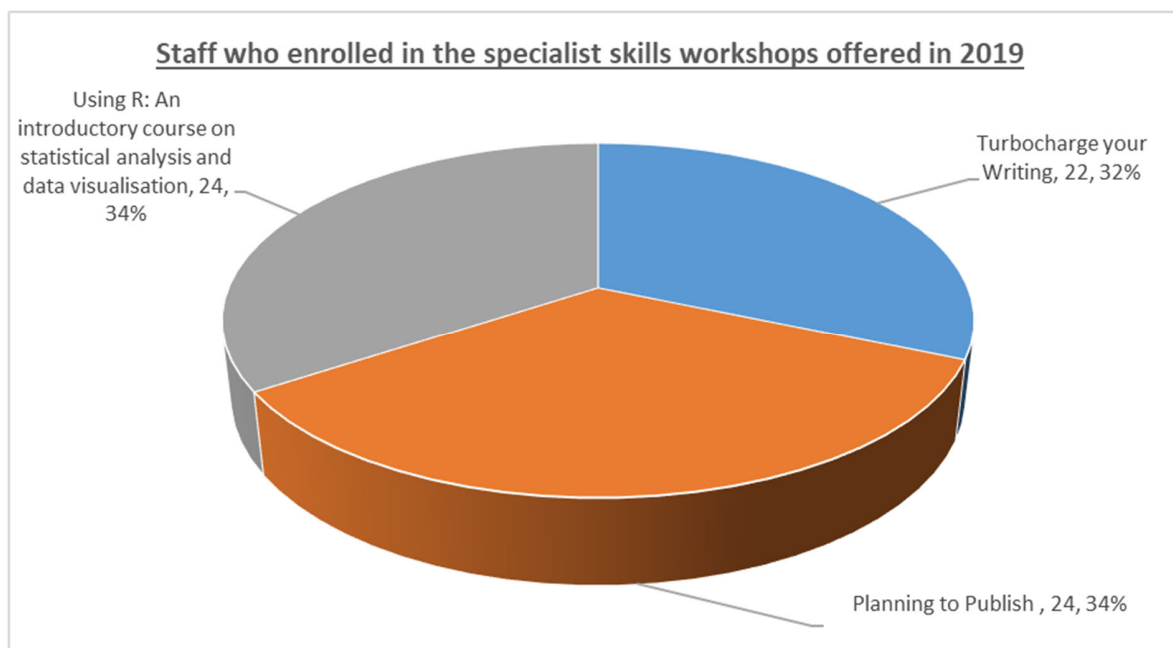


Figure 2: Staff enrolment in specialist skills workshops offered in 2019

In addition, in 2019 Tūāpapa Rangahau piloted a set of workshops aimed at professional development specifically for Level 9 and 10 supervisors. Sixteen staff members participated in offerings such as Introduction to Sage Research Methods Database; Research Ethics: How to Prepare a Strong Application; and Industry Research, Staff/Student Collaboration Workshop. Based on positive feedback received, Tūāpapa Rangahau plans to further develop such offerings, starting in 2020.

Unitec's PhD Leaders Programme was launched in 2018. Facilitated by the Research Professional Development Liaison, this programme provided research leadership training and 0.2 FTE additional research time for staff members pursuing an industry/community-engaged PhD. In 2019 we had four staff members participating in this programme in four different disciplines. Feedback from participants showed the benefits of the programme were:

- increased confidence in research and research leadership capabilities;
- mutual learnings across disciplinary boundaries;
- research engagement extending beyond specialist fields of study;
- increased ability to support others' research (in a mentoring capacity).

A decision was reached in 2019 to discontinue the PhD Leaders Programme at the end of the year due to a bonding requirement commencing in 2020 that only one participant was in a position to take up. Accordingly, Tūāpapa Rangahau began to develop plans, to be initiated in 2020, to continue to offer support by other means to Unitec staff pursuing PhDs who have potential to grow research leadership and who are on track to submit a competitive PBRF portfolio for the 2024 PBRF round (the latter were core criteria for participation in the PhD Leaders Programme).

Last year saw the initiation of a new and highly successful programme: a year-long research skills and development course offered through Nelson Marlborough Institute of Technology, made available to Unitec staff on a contestable basis (via a formal expression-of-interest application). Fully funded by Tūāpapa Rangahau (at relatively low cost), the course is open to emerging researchers at Unitec and focuses on academic writing for high impact, as well as developing long-range plans for research and dissemination productivity. As part of course requirements, participants commit to submitting a high-quality piece of writing to a peer-reviewed journal. Seven Unitec staff members participated in the course in 2019, and all seven cited its enormous benefits in progressing their research skills and plans, and in motivating ongoing research activity. By March 2020, five Quality Assured outputs were accepted for publication or published as a direct result of this programme.

Twenty-two staff members completed the Successful Postgraduate Supervision course in 2019. This blended and ‘flipped’ course is very highly regarded and serves as a permanent resource for postgraduate supervision practice. Two additional courses on offer (online) include Writing a Successful Grant Application and Managing a Research Contract. Course participation is largely self-managed; any Unitec staff member can self-enrol to access course resources and learning activities.

Evaluation data for the 2018 Research Professional Development series reveal very positive reception and benefits. For example, taken together, 88% of respondents gave a 5 out of 5 rating to the workshops Turbocharge Your Writing and Planning to Publish, and the remaining 12% rated them 4 out of 5.

The following quotes are representative of most participants’ experiences of the writing retreats offered in 2019:

- “Extremely valuable experience, perfect location. I was able to focus my energy and all my time on writing with fantastic results both in quantitative and qualitative terms. I also enjoyed the location and the company!”
- “[T]he retreat was well organised and the setting perfect to allow for thinking, sharing, reading and contemplation, all very valuable parts of my job. It felt glorious to have time to read and discuss academic and philosophical issues with other like-minded people.”
- “Once again it was a fantastic opportunity. Helen [Research Professional Development Liaison at Unitec and retreat facilitator] is excellent support and the group dynamic was fantastic. A really good retreat. Thank you very much for the support.”
- “I am very grateful for the opportunity provided for me. It was a productive and effective retreat. The food was amazing and the environment was second to none. Helen did a great job. She let us get on with our work and was responsive to our needs. Thanks!”

## 2.2 Supporting our researchers – internally funded research projects

In 2019, Unitec had one annual contestable funding round for staff-initiated research projects: The Early Career Researcher (ECR) Fund. Applications for ECR funding are appraised by a Grants Assessment Committee, a sub-committee of the Unitec Research Committee.

In 2019, four ECR projects were awarded contestable funding totalling \$38,235.

Two new internal funds were introduced in 2019; the ECR Research Support PhD/Doctorate for PBRF Portfolio, along with the New Researcher Project Start-up Fund (NRPSF). Successful applicants to these funds are required to report at least twice to Tūāpapa Rangahau on the progress, challenges and highlights of their research projects. In addition to being the ‘funder’, Tūāpapa Rangahau also provides project and

administrative support to the Lead Researchers to ensure they are well placed to successfully deliver their projects.

The NRPSF provides a small budget to support new researchers to team up with an experienced researcher to undertake a research project. The fund provides a pathway for these new researchers to become research active and to contribute to their School's Research Productivity Traffic Light results. Only one project team was awarded NRPSF funding in 2019, totalling \$4,200.

A new ECR support fund, PhD/Doctorate Toward PBRF Portfolio Fund, is an integral component of a range of initiatives designed to support research and enterprise at Unitec. This fund invests in Early Career Researchers whose work is aligned with the Unitec Research and Enterprise Strategy, Te Noho Kotahitanga and Unitec's values. In 2019, a total of \$2,447 was used to support a staff member who was certain to complete a PhD/Doctorate in a period leading toward a PBRF review.

Other contestable funding rounds are offered on a case-by-case basis.

The 2019 awardees are listed in Tables 1, 2 and 3 below, along with selected highlights from some of the funded projects.

### 2.2.1 Early Career Researcher (ECR) Fund

The ECR contestable funding supports both emerging and established early-career researchers at Unitec, in order to develop their capability, capacity and career progression.

Lead Researcher	School	Project name
Kristina Naden	Environmental & Animal Sciences	Assessment of the health and welfare status of dogs in Tonga
Paul Woodruffe	Creative Industries	Piki Project
Maryam Mirzaei	Applied Business	Application of the Theory of Constraints to change management
Min Hall	Architecture	Project Pātūtū – Stage 1

Table 1: 2019 Early Career Researcher Fund projects supported

While several of these ECR projects are still underway, a few 2019 highlights to date are:

- **Paul Woodruffe** partnered with Lifewise Trust, Datacom and Heart of the City on the Piki Project, a multiyear project aiming to address the results of homelessness on individuals. The project was conceived as a way to replace 'hustling' on the streets of central Auckland by facilitating entrepreneurship for people with lived experience of homelessness. The next step will be investigating how technology can be leveraged to replace hustling with trading.
- **Kristina Naden** and her research team, in collaboration with Joseph Cecil from REM Systems, endeavoured to evaluate the general health and welfare status of dogs on the Tongan island of Tongatapu. A range of health and welfare assessments were carried out, including faecal and blood tests, body condition score and weight, and a survey to assess the relationships between humans and dogs. This research will benefit those working with animals in Tonga and the Pacific

Islands, and enable them to better understand the possible underlying health conditions or challenges dogs may have.

- **Maryam Mirzaei's** research team worked with Foodstuffs, a major supply-chain player in New Zealand. The research enhanced the collaboration with this key industry partner, and offered a great opportunity to gain valuable insight to practices within the industry, which in turn will have future impact on our teaching practices and industry engagement. The research focused on the implementation process of a new SAP system in the Four Square retail outlets as a case study. This research offered insights into the challenges of digitisation and supply-chain integration. It also demonstrated that resistance to change from affected stakeholders can be a valuable source of information on aspects such as overlooked risks, unidentified behaviours and work patterns that can guide planning and implementation of successful change. The findings show both challenges and newfound benefits from the introduction, and several simple measures that could have been taken to manage stakeholders' expectations and make the process more successful.
- **Min Hall's** Project Pātūtū Stage 1 was the first stage of a larger project, likely to span three to five years. It addressed the dilemma faced when building thousands of new houses in Aotearoa New Zealand, while also trying to reduce greenhouse gas emissions. The overall goal is to develop a prefabricated bio-based wall-panel system for house production using plantation-grown timber and straw. For Stage 1, there were three aims. The first was to investigate a variety of panel sizes, timber frame options, connection options, and straw bale orientations to arrive at the project outcome – a wall-panel system best suited for further development. This would involve the construction and subsequent analysis of part- and full-scale wall-panel prototypes. The second aim was to develop the relationship, already established, with cereal grain growers via their research organisation, the Foundation for Arable Research, and investigate their capacity to supply straw for commercial production. The third and final aim was to seek partners for the ensuing stages of Project Pātūtū.

### 2.2.2 New Researcher Project Start-up Fund (NRPSF)

The NRPSF is targeted to support research projects with strong mentor–mentee relationships and goals. The following project was funded in 2019:

Lead Researcher	School	Project name
Patrick Dodd	Applied Business	Student learning experiences as they interact with authentic assessments

Table 2: 2019 New Researcher Project Start-up Fund project supported

**Patrick Dodd's** project aimed to investigate the efficacy of assessments in student learning and engagement. This project, which was awarded \$2,700, is an example of the way the fund is used to support researchers from programmes that are not meeting the minimum NZQA standards for research productivity to become research engaged, and to support staff collaboration on research that results in outputs for multiple staff and that provides an opportunity for staff to develop their research leadership capabilities.

### 2.2.3 PhD/Doctorate Toward PBRF Portfolio Fund

The PhD/Doctorate Toward PBRF Portfolio Fund is targeted to support staff who are certain to complete a PhD/Doctorate in a period leading toward a PBRF review.

The following staff member was funded in 2019:

Lead Researcher	School
Wajira Dassanayake	Applied Business

Table 3: 2019 PhD/Doctorate toward PBRF Portfolio Fund awarded

The PhD/Doctorate toward PBRF Portfolio Fund highlights:

- **Wajira Dassanayake** was awarded \$2,447 to cover the DCOMP tuition fee. This is an example of the way the fund is used to support a staff member who is certain to complete a PhD/Doctorate in a period leading toward a PBRF review.

## 2.3 Focusing on research productivity – research outputs

Research outputs have been a key measure of Unitec's research performance for some time, which enables longitudinal data to be reported. Research outputs are the way researchers contribute to the store and accumulation of human knowledge. They include articles, books, conference papers and less-traditional forms of research dissemination such as patents, websites, films, exhibitions, reports for industry, government, etc.

This year's annual target, as outlined in Unitec's 2019 Annual Report to the Tertiary Education Commission, was to produce 368 quality assured<sup>1</sup> outputs. As demonstrated in the results that follow, we did meet our annual target for this measure. The 2019 figures are indicative only because staff have not yet fully reported their outputs. We expect the final figures to increase in 2020.

### 2.3.1 Total Unitec research outputs

A total of 514 research outputs were delivered in 2019. Some 404 (79%) were quality assured (QA) and the remaining 110 (21%) were not quality assured (non-QA). **Error! Reference source not found.** shows the overall count, which is similar to 2018.

Recording research outputs is a retrospective process because staff continue to add research outputs to Unitec's research output management system (ROMS) each year. As new staff publish, they also add their research activity for previous years. These retrospective additions mean that the research outputs for each year continue to rise.

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<sup>1</sup> Quality assurance means that the research output has undergone a peer-review process before publication and assures the consumer of the research of its veracity.

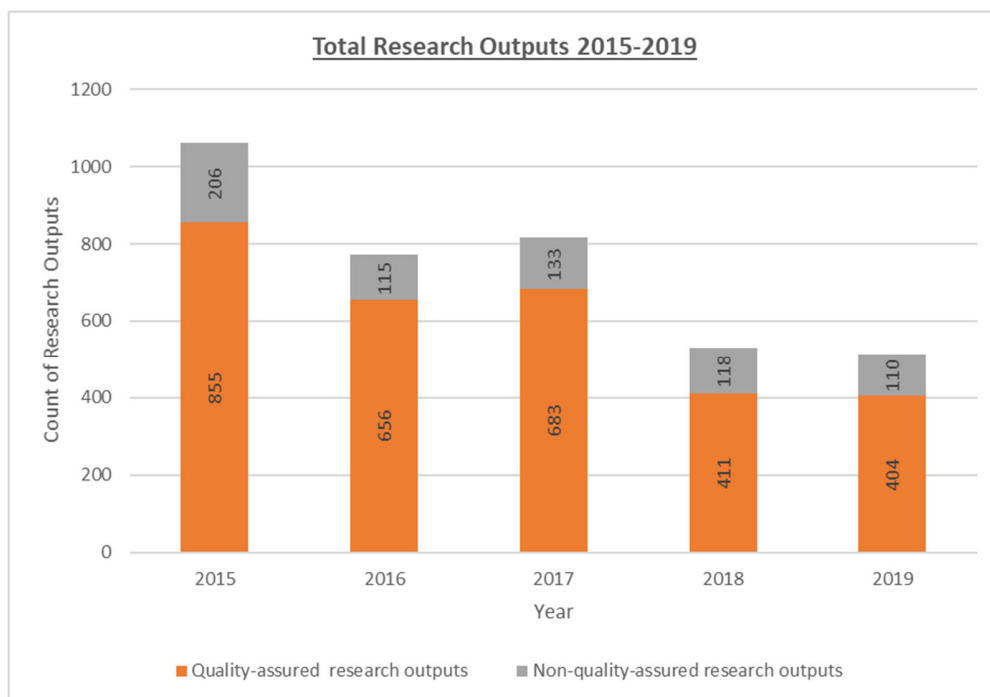


Figure 3: Quality- and non-quality-assured research outputs

The number of QA research outputs as a percentage of total outputs produced annually grew significantly leading up to 2017 and then dropped in 2018, see Figure 4. This may be partly due to an increase in research activity that tends to occur towards the end of a PBRF cycle (2017 was the last year for research publication for the most recent PBRF round).

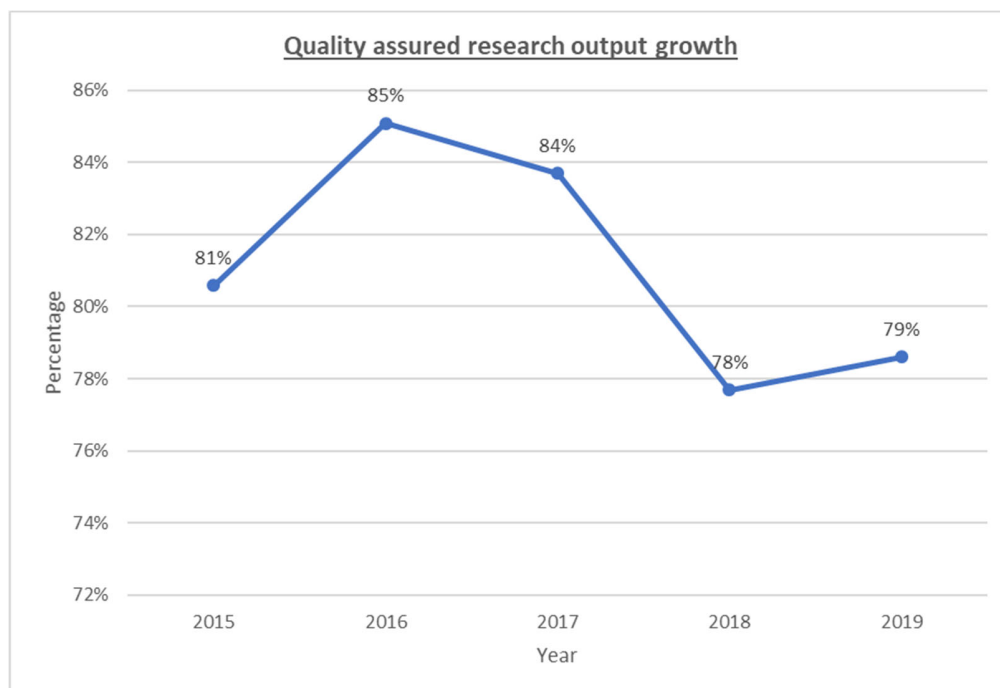


Figure 4: Quality-assured research output growth

### 2.3.2 Research outputs by School

Figure 5 illustrates the total QA and non-QA research outputs produced by each School in 2019. The category 'other' represents research outputs from Academic Development, Tūāpapa Rangahau and Te Miro.

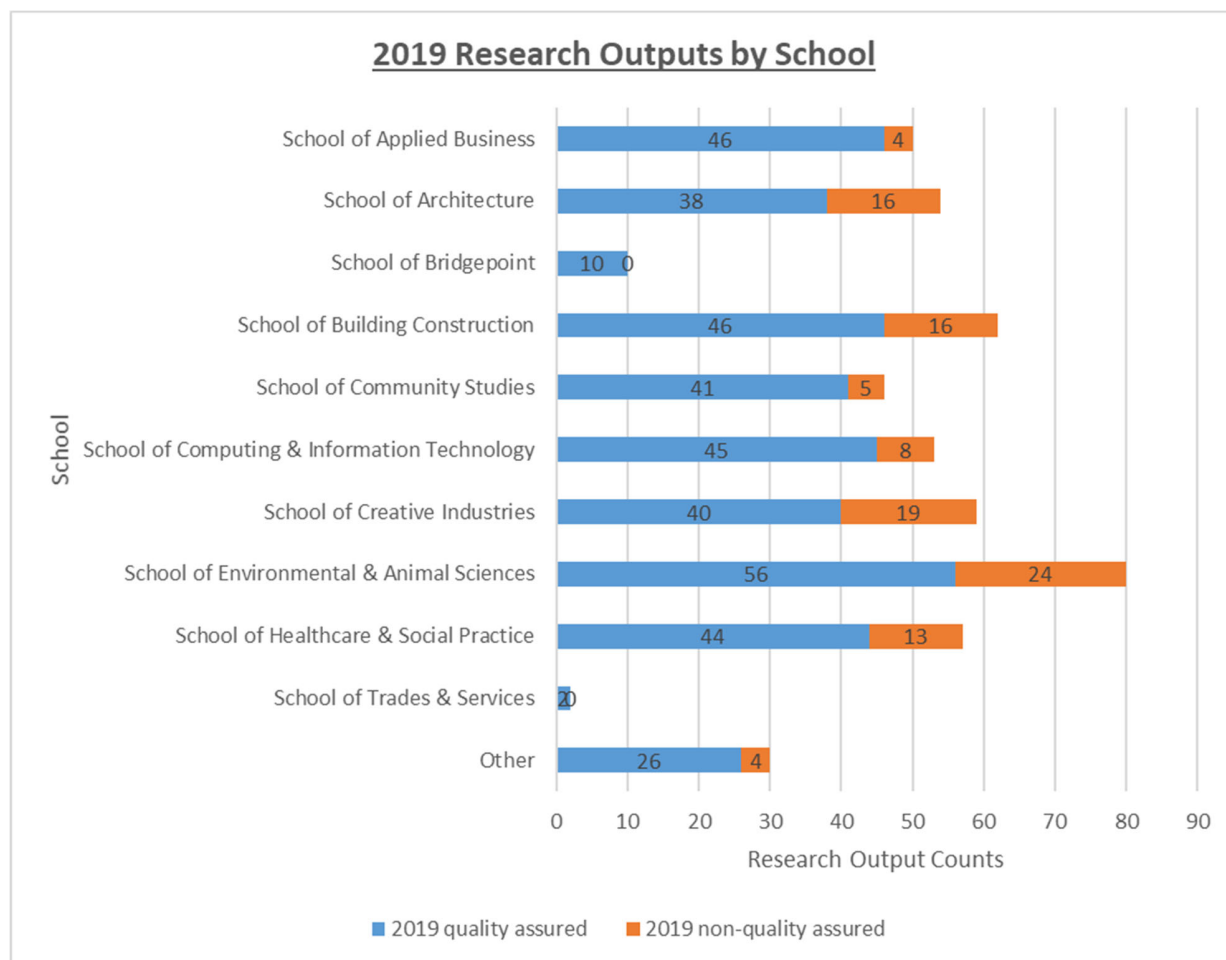


Figure 5: 2019 QA and non-QA research outputs by School

While it is acknowledged that not all 2019 research outputs were included in ROMS at the time of this report, the current results show a high degree of variability in research output productivity across the Schools. However, these total counts need to also be seen in the context of the total research-active FTE within each School.

School	QA outputs per research active FTE
Environmental & Animal Sciences	3.45
Applied Business	1.88
Building Construction	1.80



<b>Computing &amp; Information Technology</b>	1.65
<b>Creative Industries</b>	1.64
<b>Architecture</b>	1.50
<b>Community Studies</b>	1.49
<b>Healthcare &amp; Social Practice</b>	1.46

shows the number of QA research outputs achieved per research-active FTE within each School.

<b>School</b>	<b>QA outputs per research active FTE</b>
<b>Environmental &amp; Animal Sciences</b>	3.45
<b>Applied Business</b>	1.88
<b>Building Construction</b>	1.80
<b>Computing &amp; Information Technology</b>	1.65
<b>Creative Industries</b>	1.64
<b>Architecture</b>	1.50
<b>Community Studies</b>	1.49
<b>Healthcare &amp; Social Practice</b>	1.46

Table 4: QA research outputs per research-active FTE in 2019

In 2019 Unitec produced an institutional average of 1.9 QA research outputs per research-active FTE. The target<sup>2</sup> for 2019 was 2.4 QA research outputs per research-active FTE. The School of Environmental and Animal Sciences was the clear front-runner, demonstrating high QA research-output performance in 2019 by producing 3.45 QA outputs per FTE.

### 2.3.3 Research dissemination support to Schools

Disseminating research through attendance and presentations at academic conferences is an important and necessary part of academic careers. This provides opportunities to generate peer-reviewed research outputs (one measure of an academic's productivity), to provide staff professional development and networking opportunities and to gain the latest knowledge and advances regarding a specific discipline. Unitec provides the Research Dissemination Fund, managed by Tūāpapa Rangahau, to support academic staff in the dissemination of new knowledge at conferences, promotion of Unitec research and increasing external recognition.

A total of \$130,000 was available across Unitec's Schools to support research dissemination but not all of this was spent due to the travel restrictions that were necessary as Unitec worked to return to a financially robust operating model. Submitting multiple papers with one presenter, presenting papers via conferencing software and papers presented at conferences for publication in proceedings are a few examples of how staff adapted to the restrictions. While retaining this economy of practice is desirable, a sustainable resourcing model for research dissemination, which ultimately builds the foundations for the 2024 PBRF submission, is essential. A sub-total of \$84,052 was used to support 57 individuals to

<sup>2</sup> This target was set as part of the Enabling Strategies process.

disseminate their research (averaging \$1,475 per person). Some travel occurred, with 40 presenting at New Zealand conferences and 17 presenting at international conferences. The remaining monies were used to assist with writing, publishing and exhibiting research work. The allocation of resources for research dissemination at Unitec is a collaborative process between Schools and Tūāpapa Rangahau. The process of prioritisation aims to ensure that the resourcing gets to where it is needed most to make the biggest impact on our priorities. In addition to Unitec funding, three staff were partially funded by external organisations to disseminate their research outputs, providing a strong indication of the quality and relevance of their research.

### 2.3.4 Professoriate

*Ko te amorangi ki mua, ko te hāpai ō ki muri.*

*The leader is in front and the food bearers behind.*

The professoriate are researchers who have gained national and international recognition and have reputations as leaders in their disciplines. The goal for the Unitec professoriate is to share their knowledge, skills, time, passion, listening ear and selves with colleagues, students and industry stakeholders for the better of society. The professoriate advocate for their disciplines by collaborating, presenting, engaging in public and building teams across the organisation to catalyse research potential at Unitec. Supervising new and emerging researchers is a key part of the professoriate's mission.

The professoriate run the Unitec Professorial Research Mentoring Framework, which involves every member mentoring an emerging researcher through to co-authorship in a recognised publication, or supporting researchers to be the lead on their own paper. This framework continues to contribute to the overall aim that every degree programme will be green lit in the Unitec Research Productivity Traffic Light (research engaged) by 2020.

Members of the professoriate show leadership across many aspects of the institute. Some examples are:

Deputy Chair of our Health Research Council-accredited research ethics committee. Principal Investigator on externally funded projects.	Associate Professor Nigel Adams
Director, Ngā Wai a te Tūi, Māori & Indigenous Research Centre. Principal Investigator on externally funded projects.	Professor Jenny Lee-Morgan
Director, Environmental Solutions Research Centre. Principal Investigator on externally funded projects.	Associate Professor Terri-Ann Berry
Director, Applied Molecular Solutions Research Centre. Principal Investigator on externally funded projects. Curator, Unitec Herbarium.	Associate Professor Dan Blanchon
Director Research and Enterprise. Chair of two sub-committees of Academic Board, Investigator on externally funded projects.	Associate Professor Marcus Williams
Professional Development Liaison	Associate Professor Helen Gremillion
School Research Leaders	Associate Professor Linda Kestle (Principal Investigator on an externally funded project) Associate Professor Leon Tan Associate Professor Jonathan Leaver (Investigator on an externally funded project) Associate Professor Lian Wu (Principal Investigator on an externally funded project) Associate Professor Christoph Schnoor

Table 5: Members of the professoriate

In addition, members of the professoriate commonly serve as Principal Supervisors on postgraduate research degrees and lead the development of new academic programmes.

## 2.4 Research Productivity Traffic Light (RPTL)

In order to monitor the extent to which degree programme teaching and supervision is underpinned by research activity, an NZQA requirement, Unitec's Academic Board approved the use of the Research Productivity Traffic Light (RPTL) Report. This report was first presented to the Academic Board in 2012 and has been produced annually since then.

The Unitec Research and Enterprise Strategy 2015-2020 outlines Unitec's aspiration with regard to RPTL performance, stating that all programmes at degree level and above will be rated 'green' by 2020.

### 2.4.1 RPTL terms of reference and methodology

Following is an overview of the key terms of reference and methodology approved by Academic Board:

- The criteria for inclusion is permanent full-time or part-time staff, or staff on contracts of 12 months or more, with an FTE of at least 0.2 who significantly taught and/or supervised on degree and above level courses during Semester One 2020.
- For the purposes of the RPTL, a 'research active' staff member is defined as someone who produces at least two eligible research outputs that are verified in ROMS (Unitec's research output management system) within the past two years. For part-time staff, the criteria are at least one research output for the two previous audited years.
- The current 2020 report is based on staff research activity as recorded in ROMs for the 2018 and 2019 period.

### 2.4.2 Research productivity status of Unitec degree programmes

The RPTL analysis uses a traffic-light colour system to represent levels of research activity in each degree programme:

- **Green** is the required standard, where at least 75% of staff teaching and/or supervising on the programme are producing the required number or more of outputs for the two-year period under review.
- **Amber** is marginal, with 50-74% of staff producing the required number or more of outputs.
- **Red** is below standard, with under 50% of staff achieving the required number of outputs.

In the 2020 reporting period, Unitec maintained the consistent gains made since the RPTL report was introduced in 2012 (see Table 6 and Figure 6 below), however the rate of progress has slowed. As shown in Table 6 below, in 2019, 33 degree programmes were green lit (79%), seven programmes were amber lit (17%), and two were red lit (5%). In 2020,<sup>3</sup> 28 degree programmes are green lit (82%), three programmes are amber lit (9%), and three are red lit (9%).

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<sup>3</sup> In 2020, there were 34 active degree programmes, while in 2019 there were 42; a difference of eight programmes. Out of these eight, four degree programmes were taught out at the end of 2019. The remaining four programmes belonged to The Mindlab. These programmes were excluded because The Mindlab is no longer part of Unitec.

Programme Status	2012	2013	2014	2015	2016	2017	2018	2019	2020
Count of green lit programmes	9	10	14	19	21	28	27	33	28
Count of amber lit programmes	7	8	9	12	16	8	5	7	3
Count of red lit programmes	11	9	7	4	3	5	8	2	3
Total	27	27	30	35	40	41	40	42	34

Programme Status	2012	2013	2014	2015	2016	2017	2018	2019	2020
Percentage of green lit programmes	33%	37%	47%	54%	53%	68%	68%	79%	82%
Percentage of amber lit programmes	26%	30%	30%	34%	40%	20%	13%	17%	9%
Percentage of red lit programmes	41%	33%	23%	11%	8%	12%	20%	5%	9%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 6: Total number and percentage of green, amber and red-lit degree programmes 2012-2020

**Error! Reference source not found.** below also illustrates the research productivity results and trends for the institute over the last eight years.

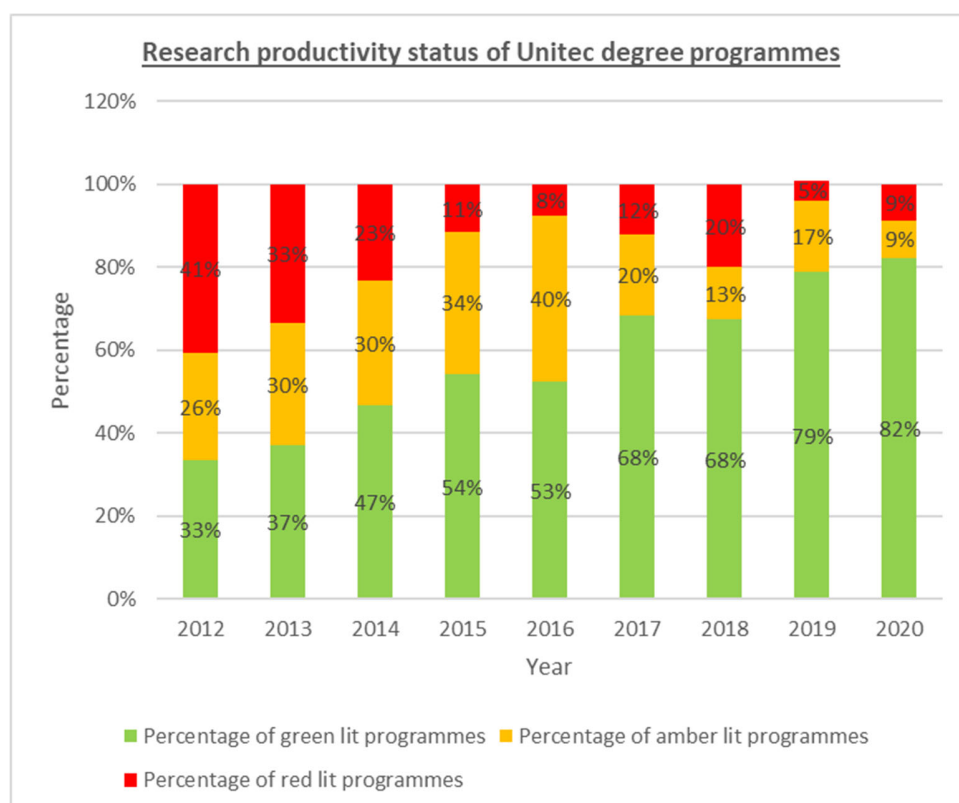


Figure 6: Percentage of green, amber and red-lit degree programmes 2012-2020

There was a small shift in green-lit programmes, a three-percentage-point growth from 2019. In total, we now have 91% of the degree programmes either green lit or amber lit. We now have only three

programmes amber lit and three programmes red lit. By looking at the positive shifts, it seems quite possible to achieve our 2020 target; that is, all degree programmes to be green lit. While this goal remains achievable it requires a strong focus, increased effort, and appropriate resourcing to shift the final group of amber and red programmes to green-lit status. Careful planning needs to be put in place and implemented in 2020.

The majority of programmes that were green lit maintained their status in 2020. Not only this, but the percentage of staff who are green lit in these programmes is much higher than the cut-off percentage (75%).

**Positive shifts:** Bachelor of Business, Master of Applied Practice (Professional Accounting), Bachelor of Sport (Teach Out) and Master of Osteopathy (Teach Out) moved from amber lit to green lit.

Bachelor of Engineering Technology and Bachelor of Nursing maintained their red-lit status. Bachelor of Engineering Technology shows a similar trend as in 2019. However, Bachelor of Nursing showed some positive shifts. When compared with 2019 data, 11% more staff were green lit and 30% more staff were amber lit in this programme. Forty-one percent of the staff who were red lit in 2019 moved to either amber lit or green lit.

**Negative shifts:** Bachelor of Construction and Bachelor of Computing Systems moved from green lit to amber lit. Bachelor of Applied Technology moved from green lit to red lit.

### 2.4.3 Research partnering and planning

The Research Development Programme (RDP) planning initiative was implemented five years ago to support programmes to improve on their research productivity (RP) so staff engage in research and develop a strong research culture. To measure research productivity, Tūāpapa Rangahau has tracked individual progress with a Traffic Light system to optimise resources toward the ultimate goal of 100% green-lit programmes by the end of 2020. In 2019, this resulted in excellent research productivity results with **91% of Unitec's programmes green or amber lit**.

This has also involved establishing a research partnering model where Research Partners work closely with Research Leaders and other staff to manage the RDP process. RDP is one of the key responsibilities of the Research Partners, who manage the research productivity of each Unitec programme – programmes are managed by a School, which appoints a Research Leader to oversee the research function.

In 2018, Tūāpapa Rangahau embedded four key RDP initiatives: incorporating HR standard operating procedures; implementation of Individual Research Planners (IRPs), integrating research goals into ADEPs, and development of Research Competencies. These initiatives have heralded improved outcomes, where research activity and research culture are actively integrated into Unitec's culture. In 2019 the focus has been on implementing and embedding these initiatives. We have achieved this by:

- Regular attendance at School staff meetings to promote our funding mechanisms and services. This included celebrating School research productivity (post outstanding Unitec PBRF results) with a morning tea, to meet and connect with staff.
- Clear, concise and regular communication with Research Leaders to ensure they are well informed.

- Quarterly Research Leaders Hui set up as a forum for Research Leaders to share their experiences and plan for the upcoming months.
- New co-designed systems for research time allocation.
- Actively encouraging research clusters, mentoring and collaboration, especially in those red-lit programmes that need extra support.
- Reviewing and improving Early Career Researcher initiatives to grow and nurture research capability and leadership.

It is also important to note that the work around RDP is forming a significant part of the research narrative for the External Evaluation and Review (EER), which is occurring in October 2020.

## 2.5 Performance Based Research Fund (PBRF) performance

The primary purpose of the PBRF is to ensure that excellent research in the tertiary education sector is encouraged and rewarded. This means assessing the research performance of tertiary education organisations (TEOs) and then funding them on the basis of their performance. The PBRF comprises three funding components:

1. **Quality Evaluation (QE) measure:** the purpose of this measure is to reward and encourage the quality of research – 55% of the fund. The QE is a periodic assessment of the research performance of staff at eligible TEOs. TEOs present their staff members' research in Evidence Portfolios that are assessed for quality by expert peer-review panels. TEOs determine which of their eligible staff members' research is likely to meet the standard for a funded Quality Category and then support these staff to submit their research portfolios for assessment (discussed in Section **Error! Reference source not found.**).
2. **Research Degree Completions (RDC) measure:** the purpose of this measure is to reflect research degree completions – 25% of the fund. This element is a yearly measurement of the number of PBRF-eligible postgraduate research-based degrees completed at participating TEOs (discussed in Section 6.8).
3. **External Research Income (ERI) measure:** the purpose of this measure is to reflect external research income – 20% of the fund from 2016. This element is a yearly measurement of the amount and type of income received by participating TEOs from external sources for research purposes (see Section 3.2.4 for details of ERI earned in 2019).

The total size of the PBRF fund for 2019 is \$315 million. Unitec received \$3.159m as PBRF income in 2019. Unitec's performance in the 2018 QE round secured 1.05% of the total QE fund, resulting in \$1.826m of funding from 2019-2024. This figure is the most stable of the three measures but can change, as the size of the PBRF funding pool is determined by the government through its annual budget. RDC and ERI funding is calculated annually based on our annual RDC and ERI performance.

### 2.5.1 2018 PBRF Quality Evaluation results

The results for the 2018 Quality Evaluation round were released in 2019. Out of all the Quality Evaluation rounds, 2003, 2006, 2012 and 2018, Unitec has been the highest performer of the ITPs throughout that period. Despite 121 PBRF-rated staff leaving Unitec between 2014 and 2017 due to transformation-related redundancies and resignations, Unitec still managed to maintain its status as the highest-performing ITP in the 2018 PBRF.

#### 2.5.1.1 Key results:

- Number of Evidence Portfolios submitted = 128.
- Number of Evidence Portfolios achieving funded ratings = 124.
- Percentage of eligible staff who submitted an Evidence Portfolio and were awarded funded ratings = 44%.
- Success rate (percentage of staff who submitted an Evidence Portfolio and received a funded rating) = 97%.
- Unitec achieved five A, 26 B, 75 C, 18 C(NE), three R and one R(NE) Quality Category ratings.
- Overall Unitec ranked ninth out of 36 TEOs participating in the 2018 PBRF Quality Evaluation.
- Unitec ranked first for AQS(S) in the ITP sector (AQS[S] shows the intensity of research at each TEO relative to their staff numbers) and 12th for AQS(S) in the TEO sector overall.
- Unitec is the only ITP that will receive greater than 1% of the total funding available through the PBRF.
- Unitec will receive \$1.8m of Quality Evaluation Funding, a drop of \$300k from the 2012 round.<sup>4</sup>
- The 2015-2020 Unitec Research and Enterprise Strategy set a stretch target to grow the number of PBRF-rated staff by 5% from the 2012 round to the 2018 round (from 33% to 38% of eligible staff). However, as mentioned above, we lost 121 of the 2012 cohort of staff with rated (funded) portfolios between 2014 and 2017. In June 2017 the Executive Leadership Team agreed that, given these developments, the PBRF-related KPI needed revision and the Unitec Research Committee subsequently agreed to lower the PBRF target to 30% of eligible staff. That is, Unitec was aspiring to see 30% of its eligible staff achieve a funded PBRF ranking for the 2018 Quality Evaluation. Despite these challenges, we exceeded this target of 30% by 14%. Table 7 shows the details of Unitec's achievements over the last four PBRF rounds.

Year	2003	2006	2012	2018
Number of PBRF eligible staff	371	419	393	281
Number of Evidence Portfolios submitted	121	113	183	128
Number of Evidence Portfolios achieving funded ratings	82	98	131	124
Percentage of eligible staff who submitted Evidence Portfolios	33%	27%	47%	46%
Percentage of eligible staff who submitted an Evidence Portfolio and were awarded funded ratings	22%	23%	33%	44%
Success rate (percentage of staff submitting an Evidence Portfolio who received a funded rating)	68%	87%	72%	97%

Table 7: Success data for the last four PBRF rounds

<sup>4</sup> Although Unitec's performance was better or similar in some areas compared to the 2012 round, our funding allocation was reduced, as eight more TEOs participated in the 2018 round while the funding pool remained at \$315 million.



While Unitec submitted 26% fewer Evidence Portfolios (EPs) to the 2018 PBRF round compared to the 2012 round, in 2018, 97% of Unitec's EPs received a fundable rating, while in 2012 only 71% received a fundable rating. This clearly indicates that even though we were smaller in 2018 when compared to 2012, the quality of our research was better (to reiterate, the review process being discussed here is called the "Quality Evaluation"). Table 7 shows the details relating to these numbers.

These positive outcomes are the result of the improvement of the quality of research being undertaken at Unitec. Being more thorough and strategic in preparing for the submission process and improved recruitment protocols for degree programmes have helped address previous challenges around building Unitec's research capability.

### 2.5.2 Unitec's results by Quality Category

Table 8 shows the Quality Categories awarded to EPs submitted by Unitec in the PBRF 2018 Quality Evaluation Round and the prior three rounds.

<b>Quality Category</b>	<b>2003(FTE)</b>	<b>2006(FTE)</b>	<b>2012 (FTE)</b>	<b>2018 (FTE)</b>
A	1	2	2	5
B	21	26	24	24
C	55	70	75	70
C(NE)	0	26	14	16
<b>Total</b>	<b>77</b>	<b>124</b>	<b>115</b>	<b>116</b>

Table 8: Unitec results by Quality Category

In the 2012 Quality Evaluation, 12% of staff who achieved a PBRF ranking were classed as 'New and Emerging' researchers. The PBRF defines 'New and Emerging' as someone who became research active for the first time within the six years leading up to the PBRF assessment. In the 2018 Quality Evaluation Round Unitec was seeking to grow that figure by 5%. That is, Unitec had a new target that 17% of the staff who achieve a PBRF ranking would be classed as 'New and Emerging.' The 2018 figure was 14%, 3% less than our target.

Over the four PBRF Quality Evaluation rounds, 2018 saw Unitec's highest number of A ratings: an A attracts five times more funding than a C. The number of B ratings remained the same in 2018 as those received in 2012, while the number of portfolios rated C was down and the number rated C(NE) was slightly up.

### 2.5.3 Implications for Unitec

The results of this assessment show that Unitec has managed to maintain its position as the highest performing ITP. By virtue of size, Unitec maintains a significant proportion of the PBRF funding awarded to non-universities (1% out of 4%). Our 2018 performance will attract slightly less funding than our 2012 performance due to the loss of rated staff and because more participating TEOs will be drawing from a resource that remains static.

With over a quarter of the ITP sector's share of the PBRF funding going to Unitec, and with Unitec ranked ninth out of the 36 participating tertiary organisations in a fund that better suits the university sector, this

result highlights the quality of the research programme in place at Unitec and is all the more notable. It also rewards Unitec's ongoing focus on applied research, and our support of our new and emerging researchers.

### 3 Increasing external engagement

Building partnerships to meet the needs of industries and to improve student success is central to achieving Unitec's vision and Research & Enterprise Strategy.

#### 3.1 Building external relationships through research

Unitec seeks to build external partnerships through impactful research projects informed by an "outside-in" approach. To achieve this aspiration, we have promoted programmes such as the *ITPResearch* and Enterprise Voucher scheme (details in Section 3.1.1). Furthermore, our largest external research projects, in areas including Māori and indigenous research, cybersecurity and environmental engineering, are strongly partnered with industry stakeholders and external research collaborators. These external relationships have engaged Unitec researchers in applied, impactful research projects and have generated external research income (ERI), while also producing secondary benefits such as access to industry expertise for course development, guest lecturing and off-campus learning experiences.

##### 3.1.1 *ITPResearch* and Enterprise Voucher scheme

The *ITPResearch* and Enterprise Voucher scheme aims to seed new relationships with communities, iwi and businesses by subsidising the cost of our research services to kick-start research collaborations. In the course of delivering on a contract, we are facilitating professional development for staff in the commercial arena (outside of traditional academia) and engaging directly with end users. This creates real-world opportunities for staff and students through increased industry engagement, as well as the opportunity to foster joint projects around commercialisation and the creation of intellectual property.

Unitec has delivered, or was in the process of delivering, 16 research and enterprise vouchers by the end of 2019. The majority of research voucher projects were delivered by the School of Applied Business (6) and School of Healthcare and Social Practice (6). Within these, the Social Practice and Business Practice staff were the most active.

Recent voucher projects have been more student-engaged, providing opportunities for Unitec students to undertake research and work experience with industry partners.

The developed projects were highly targeted to provide benefit to industry and the communities Unitec serves, and to increase research activity in areas where Unitec struggles to achieve sufficient research activity for the Research Productivity Traffic Light (RPTL). For example, a research voucher project was developed by automotive engineering staff for electric car company Blue Cars, New Zealand's largest importer of Nissan Leaf electric vehicles. The research voucher project will involve Unitec students in investigating recycling options in New Zealand for all plastic components of a Nissan Leaf. This project has tremendous potential to support a sustainability-focused industry and will also help the Bachelor of Applied Technology degree reach green-lit status in the RPTL.

In 2019 there was a good mix of different types of organisations accessing the voucher scheme, although our focus was on increasing the number of private companies and public/local government organisations involved in voucher projects (see Table 9).

Organisation Type	Number of voucher clients
Private company	2
Public, local government	13
Other	1
<b>Total</b>	<b>16</b>

Table 9: Research voucher clients by organisation type

Figure 7 illustrates Schools' involvement in the research and enterprise voucher scheme in 2019, shown as the number of active voucher projects by School.

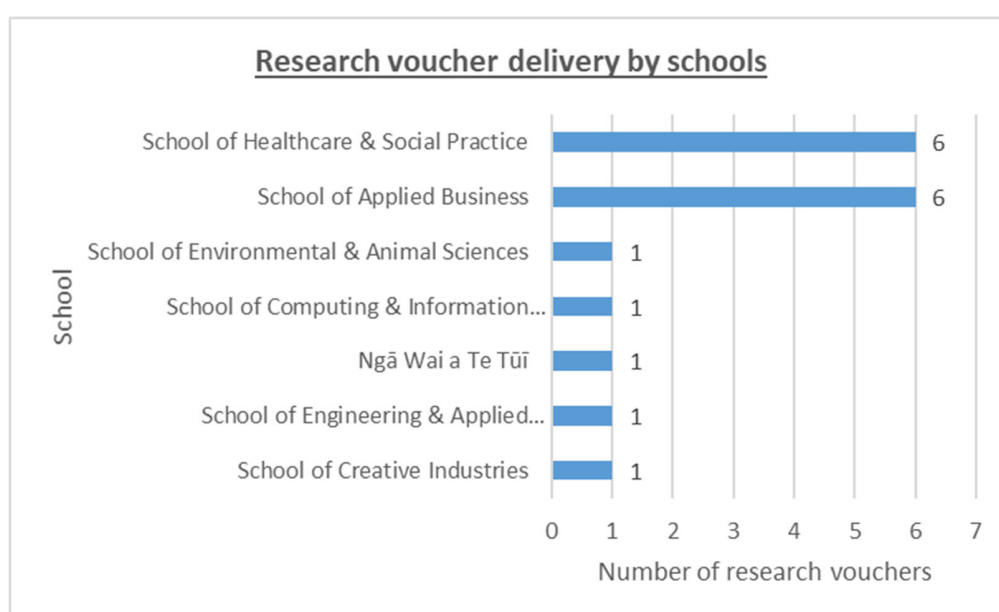


Figure 7: Schools' involvement in the research voucher scheme in 2019

### 3.1.2 Industry-funded projects

Sixty-one research and enterprise projects in 2019<sup>5</sup> were at least partially industry funded. Industry-funded projects are defined as active research or enterprise projects that Unitec is receiving funding for, where the organisation is private sector or public sector and where the service Unitec is providing is applied contract research or consultancy.

Figure 8 illustrates the Schools' contribution to 2019 industry-funded projects.

<sup>5</sup> There was a slight change in the definition of industry-funded projects in 2018 to include public sector, and where the service Unitec is providing is applied contract research or consultancy. Prior to this only funding from private sector was included. Thus the 2018 figures reported are comparatively higher than those of 2016 and 2017.

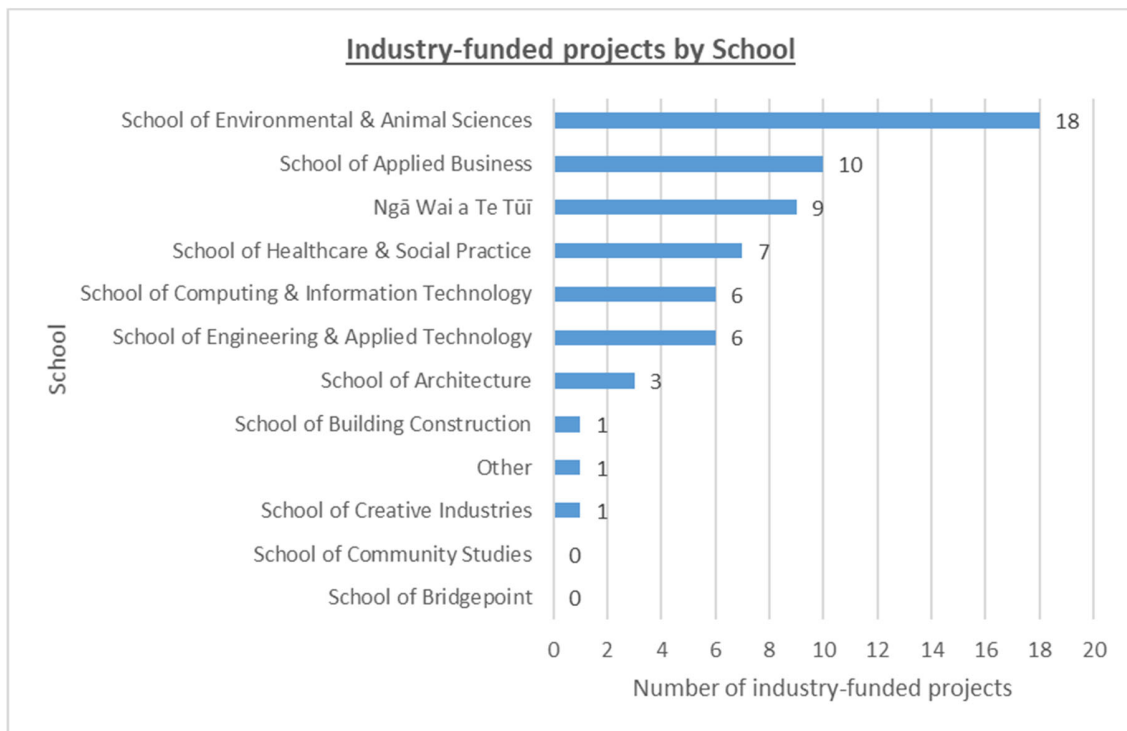


Figure 8: Schools' contribution to industry-funded projects

### 3.1.3 Commercialisation

In 2019, Unitec entered into the delivery phase for our cybersecurity products that were developed as part of STRATUS. STRATUS (Security Technologies Returning Accountability, Trust and User-centric Services in the Cloud) is a multi-partnered, \$13m six-year cybersecurity research programme led by the University of Waikato, on which Unitec holds the \$2m contract to deliver Research Aim 4. It has entered its final stage and industry-engaged research has now moved on to industry-partnered commercialisation. We have successfully delivered on a license agreement with Taranaki-based cloud computing service provider NakiCloud by delivering the CRaaS 2.0 version of our disaster-recovery software. Unfortunately, a strategic reorientation of NakiCloud led them to no longer pursue the commercialisation of CRaaS. Tūāpapa Rangahau successfully negotiated the return of the intellectual property to Unitec (at no extra cost) and is now pursuing other commercialisation partners for CRaaS and other STRATUS-derived products.

For New Zealand's first domestically designed hydrogen fuel-cell vehicle, the UniQuad, commercialisation negotiations are underway with Exergy Research, a start-up company founded by former Unitec student and staff member Simon Hartley, who designed the UniQuad as part of his Master of Design thesis.

### 3.1.4 Joint research with universities, other ITPs and CRIs

New Zealand's research institutions need to collaborate more with each other to build expertise and skill.<sup>6</sup> At Unitec, there is an emphasis on staff and student involvement in quality research and collaboration with other ITPs, universities and CRIs. Many of Unitec's funded research projects involve staff from other institutions, and many Unitec staff are sub-contractors on other institutions' projects.

In 2019 Unitec's Environmental Solutions Research Centre, led by Associate Professor Dr Terri-Ann Berry, was approached by The University of Auckland to collaborate on an urgent research response to the risk posed by naturally occurring erionite mineral fibres in the Auckland region. Erionite is related to, but even more carcinogenic than, asbestos, and Unitec's expertise and global collaborations (e.g., with the University of Pennsylvania) in asbestos research was seen as crucial to New Zealand's response to this threat. The University of Auckland and Unitec produced several joint research publications highlighting the risk of erionite to public health, provided expert opinions to the Chief Science Advisors of both the Prime Minister and the Minister of Health, and collaborated on writing an \$8.8m MBIE Endeavour Fund Research Programme grant application (outcome due September 2020). Associate Professor Berry is the Lead Researcher for one of the project's three research aims, a sub-contract worth \$2.2m to Unitec, if funded.

Collaborations with the University of Waikato and Crown Research Institutes Scion and ESR led to a joint \$1m grant application to MBIE's Endeavour Fund Smart Ideas contestable funding round. Partnered with industry collaborator Rua Bioscience, the project proposed using hyperspectral imaging of medicinal cannabis plants for improved quality and growth management. Unfortunately, the Smart Ideas round, which commenced at the end of 2019, was cancelled by MBIE in 2020 in the wake of the Covid-19 pandemic. Nevertheless, Unitec and its partners are progressing towards other externally funded opportunities for this innovative research project.

A selection of externally funded projects undertaken in collaboration with other research institutions in 2019 is presented below:

- Unitec partnered with NorthTec, Plant and Food Research, the Northland Regional Council and mana whenua from the Takahiwai Kāinga in Tai Tokerau on a UNESCO-funded project that aims to produce an evidenced-based, bilingual narrative around the intersection between Māori approaches to farming and regenerative farming, and the potential of regenerative farming practice to improve soil health.
- The Institute of Environmental Science and Research Limited (ESR) contracted Unitec Computing and Information Technology student Ali Keivanmarz to develop technology that will form part of an image-comparison database to enable image-to-image and image-to-person comparisons for identifying individuals from a small portion of their skin captured in an image.
- Associate Professor Peter de Lange was contracted to assist Manaaki Whenua Landcare Research with the production of an interactive key for Myrtaceae (myrtle) present in New Zealand, rendered for web and mobile delivery.
- Associate Professor Jonathan Leaver was contracted to provide advice to University of Canterbury researchers on a work programme that aims to develop a new process and new materials to produce bio-hydrogen and capture CO<sub>2</sub> by utilisation of New Zealand woody biomass resources.

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<sup>6</sup> Tertiary Education Strategy 2014-2019, p. 17.

- Professor Christian Probst won an MBIE Smart Ideas grant to develop a new theoretical framework for measuring anonymity of data before it is shared. The project involves researchers from The University of Auckland and the IT University of Copenhagen.

### 3.2 Seeking external funding

Most organisations that fund research make grants through highly competitive bidding processes. Proposals are carefully assessed to make sure that the research is going to contribute real value for iwi, community and industry. This means that the record of a TEO in gaining ERI is a measure of the quality of its research programme<sup>7</sup>.

The PBRF data splits ERI into four groups:

- government contestable research funds;
- research contracts for government agencies;
- other New Zealand-sourced research revenue;
- research funding from overseas.

In 2019, Unitec did not receive any external research funding from overseas sources; however, here are some diverse examples of research projects funded under the other three categories:

#### **Government contestable research funds**

Professor Jenny Lee-Morgan won \$3.5m from MBIE's Endeavour Fund Research Programme towards Marae Ora, Kāinga Ora: Marae-led housing interventions that develop kāinga, a project that poses two critical questions: How can marae best utilise their physical, economic, social and cultural capital and infrastructure in their provision of housing interventions as kāinga Māori? How can iwi, hapū, communities, service providers and agencies best collaborate with marae to ensure the successful creation of kāinga to support resilient whānau in South Auckland?

#### **Research contracts for government agencies**

Diane Fraser secured funding from Auckland Council for student Aaron Chang to monitor areas where biocontrol agents have been released in the past, for presence and effectiveness of the biocontrol agent. The student was also required to assess and prioritise site locations for future biocontrol release.

James Stewart was allocated \$39,000 from MPI for the provision of a report assessing whether ACE (annual catch entitlement) price records in the fishing industry are meaningful indicators of market value.

#### **Other New Zealand-sourced research revenue**

Associate Professor Dan Blanchon was contracted by Wildlands Consulting to examine lichen material for indications of damage and answer specific questions about the use of lichens in air pollution monitoring.

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<sup>7</sup> <https://educationcentral.co.nz/external-research-income-in-universities/>

Associate Professor Nigel Adams received \$913 to produce a report to the Northern New Zealand Seabird Trust on foraging of gannets in the 2018-19 breeding season.

### 3.2.1 Funding proposal submissions and success rates

Tūāpapa Rangahau assists researchers to identify potential sources of external funding for their research and to match researchers and teams of researchers with advertised opportunities. Where expertise in a particular discipline or field does not exist within Unitec, Tūāpapa Rangahau works with the research offices of universities, other ITPs and CRIs to contract their staff onto Unitec-led projects.

Figure 9 illustrates the number of proposals submitted, the number of successful proposals and the proposal success rates in 2019.<sup>8</sup>

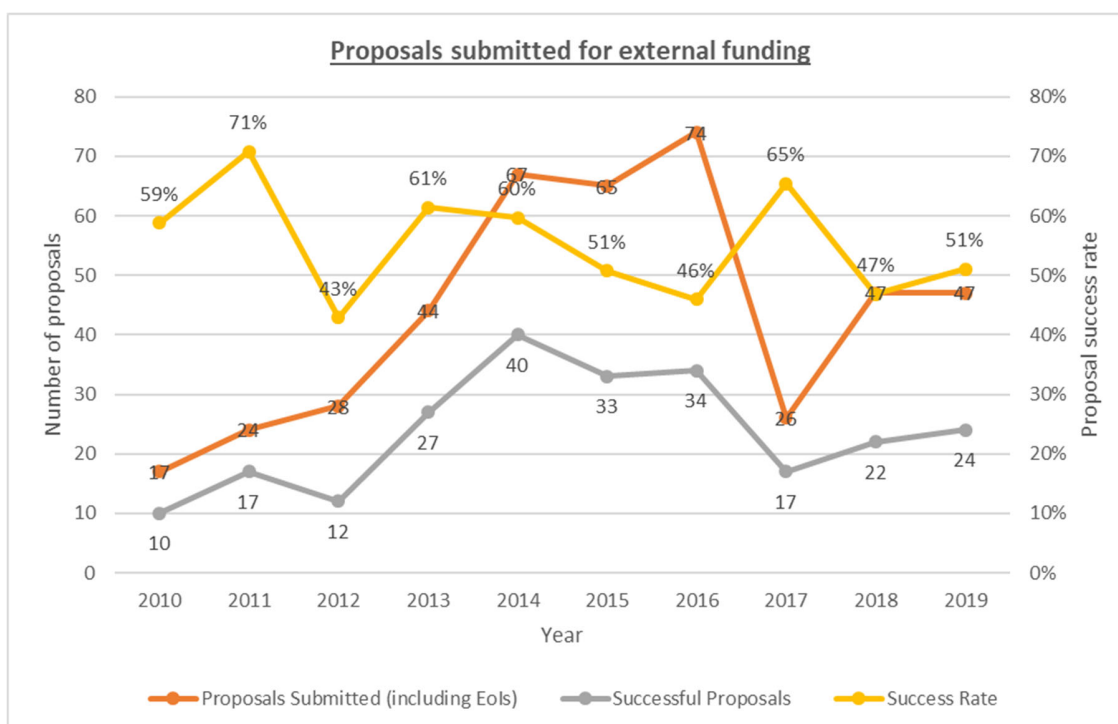


Figure 9: Proposals submitted for external funding

When the PBRF was created, part of the fund was to be awarded on the basis of each institution's share of the total ERI across all the institutions participating in the PBRF. One of the important benefits of the

<sup>8</sup> Success rate percentage is calculated from proposal outcomes known as at 31 December 2019.



2012 reforms to the PBRF was a change to the ERI component. In the 2012 reforms, the share of the PBRF pool allocated to the ERI component was raised from 15% to 20%<sup>9</sup>.

Unitec continues to perform well in terms of attracting ERI, particularly when compared to other ITPs. Unitec-led projects secured funding from MBIE's Endeavour Fund for the first time in 2019, and it was the first time in five years that an ITP won funding from the scheme, which is heavily dominated by the university sector.

While the number of proposals submitted for external funding in 2019 was the same as in 2018 (47), the number of successful proposals increased from 22 to 24, meaning the success rate was correspondingly higher (up from 48% to 51%). This is a significant achievement for Unitec, when the success rates for schemes such as the Royal Society's Marsden Fund and MBIE's Endeavour Fund in 2019 were 12%<sup>10</sup> and 17%<sup>11</sup> respectively (Unitec's success rate for Endeavour round funding was 40%<sup>12</sup>).

Figure 10 illustrates the total grants Unitec has won since 2010, where the outlier in 2014 represents the awarding of the six-year \$1.8m STRATUS sub-contract (see Section 3.13).

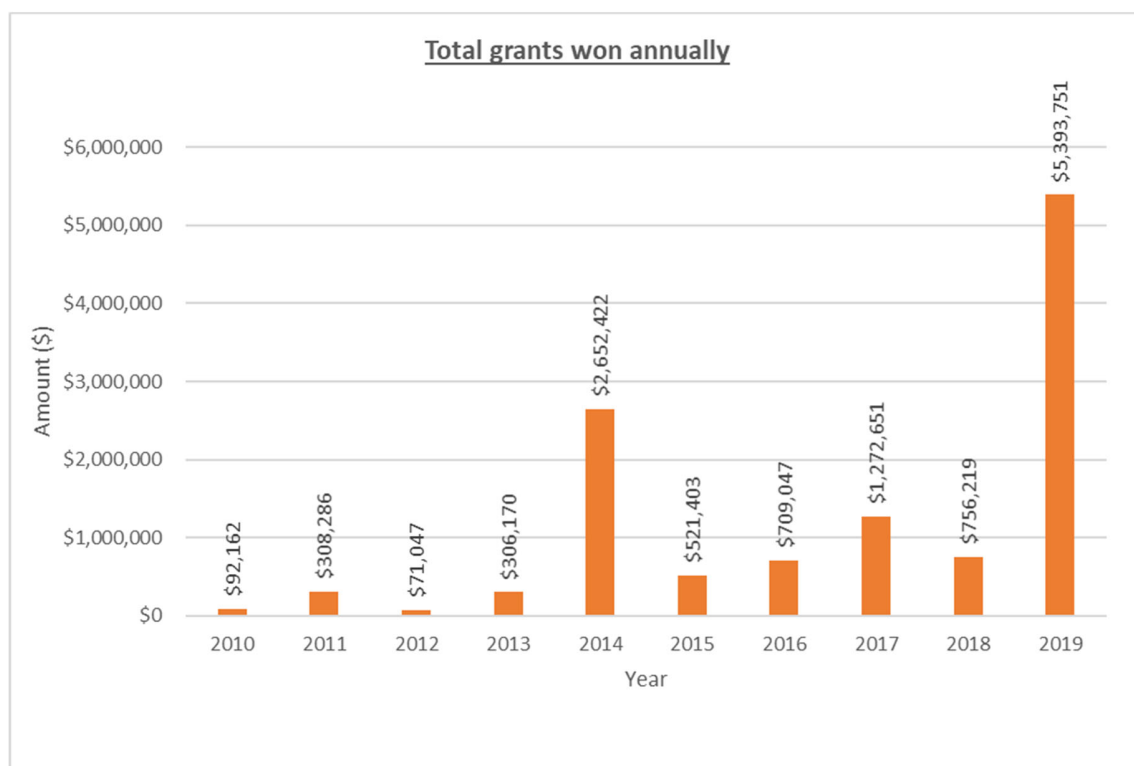


Figure 10: Total grants awarded annually

<sup>9</sup> <https://educationcentral.co.nz/external-research-income-in-universities/>

<sup>10</sup> <https://www.royalsociety.org.nz/what-we-do/funds-and-opportunities/marsden/marsden-announcements/information-on-the-2019-marsden-funding-round/>

<sup>11</sup> <https://www.mbie.govt.nz/science-and-technology/science-and-innovation/funding-information-and-opportunities/investment-funds/endeavour-fund/success-stories/>

<sup>12</sup> <https://www.mbie.govt.nz/science-and-technology/science-and-innovation/funding-information-and-opportunities/investment-funds/endeavour-fund/success-stories/>

### 3.2.2 Organisations funding our research

The sources of Unitec's ERI provide an indicator of the value placed on Unitec research by various sectors. In 2019, Unitec received funding from 16 different sources, most (98%) of it from central and local government agencies. However, income received from non-government organisations is also important, as in 2012 a loading was attached to the PBRF that gives an additional weighting to ERI that comes from New Zealand non-government organisations (Section 3.2.5).

<b>Funding source</b>	<b>Total funding received</b>
<b>Non-government</b>	\$127,394
<b>Government</b>	\$5,266,357
<b>Total</b>	\$5,393,751 <sup>13</sup>

Table 10: Sources of external research funding

In 2019, \$15.6m of funding was sought. A breakdown of the outcomes of these applications is depicted in Table 11.

<b>Application status</b>	<b>Total funding sought</b>
<b>Awarded</b>	\$5,393,751
<b>Awaiting outcome as at 31 Dec 2019</b>	\$5,556,337
<b>Declined</b>	\$3,848,135
<b>Round cancelled after submission</b>	\$50,000
<b>Researcher left Unitec before outcome received</b>	\$800,000 <sup>14</sup>
<b>Total</b>	\$15,648,223

Table 11: Outcome of submitted applications

The funders and amounts of Unitec's five biggest grants in 2019 are depicted in Table 12.

<b>Top 5 funders of successful proposals in 2019</b>	<b>Source &amp; type of funding</b>	<b>Total funding awarded</b>
<b>MBIE Endeavour Fund Research Programme</b>	Govt contestable research funds	\$3,527,403
<b>MBIE Endeavour Fund Smart Ideas</b>	Govt contestable research funds	\$998,504

<sup>13</sup> This figure excludes funding transferred from University of Waikato for Professor Leonie Pihama's research.

<sup>14</sup> The application that this figure relates to was successful, with the project now being run out of the University of Waikato

<b>Auckland Council</b>	Research contracts for govt agencies	\$205,000
<b>Dept of Conservation</b>	Research contracts for govt agencies	\$160,000
<b>Building Better Homes, Towns &amp; Cities National Science Challenge</b>	Research contracts for govt agencies	\$79,900

Table 12: Funders and amounts of Unitec's five biggest grants in 2019

### 3.2.3 Delivery of externally funded projects

The successful delivery of an externally funded research project depends upon the Principal Investigator's ability to lead, coordinate and perform the research. It also depends on the institute's support teams, including Tūāpapa Rangahau, Finance, HR and IMS to ensure Unitec maintains a strong external reputation as a quality research provider.

In 2019, Tūāpapa Rangahau provided research management and research administration support to Unitec Principal Investigators in the delivery of 66 active externally funded projects worth over \$10 million dollars in contract value.

### 3.2.4 Total Unitec External Research Income (ERI)

The total external research income (ERI) for any given year is a strong indicator of the external value and magnitude of research efforts for that year. For these reasons, it is one of Unitec's main KPIs within the Research and Enterprise Strategy, where Unitec seeks to increase the total value of ERI by 10% per annum.

Total ERI is an annual measure of the amount of income Unitec earned delivering research services to external parties. ERI is the income we have earned during a financial year, not what we have been awarded. Unitec measures the ERI earned each year by determining the percentage of project progress made that year for each active research project. Each project's percentage is then multiplied by its respective awarded amount to provide the project ERI for that year. Total 2019 ERI is the sum of ERI calculations from all 66 active externally funded research projects.

Longitudinal data from 2010 onwards shows that Unitec has significantly increased its external research efforts in the years 2015-17, dropped in 2018, and significantly increased in 2019. The major drop in 2018 was due to the change in the Accounting Principal, which is used to calculate ERI.

In 2018, Tūāpapa Rangahau and the Finance team aligned ERI project milestones with direct expenditure of the project. This change of process led to the 2018 figure being low compared with 2017 and the investment plan target. Due to this new process, the ERI will be low at project start-up but will gradually increase as the percentage of the project completed increases and is recognised. The investment plan calculation did not incorporate the complexity discussed above and requires adjustment for future years.

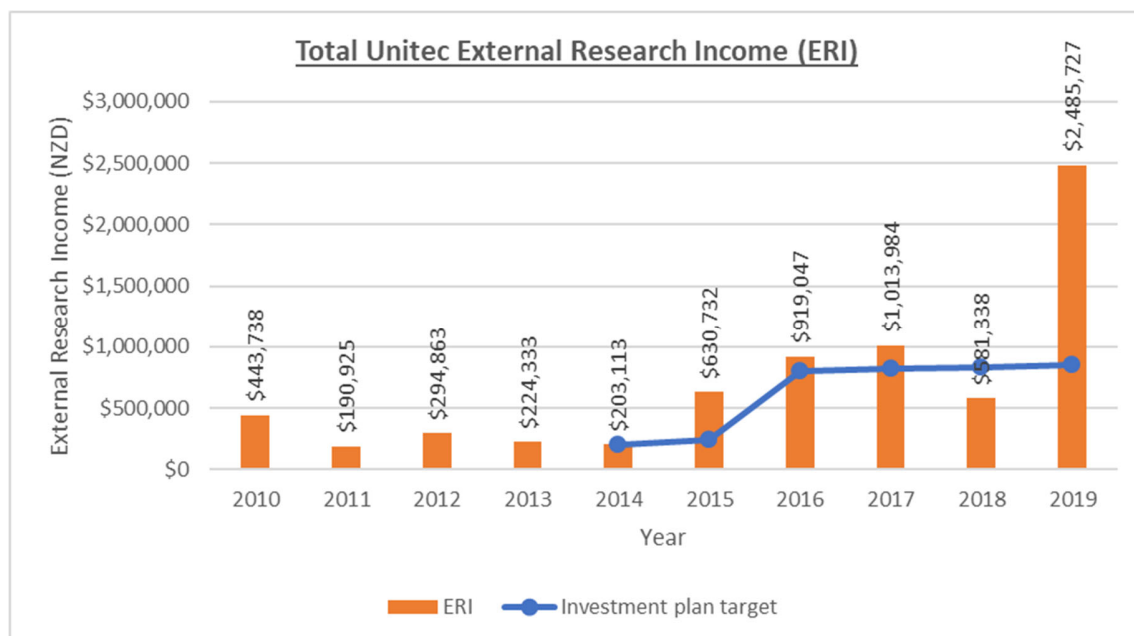


Figure 11: Unitec external research income between 2010 and 2019

### 3.2.5 External Research Income by School

To promote School-level engagement in externally funded research opportunities, ERI is now reported at School level.

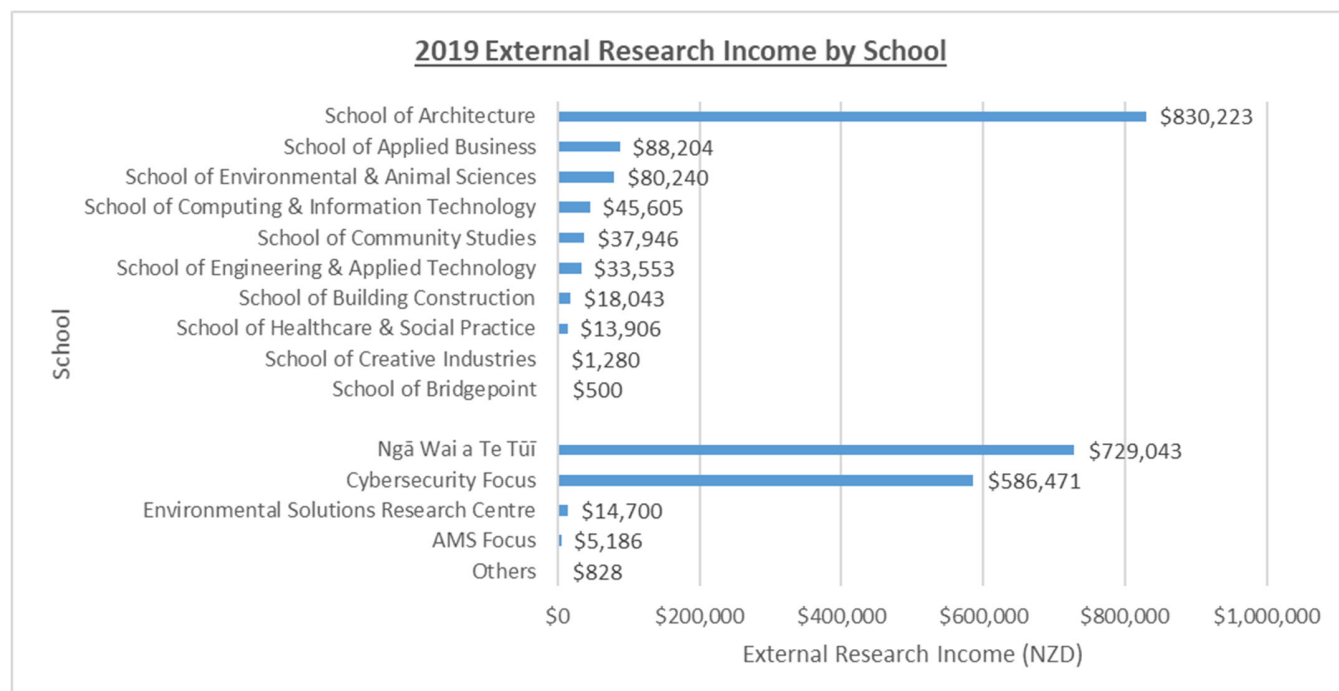


Figure 12: 2019 ERI by School (or Research Foci)

Nearly all Schools that offer degree programmes achieved some level of ERI in 2019. However, there was significant variability in ERI performance between Schools, ranging from \$500 to \$830,233 (average of \$105,836, excluding the Applied Molecular Solutions [AMS], HTRN/Cybersecurity foci, Ngā Wai a Te Tūi, Environmental Solutions Centre and Others).

The School of Architecture was a clear front-runner that produced 33% of Unitec's total ERI for 2019, followed by Ngā Wai a Te Tūi (29%). This excellent result from Architecture was due to the positive progress of large grants from BRANZ and The University of Auckland.

In its first year of operation, Ngā Wai a Te Tūi also made positive progress with some large grants funded by BRANZ, The University of Auckland, Cognition Education, MBIE and University of Waikato. The total ERI contributed by this centre was \$729,043.

The Cybersecurity focus also contributed due to the final stages of the STRATUS project. They contributed \$586,471 as ERI.

The Environmental Solutions Research Centre was established in 2019. They contributed \$14,700 as ERI with considerable funds won for future research.

The contribution by the AMS focus is declining, however, when compared to previous years, as projects in this area are coming towards the completion stage. The new research strategy will address this from 2020-2024.

### 3.2.6 PBRF ERI

ERI is one of the three assessment elements of the PBRF's mixed performance-assessment regime. ERI is included as a measure because it is a strong proxy indicator of the quality and relevance of the research TEOs conduct. In 2016 the PBRF metric changed to increase the incentives for TEOs to win ERI, particularly from non-government sources. The Quality Evaluation (individual staff portfolio) portion was reduced from 60% to 55% and the ERI portion was increased from 15% to 20%. Starting in 2015, the government also introduced requirements for ERI to be reported in four different categories, based on funding source. From 2017 onwards, the PBRF funding formula used the category weightings in Table 13 to calculate PBRF ERI funding allocations.

<b>Funding source category</b>	<b>ERI Weighting</b>
<b>NZ government contestable funds</b>	1.0
<b>NZ public-sector contract research</b>	1.0
<b>Overseas research income</b>	1.5
<b>NZ non-government income</b>	2.0

Table 13: PBRF ERI weightings by funding source

Central government's changes to the PBRF signal the growing importance of externally funded, industry- and community-relevant research. It also signals a continued push for TEOs to rely less on the public purse to fund research. These signals align well with Unitec's Research and Enterprise Strategy 2015-2020, which aims for greater external engagement, an applied research focus and ongoing ERI growth.

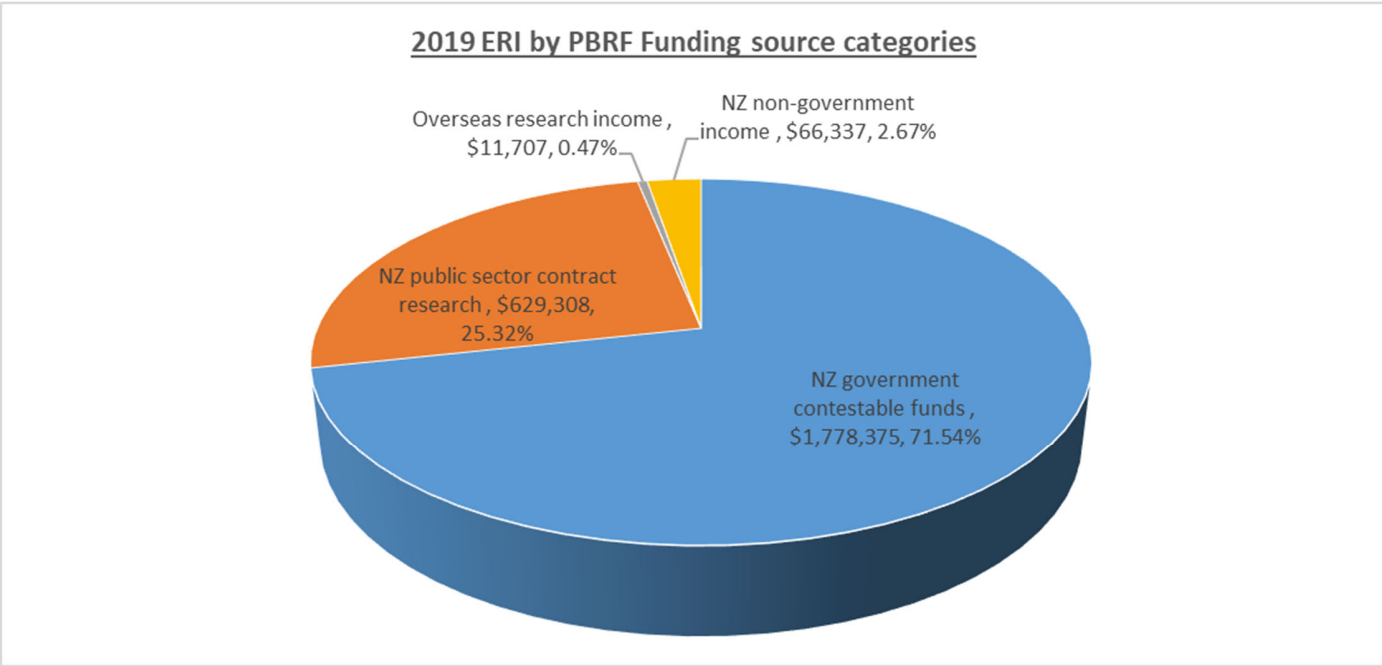


Figure 13Figure 13 shows the relative split of 2019 ERI by funding source.

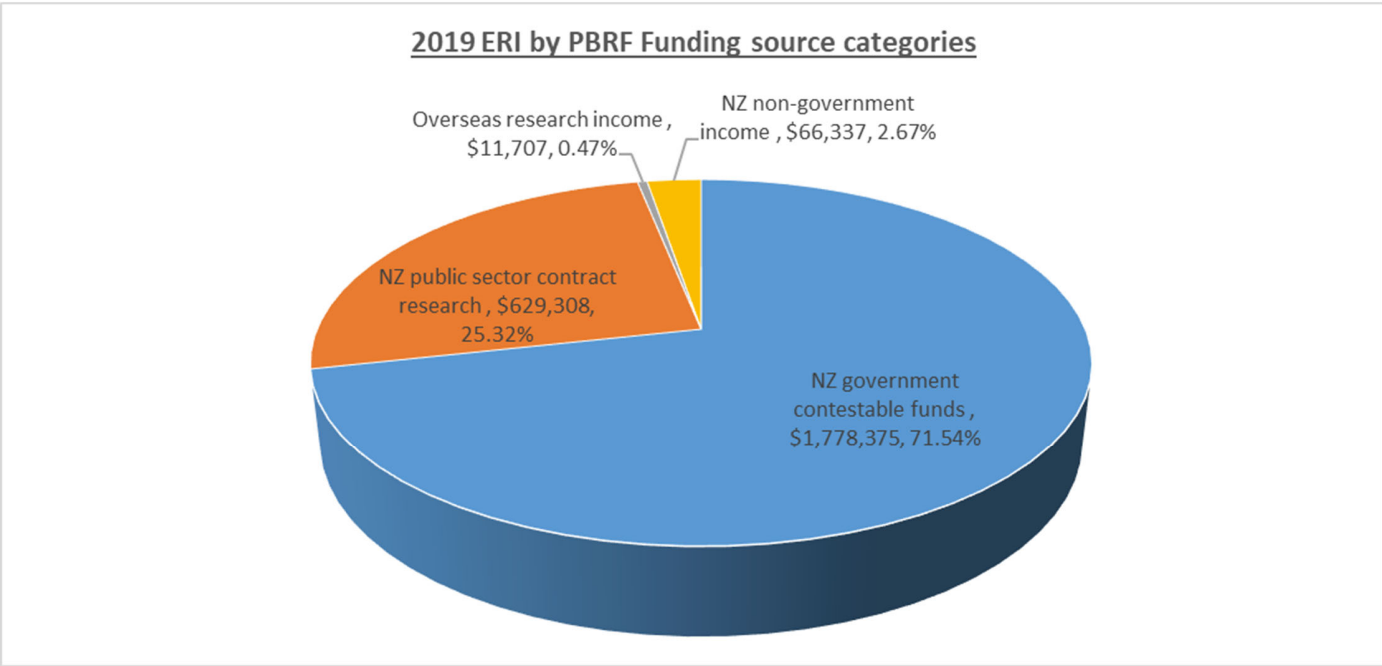


Figure 13: 2019 ERI by PBRF funding source categories

Nearly 72% of Unitec's ERI was earned from New Zealand government contestable funds and 25% was earned from New Zealand public-sector contract research, indicating \$2,407,683 (97%) of Unitec's total ERI came from New Zealand government sources in 2019. The ERI funded from overseas sources tripled from 2018 and the ERI from New Zealand non-government sources doubled from 2018.

## 4 Greater research focus

Probably the most significant development proposed in the 2015-2020 Research and Enterprise Strategy was the creation of 'strategic research foci' for Unitec. A heightened degree of focus for research and enterprise activity is a national and international trend, allowing even a relatively small institution to have a high impact in a specialised zone of activity. Strategic research foci are specific areas of demonstrated research capability and leadership, aligned to credible external relationships and funding opportunities that we will invest in to accelerate their growth. The intention is that as these foci grow and are successful they can catalyse research development in related areas, and over time the accumulation of these related areas will form larger themes. Unitec has established three Strategic Research Foci: Cybersecurity, Applied Molecular Solutions (AMS) and Kaupapa Māori Research.

### 4.1 The High Tech Transdisciplinary Research Network (HTTRN)

Established in 2016, the HTTRN was set up to encourage digital innovation in Schools outside of computing and across disciplines. Professor Christian Probst was the successful candidate in an international search for a director and he reframed and recalibrated the network in 2018, establishing an innovation incubator with bi-annual funding. The timing was good, with Unitec's new IP policy ceding ownership of IP to the originator. The HTTRN funding provided for a broader mandate to support staff innovation, beyond the prescribed discipline-based methodologies of research funding. Projects had to start with a problem that needed solving and show how specialised expertise or a range of discipline-based approaches would be brought to bear to create a solution or an opportunity.

The two rounds in 2019 resulted in some exciting projects, some of which have gone on to seed research centres or develop enduring partnerships with industry with ongoing sub-projects. An example from round one was a project led by Associate Professor Melanie Ooi, and after her departure to the University of Waikato, led by Unitec's Wayne Holmes, on the use of hyperspectral imaging for real-time monitoring of medicinal cannabis plants to improve quality and productivity in this new industry. The project is a collaboration with industry partner Rua Bioscience, University of Waikato, Massey University, Scion and ESR. Grant opportunities are currently under development.

Round two funded Associate Professor Terri-Ann Berry's project with the long-term aim to explore the impact of human behaviour on the maintenance of healthy indoor environments. Partnered with NIWA and Massey University, new houses were fitted with sensors that were created inhouse by staff in Unitec's School of Computer Science. Auckland Council's Building Consent Team contacted 26 housing construction contractors, including Fletcher Living, Generation Homes, GJ Gardner, Ngāti Whātua Ōrākei and Stonewood Homes. Researchers from Ngā Wai a te Tūi enabled the integration of mātauranga Māori into the project and subsequent collaboration with Māori communities. The data from the sensors was coupled with interviews with the occupants to provide a rich information set on the effectiveness of educational intervention for changing behaviour patterns. The project is ongoing and helped Terri-Ann in her successful bid to start the Environmental Solutions Research Centre at Unitec. The research has attracted great industry interest and we are currently in discussions with HRV Heating and Ventilation about industry-partnered and industry-funded research projects in this space.

## 4.2 The Cybersecurity Focus – Centre for Cybersecurity Research

In 2019 the STRATUS project (Security Technologies Returning Accountability, Trust and User-centric Services in the Cloud) was led by Professor Christian Probst, also Head of the School of Computing and Information Technology. STRATUS is a progressive research programme for New Zealand in that it explicitly details critical steps around not only the development of novel science, but its partnership with industry in the commercialisation of cybersecurity products. One of the key novel products developed as part of the project is CRaaS, an unconventional resiliency solution for businesses using cloud computing that ensures both backup of data and recovery of cloud services in times of uncertainty or disaster. CRaaS continues to be developed by the technical team, led by Research Associate and Software Architect Denis Lavrov, with a version for Windows (in addition to the existing Linux version) having been recently launched. Unitec's efforts around the commercialisation of CRaaS are detailed in Section 3.1.1.

Another prototype in the realm of disaster recovery, LogSpider, was further developed in 2019. LogSpider is a novel distributed backup solution for infinite data streams, such as log files or CCTV footage. In the case of an attack, for example, data can be fully recovered even when multiple storage nodes experience failures. At the end of 2018 it was decided to release LogSpider as open-source software in order to give software providers a starting point and to initiate further development in this area, as this was identified as the most viable pathway to widespread uptake. The process began in 2019 and will be extended in 2020.

Throughout 2019, development work on a Cybersecurity Diploma in the School of Computing and Information Technology occurred, with approvals achieved at the end of the year, ready for a 2020 launch.

The year ended well for this research focus, with a success in the highly competitive 2019 MBIE Endeavour Fund Smart Ideas grants scheme. The outcome is a three-year, \$1m cybersecurity project, 'Assessing reidentification risks of anonymised data sets with Bayesian probabilistic programming,' led by Professor Christian Probst. Christian is principal on the Unitec-led, University of Auckland- and IT University of Copenhagen-partnered project as a Unitec Adjunct Professor, from his new home in Berlin. He states in the project rationale that sharing data is at the core of society and industry, but it comes at the price of a latent risk to privacy protection. Using Bayesian models for a range of standard statistical procedures and anonymisation algorithms, the team will test the effectiveness of existing Bayesian inference algorithms for assessing the reidentification risk. The main result of the proposed project will be a new theoretical framework for measuring anonymity of data before sharing, improving on existing, established solutions. Beneficiaries of the project results will be public agencies, companies, iwi groups and citizens. In the long run, this could have an influence on data-sharing policies and privacy acts around the world.

## 4.3 The Applied Molecular Solutions Research Focus

Established in 2016, the Applied Molecular Solutions Research Focus is based on the ongoing technological revolution in biology that is associated with the ability to identify organisms rapidly and efficiently using DNA obtained from small amounts of biological or environmental material. The growth in the availability of genetic data is transforming our understanding of the world around us. Genomic data unlocks opportunities for decision making that relate to the protection of natural resources, animal, human and plant health. These genetic resources can be used, for example, to create rapid diagnostic tests for



diseases that affect humans, crops or livestock. They can also be used for more comprehensive studies that characterise whole communities of organisms, describe the physiology of an animal, or investigate the adaptive functions of genes in given ecological situations.

The AMS Research Focus has helped the School of Environmental and Animal Sciences develop a strong reputation for the production and publication of cutting-edge research, particularly in conservation and biosecurity. It also operates well in a transdisciplinary sense, providing, for example, critical science capability to the new Environmental Solutions Research Centre (ESRC). An example is staff in AMS are assisting ESRC to deliver on a \$400k Ministry for the Environment-funded project for work on asbestos bioremediation. They are also assisting with ESRC-led projects on erionite (a naturally occurring carcinogen) and toxic moulds in buildings. A characteristic of the research contracts, large and small, in AMS is the high level of student involvement that demonstrably creates career pathways for our graduates. Undergraduate student projects and graduate internships form an integral part of the research culture here.

The Unitec emphasis in AMS is on research with practical relevance, and the centre provides research services that private companies and our communities would not otherwise have access to. In practice this means contract research, services and applying for external grants. AMS has built up over the last four years a uniquely well-equipped collection of facilities that include:

- A fully equipped, climate-controlled molecular ecology laboratory, where we can extract DNA from samples, run PCRs (polymerase chain reactions), prepare samples for DNA sequencing, run gels and conduct state-of-the-art genomic projects with standard outsourcing for sequencing.
- A -80°C freezer to store samples for projects with a long-term focus.
- A small climate-controlled culture room with laminar flow cabinet.
- A plant growth room (climate controlled with growth lights).
- A registered herbarium for DNA voucher specimens (12,000 specimens currently).
- An insect collection for DNA voucher specimens.
- Microscopy (with UV fluorescence available).

In 2019, AMS projects produced seven peer-reviewed journal articles, as well as conference outputs, reports and industry-partnered student project supervisions.

**Current funded projects under implementation in 2019 include:**

- Development of a mycoherbicide for climbing asparagus (Associate Professors Dan Blanchon, Peter de Lange and Mark Large, Erin Doyle and Dr Ashveen Nand, funded by Auckland Council, \$134,000). This project includes a student internship.
- Revising the taxonomy of manuka to aid in conservation management (Associate Professor Peter de Lange, funded by Department of Conservation, \$160,000).
- Determining the effects of diet supplementation on vitamin D synthesis of lizards (Dr Marleen Baling, funded by the Morris Animal Foundation, \$17,500). This project will include student research.
- Determining population density estimates and trap detectability of the invasive plague skink (*Lampropholis delicata*) for incursion management (Dr Marleen Baling, co-supervisor of an MSc student from Prague University, travel/fieldwork funding from Prague University).

- Genetic relatedness between chevron skinks (*Oligosoma homanolotum*) from Great Barrier and Little Barrier Islands (Dr Marleen Baling, funded by James-Watson Conservation Trust, \$4,500).
- Remediation of asbestos-contaminated soil as an alternative to landfill disposal, led by Associate Professor Terri-Ann Berry (ESRC). Funding (\$400,000) from the Ministry for the Environment awarded in 2018, research began in 2019 and continues for three years (Associate Professor Dan Blanchon, Erin Doyle and Associate Professor Peter de Lange).

#### **Funding applications in 2019 include:**

- AMS involvement in the ESRC-led application to MBIE's Endeavour Fund Smart Ideas for further funding (\$1m) to develop biological methods to remediate asbestos-contaminated soil and other waste streams. The AMS team are providing the expertise in searching for potential fungi and bacteria that may be able to break down asbestos, culturing them and identifying them using molecular methods. The project is a collaboration with staff from Plant and Food Research, the University of Pennsylvania, the Fox Chase Cancer Center and University of Canberra. Unfortunately, due to Covid-19 the Smart Ideas round was cancelled.
- An application for MBIE Endeavour Fund Research Programme funding (\$2m for Unitec, decision pending) in a collaboration between AMS, ESRC and The University of Auckland to do research on assessing and managing the risk of carcinogenic erionite (a naturally occurring carcinogenic fibrous mineral found in Auckland).
- An application was made by the ESRC to HRV for funding (\$70,000), which will include work to be done by AMS on screening for toxic mould species in buildings using qPCR (quantitative or real-time PCR).

#### **4.4 The Environmental Solutions Research Centre**

Approved by the Unitec Research Committee in 2019, the Environmental Solutions Research Centre (ESRC) involves chemists, biologists, engineers, epidemiologists, geographers, and building and construction experts. These collaborate with industry leaders from various fields such as waste management and minimisation, air quality, wastewater treatment and civil engineering, who work on complex and multigenerational challenges such as asbestos-contaminated soil, indoor air quality and plastic reduction in construction. Led by Associate Professor Terri-Ann Berry and with 20 Unitec researchers on the team, the Research Centre fosters transdisciplinary research initiatives that push the boundary of current disciplinary silos.

National external collaborators from both academia and industry currently include Associate Professor Jennifer Salmond, Associate Professor Kim Dirks and Dr Colin Whittaker (University of Auckland); Dr Julie Bennett (University of Otago); Dr Nick Talbot (Auckland Council), Dr Guy Coulson (NIWA), Dr Perry Davy (GNS), Nigel Ironside (Ports of Auckland), Andrew Schunke (Chester Consultants), Raymond Chang (Beca) and Tony Edmonds (Chemcare).

International collaboration partners include Dr Robyn Hardy (University of Canberra), Professor Edward Emmett and Dr Brenda Casper (University of Pennsylvania), Dr Joe Testa (University of Pennsylvania and Fox Chase Cancer Center) and Dr Rachel Codd (University of Sydney).

The ESRC applied for multiple grants in 2019 and has been implementing a \$400,000 Ministry for the Environment funded, three-year research project called 'Remediation of asbestos-contaminated soil: An alternative to landfill disposal'. As Principal Investigator of the project, Associate Professor Berry is leading

a team that includes international researchers and professors from the US Ivy League University of Pennsylvania, the Fox Chase Cancer Center in Philadelphia and Canberra University, as well as a senior researcher and associate professor in the School of Environmental and Animal Sciences, and a former Unitec student and University of Canberra PhD student.

The future is bright: some examples are that work has started on integrating the value proposition of the centre into Unitec's bid for a Centre of Vocational Excellence in the rapidly emerging NZIST, and the team is developing a project with Nigel Ironside at Ports of Auckland working on a project to recycle sediment from dredging. This is a collaborative project that includes MEng student Andrew Schunke (University of Auckland) and co-supervisor Dr Colin Whittaker (University of Auckland). Funding has been offered by the Ports of Auckland for a long-term project to find environmental waste-management options for Auckland (industry funding is extremely difficult in NZ). Associate Professor Berry has recently been invited to join a Waste Minimisation Committee led by Auckland Council and Civil Share, which supports initiatives to encourage a global economy within New Zealand.

#### 4.5 The Kaupapa Māori Focus – Ngā Wai a Te Tūi, Māori and Indigenous Research Centre

Committed to providing kaupapa Māori research to support indigenous innovation and Māori development, Ngā Wai a Te Tūi was gifted its name by revered kaumatua Dr Haare Williams on a beautiful February day at Unitec in 2019, on the occasion of the launch of Unitec's third Strategic Research Foci (see <https://www.unitec.ac.nz/UnitecResearchBlog/new-kaupapa-maori-research-centre-at-unitec/>).

Led by Professor Jenny Lee-Morgan (Waikato-Tainui), Ngā Wai a Te Tūi comprises a fast-growing multidisciplinary team to respond and lead whānau, hapū, iwi and community research. This team included, in 2019, Professor Leonie Pihama (Te Ātiawa, Ngāti Māhanga and Ngā Māhanga ā Tairi), Irene Kereama-Royal (Hauraki, Ngāti Raukawa ki te Tonga and Ngāpuhi), Jackie Paul (Ngāpuhi, Ngāti Tūwharetoa, and Ngāti Kahungunu ki Heretaunga), Ngāhuia Eruera (Ngāti Awa, Ngāi Tūhoe, Tūhourangi), Rihi Te Nana (Ngāti Haaua, Ngāpuhi, Tūwharetoa, Ngāti Maniapoto, Ngāti Raukawa), Dr Tia Reihana (Ngāti Hine), Wetini Paul (Ngāti Awa, Ngāti Tūwharetoa, Ngāi Tūhoe, Ngāi Te Rangi, Pikiao) and Rau Hoskins (Ngāti Hau, Ngāpuhi).

Embedded within the surrounding landscape of Te Whare Wānanga o Wairaka, 'Ngā Wai a Te Tūi' literally means 'The waters of the Tūi.' The name emphasises the importance of water to all living things, and connects us with the cultural waterways that our tūpuna have protected for hundreds of years.

The year saw the completion of Te Manaaki o te Marae, funded by Kāinga Tahī, Kāinga Rua, Building Better Homes, Towns and Cities National Science Challenge. This was a foundational project for Ngā Wai a Te Tūi and was co-led by Professor Jenny Lee-Morgan and Rau Hoskins, who also teaches in the Unitec School of Architecture. It brought together a large and diverse research team to investigate the role of marae in the Tāmaki Makaurau housing crisis. This research project was based at Te Puea Memorial Marae (TPMM) under the leadership of Hurimoana Dennis, who over the period completed a Masters of Applied Practice at Unitec. A collaborative research relationship was developed that included the signing of a MoU between TPPM and Unitec, a Unitec Masters scholarship, art exhibitions, keynote addresses and multiple publications. <https://www.ngawaiatetui.org.nz/te-manaaki-o-te-marae/>.

Professor Lee-Morgan and Rau Hoskins were nominated as funding advisers for the BRANZ Building Better Homes, Towns and Cities National Science Challenge tranche two, and went on to win \$2m for Urban Intergenerational Kāinga Innovations (UIKI). Premised on the completion of the UIKI tranche one scoping project, the overall aim of the UIKI tranche two research programme is to explore four broad themes that include: rangatahi views of home ownership, building skills and expertise for kāinga development, building innovations in high-density papakāinga, and important aspects of social and intergenerational cohesion and resilience in crisis situations. The four kaupapa Māori projects will involve Unitec postgraduate architecture students from Te Hononga in research, design and prototyping over a three-year period.

A highlight in the year for this Unitec Strategic Research Focus was winning a \$3.5m MBIE Endeavour Research Programme grant for the project Marae Ora, Kāinga Ora (MOKO): Marae-led Housing Interventions that Develop Kāinga. Led by Professor Lee-Morgan, the project partners with five urban South Auckland marae on a ground-breaking research project to explore and support their aspirations to strengthen their communities. The aim of the research is to work with marae to explore their respective and collective aspirations, and investigate ways to best support and implement these strategic designs for the wellbeing and sustenance of the marae and their communities.

Professor Leonie Pihama joined Ngā Wai a Te Tūi in 2019, bringing her \$2.1m MBIE Endeavour Fund Research Programme, He Waka Eke Noa: Maori Cultural Frameworks for Violence Prevention and Intervention. The research project conducts a national survey to examine prevalence rates of family and sexual violence for Māori, and seeks pathways for intervention and prevention.

In addition to these grants and project completions, this talented and passionate team had a highly successful year, winning and completing the following five grants:

- **Tukua ki te Ao: Progressing the normalisation of te reo Māori in organisations**

A one-year kaupapa Māori research study led by Professor Jenny Lee-Morgan and funded by Te Taura Whiri i Te Reo Māori. This research study investigated the use of te reo Māori in three types of organisations (local council, secondary school and company) with the aim of contributing new knowledge towards the 'normalisation' of Māori language in wider New Zealand society.

- **Poipoia Te Kakano Kia Puawai**

A six-month kaupapa Māori research scoping project led by Dr Tia Reihana and funded by BRANZ Building Better Homes, Towns and Cities. The research study involved the collaborative exploration of innovative iwi trade training programmes with the aim to investigate a framework co-created for workforce development that supports Māori into apprenticeships and employment.

- **Showcasing Decolonising Research: Indigenous Storywork as Methodology**

A one-year Knowledge Event Support Grant led by Professor Jenny Lee-Morgan and funded by Ngā Pae o te Māramatanga to enable the showcasing of the co-edited book by Emeritus Professor Joann Archibald, Dr Jason De Santolo and Professor Jenny Lee-Morgan.

- **Pūrākau – Te Manaaki o Te Puea Memorial Marae**

A six-month kaupapa Māori collaboration project led by Professor Jenny Lee-Morgan and funded by Cognition Education Ltd to support the creation of a teaching-support resource as an audio and visual web platform bringing to life Te Manaaki o Te Puea Memorial Marae.

- **Urban Intergenerational Kāinga Innovations UIKI, Tranche One**

A six-month kaupapa Māori research scoping project led by Professor Jenny Lee-Morgan and funded by BRANZ Building Better Homes, Towns and Cities to investigate the potential of kaupapa Māori-based kāinga innovations to support intergenerational Māori housing aspirations and the diverse needs of whānau, hapū, iwi and marae in Tāmaki Makaurau.

## 5 Ethics

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

In 2019, 49 ethics applications were received from Unitec staff and students and 44 were approved. This is a marked drop in the number of applications from 2018, and this can be mainly attributed to the closure of various masters programmes at Unitec. As opposed to previous years, around half of ethics applications were submitted by students completing masters degrees and half by academic staff members. The quality of applications from both staff and students continues to be an issue and UREC is investigating measures to improve this.



Figure 14: Staff and student ethics applications received and approved

In April 2019, a three-year report was submitted to the New Zealand Health Research Council. This three-year report was necessary for UREC to be recertified by HRC as an accredited New Zealand ethics committee. As a result, UREC was reaccredited for another three years. In recognition of the submitted report, the HRC Ethics Chairperson sent a letter to UREC emphasising the high standard of work and reporting by the committee.

## 6 Postgraduate studies and student-engaged research

Engaging students in research is an important way to broaden their educational experience and to make the taught subjects more accessible to them. Unitec is currently developing a fifth research goal referring to student-integrated research at Unitec. This will help our initiative to further embed student-integrated research across Unitec. Below are some current examples.

### 6.1 Postgraduate scholarships

Each year Tūāpapa Rangahau provides postgraduate scholarships to students across Unitec's postgraduate programmes, supporting our students to succeed. These scholarships are advertised, awarded and administered by Tūāpapa Rangahau in close partnership with the relevant Academic Leaders.

In 2019, \$250,000 of scholarship funding was made available to 10 postgraduate programmes. The funding also supported eight Māori students with Māori-specific scholarships, seven Pasifika students with Pasifika-specific scholarships plus a Bold Innovator Scholarship and IBM Scholarship.

### 6.2 Success stories

Below are some of the 2019 postgraduate scholarship success stories:

### 6.3 Success stories

Below are some of the 2019 postgraduate scholarship success stories:

#### 6.3.1 Jane Park's success story

Jane studied in the Master of Landscape Architecture and said this about Master of Landscape Architecture scholarship, which supports her project:

"Being a part of the Master of Landscape Architecture programme at Unitec was a pivotal point for my professional career. I spent two years researching and writing my thesis project – Sound Landscapes: The Past, the Present, the Possible, under the supervision of Dr Hamish Foote. The project examined why sonic discord within urban environments is so common and how this cyclic behaviour could evolve to produce a positive flow-on effect.

"I would encourage those who are contemplating postgraduate study to take the initiative and apply yourself to that thing you are passionate about. It will be tough at times and it will not be one smooth expedition, but it is a truly rewarding experience that will open doors to your next journey."

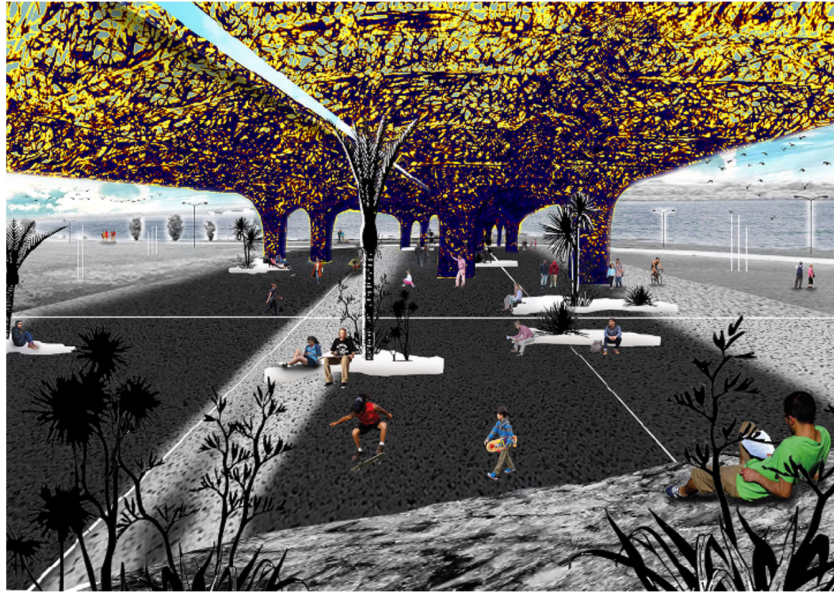


Figure 15: Panuku development (photo provided by Associate Professor Matthew Bradbury)

### 6.3.2 Sumit Biwas's success story

An international student in the Master of Computing programme, Sumit received the scholarship in 2019 while he was conducting his research on intelligent beehive status monitoring under the supervision of Associate Professor Iman Ardekani. Sumit's research contribution in the emerging multidisciplinary research area of precision beekeeping provides a solid base for prospective postgraduate students.

### 6.3.3 Danae Ripley's success story

Danae studied in the Master of Creative Practice and said the following about her scholarship, which supported her project:

"Scholarships are important for postgraduate students in our school because of the material costs involved in artistic and design research," says Associate Professor Leon Tan. This scholarship allowed Danae to advance her artistic research project over the year. In 2019, Danae's practice-based research was featured in several exhibitions including the National Contemporary Art Award (Waikato Museum), the NZ Painting and Printmaking Award (Hamilton) and the Molly Morpeth Canaday Award (where she won the Craigs Investment Partners Youth Award).

### 6.3.4 Paul De Leeuw's success story

Paul studied in the Master of Architecture (Professional) and said the following about his scholarship, which supported his project:

"I have found the scholarship invaluable as it allowed me to focus on studies full time as opposed to fragmented focus if part-time work was required to pay existing overheads. Furthermore, it helped by allowing purchasing of certain PC hardware upgrades as well as software and subscriptions that are useful for architectural design and rendering. Not to mention printing and travel costs."



### 6.3.5 Ameesh Morar's success story

Ameesh studied in the Master of Architecture (Professional) and said the following about his scholarship, which supported his project:

"Firstly, the design scholarship helps with general living costs, allowing me to put full effort into my studies rather than having to worry about the cost of living. I was also able to build a computer to increase my productivity at home and was able to build and render models at home, which saved a lot of time."

### 6.3.6 Cameron Rigby's success story

Cameron studied in the Master of Architecture (Professional) and said the following about his scholarship, which supported his project:

"The scholarship allowed me to take time off work and focus on my studies. The money also went towards supplies for models and software for my laptop so that I could do work from home."

### 6.3.7 Daniel Amanaki's success story

Daniel studied in the Master of Architecture (Professional) and said the following about his scholarship, which supported his project:

"With the scholarship, I was fortunate enough to visit Vanuatu, the country my research project was based in. This allowed me to not only carry out multiple site visits, but I had the opportunity to conduct my own investigations and research – this helped properly contextualise initial academic research and make fundamental parallels. Ultimately, with the first-hand experience I was able to make the theoretical and architectural outcome as accurate and realistic as I could. The scholarship was a huge help in achieving this."

### 6.3.8 Celine Pearn's success story

Celine studied in the Master of Architecture (Professional) and said the following about her scholarship, which supported her project:

"The research scholarship proved useful to me by contributing towards a quality laptop that allowed me to run the necessary software and architectural programmes. This proved extremely valuable to my workflow, as I often worked away from uni, and allowed weekly discussions with my supervisor to be more constructive."

### 6.3.9 Thomas Kerby's success story

Thomas studied in the Master of Architecture (Professional) and said the following about his scholarship, which supported his project:

"Receiving a research scholarship in 2019 was an amazing opportunity from Unitec and felt like a fantastic reward and recognition for the hard work that I had put in throughout my previous years of study. I was able to partially use my funds to invest in a new computer and software subscriptions that I used on a daily basis throughout the year. The remainder of my funds I was able to put towards living costs, which reduced the financial pressures of studying, really allowing me the opportunity to invest my time and focus on my research project."

### 6.3.10 Venus Mataia's success story

Venus was the recipient of a 2019 Pacific Masters Scholarship. Last year she was completing her Masters Architecture Professional degree. Her thesis is entitled Measina o Samoa – The Treasures of Samoa. She used her scholarship to fund her site visit to Samoa, where she was designing a museum in the capital of Samoa, Apia. It also helped her to purchase materials that she needed for her final architectural project.

## 6.4 IBM Scholarships

In 2019, Unitec was able to negotiate scholarships from IBM. These were dedicated to the purpose of encouraging and supporting industry partnered postgraduate research and were contestable, implemented by the Postgraduate Research and Scholarships Committee. Students had to demonstrate that in partnership with their supervisor, they had secured an industry or community partner, who is actively supportive preferably to the point of contributing resources. Five scholarships were offered to three Master of Architecture Professional, one Master of Osteopathy and one Master of Applied Practice (Media) Te Miro students. The Unitec Postgraduate Research and Scholarships Committee selected the candidates who demonstrated the highest-level qualities in Te Tiriti, applied/industry research and transdisciplinary research.

### 6.4.1 2019 IBM Scholarship highlights

Below are some of the 2019 IBM Scholarships highlights:

#### 6.4.1.1 Reza Rouhani

Reza was an international student who studied in the Master of Computing and said the following about her scholarship, which supported her project:

“During my last year’s research, I learned about the concepts and security of quantum key distribution and the protocols of quantum computing in deep detail. I studied quantum physics principles such as Heisenberg’s inaccurate and un-clone theory of quantum physics, two elementary quantum physics properties that guarantee quantum cryptography security. I also became familiar with QuVis Software (The Quantum Mechanics Visualization Project) from St Andrew’s University of Scotland, using it to collect my research data. I read more than 40 research papers related to quantum computing and developed a good base of knowledge.”

#### 6.4.1.2 Neill McCulloch

Neil studied in the Master of Architecture (Professional) and said the following about his scholarship, which supported his project:

“In 2019, with help from an IBM Scholarship, I completed an investigation into prefabricated housing, by being involved with the pre-construction and assembly of a two-bedroom house for clients in Mt Albert, Auckland. The project recorded what could be achieved with a limited scope of construction knowledge, and how the process could be improved through the interactions and consultation of industry professionals. The findings were reported via an essay, and a presentation at an architectural conference held at Monash University in Melbourne.”

#### 6.4.1.3 Chris Solomon

Chris studied in the Master of Osteopathy and said the following about his scholarship, which supported his project:

“New Zealand is becoming increasingly culturally and ethnically diverse. My research project aims to identify the cultural awareness of osteopathy students. Ethics has been approved, however Covid-19 has hindered data collection, which is scheduled for the month of July. I am currently reviewing literature and methods, and aiming for completion at the end of November.”

## 6.5 Unitec Bold Innovators Scholarship

Tūāpapa Rangahau introduced the Unitec Bold Innovators Scholarship in 2017. Many talented Unitec students develop start-up ideas during their studies, however do not often have the opportunity to progress these further once they graduate. This scholarship supports selected graduates in maturing these ventures into the early stages of commercialisation. Melissa Cameron graduated from Unitec in 2019 with a Master of Creative Practice. As a part of her masters she developed the concept for the socio-circus theatre group A Fool's Company, together with three other Unitec Bachelor of Performing and Screen Arts graduates. Winning 2019's Unitec Bold Innovators Scholarship provided her with a grant and further support that allowed her to take A Fool's Company to the next stage. The team delivered a very successful show, *Get that Circus out of my Lion* at Auckland's TAPAC venue. Incubation within the Bold Innovators Scholarship supported Melissa and her team to develop A Fool's Company into a credible business with high aspirations to enrich culture and education in Auckland and New Zealand. They are currently planning their next show in a bigger venue, once the pandemic situation allows for large events to be commercially viable.

## 6.6 Stories of student-engaged research

Student engagement and collaboration in staff led or initiated research is common at Unitec. This occurs through studentships, industry-funded projects, externally funded grants, co-authorship with supervisors and credit-bearing courses that involve industry-partnered research. Such projects and partnerships provide real-life experience for students and often get them in front of the industry they aspire to work in. Student-integrated research is not a goal in the current strategy, but will almost certainly be in the next one. As a consequence, Tūāpapa Rangahau has not yet collected data on this, but here are some excellent examples:

### 6.6.1 Min Hall's project

Architecture Lecturer Min Hall is the lead researcher in Project Pātūtū, investigating the development and use of prefabricated timber-framed, straw-insulated panels for house construction. Project Pātūtū has involved postgraduate students as research assistants at each of its two stages. Min says, “I had two research assistants for Stage 1, who were involved for a semester each. A third is involved this year... Kate Olsen has received an industry scholarship to do a comparative study on the thermal performance and/or the carbon footprint of the wall panels for Stage 2. That works starts next semester and goes through to 2021.” Min has also been involved in an elective, Resource Matters, with colleague Magda Garbarczyk. In 2019 the students built a 1/3-scale structure, using prefab straw-bale panels. The project, titled *Straw into Gold*, was presented at BuildNZ, a design and building trade exhibition, and profiled in an article on Min's research in FAR's magazine, *From the Ground Up*. Five students from the elective also attended the Earth Building Association Conference in Cromwell in November 2019, and did a brief presentation of the project there.

### 6.6.2 Associate Professor Linda Kestle and Associate Professor Terri-Ann Berry's project

Associate Professors Linda Kestle and Terri-Ann Berry, in Construction and Engineering, are working closely with Naylor Love Construction, Mitre 10 and Green Gorilla to determine the sources, quantities and composition of plastic waste generated during construction activities. The overall aims of the research are to work with material suppliers such as Mitre 10 to eliminate unnecessary plastic packaging, to establish effective on-site plastic-waste management and to identify options for recycling or reuse. Alex Bu, Bachelor of Engineering Technology final-year project student and German Hernandez, Research Associate, Environmental Solutions Research Centre have been working on-site completing audits and taking samples for compositional analysis by Dr Ashveen Nand, Technical Lab Manager at Unitec and plastics expert. The outcomes of this study will be used to plan for future applied research with industry that seeks to minimise construction waste volumes to landfill. This project has been fully funded by Auckland Council's Waste Minimisation Innovation Fund over an 18-month period.

### 6.6.3 Dr Diane Fraser's project

Dr Diane Fraser, Senior Lecturer in Environmental and Animal Science, continues to focus on providing students with opportunities to engage in industry-led research projects. The student research relationship with Auckland Council, which started in 2011, continues with both supervised Bachelor of Applied Science third-year students conducting small research projects in biosecurity awareness as part of their self-directed study course, and summer studentship research placement in the biocontrol of pest plants. In 2019, two students, Aaron Chang and Zac Wilcox-Brown, worked with Emma Edney-Browne of Auckland Council Biocontrol team on the monitoring and release of a number of biocontrol agents in the Auckland region. In 2019, Diane was delighted to present this work to staff at the Unitec Teaching and Learning Symposium together with Chelsea Neverman, who was one of her Auckland Council summer students. After graduating, Chelsea gained an internship and then employment with Auckland Council and now supervises the new studentship research students. Diane received Unitec's Excellence in Teaching Award 2019 for her work with these industry/student research projects.

### 6.6.4 Dr Renata Jadresin-Milic's project

Dr Renata Jadresin-Milic, Senior Lecturer in Architecture, has undertaken a research project funded by the Tūāpapa Rangahau Early Career Researcher Fund. Her project is investigating the Digitalisation of Heritage in New Zealand, and she has two postgraduate students (Julia Hamilton and Sian Singh) involved, working on two different aspects of the project. This project and the partnership with industry provides real-life experience for her students and "gets them in front of the industry they aspire to work in."

Dr Jadresin-Milic has also set up a student-based programme with INTBAU Italy International Architectural Programme Cultural Landscape and Heritage Skills in Lizoni (June 2018). As a result, seven Unitec students have been taught by leading academics and practitioners from Italian universities. The project has utilised the most advanced digital-heritage methodologies for survey and documentation: laser scanning, digital photogrammetry, three-dimensional modelling and computer graphics. The Unitec students have also had field and software training in 3D laser scanning – point clouds, photogrammetry and B.I.M. technology. These students were granted a 50% scholarship by Fondazione Antonio Meneghetti, Switzerland, for the programme. As a result, we now have an opportunity to develop stronger cooperation between Unitec and Politecnico Milano. Renata's proposal for the project Digitalisation of Heritage in New Zealand was based on this practical experience. The programme was recognised as a major event for the European

Year of Cultural Heritage in 2018. In addition, Renata has also published a book chapter with one of her postgraduate students, *Functional Heritage: Reconnecting with the Iron Web*.

## 6.7 Postgraduate examinations and completions

Tūāpapa Rangahau manages and administers the examination of all 90-credit and higher theses for Unitec's masters and doctoral programmes. Figure 16 shows the number of theses (90 or more credits<sup>15</sup>) submitted for examination since 2011. The number of submissions of theses in 2019 is very similar to the number of theses submitted in the last two years

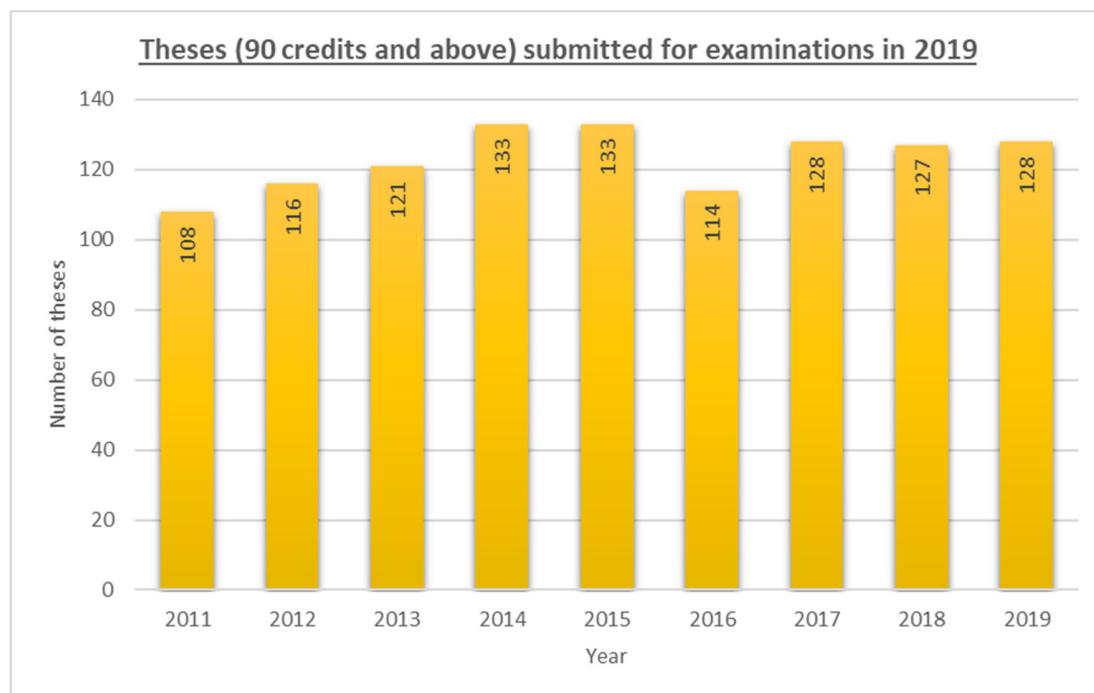


Figure 16: Theses (90+ credits) submitted for examination

Figure 17, below, shows the number of graduates with a masters or doctoral degree, along with the graduates who identify themselves as Māori or Pacific. There was a slight increase in the number of Māori or Pacific graduates in 2019.

The numbers of examinations and graduates differ because students submit theses for examination in one year and graduate in the following year.

<sup>15</sup> 90-credit plus masters examinations involve external examiners.

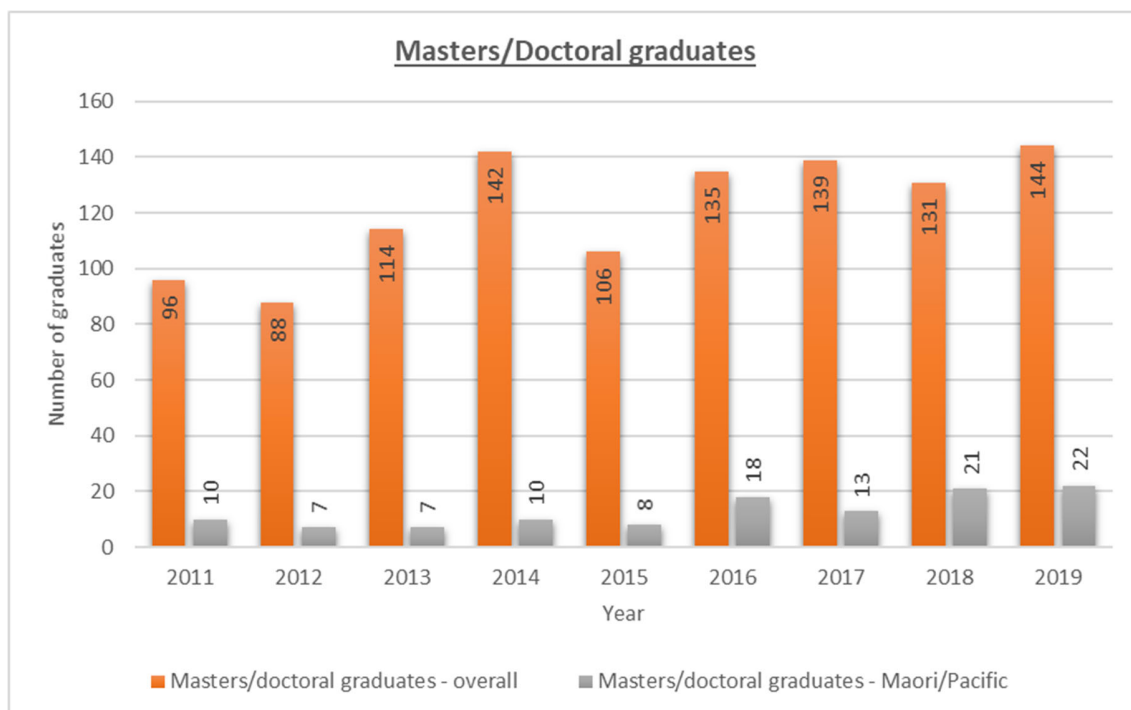


Figure 17: Masters and doctoral graduates from 2011 to 2018

## 6.8 Dean's Award for A+ postgraduate students

In 2019 there were a total of five research masters completions with an A+ grade. Figure 18 shows the distribution of grades by masters degree programmes. Two of these A+ grade recipients identified themselves as Māori and none identified as Pacific. An award ceremony is held annually where family, supervisors and leaders of programmes attend. Unitec Chief Executive Merran Davis gave out the certificates and gifts.

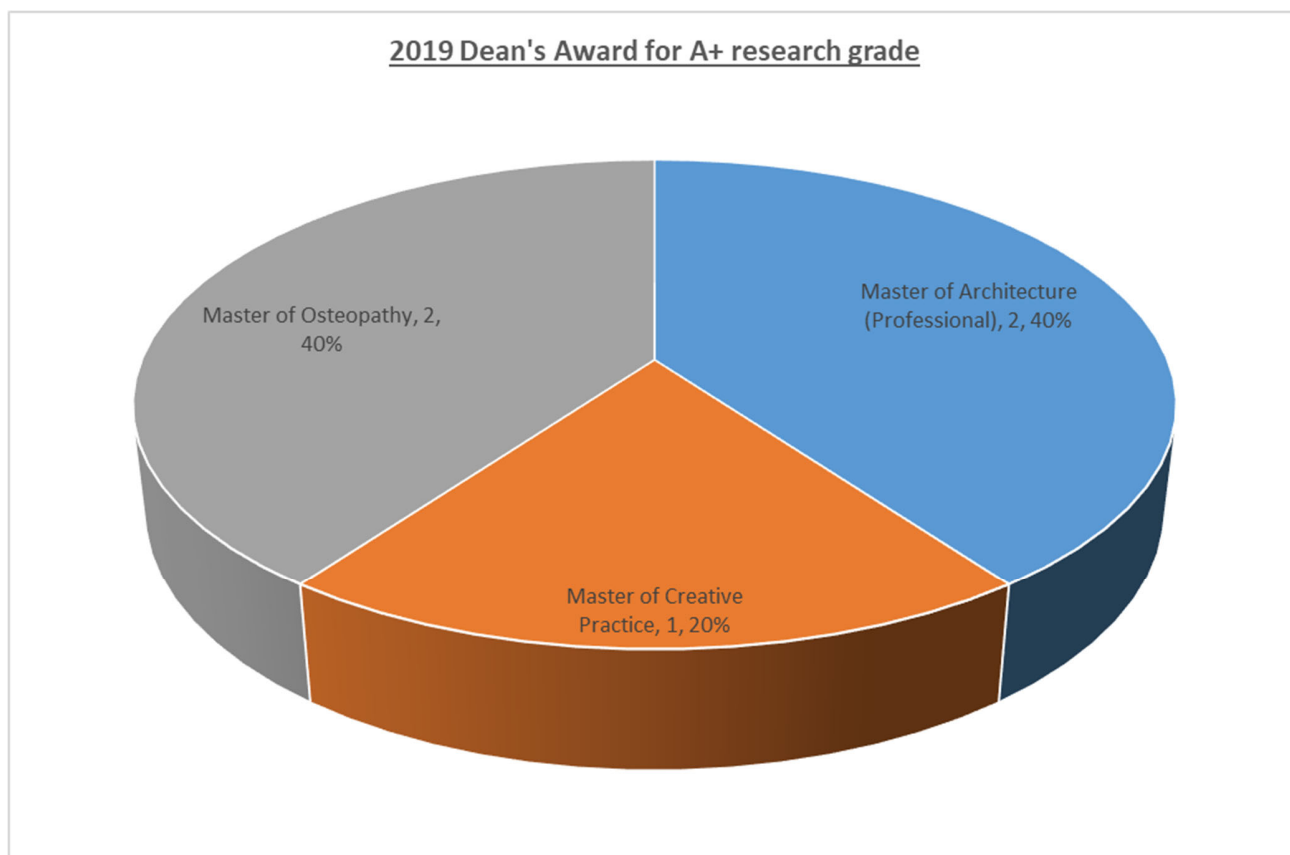


Figure 18: 2017 Deans Award for A+ research grades

## 6.9 Research Degree Completions (RDC)

RDC is one of the three performance measures used in PBRF to allocate PBRF funding (see section 2.5). RDC is a measurement of the number of PBRF-eligible postgraduate research-based degree completions (including doctorates and masters, as well as some postgraduate diploma and honours programmes). It is a measure of postgraduate qualification completions of greater than or equal to 90 credits that contain an externally assessed postgraduate research component. This element makes up 25% of the PBRF fund and provides Unitec with approximately \$1 million of funding per annum (approximately 1.46% of the total funding pool for all TEOs).

### 6.9.1 RDC performance calculations – a quick summary

The RDC performance and funding calculations are complex, however Tūāpapa Rangahau has attempted to simplify this here.

RDC performance calculations comprise four parameters that dictate how much funding the institute will get for any particular student, course or year. Those parameters are the total credit value of the course, the course category, the student ethnicity and the completion year.

The following is a summary of the four key parameters that dictate RDC performance and how the weighting system works:

1. **Credit-value** and the level of the course:

- Level 9 (90 credits) – weight = 0.75
- Level 9 (120 credits) – weight = 1
- Level 10 (doctorate) – weight = 2

The higher the weighting value, the proportionally higher the funding allocated.

2. **Student ethnicity** – all students on enrolment can select multiple ethnicities that they identify with. Māori and Pacifica get a weighting value of 2 and all other ethnicities get 1. The higher the weighting, the proportionally higher the funding allocated.
3. **Course discipline category** – each course is classified into a discipline category and weighted by TEC (presumably to incentivise growth in some discipline areas). Unitec's RDC courses fall into the categories A, B C, I, J and L. The higher the weighting, the proportionally higher the funding allocated.

Course discipline category	RDC weighting	Classification of RDC-eligible Unitec programmes
<b>Category A</b>	Weighting value = 1	Master of Educational Leadership and Management Master of Social Practice Master of Education Master of International Communication Master of Applied Practice
<b>Category B</b>	Weighting value = 2	Master of Design Master of Computing Master of Health Science Master of Creative Practice
<b>Category C</b>	Weighting value = 2.5	Master of Architecture (Professional) Master of Landscape Architecture Master of Architecture Doctor of Computing
<b>Category I</b>	Weighting value = 1	Master of Teaching and Education Leadership Master of Contemporary Education
<b>Category J</b>	Weighting value = 1	Master of Business
<b>Category L</b>	Weighting value = 2	Master of Osteopathy

Table 14: Classification of Unitec's RDC-eligible programmes by course category and weightings

4. **Yearly weight** – students in research degree courses start and finish their course at different times, depending on whether they are full-time or part-time. Apart from being full-time or part-time, students also have the flexibility to split the dissertation course-credit value in multiples of 15 credits over multiple semesters. If a particular cohort of students starts at one date, their finish date could be different for each student. Due to this complexity, the funding per completion starts two years after the actual year of completion and the funding is paid to Unitec in decreasing instalments over a three-year period. We get 50% of the total RDC funding per completion two years after a completion, 35% three years after a completion and 15% four years after a



completion. For example, the 2018 year will return 50% of funding from a 2016 completion (two-year lag), 35% from 2015 completions and 15% from 2014 completions.

Combining the weightings for all the four parameters described above gives the weighted count per student completion as follows:

***Weighted count per student = Credit-value weighting x Ethnicity weighting x Course category weighting x Year weighting (either 50%, 35% or 15%)***

### 6.9.2 2019 RDC performance data

Using the above formula for calculating RDC weighting counts,

Table 15 shows Unitec's total number of RDC-eligible weighted counts for the 2019 year, and illustrates how these weighted counts are earned from the completions from prior years, 2015, 2016 and 2017.

Year (Year weight)	Total Completions (Total weighted count)
2015 (15%)	114 (37)
2016 (35%)	105 (77)
2017 (50%)	99 (114)
<b>2019 RDC weighted count total:</b>	<b>(228)</b>

Table 15: 2019 RDC completions and total weighted counts across eligible years

Figure 19 shows Unitec's weighted RDC counts over the last seven years. The 2019 data showed a little drop from 2018.

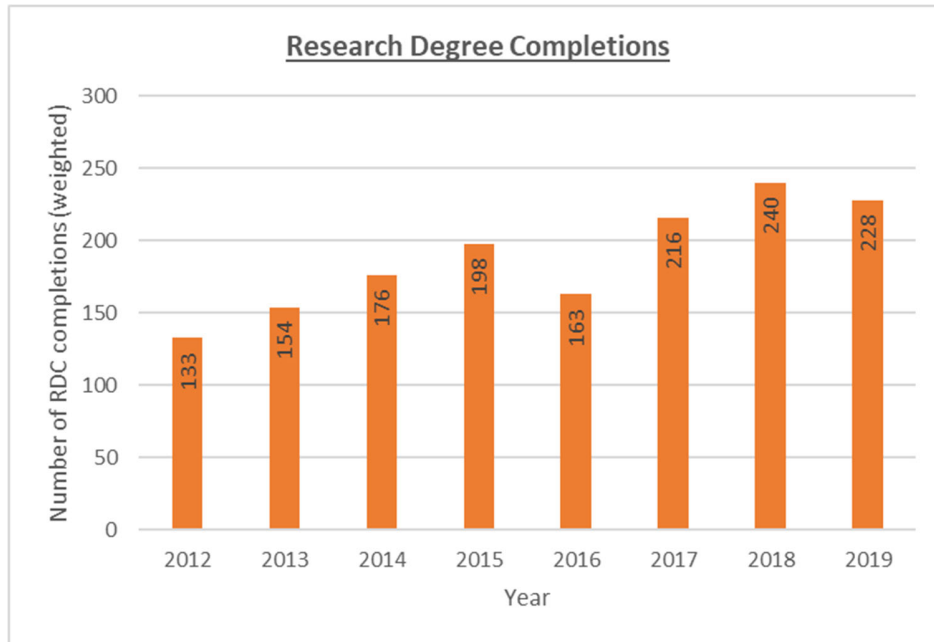


Figure 19: Unitec's RDC weighted completions from 2012 to 2019

### 6.9.3 RDC funding estimate

Because TEC's total PBRF funding pool is variable and so is the RDC performance of other TEOs, we are not able to definitively translate total weighted counts into RDC funding per annum. However, based on the previous years' funding allocation of approximately \$5,500 per RDC weighted count, we estimate RDC funding to be around \$1m again in 2019. The final RDC figure for 2019 will be released by TEC in October 2020.

Between 2015 and 2017, there were 26 actual RDC completions by Māori (13 in 2015, 8 in 2016 and 5 in 2017). During the same period, there were 14 actual RDC completions by Pacific students (4 in 2015, 3 in 2016 and 7 in 2017).

### 6.9.4 Credit value of RDC completions

Figure 20 indicates that a majority of Unitec's RDC completions over the past seven years have a credit value of 1, that is, 120-credit level 9 degree courses. Credit value is also referred to as volume of research factor (VRF).

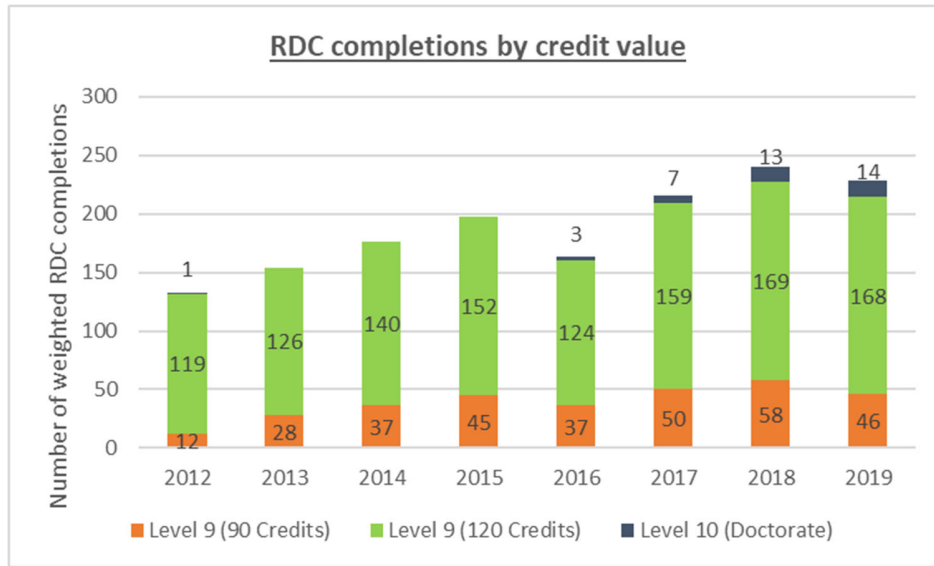


Figure 20: RDC completions by credit value

#### 6.9.5 Course categories of RDC completions

Figure 21 indicates that a majority of Unitec's RDC comes from courses which are classified as category C. This category has a cost weighting value of 2.5 and this inflates the weighted counts significantly and positively.

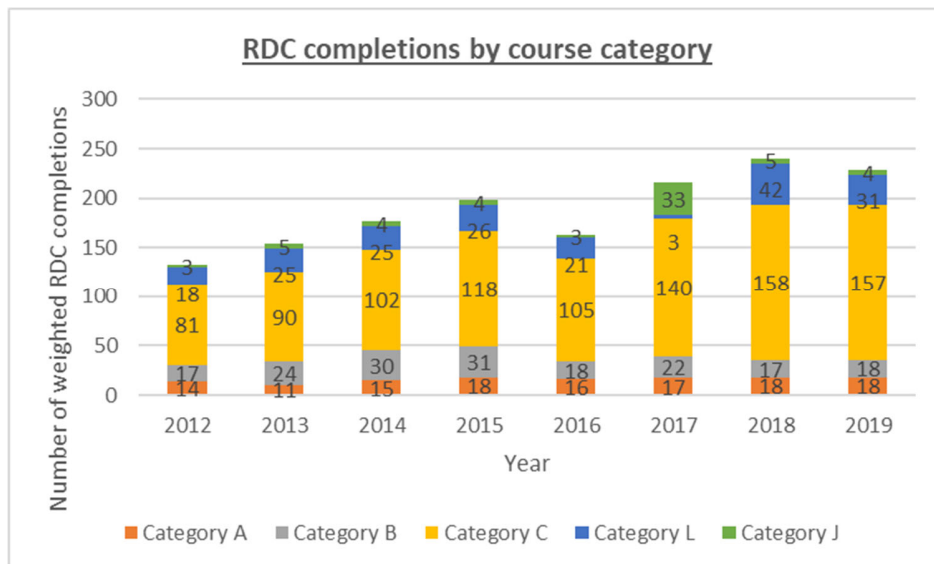


Figure 21: RDC completions by course category

Table 16 below details the full list of programmes that are included in this category, however these high category C numbers are predominantly due to large numbers of Master of Architecture completions.

<b>Programme</b>	<b>Course discipline category</b>	<b>RDC Weighting</b>	<b>2019 RDC Weighted Count</b>
Doctor of Computing	C	2.5	10.8
Doctor of Philosophy	A	1	3.6
Master of Architecture	C	2.5	2.0
Master of Architecture (Professional)	C	2.5	126.3
Master of Business	J	1	4.4
Master of Computing	B	2	7.0
Master of Design	B	2	10.4
Master of Education	A	1	0.5
Master of Educational Leadership and Management	A	1	8.6
Master of Health Science	B	2	0.3
Master of International Communication	A	1	3.5
Master of Landscape Architecture	C	2.5	15.0
Master of Osteopathy	L	2	31.4
Master of Social Practice	A	1	1.7
Postgraduate - Certificate of Proficiency	C	2.5	2.9
<b>Total</b>			<b>228.3</b>

Table 16: Unitec's RDC-eligible courses by course discipline categories and the associated weighting

## 7 Telling our research stories

Tūāpapa Rangahau promotes Unitec research stories via the Unitec Research Symposium, the ITP Research Symposium, Unitec ePress and the Unitec Research Blog.

### 7.1 Unitec Research Symposium

The annual Unitec Research Symposium focused on the 3-Minute Thesis Competition in 2019, with an outstanding event hosted in the School of Architecture.

The judges for this event were:

- David Glover – Executive Director, Partnerships and Student Recruitment
- Mary Johnston – Executive Director, People and Infrastructure
- Duaa Alshadli – Lecturer, School of Building Construction

**Winner: Kate Martin**, Attitudes of First-year Health Students in New Zealand Regarding Immunisation, Master of Osteopathy. Principal Supervisor, Associate Professor Dianne Roy; Associate Supervisor, Nichole Phillips.

**Runner up: Carl Salas**, Living with the Dead, Master of Architecture (Professional). Principal Supervisor, Peter McPherson; Associate Supervisor, John Pusateri.

The table below shows the participants, project title and programme.

Name	Title	Program
Jacqueline Topless	Welcome Home: Return, Rehabilitation and Reconnection; Architecture as a Kaitiaki for Taonga Māori	Master of Architecture (Professional)
Raheleh Jahanbani	Optimising the Cycling Networks in Auckland	Master of Landscape Architecture
Carl Salas	Living with the Dead	Master of Architecture (Professional)
Steeven Mou Sang	Tahiti: Between Myth and Reality	Master of Architecture (Professional)
Qi Yang	How Can Green Infrastructure Treat Urban Stormwater in a Waterfront Site in the Estuary of Ahuriri in Napier?	Master of Landscape Architecture
Zahra Baradaran	Applying a Life-cycle Approach in Designing Flexible Housing	Master of Architecture

Reza Rouhani	Analysis and Evaluation of Quantum	Master of Computing
Joseph McAuley	Groundwater-Architecture	Master of Architecture (Professional)
Kieran Hogan	Seeing is Deceiving	Master of Architecture (Professional)
Kate Martin	Attitudes of First-year Health Students in New Zealand Regarding Immunisation	Master of Osteopathy
Te Kerekere Roycroft	“Pūtahi a Whenua: Voices Flowing as One	Master of Landscape Architecture
Fauzia Mortuza	Eudaimonia	Master of Architecture (Professional)
Kai Fan	Towards the Flourishing of Chinese Protestantism: An Architecture Enquiry, Shanghai	Master of Architecture (Professional)
Jaspreet Kaur	Making Place	Master of Architecture (Professional)
Jacob Bowden	Plasti-city	Master of Architecture
Josh Adams	Post-prison Occupancy: A Facility for Former Inmates to Re-engage in with a Support Network and Independent Living	Master of Architecture (Professional)

Table 17: 3-Minute thesis competition participants

## 7.2 ITP Research and Innovation Symposium

The seventh ITP Research and Innovation Symposium was convened by EIT and Otago Polytechnic jointly and held in Hastings. Unitec sent a small group of staff down, staying on the EIT marae, Te Ara o Tāwhaki. This group included a strong contingency of Māori staff in order to build on the Māori networks that had been developed by Te Urikore Biddle, convenor of the Kā Rewa: Maori Innovation Symposium at Unitec in 2018. Victor Grbic presented the mauri stone from Te Whare Wānanga o Wairaka to Professor David Tipene-Leach from EIT. Two Māori postgraduate students joined the hiko from the Unitec School of Architecture. This proved to be a good move, as EIT presented an event with outstanding manaaki; a sense of bicultural ownership and a pride of whenua that was utterly infectious. Held on Monday 15<sup>th</sup> and Tuesday 16<sup>th</sup> of April, the symposium was called Whanaungatanga: Community-centred Research, with themes around relationships, networks, reciprocities and obligations (see <https://itpresearch.ac.nz/2019->

[symposium/](#)). Unitec presentations included Patrick Dodd from the School of Applied Business, Student Learning Experiences as They Interact with Assessments; Paul Woodruffe from the School of Creative Industries, The Piki Project: Building Capabilities Within the Homeless Community; and Gregor Steinhorn from Tūāpapa Rangahau, Building Collaborative Research Networks to Tackle Asbestos Waste with a Circular Economy Approach. A presentation from Tepora Emery looked at the Toi Ohomai-led, National Science Challenge-funded project Toitū te Kainga, Toitū te Ora, Toitū te Tangata – Healthy Homes, Healthy People, on which Unitec’s Professor Bin Su and Associate Professor Lian Wu had played key roles.

### 7.3 Unitec ePress

Unitec’s ePress is an online publisher of peer-reviewed, quality-assured academic work by Unitec staff, students and associates. It publishes academic work in a range of formats on the ePress website (<https://www.unitec.ac.nz/epress/>) and provides a supportive publishing environment for current and emerging researchers.

Its Executive Editor and founder, Associate Professor Evangelia Papoutsaki, left Unitec towards the end of 2018, though she still retains an advisory role with ePress, and a replacement Editor resigned in early 2019. A new Editor was appointed in mid-2019, but was not available to take up the position until early November 2019.

Due to this hiatus, the ePress publishing schedule for 2019 was as follows:

- One issue of the journal *Perspectives in Biosecurity* published
- One Occasional Paper published

However, there were a few papers close to publication by the end of 2019, and early 2020 saw:

- One issue of the journal *Whanake* published
- One Occasional Paper published

The above publications represent quality-assured research outputs for nine Unitec staff members.

ePress is committed to giving new and emerging researchers access to an open-source publishing platform, while maintaining high standards of academic integrity through the double-blind peer-review process. The ePress Editor is able to support new and emerging researchers by reviewing papers prior to submission, and giving authors guidance on structure and writing clarity.

### 7.4 Unitec Research Blog

The blog proudly samples our research stories, news and other information about research at Unitec, and feeds into Tūāpapa Rangahau’s social media platforms via Facebook (<https://www.facebook.com/UnitecResearch>) and Twitter (<https://twitter.com/UnitecResearch>).

The blog is an important means of telling our research stories, particularly now that *Advance* is no longer being published. Content is created by the ePress editor.

Posts published in 2019 were:

- World Hydrogen Energy Experts to Meet in Rotorua

- New Education Publication from The Mind Lab
- Unitec Engineer has Weeds, Cannabis in her Sights
- Unitec Response to the Mayoral Housing Taskforce
- New Research into Climate Change's Effect on Weeds
- New Kaupapa Māori Research Centre at Unitec

## 7.5 Writing Support

Tūāpapa Rangahau continues to offer writing support to staff members, through the services of a contractor, to assist with preparing papers and books for publication. Staff members receiving writing support are also guided through the process of submission to journals where necessary, and given help with responding to reviewer feedback. This is particularly valuable for new and emerging researchers, and represents a worthwhile investment in Unitec's staff in supporting them towards achieving quality-assured research outputs.



## 8 Priorities for 2020

The year 2020 will be one of consolidation on the success of 2019, as well as one of strategy, as we think ahead into the next five years.

The outstanding success of Ngā Wai a Te Tūi in winning over \$6m in research grants will make 2020 a busy year for Tūāpapa Rangahau as we embed significant projects such as the Research Programme MOKO. The Environmental Solutions Research Centre will be busy finalising several significant project bids; both Smart Ideas and Research Programme applications, the latter with The University of Auckland. Implementing the Smart Ideas-funded Centre for Cybersecurity Research project, Assessing Reidentification Risks of Anonymised Data Sets with Bayesian Probabilistic Programming, will be complex. Project leader Professor Christian Probst's move to Berlin at the end of the year has created challenges that both MBIE and Tūāpapa Rangahau have shown great resolve and determination to overcome. While consolidating such projects, Unitec will be dealing with becoming a member of the NZIST. The Research Directors, who meet four times a year, are already planning work streams and a mission statement of collaboration toward the presentation of a strongly networked, highly functional sector leadership group. Finally, the 2020-2024 Unitec Research Strategy needs to be completed. Early drafts and consultation signal the likely inclusion of new priorities around student and environmental research.

## 9 Conclusion

Unitec has become a small but rapidly emerging player in New Zealand's research and innovation ecosystem, with an average 450% increase in external research income, year on year, since 2014. In 2019, the Unitec Research Director was asked by Associate Minister of Education Jenny Salesa to serve on the panel to review PBRF for New Zealand, representing the ITP sector. Unitec now hosts a nationally significant kaupapa Māori research centre with an emerging capability in the environmental research space. Our levels of industry engagement have increased, with 183% improvement since the inception of our industry-funded research goal. Research is beginning to inform and influence the educational product offering of the institute, with the development of the Diploma in Cybersecurity a direct result of seven years of the Cybersecurity Research Centre. It is exciting to speculate on what the impact for New Zealand Inc. might be if this increase in capability can be scaled across the sector and at a national level through the NZIST. Exciting because our research is partnered into the industries and communities within which it is implemented. This means that our research is immediately shared with these industries and communities, and that they are able to integrate the outcomes into their business plans, operating models and kaupapa. It also means that the potential for impact is maximised and the outcomes are located where they are most needed, instead of on a shelf somewhere. This immediacy of access through partnership has always been the real potential for our institute and our sector. We just needed to get a toehold on the slippery slope, which we have.