



UQ scholarship student Gustavo Villafuerte from Peru was one of more than 560,000 students worldwide to enrol in IELTSx: IELTS Academic Test Preparation, one of UQ's most popular MOOCs. A new and improved version was released in July with extra content and new practice activities, which Mr Villafuerte found helped improve his English before starting his Master of Economics and Public Policy program at UQ.

the development of the ANZ My eQuals qualifications register, which was launched in April and enables graduates to digitally access their academic qualifications and create digital copies of their transcripts and certificates from all universities in Australia and New Zealand. The University of Queensland joins other universities that have already implemented this solution.

Cultural competencies

New Colombo Plan Mobility Program

In the 2017 round of the Australian Government's New Colombo Plan Mobility Program, UQ received \$1,040,862 to support 284 students to participate in semester-length and short-term study experiences in China, India, Indonesia, Japan, Malaysia, Myanmar, Nepal, South Korea, Thailand, Timor-Leste and Vietnam. Seven UQ students were also selected as recipients for the prestigious New Colombo Plan scholarships to study in Cambodia, Fiji, Indonesia, Japan, Singapore and South Korea.

Australia Awards Scholarships

In 2017, UQ welcomed 131 new Australia Awards students, with a total of 278 students from 43 countries completing studies at UQ under the Australia Awards Scholarships program. UQ Global Engagement managed approximately \$16.5 million in funding for Australia Awards scholarship expenses in 2017.

Endeavour mobility grants

With total funding of \$331,500 (an increase of 50 per cent on 2016), in 2017, UQ secured funding for 11 projects that allowed 97 students to undertake mobility experiences. Students participated in programs in Austria, Brazil, China, France, Hong Kong, India, Indonesia, Japan, Nepal, Switzerland, UK, US and Vietnam.

Other scholarships

In 2017, UQ welcomed students from nine new sponsorship bodies from eight countries— Bahrain, Bhutan, Indonesia, Japan, Malaysia, Singapore, Tuvalu and the UK. Overall, almost 1600 sponsored students from 71 countries were enrolled at UQ in 2017.

Institute of Continuing and TESOL Education (ICTE-UQ)

In 2017, ICTE-UQ delivered training at the St Lucia and Gatton campuses, as well as offshore, to more than 7054 students and professionals from more than 100 countries.

Often collaborating with other UQ faculties, schools, institutes and central divisions, ICTE-UQ's key achievements included:

- UQ English language pathway program training for 1724 students from non-English speaking backgrounds, English language training for a further 1629 students and professionals, and the expansion of the *Bridging English Program* (BEP) to include BEP Advantage, Standard and Extension, as well as increased entry points
- concurrent English language support programs for 1748 UQ students from non-English speaking backgrounds, including customised, discipline-specific programs
- teaching methodology training for 409 teachers and academics
- customised English language and Continuing Education training programs for more than 1966 students and professionals
- more than 20 International Development short courses to 530 participants
- more than 560,000 enrolments since its 2015 launch in the ICTE-UQ-facilitated UQx IELTS Academic Test Preparation course—*IELTSx*—making it one of UQ's most popular online courses.

UQ student mobility

The UQ Employability Office supported around 1000 UQ students to participate in a global experience such as student exchange, short-term programs or an extracurricular international program at one of 200 exchange partner universities.

Key programs and achievements included:

- almost 600 students participating in the student exchange program
- just over 400 students participating in one of more than 100 short-term programs during their university break
- 233 students being supported through the UQ Employability Grant program to participate in international extracurricular activities such as volunteering, internships, competitions and conferences
- five students representing UQ at U21 conferences in Edinburgh and Ecuador.

REVIEW OF ACTIVITIES

DISCOVERY

The University of Queensland is one of Australia's top research-intensive universities, addressing many of the cultural, economic and social challenges facing the world today. UQ continually builds on its global reputation in key areas such as energy, sustainability, water, health, food security and social equity through an emphasis on high-quality, interdisciplinary global collaboration with public and private organisations.

Discovery: Key indicators of performance						
Discovery ¹		2013	2014	2015	2016	2017
Proportion of UQ research publications with an international co-author ²	(Percentage)	47.1	49.1	52.1	53.8	na ³
Number of Higher Degree by Research completions	(Count)	757	835	749	824	763 ⁶
Discovery						2017 projected⁵
Total research income ⁴	(\$ million)	381.8	377.3	385.0	367.9	na
ARC income (Cat. 1) received ⁴	(\$ million)	96.3	99.4	80.3	77.9	76.0
NHMRC income (Cat. 1) received ⁴	(\$ million)	76.6	72.6	72.2	64.1	67.0
Industry income ^{4,5}	(\$ million)	122.1	129.0	150.1	139.9	na
International funding ⁴	(\$ million)	29.1	36.6	49.9	51.6	na

¹ In 2015, statistics on Higher Education Research Data Collections points for publications were included. As this is no longer measured, it has not been included this year.
² This data is sourced from Incites, a commercial product. This product underwent considerable development in 2014/2015. As such, historical data may differ from those previously published.
³ Where provided, data is preliminary at 12 January 2018. Data not finalised until mid-2018.
⁴ There may be slight changes in historical data due to improvements made in UQ's reporting systems.
⁵ Industry income includes Australian Research Council Linkage Project Partner Cash, Australian contracts, Australian grants, Australian donations, international funding, and non-Commonwealth Cooperative Research Centres funding.
⁶ This data is preliminary (based on Strategic KPI targets).

Research performance

International recognition

International university rankings highlight the excellence of the University's research performance. In 2017, UQ maintained its 55th rank globally in the prestigious Academic Rankings of World Universities (ARWU). UQ is one of only two Australian universities to be included in the global top 60 of more than 10,000 universities worldwide.

UQ was also ranked as one of the top 50 universities in the world in the QS World University Ranking (47), the CWTS Leiden Ranking¹ (38), the Performance Ranking of Scientific Papers for World Universities (=41) and the *U.S. News Best Global Universities* Rankings (45).

UQ placed well within the top 100 in the *Times Higher Education World University Rankings* (65).

Research funding

Research income remained strong, with UQ receiving \$368 million in research funding income in 2016, the second-highest total research income for the year to be received

by an Australian institution. This total includes Australian competitive grants, industry funding, Cooperative Research Centres and other public sector research funding—a strong indication of the commitment and quality of UQ researchers. Governments, industry and private benefactors are acknowledged for sharing in the University's vision for research excellence and its success in attracting research funding.

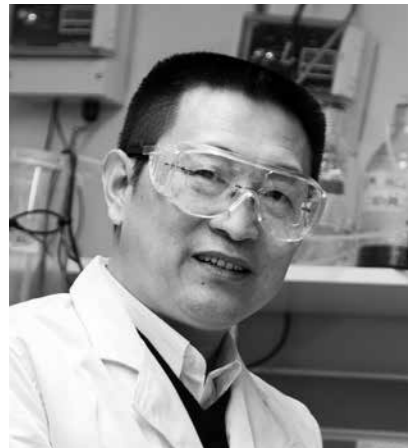
Australian Research Council (ARC) funding

The University continued to perform well in attracting ARC funding commencing in 2017, despite the declining amount of ARC funds being awarded through the major Discovery Projects and Linkage Projects programs.

Discovery Projects

The University received \$21.8 million in new funding for Discovery Projects, ranking fourth nationally. The total number of new projects awarded was 55, with UQ maintaining its cumulative number one ranking in total dollars awarded over the last five rounds. In addition, the University secured \$975,000 for two Discovery Indigenous Projects.

¹ Measured by the impact indicator (top 10 per cent) and ordered by P (top 10 per cent).



Professors Zhiguo Yuan and George Zhao both became Australian Laureate Fellows in 2017.

Linkage Projects

The University received new ARC funding of \$8.1 million for 22 new Linkage Projects awarded through the newly configured continuous scheme (first nationally). Additionally, \$4.7 million was received for the ARC Training Centre for Innovation in Biomedical Imaging Technology led by Professor David Reutens from the UQ Centre for Advanced Imaging. UQ will also receive partner contributions of \$18.2 million over the life of these projects.

Linkage Infrastructure, Equipment and Facilities (LIEF)

The University received ARC funds of almost \$2 million for four new Linkage Infrastructure, Equipment and Facilities projects for 2017 (equal third nationally on projects approved).

Australian Laureate Fellowships

UQ was awarded two Australian Laureate Fellowships commencing in 2017, with a total value of \$5.8 million (third nationally on total funds awarded). UQ's new Australian Laureate Fellows are Professor Zhiguo Yuan, Director, Advanced Water Management Centre, and Professor George Zhao, School of Chemical Engineering. These prestigious fellowships support excellence in research by attracting world-class researchers and research leaders to key positions in Australia.

Discovery Early Career Researcher Awards (DECRA)

UQ received 19 awards through the DECRA scheme, with a total value of \$7 million over the three-year award term. UQ maintains its cumulative first position nationally for awards, by both the number of awards, and funding dollars awarded over the life of the scheme.

National Health and Medical Research Council funding

The University's health and medical research benefited from significant funding from the National Health and Medical Research Council (NHMRC) in 2017.

Project Grants

UQ received a total of \$32.9 million awarded to support 48 new projects.

Equipment Grant

UQ received \$484,625 in 2017 to help purchase equipment to support medical research. The funding is awarded on a pro-rata basis, based on the proportion of competitive NHMRC funding awarded each year.

Development Grants

UQ received four Development Grants to commence in 2017, positioning the University in first place nationally for both the number of Development Grants awarded and dollars awarded. These grants provide funding for proof-of-concept research.

Boosting Dementia Research Grants

Three Boosting Dementia Research Grants were awarded to UQ in Priority Round 1 (PR1), representing a remarkable 100 per cent success rate for UQ in the inaugural round, and positioning UQ's first-place ranking in both the number of grants awarded, and in funding awarded.

Boosting Dementia Research Leadership Fellowships

UQ received four Boosting Dementia Research Leadership Fellowships in Priority Round 1 (PR1) for funding commencing in 2017. This new scheme aims to expand leadership in dementia research by supporting mid-career researchers to transition to leadership positions.

NHMRC-NSFC Joint Call

One grant was awarded to UQ under the National Natural Science Foundation of China (NSFC) and NHMRC joint call for research to enhance prediction and improve the treatment of type 2 diabetes in China and Australia.

NHMRC-NIH Brain Collaborative Research Grants

UQ was awarded one grant under the BRAIN Initiative, a US Presidential program to revolutionise understanding of the human brain.

Early Career Fellowships

UQ received nine new Early Career Fellowships to commence in 2017. These fellowships allow developing health and medical researchers of outstanding ability to undertake postdoctoral training. Of the nine fellowships, eight are based in Australia and one overseas. The latter enable Fellows to spend two years at an overseas institution before returning to UQ for the final two years.

Career Development Fellowships

UQ received six new Career Development Fellowships to enable outstanding early- to mid-career researchers to develop their capacity for independent research.

Research Fellowships

Four Research Fellowships were awarded to commence in 2017. These fellowships provide support for outstanding health and medical researchers to undertake research of major importance to its field and of significant benefit to Australian health and medical research.

Practitioner Fellowships

UQ received two new Practitioner Fellowships for funding in 2017.

Other research funding

The University also continued its strong performance in attracting funding from a variety of sources. In 2016 (the most recent year for which data is available) UQ received \$174.7 million funded from Australian

Competitive Grants (Category 1), \$48.5 million in Other Public Sector Research Income (Category 2), \$139 million in Industry and Other Research Income (Category 3), and \$5.7 million in Cooperative Research Centre Research Income (Category 4).

Research Block Grants

In 2017, UQ received \$184.5 million through the Australian Government's Research Block Grants, awarded on the basis of research performance. The funding comprised:

- Research Support Program (\$89.9 million)
- Research Training Program (\$94.6 million).

UQ Internal Research Support schemes

The University continues to build research capacity and capability through investing in a range of internal research support schemes. These schemes foster early-career researchers, seed research initiatives, promote linkages and partnerships, and support collaborative infrastructure.

Internal research support schemes with funding commencing in 2017 included:

- **UQ Development Fellowships**, aimed at fostering promising early-career researchers and retaining mid-career and senior academic staff of exceptional calibre
- **UQ Early Career Researcher Grants Scheme**, to encourage research by new members of staff, provide limited seed funding as a means of generating external research support, and support high-quality projects of modest financial cost from early-career researchers
- **UQ Foundation Research Excellence Awards**, recognising demonstrated excellence and promise of future success in research and the leadership potential of individual young researchers
- **UQ-Ochsner Seed Fund for Collaborative Research**, fostering transdisciplinary research between eligible investigators based in UQ's Ochsner Clinical School (New Orleans, US) and those in other UQ schools, institutes and centres
- **UQ Major Equipment and Infrastructure Grants**, supporting the acquisition of major research infrastructure and equipment items, particularly where there is demonstrable collaborative gain through its use, and access to similar equipment is limited
- **UQ Research Facilities Infrastructure Grants**, supporting existing major research facilities within UQ, promoting sound planning strategies for the replacement and upgrade of infrastructure, and maintaining competitive advantage in research capability through greater utilisation of existing major research infrastructure within the University

- The UQ Advantage Office's **Summer and Winter Research Programs**, supporting more than 650 undergraduate students to gain valuable research experience alongside UQ academics.

UQ also participated in the Universities Australia (DAAD) Australia-Germany Joint Research Cooperation Scheme that fosters research collaboration of the highest quality between Australian and German researchers; and the UQ-FAPESP Strategic Research Fund that supports scientific and technological cooperation between UQ researchers and researchers from the State of Sao Paulo, Brazil.

Prestigious fellowships and awards

The University's global research positioning was highlighted with the election of several new Fellows to Australia's learned academies in 2017. Four new Fellows of the Academy of the Social Sciences in Australia (ASSA) are UQ academics. Two UQ staff were elected as Fellows of the Australian Academy of Science (AAS), two were elected to the Australian Academy of Health and Medical Sciences (AAHMS), two were elected to the Australian Academy of the Humanities (AAH), and one to the Australian Academy of Technological Sciences and Engineering (ATSE).

At present, 169 UQ staff (including honorary and adjunct appointments) and emeritus professors are Fellows of Australia's five learned academies, AAS, AAHMS, ASSA, ATSE and AAH. UQ excellence was further recognised with many staff securing a number of prestigious awards, including:

- **Dr Nasim Amarilian**: 2017 Queensland Women in STEM (Judge's Choice Award)
- **Dr Lilach Avitan, Dr Tamara Keeley, Dr Sue Keay**: Science & Technology Australia's 2017 Superstars of STEM
- **Professor Perry Bartlett and Emeritus Professor Cindy Shannon**: 2017 Queensland Greats Awards
- **Professor Paul Burn**: 2017 Helmholtz International Fellow Award
- **Dr Stephen Carleton**: 2016 Matilda Awards (Best New Australian Work)
- **Dr Alienor Chauvenet**: 2017 Queensland Young Tall Poppy Awards
- **Jordan Debono**: 2017 Queensland Women in STEM (People's Choice Award)
- **Chelsea Edmonds**: 2017 Women in Technology Awards (ICT Young Achiever Award)
- **Professor David Evans**: Marshall and Warren Award, 2017 NHMRC Research Excellence Awards
- **Professor Nick Hawkins**: 2017 Business and Higher Education Round Table (BHERT) Award (Outstanding Collaboration in Higher Education and Training)



Emeritus Professor Cindy Shannon and Professor Perry Bartlett were both named as Queensland Greats in 2017.



Dr Jacquiline Romero, from the School of Mathematics and Physics and the Centre for Engineered Quantum Systems, won a L'Oréal-UNESCO Women in Science award for her work on the theory of entanglement—that information is shared between particles no matter how far apart they are.

- Dr Lee Hickey: 2017 Queensland Young Tall Poppy of the Year
- Dr James Hudson: 2017 Centenary Institute Medical Innovation Award
- Associate Professor Kiarash Khosrotehrani: Career Development Fellowship – Clinical 2, 2017 NHMRC Research Excellence Awards
- Dr Jiwon Kim: 2017 Women in Technology Awards (ICT Rising Star Award)
- Dr Larisa Labzin: Frank Fenner Early Career Fellowship, 2017 NHMRC Research Excellence Award
- Dr Jess Marr: 2017 Metcalf Prizes for Stem Cell Research
- Professor John McGrath: 2017 Erik Strömngren Medal
- Professor Gerard Milburn: Fellow of the Royal Society
- Professor Neena Mitter: 2017 Women in Technology Awards (Life Sciences Outstanding Award)
- Professor David Paterson: Practitioner Fellowship, 2017 NHMRC Research Excellence Awards
- Professor Hugh Possingham, Professor Kerrie Wilson, Dr Erik Meijaard: Mahathir Science Award 2016
- Dr Jacqueline Romero: 2017 L'Oréal-UNESCO For Women in Science Fellowship
- Dr Kirsty Short: 2017 Women in Technology Awards (Life Sciences Rising Star Award); 2017 Queensland Young Tall Poppy Awards
- Associate Professor Yasmina Sultanbawa: 2017 Business and Higher Education Round Table (BHERT) Award (Outstanding Collaboration in Community Engagement)
- Professor Jian Yang: 2017 Prime Minister's Prizes for Science – Frank Fenner Prize for Life Scientist of the Year.

Highly Cited Researchers

The Prestigious 2017 Clarivate Analytics 'Highly Cited Researchers' list featured UQ 15 times, placing the University second in Australia and on par with prestigious international institutions such as Imperial College London. Researchers on the list are identified as having global influence and impact, through consistently producing top-cited papers within Essential Science Indicators research fields.

Other performance measures

The University participated in the ARC Engagement and Impact Assessment pilot in 2017. Preparations are now underway for the first full Engagement and Impact Assessment. This will run in 2018 as a companion to the next Excellence in Research for Australia (ERA), Australia's national research evaluation framework.

Research ethics and integrity

The University ensures its researchers are conducting studies to the highest ethical and regulatory standards through continuous improvement of processes and procedures. Significant operational advances in ethics and integrity were achieved in 2017.

The Office of Research Ethics was established in June 2017 in recognition of the important role ethics plays in conducting world-class research.

In human ethics, six faculty-based Low and Negligible Risk (LNR) Ethics Sub-Committees were established as Sub-Committees of the University's two NHMRC-registered Human Research Ethics Committees. These Sub-Committees are tasked with the review of all human research studies that are classified as low or negligible risk under the *National statement on ethical conduct in human research* (National Statement).

Automated submission of the NHMRC's human research ethics application was facilitated. This form is used for all human research conducted at the University and is based upon the national statement.

A new policy, *Responsible care and use of animals in teaching and research* (PPL 4.20.11a), was completed and implemented. This policy sets out the responsibilities of individuals associated with The University of Queensland with regard to the conduct of Research and Teaching involving the care and use of animals for scientific purposes.

The University continues to actively participate in the Department of Defence Export Controls Working Group, disseminating information to the University's researchers to educate and ensure compliance with the regulatory frameworks.

UQ supported the good conduct of research in 2017 by delivering 20 research integrity seminars and workshops across all campuses to research academics, HDR students and professional staff.

In 2017, UQ actively engaged in the NHMRC-led review of the *Australian code for responsible conduct of research* (Code). The University continues to ensure best practice in the investigation and management of possible breaches of research policy and the Code.

The review of risks associated with the declaration and management of Conflict of Interest relating to research at UQ commenced in 2017 as a committee reporting to the Vice-Chancellor's Risk and Compliance Committee. The report is due for completion in the first quarter of 2018.

Research collaboration

The University continues to focus on building and maintaining strong relationships with national and international industry and research organisations. These partnerships are strongly valued, bringing UQ researchers together with leading researchers and organisations across the globe to achieve demonstrable impact in research fields of national and international significance.

UQ has proactively worked beyond traditional government sources of funding to continue growing its research enterprise. To this end, a target was set to double industry-sourced research income by 2020, from a baseline of \$103 million in 2012. In 2016, UQ industry-sourced research income was \$139 million, up \$36 million from 2012 and on track to meet the target by 2020. Industry-sourced income includes partner organisation cash support for ARC Linkage Projects, industry funding of Cooperative Research Centres, industry-commissioned research contracts (national and international), and philanthropic support.

Research partnerships

A number of selected partnerships were developed or renewed in 2017.

The collaborative research relationship with Boeing, which has extended over 14 years, was further solidified with the Boeing Research and Technology–Australia Technology Centre relocating to UQ's St Lucia campus. While the major focus of the relationship with Boeing involves collaborative research, Boeing also provides a wide range of support for undergraduate programs.

In March, the Vice-Chancellor and President signed an agreement with Hebei Iron and Steel Group (China) for the establishment of the HBIS-UQ Innovation Centre for Sustainable Steel with funding of up to \$1 million per annum over five years. This follows the highly successful model established with the Baosteel Research Centre, and is a demonstration of confidence in UQ's research and development being able to deliver benefits for another major steel company's operations in China.

Meat and Livestock Australia (MLA) have introduced a major new scheme under their MLA Donor Company program. UQ has been successful in receiving awards for large-scale research projects totalling \$15 million, due to UQ research expertise across areas including genetic gain, ectoparasites, bovine respiratory disease metagenomics and Brahman breed genomics.

UQ continues to be the leading research provider for the Australian Centre for International Agricultural Research (ACIAR).

In 2017, ACIAR-funded projects totalling \$7.1 million focused on Indonesia, Philippines, Myanmar and Vietnam.

Advance Queensland Innovation Partnerships

The Queensland Government Advance Queensland Innovation Partnerships (AQIP) program offers grants of up to \$1.5 million in support of collaborative research projects with industry or small-to-medium enterprises to a total of \$15 million annually. In 2017, UQ attracted \$4.2 million of available funding:

- The Faculty of Medicine received \$2,580,000 for three projects: \$1,500,000 to establish a platform to fast-track multiple new treatments for Parkinson's disease, \$960,000 to develop a new treatment for brain disease, and \$120,000 to work with industry partner Sullivan Nicolaides Pathology to develop a blood and tissue test for use with melanoma patients.
- The Queensland Alliance for Agriculture and Food Innovation received \$636,000 to support research into a stem cell multiplication method of supplying 500 times more avocado plants to industry.
- The Australian Institute for Bioengineering and Nanotechnology received \$600,000 for a project to develop two revolutionary termiticide products.
- The Faculty of Engineering, Architecture and Information Technology received \$400,000 for a project that aims to deliver a next-generation fertiliser for Queensland's expanding agrotechnology sector.

UQ Partners in Research Excellence Awards

Four outstanding UQ–industry collaborative partnerships received UQ Partners in Research Excellence Awards (co-sponsored by UniQuest) for their collaborations that have benefited industry and the community: These partnerships were led by:

- Professor Zhiguo Yuan, Advanced Water Management Centre, with partner Colin Chapman from Queensland Urban Utilities (Engineering, Materials and Information and Communications Technology category)
- Associate Professor Trent Woodruff, School of Biomedical Sciences, with partner Dr Alan Robertson from Alsonex Pharmaceuticals (Health category)
- Professor Stuart Phinn, School of Earth and Environmental Sciences, with partners Dan Tindall from the Queensland Department of Science, Information Technology and Innovation, and Tim Danaher from the New South Wales Office of Environment and Heritage (Science category)



UQ strengthened its partnership with Boeing with the establishment of the Boeing Research and Technology–Australia Technology Centre at the St Lucia campus. Home to around 35 Boeing researchers and technical staff, the Centre also features a high-tech audiovisual and augmented-reality student interaction display area (pictured above), computer labs and collaborative spaces.

- **Dr Peggy Schrobback**, School of Economics, with partner Robert Nave from the Port of Brisbane (Social Enterprise category).

Cooperative Research Centres

Cooperative Research Centres (CRC) Programme is a grant scheme designed to promote scientific research and collaboration between the private sector and public research bodies. UQ is an essential or supporting participant in 12 of the 32 CRCs currently active Australia-wide, receiving \$5.7 million in funding in 2016. This places UQ in the top four in the country.

The CRC Programme now includes a more compact and streamlined scheme called CRC Projects (CRC-P). Under this scheme, industry leads bids for projects up to \$1 million per year for three years to solve industry problems and improve competitiveness, productivity and sustainability of Australian industries.

The two largest awards UQ received this year were for research into sustainable diesel production (\$1.85 million project led by Eco Fuel Innovations, with the School of Chemical Engineering) and for the development of ultra-thin, flexible screen-printed batteries (\$2 million project led by Printed Energy Pty Ltd and UQ's Dow Centre for Sustainable Engineering and Innovation).

Two of the 2017 UQ Foundation Research Excellence Award winners, early- to mid-career researchers Dr Emma Hutchison and Dr Ben Schulz.



ICTE-UQ

In 2017, ICTE-UQ delivered customised training programs to support UQ's international research partnerships, including:

- six eight-week, 24-hour research writing support courses, delivered in collaboration with the UQ Graduate School, for 124 Science, Technology, Engineering and Mathematics (STEM) Higher Degree by Research (HDR) students and 72 Humanities and Social Sciences HDR students; and one delivered in collaboration with the Science Faculty, for 35 Science HDR students
- a *Research skills program for international researchers* for 20 participants from several Indonesian universities
- a *Research skills and training program* for three participants in Livestock Engineering and Technology, in collaboration with the School of Agriculture and Food Sciences, for the Badan Pengkajian dan Penerapan Teknologi (BPPT) Indonesia
- offshore delivery of a two-week *Academic English writing program* for 19 researchers from UQ Partner, Indonesian Institute of Sciences—Lembaga Ilmu Pengetahuan Indonesia (LIPI), Indonesia.

Research Week

Research Week was held in September to celebrate research excellence by showcasing research collaborations with government and industry, honouring preeminent early- and mid-career researchers, and recognising UQ's most outstanding HDR supervisors who are mentoring the next generation of researchers.

Highlights in 2017 included:

- an engagement event attended by 200 of the University's research stakeholders
- the announcement and presentation of Partners in Research Excellence Awards, the UQ Foundation Research Excellence Awards, Awards for Excellence in Higher Degree by Research supervision
- the UQ Three Minute Thesis (3MT*) final.

Fostering research leaders

Professional development

The University delivered a broad range of training and development opportunities to researchers in 2017.

Professional development programs targeted at research-focused academics were again delivered, such as the *Essential knowledge for research management*, *Responsible conduct of research training* and the *Research adviser masterclass*.

UQ commenced a pilot of the online PRAXIS Research modules *Research essentials: Developing excellence in research design and practice*. The modules have been made available for 250 UQ Researchers for a 12-month period.

Further training and development opportunities to establish best practice in research management and support researcher engagement in industry and commercialisation activities were delivered by UniQuest, Staff Development, the Library, the UQ Graduate School, and external providers such as Postdoc Training and Women in Technology.

Other professional development activities and leadership events were held at faculties and institutes, including grant-writing and publication workshops, Q&A panels and leadership awards.

The Researcher Development Committee was also established to promote and support continuous researcher development and training.

UQ Foundation Research Excellence Awards

The UQ Foundation Research Excellence Awards provide funds to advance and facilitate the research agendas of early- and

mid-career researchers, and in 2017 were worth \$587,000.

Recipients were:

- **Dr Felicity Davis**, School of Pharmacy: *Targeting cancer stem cells: A novel approach to breast cancer treatment* (\$89,000)
- **Dr Jianhua Guo**, Advanced Water Management Centre: *Environmental dissemination of antibiotic resistance promoted by nanoparticles* (\$89,000)
- **Dr Zhitao Hu**, Queensland Brain Institute: *Investigating the timing of neurotransmission* (\$89,000)
- **Dr Emma Hutchison**, School of Political Science and International Studies: *Emotions and the history of international humanitarianism* (\$60,000)
- **Dr Nathan Palpant**, Institute of Molecular Bioscience: *Controlling cardiac differentiation from human pluripotent stem cells* (\$89,000)
- **Dr Ben Schulz**, School of Chemistry and Molecular Biosciences: *The mechanisms of glycogen superstructure assembly in diabetes* (\$89,000)
- **Dr Meihua Yu**, UQ Diamantina Institute: *Assessment of novel nanoadjuvants for the development of potent therapeutic cancer vaccines* (\$82,000).

UQ Awards for Excellence in Higher Degree by Research Supervision

The UQ Awards for Excellence in Higher Degree by Research (HDR) Supervision recognise outstanding performance in supervision, mentoring and training of HDR candidates. In 2017, excellence awards were presented to:

- **Professor Tom Baldock**, School of Civil Engineering, who enables his students to develop the skills and confidence to challenge conventional wisdom and then advance: this is a key focus for Professor Baldock, who has been an adviser for 11 years and currently supervises five doctoral candidates
- **Professor Elizabeth Ward**, School of Health and Rehabilitation Sciences, whose commitment to the student learning journey has led her to adopt a flexible approach to research supervision and mentoring, enabling working clinicians to further their academic studies and balance their full-time work commitments with research. Professor Ward has been an adviser for 10 years and currently supervises 11 candidates
- **Professor Sara Dolnicar**, UQ Business School, believes as a supervisor it's her primary responsibility to train the next generation of social scientists who will drive knowledge creation. An

adviser for three years and currently supervising four candidates, Professor Dolnicar encourages candidates under her supervision to come up with creative solutions to challenges ensuring her graduates succeed, irrespective of the careers they choose

- **Professor Stuart Phinn**, School of Earth and Environmental Sciences, tailors his approach to each student depending on their topic, skill and knowledge levels, and professional and personal goals. He ensures four key areas are addressed in his supervision: disciplinary knowledge and capability, transferable skills, professional skills, and integrity and ethics. Professor Phinn has been a supervisor for 16 years and currently supervises 16 candidates.

In addition, **Associate Professor Jonathan Rhodes**, School of Earth and Environmental Sciences, and **Dr Fiona Barlow**, School of Psychology, were presented with 2017 Emerging Adviser Awards, recognising the special achievements of early-career staff members in supervising, mentoring and training HDR candidates.

Research and Aboriginal and Torres Strait Islander peoples

In 2017, **Dr Chelsea Bond**, senior lecturer in the Aboriginal and Torres Strait Islander Studies Unit and affiliate of the UQ Poche Centre for Indigenous Health, was awarded an ARC Discovery Early Career Research Award to examine the issue of race in contemporary Indigenous public health discourse and practice.

The UQ Poche Centre was awarded around \$100,000 by the Lowitja Institute for its collaborative project with Bond University and QUT, *Moving beyond the front line: a 20-year retrospective cohort study of career trajectories from the Indigenous Health Program at The University of Queensland*, which will examine how UQ's Indigenous Health Program contributed to the emergence of a range of Indigenous leaders across the health system.

UQ hosted the Poche Indigenous Health Network (PIHN) National Meeting 2017, a first for the University. PIHN members in attendance included Mr Reg Richardson, AM and Professor Tom Calma, AO, as well as representatives from the Poche Centres of Flinders University and the Universities of Sydney, Western Australia and Melbourne, and UQ's core partner, the Institute for Urban Indigenous Health. The two-day program included a focus on student opportunities and networking, including a session called 'Indigenous people as knowledge producers' featuring student insights on Poche projects in Indigenous health and wellbeing, and a

Top: Emerging Adviser Award winners Dr Fiona Barlow and Associate Professor Jonathan Rhodes; bottom, from left: Awards for Excellence in HDR Supervision winners Professor Sara Dolnicar, Professor Stuart Phinn, Professor Elizabeth Ward and Professor Tom Baldock.





Edwin Davis, PhD student from the School of Information Technology and Electrical Engineering, won the 2017 UQ Three Minute Thesis competition for his research on Drones – gone with the wind.

3MT® competition for Aboriginal and/or Torres Strait Islander Higher Degree by Research (HDR) students. The Poche Centre and Office of the Pro-Vice-Chancellor (Indigenous Engagement) also co-hosted a number of sessions for prospective and current Aboriginal and Torres Strait Islander HDR students on topics such as navigating the research landscape as an Indigenous researcher and success factors in supervisor-student relationships.

UQ Graduate School

Research training

The UQ Graduate School has responsibility for the governance and strategic direction, quality assurance and policy development supporting research training at the University. In addition, it provides centralised operational management for HDR admissions, scholarships, candidature and examinations.

The Graduate School also coordinates career development and skills training for HDR candidates through activities, workshops, mobility, and industry experiences to prepare candidates for a range of career possibilities.

In 2017, more than 800 HDR candidates successfully completed UQ's online research integrity training module. All HDR candidates are required to complete this training before their confirmation milestone.

Recruitment and commencements

HDR candidate commencements remained steady in 2017 with 571 domestic and 386 internationals, a total of 957. The University conferred a total of 822 HDR awards in 2017 (731 PhD and 91 MPhil).

Career Development Framework

The Career Development Framework (CDF) is a Graduate School initiative that provides a skills- and personal development-based approach to research training.

The CDF ensures that graduates are well-rounded, with the leadership, professional and research skills that will enhance their career prospects and help shape them into future knowledge leaders. In 2017, more than 2900 HDR attendances were recorded—800 more than in 2016. More than 110 HDR candidates were provided with mobility experiences, over 20 were placed in industry, and 53 participated in the *Wonder of Science* program.

Three Minute Thesis

The Three Minute Thesis (3MT®) is a competition developed at UQ that challenges HDR students to communicate the significance of their projects to a non-specialist audience in just three minutes.

In 2017, competitions were run in more than 600 institutions across 63 countries. The UQ final attracted an audience of more than 300 global researchers, industry leaders, PhD candidates and alumni. The Asia-Pacific 3MT® final, sponsored by Springer, saw finalists from 55 universities across Australia, New Zealand and Asia gather at UQ to compete. The competition was live-streamed across the globe.

External Engagement

In 2017, UQ's partnership with Boeing continued with 10 PhD students now part of the cohort and further projects are planned for 2018. In addition, new joint PhD programs were established with the University of Exeter (UK) and the Technical University of Munich (TUM) (Germany). In addition, a collaborative PhD was established with the Southern University of Science and Technology (SUSTech) (China).

Research infrastructure

Major research infrastructure

In 2017, UQ and the Australian Genome Research Facility (AGRF) combined resources to improve accessibility to leading-edge genomics infrastructure with the new Integrated Genomics Facility that provides genomic sequencing services to UQ researchers. Genetic research projects spanning healthcare, food production, the environment, and developing new technologies are all benefiting from enhanced services made possible via this facility.

The University continued to maintain a number of core research infrastructure facilities in 2017, including:

- **UQ Biological Resources:** provides modern, best-practice laboratory animal service and facilities to support UQ's major investment in biomedical and biomolecular research
- **Centre for Advanced Imaging:** provides access to state-of-the-art research imaging instruments
- **Marine Research Stations:** provide access and support for researchers at three island-based research stations and an aquaculture facility
- **Centre for Microscopy and Microanalysis:** promotes, supports and initiates research and teaching in the applications of microscopy and microanalysis
- **Research Computing Centre:** provides coordinated management and support of the University's sustained and substantial investment in supercomputers, tera-scale data archives, visualisation and network connections, together with coordinated research user support

- **Glassblowing Services:** provides scientific glass instrumentation and laboratory glassware for teaching and research at UQ
- **Glasshouse Services:** provides a range of centralised plant-growing facilities using Quarantine, Physical Containment Level 2, temperature-controlled and evaporative-cooled glasshouses, as well as services associated with the growing of plants
- **Radiogenic Isotope Facility:** provides isotopic and elemental analyses
- **Protein Expression Facility:** provides a full-service protein production and training capability with state-of-the-art infrastructure
- **TetraQ:** provides bioanalytical clinical trial and preclinical sample and metabolite analysis.

UQ has a number of NCRIS/EIF-funded national infrastructure initiatives including three NCRIS facilities where UQ is the lead Institute: Terrestrial Ecosystem Research Network (TERN), Research Data Services (RDS), and National Imaging Facility (NIF).

The University continued to strategically invest in research infrastructure—including more than \$3.9 million committed through the UQ Major Equipment and Infrastructure scheme—to 25 projects across the University to ensure research infrastructure remains as up-to-date as possible.

Research Management Business Transformation Project (RMBT)

The RMBT is a business transformation project designed to deliver first-rate digital support systems for researchers at UQ. 2017 saw the completion of detailed planning and documentation of the requirements for a new research management system.

2017 RMBT highlights included:

- beta testing and rollout of the new NHMRC streamlined human ethics approval process, Human Research Ethics Application (HREA)
- implementation of a new faculty-based process for human research ethics review where the risk is low or negligible
- guidelines for researchers working with Aboriginal and Torres Strait Islander research participants
- a new candidature management system for HDR students
- the development and subsequent pilot of a new research data management system.

Commercialisation

UniQuest

UniQuest is Australia's leading university commercialising entity, managing the intellectual property of The University of Queensland. It benchmarks in the top 10 per cent globally for university-based technology transfer offices. As a result, UQ generates more licence income than the rest of the Group of Eight universities combined.

Since 1984, UniQuest has built, commercialised and managed an extensive intellectual property portfolio, including more than 1500 patents and 80 companies resulting from university-based discoveries. Since 2002, UniQuest and its spin-out companies have raised more than \$600 million to help take UQ technologies to the market and returned more than \$435 million in revenue to UQ. Gross sales of products using UQ technology licensed by UniQuest total more than \$15.5 billion since 2007.

Among others, UniQuest was responsible for commercialising the HPV vaccine Gardasil®, the Triple P – Positive Parenting Program, the image correction technology used in most of the world's MRI machines, and a potential new treatment for pain through spin-out company Spinifex Pharmaceuticals Pty Ltd—a biopharmaceutical company acquired recently in one of Australia's largest ever biotech deals.

Commercialisation outcomes

In 2017, clinical-stage biotechnology company QUE Oncology Inc. raised US\$16 million in series A investment to develop novel cancer therapeutics. QUE was established by UniQuest and Emory University (Atlanta, Georgia). The investment from Brandon Capital-managed Medical Research Commercialisation Fund and Uniseed was to clinically develop drug candidate Q-122, a non-hormonal therapy to treat hot flushes in women undergoing endocrine therapy for breast cancers.

Other highlights for the year included:

- An agreement was made with global healthcare leader Merck to enhance new immuno-oncology therapies. The collaboration combines the oncology and immunotherapy expertise of Merck's research labs with that of UQ Diamantina Institute's **Professors Ranjeny Thomas and Riccardo Dolcetti**.
- Human clinical trials of Den-181—a vaccine-style treatment for rheumatoid arthritis developed by Professor Ranjeny Thomas and being commercialised by UniQuest start-up Dendright Pty Ltd in collaboration with US-based Janssen Biotech Inc, one of the Janssen Pharmaceutical Companies of Johnson & Johnson and support from Arthritis Queensland—were initiated.

After many years of research, immunotherapy expert Professor Ranjeny Thomas from the UQ Diamantina Institute was pleased to see the first human clinical trials in 2017 for her vaccine-style treatment for rheumatoid arthritis, Den-181, an important milestone towards making the medicine a reality.



- Three research and option agreements were entered with Canadian health and wellness company PreveCeutical Medical Inc. to develop stabilised natural and synthetic peptides from scorpion venom for immune-boosted application, a soluble gel to deliver cannabinoids directly to the brain via the nasal cavity, and a gene therapy to treat diabetes and obesity. The researcher behind the technology is **Dr Harendra Parekh**, from UQ's School of Pharmacy, who is working with the company on all three projects.
- A landmark agreement was signed with IP Group plc, which provides UQ—along with the other Go8 universities and Auckland University—exclusive access to a minimum of \$200 million investment over an initial 10 years for spin-out companies founded on disruptive innovation.
- Technology was licensed to EMVision to develop a portable, non-invasive brain scanner that would speed up the diagnosis of brain injuries and stroke types by creating an immediate 3D image, based on the research of UQ **Professors Amin Abbosh and Stuart Crozier**.
- The Queensland Emory Drug Discovery Initiative (QEDDI) was fully established with a team of 18, including experts recruited from interstate and overseas. QEDDI is an Australian first, a fully integrated academic drug discovery centre, leveraging UQ's capabilities and research/novel insights into diseases. Significant progress has been made towards novel lead molecules for disease indications including cancer, inflammation and neurodegeneration.
- Following its initial public offering (IPO) on the NASDAQ in 2016, UQ Institute for Molecular Bioscience spin-out company Protagonist Therapeutics signed a deal with Janssen worth up to \$1 billion for its first-in-class, oral peptide IL-23 receptor antagonist for all indications, including inflammatory bowel disease.
- 120 UQ researchers and staff registered for UniQuest's 2017 UQ Research Commercialisation Workshop, which provided an introduction to commercialisation and industry engagement.
- UniQuest hosted 14 IndustryConnect events to showcase UQ's intellectual property, research capabilities and expertise to industry. Companies involved included Pfizer, AbbVie Pharmaceuticals, Alembic Pharmaceuticals, Merck KGaA Group (Millipore & Sigma-Aldrich) and Lemnatech. These were attended by more than 180 researchers, PhD students and university staff and led to 74 individual researcher meetings held with representatives from the multinational companies.

Uniseed

An early-stage investment fund, Uniseed commercialises intellectual property at UQ, as well as the Universities of Melbourne, New South Wales and Sydney, and the CSIRO.

To date, Uniseed has invested \$22.6 million into 26 UQ startup companies, and facilitated the formation of startups at UQ more often than any other investor with secured commitments of more than \$357 million of external funding from grants and other investment capital.

Two new investments in UQ technology were made in 2017:

- **Brisbane Materials (BrisMat)**, which is developing innovative materials solutions in lighting, solar power and other applications, based on technology developed by **Professor Paul Meredith and Dr Michael Harvey**
- **QUE Oncology**, which recently completed Phase 1b clinical trials in treating hot flushes in breast cancer patients.

The year also saw Uniseed make further cash distributions to UQ from milestone payments relating to successfully exited startup companies, including Spinifex Pharmaceuticals, based on the work of **Professor Maree Smith** and acquired by Novartis International AG in 2015.

Much of the investment received by UQ companies has flowed back to the University through targeted research contracts, with UQ receiving more in research funding to university laboratories than it has contributed to the fund. Research supported by Uniseed companies has led to more than 300 publications that have been collectively cited more than 4000 times.

UQ companies supported by Uniseed include:

- **Hydrexia**, which is developing hydrogen storage equipment based on the work of **Professor Arne Dahle and Associate Professor Kazuhiro Nogita**
- **Nexgen Plants**, which continues to work with Syngenta on virus-resistant vegetables, and has produced its first virus-resistant plants, based on technology developed by **Professor Peer Schenk**
- **Perkii Pty Ltd**, which is selling its low-calorie probiotic fruit juice and water-based drink in 500 stores Australia-wide
- **ProGel Pty Ltd**, which was formed to commercialise an encapsulation technology based on the work of **Professor Bheshe Bhandari**
- **Q-Sera Pty Ltd**, which raised further funds from Uniseed and the Medical Research Commercialisation Fund (MRCF) to continue work with leading serum tube manufacturers for improved blood collection (based on the work of

Dr Paul Masci, Professor Martin Lavin, Emeritus Professor John De Jersey, AM and Dr Goce Dimeski)

- **TenasiTech**, which is developing better plastics, acrylics and nylons based on the work of AIBN's **Professor Darren Martin**.

JKTech

JKTech is recognised as a leader in the supply of innovative products and services to the global resources industry. JKTech's core business covers technical consulting and training services (in mining, geometallurgy and processing), laboratory services, specialist testing equipment, specialised laboratory tests and simulation software products.

JKTech is proudly owned by UQ via UQ Holdings Pty Ltd, and is the technology transfer company for the University's Sustainable Minerals Institute (SMI).

Significant activities and achievements during 2017 included:

- continuing of work to operationalise an International Centre of Excellence in Chile (SMI ICE Chile), in conjunction with SMI and the University of Concepción (Chile)
- issuing of free upgrade licences for JKSimMet software to African universities (Universities of Witwatersrand, Johannesburg and Pretoria, South Africa; Namibia University of Science and Technology; University of Dar es Salaam, Tanzania; and Zimbabwe School of Mines) on the understanding they are teaching JKSimMet (UQ methodology) in their academic curriculum.
- significant international projects to further strengthen and support JKTech's globally diversified customer base, including:
 - Laos (PanAust's Phu Bia Mining Limited)
 - Australia (South32's Cannington Mine)
 - Peru (Glencore, Antapaccay Mine)
 - Chile (Lundin Mining, Candelaria Mine)
 - Botswana (Boteti Mining, Karowe Diamond Mine).

JKTech operated throughout 2017 in the context of improving minerals industry demand for support services, caused primarily by improved commodity prices and changing client sentiment towards optimisation of operational performance. In response to the changing market conditions, JKTech's Board and Management constantly evaluates JKTech's delivery model so that it continues to be aligned with market demand and client expectations



Selected research highlights

- A team of UQ archaeologists and dating specialists have discovered that **Aboriginal people have lived in Australia for at least 65,000 years**—much longer than the 47,000 years previously believed. Their findings were detailed in the journal, *Nature*.
- UQ researchers are helping to future-proof **growth at the Port of Brisbane**, stimulate the Queensland economy, and protect the environment with their cross-faculty industry partnership that is investigating the choices between road, rail and sea transport, optimising Port operations, and implementing an advanced monitoring program to inform the Port's rehabilitation initiatives.
- UQ researchers have shown for the first time that new adult brain cells are produced in the amygdala, a region of the brain important for processing emotional memories. This discovery advances understanding of the amygdala's role in regulating fear and may lead to new treatments for **anxiety disorders**.
- Inspired by nature, UQ researchers are mimicking the structure of pollen to create more effective antimicrobial medicines, helping to tackle one of the biggest threats facing humanity – **antibiotic resistance**. It's a promising strategy to use a natural product as an alternative, and nanotechnology to enhance its performance.
- In a unique collaboration, UQ researchers are working with some of the world's leading mining companies to provide advice on how to improve the lives of people affected by **mining-induced resettlement and displacement**.

- Working closely with the New South Wales Department of Education, UQ researchers used linked administrative and survey data to identify two key strategies (**effective teaching and setting high expectations**) that teachers can implement to drive long-term improvements in students' achievement as captured by the NAPLAN scores.
- UQ researchers have discovered a new way to combat the massive damage caused by **Crown of Thorns starfish** to the Great Barrier Reef. Decoding the starfish genome has revealed specific pheromones that the pests use to gather together in huge breeding aggregations, which can now be trialled as baits to lure starfish into traps for easy removal.
- A UQ study revealed death rates for infants and children in the Tiwi Islands fell dramatically from 1960 to 1985, and adult death rates have been falling since the late 1980s. As more people are surviving to mid and old age, and the population is increasing, the findings should moderate the pessimism that often surrounds remote **Indigenous health** and support expectations of continued improvements.
- Plant researchers at UQ have developed an intelligent online tool that predicts how crop growth is affected by photosynthetic changes at the molecular, cellular or leaf level of plants. **Food production** depends on photosynthesis, the process by which plants capture sunlight and convert it into plant growth, biomass and grain. As the world population is expected to reach 9.5 billion in future decades, food demand will increase significantly, and so improving photosynthesis has become a global research priority.

- UQ researchers have discovered a new way to target a rare form of **breast cancer**, giving hope for improved treatment. The research identifies potential new ways to stop the growth of cancer cells by changing calcium levels. This work will underpin new and potentially life-saving approaches to treatment.
- UQ researchers have developed a model comparing scenarios of restoration versus protection for **coastal marine ecosystems**. They found that marine restoration may be the most cost-effective way over decades to maximise the extent of ecosystems under particular circumstances. Their results may guide investment into coastal marine conservation in the absence of complex, region-specific modelling.
- In response to the disturbing decline of **coral reefs** around the world, UQ researchers have coordinated a unique philanthropic coalition to identify and protect the world's 50 most important coral reefs.
- UQ researchers found that palbociclib, a breast cancer drug, could also shrink medulloblastoma, a common childhood brain tumour. **Brain tumours** are the most common cause of cancer death in children, and even those who survive end up with significant long-term side-effects from existing treatments.

Pictured above: UQ researchers noticed that the rough surface of pollen particles allows pollen to adhere to the hairy legs of bees, which then helps with pollination. This inspired them to develop a simple approach for nanoparticle fabrication that was perfect for being filled with antibiotics or antimicrobials, helping to overcome more resistant bacterial infections.