UNIVERSITIES AUSTRALIA

SUBMISSION TO THE SENATE STANDING COMMITTEE ON ECONOMICS INQUIRY INTO THE MEDICARE LEVY AMENDMENT (NATIONAL DISABILITY INSURANCE SCHEME FUNDING) BILL 2017 AND 10 RELATED BILLS [PROVISIONS]

8 September 2017

Universities Australia welcomes the opportunity to make a submission to the Committee on the *Medicare Levy Amendment (National Disability Insurance Scheme Funding) Bill 2017* and 10 related Bills. Universities Australia is the peak body representing Australia's 39 comprehensive universities in the national interest. A number of our members have also made submissions and we commend these to you for consideration.

Our comments are made solely in relation to the *Nation-building Funds Repeal (National Disability Insurance Scheme Funding) Bill* 2017 (the Bill) except to the extent that we recommend splitting the package. Schedule 1 of the Bill proposes to repeal the *Nation-building Funds Act* 2008*.* This Act is the legislation that establishes the Education Investment Fund (EIF) and therefore passage of this Bill would abolish the EIF - the last remaining program to fund the development and refurbishment of critical research and teaching infrastructure in the tertiary education sector. If the EIF is abolished, any future capital works will need to be funded from alternative university revenue streams, primarily domestic and international student fees. With less investment available, the result will be a slow erosion of infrastructure quality.

SUMMARY

Universities Australia strongly opposes the *Nation-building Funds Repeal (National Disability Insurance Scheme Funding) Bill* 2017.

The purpose of this legislation is to swap a long-term, nation-building, wealth-creating, innovation-supporting program that invests in economically productive assets, for a relatively small, one-off reduction of net Commonwealth expenditure.

The amount saved will not even pay for one year's operating expenditure of the NDIS.

The Education Investment Fund is a major nation-building asset. The EIF:

- has demonstrated value disproportionate to the funds expended, contributing to this country's economic and social well-being;
- directly supports the Government's innovation agenda;
- is highly successful at leveraging funds from other sources such as State governments, philanthropists and others, substantially multiplying its value and impact;
- creates infrastructure that allows universities to compete and retain the very best students, teachers and researchers, both local and international, in a highly competitive global market – people who inspire, create and innovate; and
- develops infrastructure to attract and retain students who might otherwise not have the opportunity to participate in post-secondary education.

Closing the EIF makes no sense. The impact of its loss will mean:

- a slow and inevitable decline in the quality of our laboratories, classrooms and lecture theatres that help make Australia the third most popular destination for international students;
- outdated infrastructure that fails to keep up with modern teaching practices and technological advances; and
- an increase to the $4.1 billion maintenance and refurbishment backlog already identified across 33 universities.

Retaining the EIF is critical for maintaining and enhancing Australia's world-leading university system and for driving the knowledge economy.

Recommendations

Universities Australia calls on the Committee to recommend the Senate:

1) **opposes passage of the *Nation-building Funds Repeal (National Disability Insurance Scheme Funding) Bill* 2017; and**

2) **consider the *Nation-building Funds Repeal (National Disability Insurance Scheme Funding) Bill* 2017 separately to the ten associated Bills.**

BACKGROUND

The Australian Government has announced its intention to close the Education Investment Fund (EIF) and re-purpose the $3.76 billion to offset costs associated with the National Disability Insurance Scheme. Universities Australia strongly opposes this proposal noting that the EIF is the last remaining scheme to support capital investment in tertiary education infrastructure.

The EIF is one of four 'nation-building funds' established in 2008 during the Global Financial Crisis. It replaced the Higher Education Endowment Fund (HEEF), established by the Howard Government in 2007 to fund higher education infrastructure in perpetuity. In the search for budget savings, however, the Abbott Government announced its intention to close the EIF as part of the 2014-15 Budget.[1]

Higher Education Endowment Fund (HEEF)

In 2007 the government contributed a total of $6 billion to HEEF from the Budget surplus to create an endowment fund to guarantee the building and maintenance of world class tertiary education facilities regardless of the state of the national economy. At the time, Treasurer Peter Costello declared the HEEF would be:

> *"...a perpetual fund to generate earnings for capital works and research facilities in our institutions of higher learning"*[2]

Treasurer Costello stated that the HEEF's earnings

> *"… will be dedicated to building first class institutes of learning — first class by world standards — and put our Institutes of Higher Learning* **on a secure footing for ever**.*"*[3]

[1] Budget Paper No 2, Budget Measures 2014-2015 – Part 2, p114

[2] Costello, P, 2007. 'Budget speech 2007-08', Hansard, House of Representatives, Canberra, p.55.

[3] Ibid.

To abolish the Fund would be a substantial breach of this vision and commitment.

Education Investment Fund (EIF)

The *Nation-building Funds Act* 2008 (the Act) established the EIF, with effect from 1 January 2009. The Act also established the Building Australia Fund and the Health and Hospitals Fund.[4]

According to the Act, the purpose of the EIF is to fund higher education infrastructure, research infrastructure and vocational education and training infrastructure. Unlike the HEEF, EIF capital was able to be drawn down.

As at 31 March 2017, the status of the Fund was as follows: [5]

Total Credits	$6 483.8 m
(Plus) Actual Net Earnings	$1 476.7 m
(Equals) Total Credits and Actual Net Earnings	$7 960.5 m
(Less) Total Commitments	$4 196.0 m
(Equals) Uncommitted Balance	**$3 764.5 m**

The EIF has provided funding for research and teaching infrastructure across the country in both higher and vocational education. Universities invested in campus renewal through the EIF, creating innovative, world-class learning spaces, as well as expanding and renewing Australia's capital stock of research infrastructure.

Well over 100 individual projects were funded across the country through direct EIF funding rounds and from programs funded by EIF, including the Super Science initiative and the $500m Higher Education Teaching and Learning Capital Fund.

Projects ranged in diversity from major health and science facilities such as the Centre for Obesity, Diabetes and Cardiovascular Disease at the University of Sydney and Australia's participation in the Square Kilometre Array (SKA) radio telescope, to crucial regional projects that facilitate higher education access and attainment in the Hunter Region and expanding choice and opportunities for students in engineering and science in Lismore.

EDUCATION AND RESEARCH INFRASTRUCTURE – THE PATH TO JOBS AND GROWTH

Abolishing the EIF would remove the last dedicated federal funding for university infrastructure.

Instead of closure, the EIF should be retained as an enduring and sustainable program to enable universities and vocational providers to continue to invest in productive infrastructure throughout the troughs and peaks of the budgetary cycle.

Universities need to invest in new infrastructure to keep pace with the changing higher education landscape, maintain competitive advantage in a global market, and continue to make major contributions to Australia's economic and social well-being.

[4] The Building Australia Fund is also subject to the decision to transfer balances to the NDIS Special Account, given effect in this Bill. The Health and Hospitals Reform Fund was abolished in October 2015 with its commitments to be met from appropriations provided directly to the Department of Health.

[5] Department of Finance, 2017, 'Nation-building Funds Financials', https://www.finance.gov.au/investment-funds/nation-building-funds/financials/, retrieved 25 August 2017.

The value-add of EIF

The HEEF/EIF is a highly successful program that has enabled the establishment and renewal of critical teaching and research infrastructure in both higher and vocational education.

It has enabled investment right around the country – from Charles Sturt University's National Life Science Hub, to Swinburne University's Factory of the Future, to James Cook University's Science Place for Northern Queensland at Townsville, to investments in vocational education infrastructure in places including Darwin, Dubbo, Echuca and Port Hedland.

Case studies of projects brought to life by the EIF are provided at Attachment 1.

EIF funds have been critical to leveraging other sources of funding, attracting co-investment from universities, State Governments, philanthropists and others in creating new and innovative industry opportunities.

For example, Deakin University's Carbon Nexus project, with funds contributed by the Victorian State Government and CSIRO, has created a world-leading industry hub in Geelong, Victoria, to develop and produce carbon fibre composites. The project has created 1900 jobs and attracted an influx of international investment.

The EIF investment in La Trobe University's Institute for Molecular Science (LIMS) supports the work of around 400 La Trobe academics, research fellows, postgraduate students and support staff. The focus of LIMS is on six areas of research strength: cancer, infection and immunity, neurobiology, molecular design, molecular imaging and molecular sensing. It has two embedded companies, Hexima Ltd (developing plant-derived proteins and peptides for application as human therapeutics and the genetic modification of crops) and AdAlta Ltd (developing the next generation antibody platform, the i-body, to deliver high affinity and specific biologics against a variety of therapeutic and diagnostic targets).

EIF has enabled universities to deliver, in a practical and tangible way, on the Government's national innovation objectives.

National economic benefits

The Government has recognised the importance of investing in economically productive infrastructure.[6] Deloitte Access Economics found that university education added around $140 billion to the economy in 2014 and provides more than a ten-fold return on the Commonwealth's total investment in higher education.[7] It would be difficult to identify a more economically productive infrastructure investment than teaching and research facilities at universities.

Research investment

The Australian Government commissioned and received two reports in 2015 on universities' infrastructure needs: one on research infrastructure, and one on infrastructure in general.

The Research Infrastructure Review, chaired by Mr Philip Clark AM, found that:

> "*The investment required [in research infrastructure] over the next decade is approximately $6.6 billion*."

[6] Turnbull, M, 2017, 'Maximising our infrastructure dollar', Australian Financial Review, 7 June 2017, http://www.afr.com/opinion/columnists/maximising-our-infrastructure-dollar-20170607-gwm777

[7] Deloitte (2015), 'The Importance of Universities to Australia's Prosperity', Canberra.

The panel proposed to fund this through a new Australian National Research Infrastructure Fund (ANRIF). The panel argued that 8-10 per cent of the Commonwealth's research outlays should be invested in research infrastructure.

The Higher Education Infrastructure Working Group recommended that the Government develop a long-term plan for infrastructure (covering both teaching and research), based on an evaluation of the impact of the EIF.

These reports underscore the need for Australia to continue to invest, for the long-term, in higher education infrastructure.

IMPACT OF ABOLISHING THE EIF

Without capital funding, the renewal of teaching and research infrastructure needed to equip universities for today's competitive environment will slow significantly. The proposal to abolish the EIF is compounded by the Government's current proposal to reduce public investment in universities by $2.8 billion. Both of these proposals come on top of the $3.9 billion that universities and their students have already contributed to Budget repair since 2011.

The combined effect of these two measures will be to put the full burden for funding capital works onto universities – but with less revenue to do so.

Although some universities have been able to build modest financial surpluses from which some capital programs have been funded, the Government's current proposal to reduce public investment in universities will put these under further pressure. A Government-appointed panel estimated that 33 universities already have a backlog of $4.1 billion in deferred maintenance and refurbishments.[8]

Just under half of universities are operating either at a deficit or on slim operating margins of less than 5 per cent. Further cuts will have a negative impact on universities' bottom line and push more into deficit.

Universities' operating results have declined. Between 2008 and 2015 (latest available figures), the margin across the sector fell by 20 per cent in real terms. As a percentage of total revenue, surplus margins for the whole sector have declined from around 9 per cent in 2009 and 2010 to 5.8 per cent in 2015. In 2009, 23 universities had operating margins of 8 per cent or more. By 2015, this was down to eight universities.

State Auditors-General have noted universities' declining operating margins with concern. As just one example, the Queensland Audit Office reports that universities' capital spending has fallen by 48 per cent over five years, mainly because of reduced capital funding. **It identified capital funding as the greatest financial risk for Queensland universities.**

If universities cannot invest in critical campus renewal, Australia's competitive advantage as an education provider of choice in our region will diminish. Australia's highly successful higher education system relies heavily on its reputation for quality. Modern, well-equipped, fit-for-purpose teaching and research facilities are critical.

The increasing competition is illustrated by the latest world university rankings published by Times Higher Education, released in September 2017. Tsinghua University overtook the University of Melbourne while the Hong Kong University of Science and Technology now outperforms ANU.

Phil Baty, THE global rankings director noted:

[8] *Higher Education Infrastructure Working Group Final Report*, 2015, pp. 9-10 https://docs.education.gov.au/system/files/doc/other/higher_education_infrastructure_working_group_final_report.pdf

> *"Australia's leading institutions are already falling behind peers in mainland China and Hong Kong, which receive high and sustained levels of state funding. Funding cuts proposed by the government could seriously harm the country's institutions in future editions of the rankings."*[9]

Teaching and research infrastructure is not only important to Australia's international education industry; it is also critical to ensure that Australia remains an attractive destination for talented researchers. The academic labour market is highly international and competitive. Australian universities compete for global talent, people who then contribute to the economic prosperity of all Australians. Without high-quality infrastructure, international talent will go elsewhere and our own talent will be tempted to follow them.

EDUCATION VS THE NDIS: A FALSE DILEMMA

Universities Australia strongly rejects the assertion that the Commonwealth's commitment to funding the National Disability Insurance Scheme requires the abolition of the EIF. As an advanced economy, Australia should have the ability to fund disability support services as well as a world-class education system.

The Government has proposed that the proceeds from abolishing the EIF be directed to the (yet to be established) NDIS Special Account, to offset the cost of the NDIS. The abolition of the EIF will have no impact on the NDIS proceeding. This is a long-standing Government commitment with some of the costs having been defrayed from a variety of other savings measures. Any shortfall should be met in the same way as almost all Government appropriations.[10]

The suggestion that the EIF must be abolished for the NDIS to be funded is factually incorrect, and creates a false dilemma: that Australia must choose between a well-resourced tertiary education sector, and the NDIS.

Both are significant contributors to Australia's economic and social well-being.[11]

Abolishing the EIF is simply a budget savings measure

Although the abolition of the EIF has been couched in terms of funding the NDIS, the reality is that it will only provide a one-off reduction of net Commonwealth expenditure. Even then, net expenditure will be reduced by a very small amount. The total amount of the EIF ($3.8 billion) will go nowhere near funding NDIS operations even for a single year. Yet, as a visionary and enduring investment in education and research, it delivers value and wealth to the nation in perpetuity.

Cost of the EIF

The HEEF/EIF was funded from pre-GFC budget surpluses. The intention of the Howard Government in setting aside a part of surplus to set up this endowment was precisely to smooth investment over time, regardless of the level of public budget volatility, and protect research and higher and vocational education facilities from the fluctuations of the economic cycle.

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[9] http://www.sbs.com.au/yourlanguage/mandarin/en/article/2017/09/06/uni-rankings-raise-warning-over-cuts.

[10] Buckmaster, L, 2016, 'The National Disability Insurance Scheme: a quick guide', Parliamentary Library, Canberra.

[11] The Productivity Commission estimated the NDIS would have a net economic benefit of $7.8 billion annually, and when combined with reforms to disability support pensions, could account for an expansion of GDP by one per cent. (Productivity Commission, 2011, 'Disability Care and Support', Canberra, p.12). Australian universities account for more than 1.5% of Australia's GDP, and are part of Australia's third largest export industry. (Deloitte (2015), 'The Importance of Universities to Australia's Prosperity', Canberra, p.vi).

Universities' contribution to budget repair

Universities and their students have already contributed around $3.9 billion to returning the Budget to surplus since 2011.[12] In addition, the Government now proposes to cut $2.8 billion out of the system. These new measures strip away the modest surpluses that some universities have been able to achieve through careful husbandry and ever-increasing efficiency. Yet in the absence of the EIF, such surpluses are the only means of investing in infrastructure.

CONCLUSION

In the absence of infrastructure funding, university infrastructure will degrade, as will the quality of the education and research in the longer term. This is at odds with the Government's objective of Australia making a successful transition to the knowledge economy.

Australian universities have lent strong support to the Government's innovation agenda, and share the Government's vision of a prosperous nation built on the skills of an adaptable, resilient and future-focussed workforce.

It is time to restore the vision of universities as modern and innovative places, with cutting-edge infrastructure to support future cohorts of creative and flexible graduates, contributing to a vibrant research sector filling the innovation pipeline from basic research right through to commercialisation.

The EIF, and before it the HEEF, provides an enduring legacy of a bi-partisan commitment to higher education and research excellence. It remains a visionary initiative to secure, in the most efficient way possible, the means to ensure Australia has high-quality, fit-for-purpose teaching and research facilities in perpetuity.

Considering the disproportionate benefit associated with retaining the EIF, when compared to the short-term injection to the budget, Universities Australia calls on the Committee to reject the abolition of the Education Investment Fund.

[12] Universities Australia, 2017, *Higher Education Support Legislation Amendment Submission*, Canberra, p.12

APPENDIX I: SELECTED PROJECTS FUNDED BY THE EIF

DEAKIN UNIVERSITY – CARBON NEXUS - $37 MILLION

Background

Deakin's Future Economy Precinct, located at Deakin University in Geelong, is nurturing advanced manufacturing expertise in future fibre, light weighting, batteries, big data and smart systems. The precinct is now home to a growing number of start-up companies and industry partners such as the multi-million dollar carbon fibre composite wheel manufacturer Carbon Revolution.

The precinct – a 540-hectare site – has led to the creation of over 1900 high-tech, high-value knowledge economy jobs, through industry partnerships and co-location opportunities, and is a key part of Deakin's plan to support industry-led advanced manufacturing and smart system growth in the Geelong region.

Carbon Nexus

Unique in the global south and considered best-of-breed globally, the Carbon Nexus facility is at the heart of Deakin University's Future Economy Precinct, delivering globally significant, university-based, industrial-scale research, supporting the growth of a new smart-tech carbon fibre industry in Australia.

Carbon Nexus was funded as part of a $103 million joint Deakin-CSIRO initiative – including $37 million in EIF funding and $10 million from the Victorian State Government. The project was delivered on time and on budget opening in 2015.

Carbon Nexus is the world's most advanced carbon fibre and composite research facility:

- with the only PAN precursor wet spinning line in the Southern Hemisphere;
- offering R&D services over the entire value chain from precursor development to composite manufacturing; and
- providing access to a team of globally-recognised, high-technology materials experts.

The EIF investment is already providing a return on the initial investment, such as:

- novel intellectual property that has been developed by Deakin staff; and
- new IP and technology which is set to substantially reduce the energy and capital investment required for carbon fibre production opening the gate to more affordable light-weighting across many industries.

Key Achievements to date

1. Carbon Nexus IP is set to dramatically cut the cost of carbon fibre manufacturing globally.
    - It joined forces in 2017 with LeMond Composites in a $58 million deal that enables manufacture of carbon fibre with up to 75 percent less energy thus making the process faster and cheaper.
    - This will make carbon fibre accessible to a wider range of everyday products including cars, bikes, boats, bridges and laptops, in addition to existing aircraft and aerospace applications, opening up light-weighting to a vast range of manufacturing.

2. LeMond Composites is planning to invest $44 million in a carbon fibre manufacturing plant in Geelong which will create 110 jobs with other spin off companies intending to relocate to be closer to supply.

3. Carbon Revolution is a unique case study for the future of advanced manufacturing.
    - Currently employing 150 people and set for major expansion, Carbon Revolution, nurtured by Deakin from start up to major disruptor, produces the world's first one-piece carbon fibre composite wheels and supplies these as parts to the global automotive and aerospace industries.
    - Located at Deakin Geelong, it collaborates closely with Carbon Nexus to develop improved and lower cost carbon fibre for the manufacture of its unique wheels.
    - When the current, proposed expansion is complete, Carbon Revolution will have a workforce of over 600 high skilled advanced manufacturing workers.
    - The relationship with Deakin means that undergraduate and postgraduate engineers and scientists work in a modern, high tech advanced manufacturing environment on real problems relevant to their future careers.

4. Located at the Geelong Future Economy Precinct, the $13.2m ARC Research Hub for Future Fibres leads the development of future fibre-based materials, ranging from short polymer fibres for the medical, textile and industrial sectors, to carbon fibre composites for the automotive industry.
    - Led by Deakin's Institute for Frontier Materials, the Hub also involves Swinburne University of Technology and five industry partners: HeiQ Pty Ltd, Carbon Revolution Pty Ltd, Quickstep Automotive Pty Ltd, Draggin Jeans Pty Ltd and the Ear Science Institute Australia Inc.

5. Quickstep Holdings, also co-located, is Australia's largest independent manufacturer of carbon fibre composites and recently established an automotive division and global R&D centre on-site at Deakin in Geelong to be adjacent to Carbon Nexus.

6. Victorian company Furnace Engineering will benefit from export opportunities generated through its long-term research collaboration with Carbon Nexus. The manufacturer and supplier of Carbon Nexus' high-temperature furnaces project-managed the installation of the facility's pilot and research lines. It will also manufacture the specialised carbon fibre production machinery for the LeMond plant.

7. Carbon Nexus has so far trained 14 PhD students – creating the next generation of world-class carbon fibre researchers.

Conclusion

The EIF funding to Deakin kick-started a development that would otherwise not have occurred. Developing the world's best carbon fibre manufacturing research facility in order to advance large scale light-weighting across industry was a big idea with high risk and many hurdles.

The partnership between Deakin and CSIRO and our industry partners has probably stimulated the beginning of a globally excellent advanced manufacturing ecosystem where industry works to educate and train the thinkers and industrialists of the future. Importantly this investment has shown that there is a strong and vibrant future for advanced manufacturing in Australia that can lead to significant high value jobs and export opportunities.

THE AUSTRALIAN NATIONAL UNIVERSITY - CHEMICAL SERVICES HUB - $90 MILLION

The Chemical Sciences Hub was made possible through EIF. As Stage 2 of the ANU Science Transformation Project, the hub included two new chemistry buildings, a new science teaching building, and a combined ANU Colleges of Sciences workshop. Facilities cater for the disciplines of physical chemistry, biological chemistry and synthetic chemistry and include eight wet laboratories for undergraduate students studying chemistry and biosciences.

In addition, the hub houses several 150-seat and 50-seat flexible learning spaces, outdoor teaching areas, and analytical and instrument laboratories. Completed in 2013, the complex increased ANU student capacity in chemistry, increased the number of work-ready science graduates, and is channelling high-quality science education to students across Australia's tertiary and secondary sectors.

Key Achievements:

- A significant increase in undergraduate and postgraduate numbers in chemistry over the past five years which can be attributed to the new facilities and infrastructure available.
- The new buildings and their quality infrastructure and equipment are a significant factor in attracting new, young, dynamic academic staff to the Research School of Chemistry.
- ANU Future Fellow Dr Nicholas Cox from the ANU Research School of Chemistry has been awarded the Robin Hill Award from the International Society of Photosynthetic Research for his work in Germany to develop new methods to investigate the mechanism of biological water oxidation, a major step in photosynthesis.
- An international study led by ANU will help underpin the development of next-generation medical treatments and industrial applications such as removing pesticides from waterways.
- As reported on the ABC news on 16 Jan 2017, a Canberra teenager who discovered a way to detect previously undetectable steroids in athletes has been announced as a finalist in the BHP Science and Engineering Awards. Miss Rose Weller worked with a research team at the ANU to develop the idea. She is the first school student in 15 years to be invited to conduct post-graduate studies at the university with the help of mentor Bradley Stevenson, a research fellow at the School of Chemistry. "I learnt a lot about more in-depth chemistry," Miss Weller said, of her week in the ANU laboratories.

UNIVERSITY OF CANBERRA - THE NATIONAL CENTRE FOR SOCIAL AND ECONOMIC MODELLING (NATSEM) INTERNATIONAL MICROSIMULATION CENTRE - $11 MILLION

The EIF contribution allowed a new building to be constructed – it allowed NATSEM to provide detailed, evidence-based prediction on the impact of public policy. The new centre allows NATSEM to extend its approach to important new areas of public policy, such as climate change, transport and infrastructure.

For over 20 years NATSEM has been, and remains, one of Australia's leading economic and social policy research centres, and is regarded as one of the world's foremost centres of excellence for microsimulation, economic modelling and policy evaluation. NATSEM specialises in analysing data and producing models so that decision makers have the best possible quantitative information on which to base their decisions. The Federal Government relies heavily upon its modelling through Treasury, Social Services and Employment to understand how policy impacts on families – both example families (cameos) and the broad impacts on different socioeconomic groups across the country.

NATSEM undertakes independent and impartial research, and aims to be a key contributor to social and economic policy debate and analysis Australia-wide and throughout the world through expert economic modelling of the highest quality, and supplying consultancy services to commercial, government and not-for-profit clients.

Through its research NATSEM is an active contributor to social and economic policy debate and its research receives extensive media and public attention.

LA TROBE UNIVERSITY - INSTITUTE FOR MOLECULAR SCIENCE (LIMS) - $64.1 MILLION

Launched in 2009 - the LIMS complex has 56 research and support laboratories, advanced research equipment, a 200-seat auditorium, and over 3,000 square metres of teaching facilities. Around 400 La Trobe academics, research fellows, postgraduate students and support staff are based at the Institute. LIMS also has an important regional node: many of its scientists work at La Trobe's Bendigo campus. The focus of LIMS is on six areas of research strength: cancer, infection and immunity, neurobiology, molecular design, molecular imaging and molecular sensing.

LIMS also has two embedded companies:

- Hexima Ltd, who are developing plant-derived proteins and peptides for application as human therapeutics and the genetic modification of crops; and
- AdAlta Ltd, who are developing the next generation antibody platform, the i-body, to deliver high affinity and specific biologics against a variety of therapeutic and diagnostic targets.

LIMS has an important collaboration with the Olivia Newton-John Cancer Research Institute that facilitates the sharing of knowledge, skills, research, training and facilities. LIMS is known for its research, but it is also a training centre, providing students and early career researchers with access to the latest equipment and exposure to high impact research projects.

Key Achievements:

- Emeritus Professor Nick Hoogenraad AO and Dr Amelia Johnston led an international research team that discovered the cause of cancer cachexia, a condition that kills up to one third of late-stage cancer patients.
- Dr Ivan Poon and Georgia Atkin-Smith captured the death of a human white blood cell for the first time.
- Dr Karen Harris and Professor Marilyn Anderson AO, together with collaborators at the University of Queensland, identified and produced the key enzyme that can turn small proteins known as linear peptides into more robust and chemically stable circular ones. The discovery makes the peptides a leading candidate for future pharmaceutical drug design.

QUEENSLAND UNIVERSITY OF TECHNOLOGY - SCIENCE AND TECHNOLOGY PRECINCT (SCIENCE AND ENGINEERING CENTRE) - $75 MILLION

The Science and Engineering Centre (SEC) brings together teaching and research in science, technology, engineering and mathematics in a world-leading model and dynamic community hub. $75 million in EIF funding enabled QUT to leverage an additional $155 million of funding towards the delivery of a science and engineering innovation precinct that has transformed QUT's Gardens Point Campus. The SEC houses some of the nation's most advanced electron microscopes in a $17 million analytical research facility.

The SEC also houses the Institute for Future Environments (IFE) which is working to solve some of the world's most pressing problems, from tackling global food security to managing scarce natural resources. It brings together more than 300 scholars from the fields of science, technology, engineering, mathematics, business and law to seek solutions collaboratively.

EIF funding has contributed to provisioning of a range of innovative initiatives that push boundaries in a way that might otherwise not have been possible. For example:

- The design of the collaborative learning spaces has been a catalyst in transforming the way in which university students will learn in the future, stimulating new approaches to research, education, and public engagement beyond the Centre's immediate footprint.

- A student innovation incubator space inside the main building foyer enables students to develop and showcase their latest ideas and designs.

The SEC project demonstrates that investments in academic facilities can have resounding impacts, not only on the quality of research and education, but on the perception and values of an institution and its relationship with the public. An international Reimagine Education Award in 2015 and an Australian Financial Review Higher Education award that same year demonstrate the calibre and impact of the project.

UNIVERSITY OF NEW ENGLAND: INTEGRATED AGRICULTURAL EDUCATION PROJECT (IAEP) - $29 MILLION

The University of New England, in partnership with CSIRO and the NSW has developed a $40 million Integrated Agricultural Education Project, leveraging funding from the EIF. This project comprised five separate components:

- agricultural education building (Armidale NSW);
- new Animal Husbandry Facility;
- refurbishment and upgrade of lecture theatres - Development of the SMART Farm education facility; and
- upgrade to the Tamworth regional study centre (Tamworth NSW).

Key outcomes of this project include:

- increased world class tertiary education opportunities through the provision of globally connected facilities in regional and rural communities;
- substantial output in terms of research impact and commercialisation of research in animal genetics;
- providing students with opportunities to connect with their peers across regional areas where programs on participation and retention are likely to see positive results; and
- increased industry and community participation, providing sustainable pathways for the development of geographically diverse relationships.

MACQUARIE UNIVERSITY - HEARING HUB - $40 MILLION

The Hearing Hub is an initiative of Macquarie University, generously funded with $40 million from the EIF together with an $80 million investment from the University. The Hub has made it possible to bring together leading researchers and health care organisations to drive research, education and innovation to improve the lives of people with hearing, communication or mental health disorders. The partners include:

- the Commonwealth's Australian Hearing, the nation's leading hearing specialist and largest provider of Government-funded hearing services, and its world-recognised research division, the National Acoustic Laboratories (NAL);
- Cochlear Limited, whose world headquarters are located adjacent to the Hub;
- The Royal Institute for Deaf and Blind Children (RIDBC) and its associated cochlear-implant service, the Sydney Cochlear Implant Centre (SCIC);
- The Shepherd Centre; and
- the Cooperative Research Centre, The HEARing CRC.

All of these organisations are working together to address one of Australia's major health problems—by 2050, one in four Australians could have hearing loss.

The Hearing Hub has outstanding technologies and research facilities that enable collaborative research. These include one of the world's most advanced laboratories for brain research. That research is being used to continually improve clinical best practises for patients at the Hub's clinics in speech and hearing, reading, emotional health, and psychology as well as in the work of the Hub partners.

Key Achievements:

- A major achievement has been in the way that technology has been utilised by clinics at the Hearing Hub to improve access to education and health care services.
- Through online and over the phone programs, clinics have made treatments more accessible so that children and adults in regional and remote areas can receive world-class healthcare in their home.
- The Hearing Hub also gives Macquarie students the unique opportunity to work alongside experts in all aspects of hearing health, providing an unrivalled learning experience.
- Visitors from around the world are amazed by the Hearing Hub and by the potential of the work done here to impact on the lives of people everywhere.

NEWCASTLE UNIVERSITY - NEWCASTLE INSTITUTE FOR ENERGY AND RESOURCES (NIER) - $30 MILLION

The objective of the NIER project has been to build and establish a world-class facility and to create a critical mass of leading researchers, across disciplines. The Institute undertakes innovation research for next generation energy and distribution solutions and for minimising energy usage in the resources sector.

NIER comprises extensive mineral, chemical and related technical laboratories, offices, industrial-scale pilot plant workshops and research demonstration units. The project has also included the design and construction of an additional state-of-the-art research building housing laboratories and additional office space.

The construction of this research infrastructure and subsequent capacity for industrial-scale research projects ensures NIER is well equipped to contribute to industrial transformation with research focused on high performance, low emission and innovative technologies critical for economic growth and environmental sustainability.

Key Achievements:

- Professor Jameson revolutionised a mineral separation process first invented in 1905, to develop the Jameson Cell, a froth flotation device that has netted Australia more than $36 billion in exports of fine coal and minerals.
- The Cell has also been used for industrial and environmental applications including extracting oil from tar sands in Canada, cleaning up industrial wastewaters in Newcastle and other locations in Australia, and removing blue-green algae from waterways in inland Australia.
- Professor Moghtaderi and his 30-strong research team are currently working on delivering safe, new methods of managing ventilation air methane (VAM) generated by underground coal mines.