MACQUARIE University

World-Leading Research World-Changing Impact

STRATEGIC RESEARCH FRAMEWORK: 2015-2024

5 stars across all categories

teaching, employability, research, internationalisation, facilities, innovation, access and specialist subjects

The rating places Macquarie alongside **renowned international institutions**

HARVARD UNIVERSITY

PRINCETON UNIVERSITY

UNSW AUSTRALIA

MONASH University

Yale University

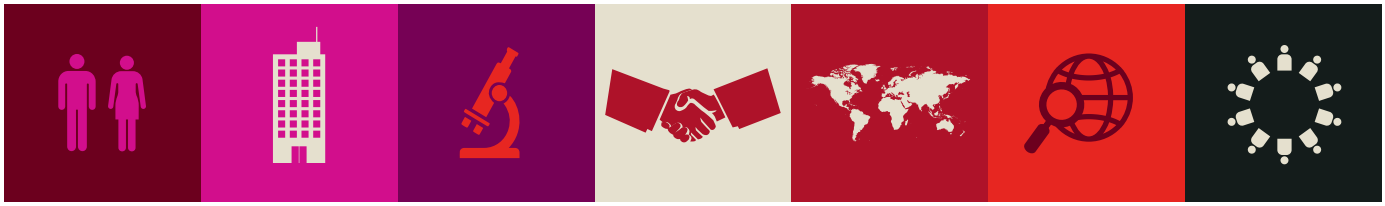
UNIVERSITY OF CAMBRIDGE

"A typical **five star university** is generally world class in a broad range of areas, enjoys a high reputation and has cutting-edge facilities and internationally renowned research and teaching faculty."

QS 2014

The rating, attained only by truly **world-class institutions**, reinforces our academic, research and international standing

We achieved **top scores** for institutional research collaborations, prolific academic experts, academic reputation, internationalisation, student satisfaction and graduate employment



Over 38,000 *students*

$1 billion *invested in infrastructure and facilities in recent years*

85 per cent *of our research is rated at world standard or higher by the Australian government*

20 *companies on campus providing access to research and job opportunities*

50 *countries and over 150 partner universities for exchange*

44 *researchers ranked in the top one per cent in the world*

150,000 *alumni in more than 140 countries*

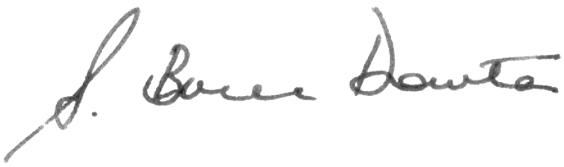
Contents

Vice-Chancellor's endorsement

It is with great pleasure that I commend to you this Strategic Research Framework. It is the first of the seven strategic priorities described in *Our University: A Framing of Futures* to be brought to life as a fully-fledged framework, and I congratulate the Deputy Vice-Chancellor (Research) and his team for their work in bringing it to fruition.

These pages outline ambitious goals that will stretch our people, our processes and our infrastructure, but success will firmly establish this University as one of substance, excellence, integrity and esteemed reputation on the global stage.

Our University has extraordinary potential, and this Framework is a blueprint for future excellence in research. I look forward with great anticipation to the years ahead, and the continuation of our ascendance as an open, engaged and audacious research community.



Professor S Bruce Dowton MB BS MD FACMG FRACP
Vice-Chancellor and President

Foreword – Deputy Vice-Chancellor (Research)

Macquarie University has an enviable reputation for research excellence. While the extent of its achievements belies the University's youthfulness, they are an accurate reflection of the ingenuity, inventiveness, agility and audacity shown over the first 50 years of its history. Across a kaleidoscope of intertwined disciplines, Macquarie's researchers have led or contributed to world-leading research with world-changing impact.

World-Leading Research; World-Changing Impact charts an exciting course for Macquarie's research over the next 10 years, aimed at accelerating and propelling our research performance to even greater heights. It is a strategic research framework rather than a research plan, providing overarching objectives, goals and priorities, establishing targets and outlining supporting strategies, while maintaining great respect for the principle of academic freedom and scholarship. The framework aligns with the University's long-term aspirations and the values of scholarship, integrity and empowerment as expressed in *Our University: A Framing of Futures* and aims to support the achievement of the seven strategic priorities while having a particular focus on Strategic Priority 2 – *An accelerating and impactful performance in discovery*.

I genuinely believe that this Strategic Research Framework, forged with significant input and feedback from staff over many months, offers inclusiveness rather than exclusivity. It seeks to provide a clear vision and durable strategic directions without constraining the creative and dynamic nature of cutting-edge research, discovery and innovation in a changing environment.

As a university we have an important responsibility to add value with the research we choose to pursue –rigorous research inspired by a quest for deep understanding of disciplinary fundamentals in a context responsive to the needs of society at levels of both problem selection and research project design. Seizing the opportunity to collaborate with industries, governments, communities, professions and academic colleagues around the world is paramount to our success. As we continue to attract the best and brightest and develop the next generation of talented researchers and world-ready leaders, Macquarie will expand its cross-disciplinary and applied research and build on the tremendous depth of fundamental research and disciplinary expertise that underpins much of our discovery.

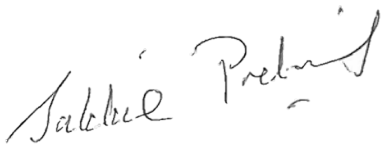
The future-shaping research priorities outlined in the framework have been developed as a means of aligning our current and emerging areas of disciplinary research strength with the significant challenges of today and tomorrow. Their breadth and local, national and global relevance should offer researchers at Macquarie a considerable level of stability over the next 10 years. The associated research streams and themes have been framed by our research community and embody the areas of research excellence for which we want to be known. They will operate under the remit of our five faculties, offering flexibility and agility as our internal and external environments inevitably change.

Over the next decade, we will focus on five future-shaping research priorities: healthy people, resilient societies, prosperous economies, a secure planet, and innovative technologies. Building on successes to date, Macquarie will continue to pioneer health outcomes, integrated healthcare, lifelong learning and wellness. Importance will be placed on understanding cultures and building ethical, just and inclusive communities. Macquarie's research expertise will be dedicated to strengthening economic productivity and promoting prosperity, while emphasising the importance of sustaining our interdependent world and exploring our place in the universe. Macquarie's excellence in frontier technologies, systems, designs and creative practice will continue to produce world-changing advances in innovative technologies.

Our objectives are to accelerate world-leading research; to prepare world-ready higher degree research candidates; to actively engage as a world-recognised research collaborator and partner of choice; and to deliver groundbreaking research with world-changing impact. The Framework, like Macquarie University itself, is bold and ambitious; the targets will stretch us and the expectations for quality are high.

The success of the past 50 years has positioned this distinctive Australian university to achieve its future objectives. Macquarie's diverse tapestry of interconnected disciplines, its research priorities and its talented researchers enable it to energetically pursue world-leading research with world-changing impact.

I look forward to embarking on an effective partnership with the Pro Vice-Chancellor (Research: Integrity and Development) and the Pro Vice-Chancellor (Research: Performance and Innovation) as they take on their new roles. To working with the offices within my portfolio: the Research Office, Higher Degree Research Office, Dean: Higher Degree Research, Office of Commercialisation, and Animal Facilities as we implement the strategies outlined in this Strategic Research Framework. To collaborating with my colleagues in the University's Executive as they develop their strategic frameworks that will see *A Framing of Futures* brought to life. Lastly, but most importantly, to engaging with each and every one of you, the staff in the portfolios who make research at a university possible, and the staff in the Faculties – our community of researchers and research support staff – working at the coalface of research excellence as we strive to make Macquarie University a leading light for research globally.



Professor Sakkie Pretorius
Deputy Vice-Chancellor (Research)

Our University: A Framing of Futures

Macquarie University has always sought to be innovative and distinctive. *Our University: A Framing of Futures* provides the basis for our continued ascendant differentiation by identifying seven Strategic Priorities (listed over the page), with the second strategic priority specifically calling for 'an accelerating and impactful performance in discovery'. The Macquarie University Strategic Research Framework, *World-Leading Research; World-Changing Impact*, represents one of a series of seven portfolio statements that will support the vision outlined in *A Framing of Futures* by setting a clear strategic direction for the University to achieve its research ambitions over the next 10 years.

It identifies five future-shaping priorities for cross-disciplinary research aligned with the national research agenda, major global challenges, and our areas of current and emerging disciplinary research strength[1]. It also lists key objectives, goals, targets and supporting strategies to help us advance these priorities.

Although the Strategic Research Framework outlines a University-wide approach to achieving world-leading research with world-changing impact, it will, of course, be the talent and drive of our people in the faculties, departments and offices that will truly determine our success.

This framework does not stand in isolation. The fundamental interdependence of learning and teaching and research cannot be overstated. Research plays a significant role in Macquarie's brand positioning and the development of its reputation. Producing world-leading research plays an important factor in independent international university rankings and it is often these rankings that underpin a university's attractiveness to both domestic and international markets.

For Macquarie's learning and teaching to remain attractive in an increasingly competitive and deregulated sector, our academic programs must continue to be provided in a research-enriched environment. The more we expose our undergraduates to the concepts and practices involved in research– critical thinking, analytical inquiry, and effective communication – the better equipped they will be for their chosen careers beyond Macquarie, or indeed, as future higher degree research (HDR) candidates, postdoctoral research fellows and future research leaders.

The Strategic Research Framework will therefore be closely aligned with the University's Learning and Teaching Framework. Similarly, the aspirational targets outlined in the Framework will only be possible with direct synergy with, and support from, our supporting portfolios of International, Corporate Engagement and Advancement, and the broader strategy of shaping the nature and size of the University as depicted below.

[1] For the purposes of the Strategic Research Framework, areas of current and emerging research strength (ACERS) include: fields of research (ERA) rated 'at or above world standard'; areas of concentrated excellence such as our ARC Centres of Excellence; and areas defined by the faculties as fields in which Macquarie wishes to build research strength and described as the research themes and streams that support the future-shaping research priorities (refer page 15).

Our strategic priorities:

ONE: A CULTURE OF TRANSFORMATIVE LEARNING IN A RESEARCH-ENRICHED ENVIRONMENT

TWO: AN ACCELERATING AND IMPACTFUL PERFORMANCE IN DISCOVERY

THREE: ALIGNING THE NATURE AND SIZE OF THE UNIVERSITY FOR THE FUTURE

FOUR: CREATING AN INNOVATION NEXUS WHERE MACQUARIE AND OUR PARTNERS CONTRIBUTE SOLUTIONS TO THE WORLD AND DEVELOP LASTING RELATIONSHIPS

FIVE: EMBOLDENING MACQUARIE UNIVERSITY'S RECOGNITION AND INTERNATIONAL PRESENCE

SIX: DEVELOPING A VIBRANT AND SUSTAINABLE CAMPUS, CLEARLY AT THE CENTRE OF A RAPIDLY CHANGING NEIGHBOURHOOD IN THE INTERNATIONAL, COSMOPOLITAN CITY OF SYDNEY

SEVEN: IMPROVING THOSE ASPECTS OF OUR SUPPORT SERVICES TO REALISE THIS ASPIRATION AND VISION

OUR RESEARCH FOUNDATIONS

Research, and research-enriched learning and teaching, are what makes a university. Through its research, a university enacts its commitment to society. Almost all innovations, from healthcare, education, law and psychology through primary industry, engineering, environmental science and IT to economic policy and creative arts, have been moulded by university research. Research solves problems, extends horizons, advances technology and changes lives.

Macquarie University has always been an ambitious and dynamic place to undertake research. Having celebrated our 50th anniversary in 2014, members of the Macquarie community can take pride in groundbreaking research achievements across a broad range of disciplines. In line with our anniversary celebrations, Macquarie has published a book identifying our 50 most important contributions to research with world-changing impact. We can confidently say Macquarie's research foundations are deep and provide a strong platform for accelerated growth and performance as we look toward our 60th year in 2024.

MANY OF OUR PAST RESEARCH ACHIEVEMENTS PUT US IN A STRONG POSITION TODAY:

- Macquarie has 44 researchers who have authored at least one research paper that is currently in the top 1 per cent of cited papers in the world (ESI, July, 2014) and four researchers who have recently been recognised as among the world's 'most influential scientific minds' (Thomson Reuters 2014).
- Macquarie is the host of two, and has a major role in another four, Australian Research Council Centres of Excellence. We participate in nine National Research Centres (including three Cooperative Research Centres) and have 17 University Research Centres.
- With 85 per cent of our broad fields of research rated 'at or above world standard' in Excellence in Research for Australia (ERA) 2012, we are well positioned to have 95 per cent rated at an equivalent standard by 2024. We will achieve this by continuing to build on our current and emerging areas of research strength and by increasingly directing our discovery toward national and global challenges of significance.
- Macquarie University has achieved a rating of 5 QS Stars, including the maximum rating in all of the eight major sub-categories – one of only eleven Australian universities to achieve this, and one of only seven Australian universities to have achieved a 5-star rating in the sub-section of Research.
- We are ranked sixth in Australia for collaboration in terms of the proportion of international collaborative publications (CWTS Leiden Ranking 2014); and within the top three universities in Australia with regard to the number of peer-reviewed publications produced per academic staff member.
- In the 2013 edition of the Asia Pacific Nature Index (NPI) Macquarie ranked 62nd out of 757 Asia-Pacific-based research institutions and 8th in Australia among Australian universities for research published in *Nature* journals. In the month after the release of the 2013 NPI, Macquarie was consistently tracking in the Top 50 of the Asia-Pacific region and seventh among Australian universities.
- Macquarie has been highly innovative in research training: as the first university in Australia to establish a two-year research degree as the standard pathway to a PhD, Macquarie is championing quality improvement in research training that is the envy of the Australian higher education sector. Macquarie is also the national leader in cotutelle and joint PhD study, adding an important international dimension to our HDR experience.

By all these measures, Macquarie is on track to becoming one of Australia's leading research universities.

There is, however, ample room for improvement with regards to our external research income; in 2012 Macquarie was ranked in the top 10 universities on indicators for research outputs but only in the top 20 universities for research income. To facilitate investment in truly world-leading research performance with world-changing impact we must strive to triple our research income over the next 10 years. Research funding is not only about numbers, however. Strong investment means our research can be more adventurous, more sustained and more impactful. With better levels of external funding, research teams can be bigger, better equipped and more mobile. Funding means more opportunities for researchers, colleagues and students. It makes more possible.

MACQUARIE'S STRATEGIC ADVANTAGES

Our location on 126 ha of park-like freehold land adjacent to Macquarie Park, a nationally significant research and business centre, specialising in the communications, medical research, pharmaceutical and IT&T sectors, affords us the opportunity to build effective and long-term collaborations with business and industry, including some of the world's leading multinationals. Our proven ability to build unique research concentrations that bring together end-users, suppliers, policy makers, and basic and applied researchers is a competitive advantage we seek to maintain and further exploit.

We are the only Australian university with its own hospital. Macquarie University Hospital and the Faculty of Medicine and Health Sciences work together to conduct research into clinical best practice, offering the unique opportunity to establish Australia's first fully integrated healthcare enterprise. Much of this research is based on the concept of 'translational research', a process of adapting scientific discoveries to practical improvements in patient care.

Macquarie hosts the Australian Hearing Hub, uniting researchers, educators, clinicians and innovators with expertise in audiology, speech pathology, cognitive and language sciences, psychology, nano-fabrication and engineering sciences. With the world-leading company Cochlear Ltd. located on campus, the Australian Hearing Hub is well positioned to be a global leader in hearing-related research.

Finally, Macquarie University offers significant internal funding to support research through a wide variety of funding schemes and investment in strategic opportunities. This funding has always been allocated in alignment with the University's strategic research initiatives and now with the Strategic Research Framework. Given the increasingly competitive environment and the scarcity of hard-won resources, it is important that the University's internal research funds are allocated to achieve maximum return in terms of external research income or impact. Decisions about the allocation of internal funds will be guided by principles such as excellence, significance, alignment, strategy, co-investment, efficiency and equity.

Internal research funding will be directed to a balanced combination of people, projects, infrastructure and collaborative endeavour.

THE CHANGING RESEARCH ENVIRONMENT

The environment for research-intensive universities is increasingly challenging and competition for the best talent and resources is global and fierce. Macquarie's strong record of international collaboration in research and research training establishes its place on the international stage of research-intensive institutions. While there are universities around the world that have achieved the level of success and reputation we aspire to, the Strategic Research Framework intends to position Macquarie as a university that others will benchmark against.

We should look beyond comparing ourselves with other Australian universities. To improve, we need to see ourselves in relation to the best internationally – often universities with much longer histories of research excellence, extensive networks of alumni and investors, and far greater resources at their disposal. Many will be located in countries that are investing heavily in people and infrastructure for the sole purpose of developing higher education and research excellence.

With the increasing pressures on funding it is more important than ever that we use our resources strategically and productively to obtain the best possible outcomes. During the life of the Framework, the University will constantly review and evaluate the outcomes of its investments in research and adjust these investments accordingly. While it would be an easy option in the short term to support every new opportunity, the University's investment decisions ultimately must be strategic and based on those activities and initiatives that will provide Macquarie with the best return in terms of world-leading research and world-changing impact. This will be particularly evident in the distribution of internal research funding, although factors such as equity and stage of career will remain pivotal. In essence, the University will be co-investing for outputs and while we need to build scale, the quality of outputs will be valued over the quantity of outputs.

Additionally, with a large part of our research funding cross-subsidised from teaching revenues and other internal funding sources and increasing pressure on student fees, it is crucial that we secure alternative funding sources from industry, business, philanthropic sources and international schemes and partners.

Every Australian university faces the same challenges and all are mobilising their strategies and resources towards targeting alternative funding sources and seeking greater productivity from their staff. Not only are we competing against other Australian universities, the world around us is changing and an increasing number of universities in the Western Pacific region are being ranked among the world's best. This creates challenges in terms of increased competition for the best and brightest students and research, but also offers unparalleled opportunities in terms of collaboration and knowledge transfer. For Macquarie to succeed in this increasingly competitive environment, we must optimise our natural advantages such as the land we hold and our position within Macquarie Park, and create unique and differentiating opportunities that are outside the traditional mould for Australian universities.

World-Leading Research; World-Changing Impact

Macquarie's achievements are outstanding, but the drive of researchers is always to improve the quality and extend the influence of their discovery. We must accelerate world-leading research performance and continue to raise the standard of our research. All Macquarie researchers should aim to have their work recognised as at least 'at or above world standard' (ERA 3 or 4). Together, we can continue to increase the number of broad fields of research rated as 'well above world standard' (ERA 5).

We must also attract, develop and retain top-performing researchers and research support staff, and optimise their full potential by creating an inspiring, dynamic and collegial culture, as well as providing them with access to advanced infrastructure and innovative technologies. We must diversify our funding sources and increase our external research income three-fold to facilitate investment in the acceleration of our performance, thus expanding the scope, impact, and reach of our work.

We must prepare world-ready higher degree research candidates and continue to attract and retain candidates of the highest quality and potential. Our supervision must be outstanding, inspirational and unrivalled. We must embed our higher degree research candidates in areas of current and emerging strength and provide them with real-world engagement opportunities and personally enriching experiences. Our degrees should be internationally aligned and globally relevant.

We must engage as a world-recognised research collaborator of choice and engage strategically with local, national and international partnerships to complement and enhance our areas of current and emerging research strength. We must underpin our collaborations with deep, durable and authentic relationships, built on mutually beneficial and long-term engagement. We must pursue shared goals with end-users to show our commitment to solving society's problems and improving lives. Our communication needs to be swift and our processes for managing both contracts and projects need to be streamlined, simple and focused on outcomes.

We must deliver research with world-changing impact and align our discoveries with national and global challenges of significance. This will entail strengthening our basic research capability to drive discovery and underpin innovation, while also optimising the opportunities for inquiry across disciplines. We will foster an environment that values diverse forms of knowledge creation, application, and creative output. Our pursuit of research that makes a significant and measurable contribution to national and international productivity and wellbeing is critical to our success as a research-intensive university and must be relentless.

The University is on the threshold of a step-change in its research culture. In addition to increasing the funding we are awarded by the Australian Research Council (ARC) and the National Health and Medical Research Council (NHMRC), we need to further increase our Category 1 funding by targeting other opportunities on the Australian Competitive Grants Register. Beyond Category 1 funding we must also diversify and seek alternative sources of research income. We need to become better at identifying opportunities, facilitating collaborative engagement, and rewarding high-impact discoveries.

We must ensure our operational plans are strongly aligned with, and directly connected to, our strategic endeavours, with clear key performance indicators (KPIs), assigned accountabilities and robust performance monitoring and feedback. Our supporting systems and processes need to be robust, agile and effective with a particular focus on reducing administrative burdens on our researchers and the staff supporting them.

The targets set out in this Strategic Research Framework are intended to stretch our capabilities, but are realistic and achievable if we are prepared to rise to the challenges they present. Failure to engage and adapt in the context of our increasingly competitive, impact-driven and global research environment, is simply not an option under Macquarie's *Our University: A Framing of Futures*.

By 2024, this Strategic Research Framework challenges Macquarie to: more than double our HDR completions (to >800); triple our external research income (to >$150 million); more than double our HERDC publications (to >5000); and increase the percentage of broad fields of research rated 'at or above world-standard' from 85 per cent to 95 per cent (see Appendix A). Such results could see Macquarie ranked in Australia's top six universities and among the top 150 globally.

While our end-goal is not in itself to be among the highest ranked universities in Australia or the world, if Macquarie succeeds in its aim to deliver world-leading research with world-changing impact, it is logical that top rankings will follow. Although we may face headwinds and unforeseen hurdles along the journey, an unwavering commitment to this research ideal will enable us to successfully navigate our course to international recognition for research excellence across a broad range of fields.

PURPOSE AND OUTLINE OF THE STRATEGIC RESEARCH FRAMEWORK

The Strategic Research Framework is a broad, guiding 'touchstone' that aims to inform the development of faculty and department targets, plans and initiatives. The framework is not prescriptive. It lays the groundwork for the University to build its research capacity and quality but will remain a living and flexible document, adapting as new opportunities and challenges arise.

The framework charts a course for Macquarie that will lead to significant growth and scale; however, achieving aspirational targets must not come at the expense of quality. Our research success must continue to be underpinned by an unwavering commitment to quality in all of our endeavours, from the attraction of higher degree research candidates of the highest potential to the quality of our research output.

The Strategic Research Framework does not stand in isolation. It takes its lead from *Our University: A Framing of Futures,* but also provides a structure that is designed to connect with the University's refreshed Learning and Teaching Strategic Framework and relies heavily on support and integration from the strategic frameworks arising from the portfolios of the Deputy Vice-Chancellor (Corporate Engagement and Advancement), the Chief Operating Officer, and the Deputy Vice-Chancellor (International). Importantly, it is the faculties that will take the lead on implementing many of the supporting strategies outlined in the framework.

Key decisions concerning new or revised strategies, research streams and themes, or initiatives will not be the sole domain of any one person. The consultative manner in which this framework was developed will continue into implementation and the input of key stakeholders will be sought, as will that of the committees responsible for strategy pertaining to research and higher degree research candidates – the Research Strategy and Policy Committee (RSPC) and the Higher Degree Research Committee (HDRC). This will ensure that a broad range of stakeholders have a role to play in implementing the framework – either as a member of RSPC or HDRC, a member of a committee reporting to RSPC or HDRC, or as a member of a body receiving reports from RSPC and HDRC, such as the Academic Senate.

A university that aspires to distinction on a global stage must be many things to many people and this is amplified by our purpose as a university of service and engagement. Research, teaching, engagement and service all have important roles to play and the same is true at the level of individual staff members. Each element must be present to achieve excellence but may be expressed differently by each individual as they are by each university. The goals and targets expressed in the framework should be viewed as complementary to those that will be expressed in the refreshed Learning and Teaching Strategic Framework, rather than in competition with them. When all elements are present we will offer our students the best education, our partners the best knowledge, our colleagues the best advances, and our community the best outcomes.

FRAMEWORK ARCHITECTURE

The framework comprises a cascading set of long-term key objectives, goals, targets and supporting strategies designed to guide the development of KPIs for Executive Deans, Associate Deans, and Heads of Department and the development of strategic research plans for faculties and departments.

The framework identifies four interdependent key objectives.

Key objectives:

ONE: ACCELERATE WORLD-LEADING RESEARCH PERFORMANCE

TWO: PREPARE WORLD-READY HIGHER DEGREE RESEARCH CANDIDATES

THREE: ENGAGE AS A WORLD-RECOGNISED RESEARCH COLLABORATOR OF CHOICE

FOUR: DELIVER RESEARCH WITH WORLD-CHANGING IMPACT.

None of the key objectives can be successful in isolation. The success of each is dependent on, and intertwined with, the success of the others. For example, high-potential higher degree research candidates will not be attracted to Macquarie without a reputation for high quality research; the likelihood of producing research that changes the world is increased when we collaborate; research without relevance is unlikely to attract funding or the highest calibre of researcher to Macquarie. Collectively, however, the realisation of these four key objectives will propel Macquarie's research performance to unparalleled levels.

Importantly, the framework establishes an inspiring and integrated set of overarching and cross-disciplinary research priorities, focused on shaping our academic and social future. A comprehensive set of research themes and streams will support these priorities by guiding and driving the 'bottom-up' development of strategically aligned research projects and programs.

AREAS OF CURRENT AND EMERGING DISCIPLINARY RESEARCH STRENGTH

Macquarie University is well known for its deep and durable research strengths in a number of fields of discovery. Our humanities, arts, social sciences, sciences, technology, engineering and mathematics researchers undertake disciplinary research that explores and advances our knowledge and understanding of the universe in which we live. From abstract mathematics to the study of human social behaviour, through the study of atoms, molecules, and cells and of experiential reality and the human mind, fundamental research forms the crucial foundation on which all applied research is built.

Outcomes for Excellence in Research for Australia (ERA) 2010 and ERA 2012 have consistently shown the areas of Earth sciences, environmental sciences and physical sciences to be rated at the very highest level of quality – 'well above world standard' (ERA 5) and a further five broad research disciplines rated at 'above world standard' (ERA 4): Biological sciences; history and archaeology; language communication and culture; law and legal studies; and philosophy and religious studies.

It is paramount to Macquarie's aspiration to be recognised as a world-leading research-intensive institution for the research undertaken in these disciplines to maintain the existing ERA 5 ratings and elevate the current ERA 4 rated disciplines to also be 'well above world standard'.

Similarly, for Macquarie to distinguish itself as a world leader, the number of disciplines it excels in cannot be limited to a few. To continue to attract high potential domestic and international undergraduate and postgraduate students to our University, the quality of all our research, including that which informs our teaching-intensive disciplines, needs to be at least at world standard.

A number of fields of research currently at or below world standard (or not yet assessed under the ERA) are targeted areas of emerging research strength fundamental for a comprehensive university. We will continue to invest in and support these fields as they pursue a path to elevated ERA ratings.

The importance of leading the world in these fundamental disciplines cannot be overstated if we want to attract the very best researchers and higher degree research candidates, and gain a worldwide reputation for excellence. The breadth and depth of our expertise in these fundamental disciplines is also vital to support the University's objective to deliver research with world-changing impact. Macquarie's research investment decisions will be weighted towards building depth and scale in these current and emerging areas of disciplinary research strength.

FUTURE-SHAPING RESEARCH PRIORITIES

A broad cross-section of Macquarie researchers has worked to develop five future-shaping research priorities. These priorities provide a focal point for cross-disciplinary research that is aligned with the national research agenda, global challenges of significance, and our areas of current and emerging research strength. For the purposes of this framework, we are applying a broad and inclusive interpretation to the term 'cross-disciplinary' with the expectation that it covers multi-, inter- and trans-disciplinary research teams.

Our desire is to focus our cross-disciplinary research effort on being the best in a select range of areas and to build scale, critical mass and a reputation that will further attract world-class researchers, higher degree research candidates, collaborators and funding support. Macquarie's research investment decisions will be weighted towards building quality and scale in these five future-shaping research priorities.

The challenges faced by the world today are complex and interrelated and require bold thinking and the discovery, synthesis and application of new knowledge. The complexity of these challenges requires sophisticated, holistic solutions that can only be achieved through by applying the combined expertise of a range of disciplines and cross-disciplinary teams. The development of world-changing applied research is only possible if it is sustained and underpinned by world-leading excellence in basic research.

Under the framework, Macquarie will continue to value, support and develop basic core disciplines from finance to philosophy and from mathematics to education. We will harness this discipline-based, researcher-driven investigation and draw together its strengths around our future-shaping research priorities. A university can only build strong cross-disciplinary research if it has strong foundations across all disciplines.

The pursuit of cross-disciplinary research on the scale envisaged by the framework is perhaps our greatest cultural change and challenge. Discipline depth and strength must co-exist with the emerging, accelerating and pervasive paradigm of cross-disciplinary research teams engaged with global challenges of significance.

Future-shaping research priorities:

ONE: HEALTHY PEOPLE

Pioneering health, integrated healthcare and lifelong-learning for wellness in our ageing world

TWO: RESILIENT SOCIETIES

Understanding cultures in our changing world and building ethical, just and inclusive communities

THREE: PROSPEROUS ECONOMIES

Strengthening economic productivity to promote prosperity in our diverse world

FOUR: SECURE PLANET

Sustaining our interdependent world and exploring our place in the universe

FIVE: INNOVATIVE TECHNOLOGIES

Advancing our interconnected world with frontier technologies, systems, designs and creative practice

A detailed overview of the future-shaping research priorities, research themes and streams is found at page 44.

Research integrity

Macquarie University is committed to the highest standards of research integrity. As set out in the Research Integrity Framework and *The Macquarie University Code for the Responsible Conduct of Research*, the University expects all staff and students, and those who are conducting research on University premises or using University facilities, to observe the highest standards in the conduct of their research.

The University's research integrity arrangements aim to offer a positive research experience, constructively promote good research, and effectively and efficiently ensure responsible conduct in a way that is proportional to risks and sensitivities.

Macquarie's Research Integrity Framework, which is underpinned by the *Australian Code for the Responsible Conduct of Research*, aims to facilitate research, by providing researchers with resources and training. A key element of the implementation of the Research Integrity Framework will be the centrally-coordinated establishment of a suite of activities that build awareness and capacity, that are discipline-relevant and present research integrity as a core component of quality research.

Our key objectives, goals, targets and supporting strategies

The diagram on the following page provides an overview of the key research objectives and specific goals underpinning the framework, together with the five future-shaping research priorities that guide the foundational cross-disciplinary research themes and streams.

While our key objectives and future-shaping research priorities have been designed to be broad, inclusive and able to stand the test of time, changes in our internal and external environments are inevitable. To ensure that Macquarie remains agile, relevant and world-leading it is proposed that elements of the Framework – particularly the targets, supporting strategies, research themes and research streams – be formally re-evaluated at least every three years.

OUR UNIVERSITY

A Framing of Futures:
An accelerating and impactful performance in discovery

KEY RESEARCH OBJECTIVES AND GOALS

01 Accelerate world-leading research performance

Top-performing staff: Increase the number and proportion of research-productive staff

World-leading research concentrations: Build on disciplinary areas of current and emerging research strength and enhance cross-disciplinary capability

Growing research investment: Accelerate growth of external research income to facilitate world-leading research

Pervasive best practice: Continuously improve policies, processes and systems that support the pursuit of excellence and integrity in research and scholarship

Leading-edge infrastructure: Secure world-leading research infrastructure, facilities and equipment

02 Prepare world-ready higher degree research candidates

Attracting quality candidates: Attract high-potential higher degree research candidates

Inspirational supervision: Provide outstanding supervisory expertise and mentoring

Transformative research environment: Embed higher degree research candidates in areas of current and emerging strength

Real-world engagement: Provide opportunities for career enhancing exposure to industry and the community

Global champions: Provide internationally-aligned degrees with global relevance

World-class support: Provide personally-enriching experiences and enabling facilities, policies and processes

03 Engage as a world-recognised research collaborator of choice

Strategic engagement: Pursue local, national and international partnerships to complement and enhance areas of current and emerging research strength

Deep and authentic collaborations: Build mutually-beneficial, long-term engagement with institutional, national and international colleagues

Synergistic end user partnerships: Pursue shared goals with end users to maximise delivery of solutions and return on investment

Streamlined support: Practice efficient and effective facilitation of research collaborations

04 Deliver research with world-changing impact

Discovery for innovation: Strengthen basic research capability to drive discovery and underpin innovation

Cross-disciplinary inquiry: Optimise the opportunities for inquiry across disciplines and structures

Diversity of impact: Foster an environment that facilitates and values diverse forms of knowledge creation, application, and creative practice to benefit society

Challenge-focused research: Conduct research that addresses national and global challenges and delivers significant benefits

FUTURE-SHAPING RESEARCH PRIORITIES

Research themes and streams

Healthy people: Pioneering health, integrated healthcare and lifelong learning for wellness in our ageing world

Resilient societies: Understanding cultures in our changing world and building ethical, just and inclusive communities

Prosperous economies: Strengthening economic productivity to promote prosperity in our diverse world

Secure planet: Sustaining our interdependent world and exploring our place in the universe

Innovative technologies: Advancing our interconnected world with frontier technologies, systems, designs and creative practice

***World-Leading* RESEARCH**

***World-Changing* IMPACT**

Arts and humanities | ***Business, economics and management*** | ***Human sciences*** | ***Medicine and health sciences*** | ***Science and engineering***

EXCELLENT RESEARCH SPANNING FUNDAMENTAL TO APPLIED

Key objective 1: Accelerate world-leading research performance

Macquarie is fearlessly building its reputation as a world-leading, research-intensive university. To accelerate our research performance we need: top-performing staff; world-leading research concentrations; expanding research investment; best-practice systems and processes; and leading-edge infrastructure.

Macquarie's ability to attract and retain the very best researcher talent means having an outstanding value proposition that we can live up to in practice across the university. The research experience at Macquarie must be able to stand up against the best experiences internationally if we are to attract and retain the best. We must establish a staffing profile in terms of the number of staff, their capability and capacity to achieve our 2024 research targets. Our recruitment processes must be strategic with a view to the future and must reflect the University's drive for excellence. Perhaps most importantly, this drive to recruit strategically for excellence must extend to the University's high-level academic management roles such as heads of department and executive deans.

Achieving a step change in gender balance among our research community is fundamental to our ability to attract and retain top-performing staff and must be part of our value proposition. Our policies, processes, opportunities and promotion guidelines need to facilitate the movement of women through an academic career from early career researcher to distinguished professor or laureate level, in line with, and in support of, Macquarie's broader advancement of equity and diversity.

Accelerating world-leading research performance will require us to build on our current disciplinary research strengths and branch out boldly into targeted emerging areas, while at the same time develop outstanding cross-disciplinary capability. The former will enable scale, reputation and esteem, whilst the latter will position us to address the world's complex challenges.

Building scale and attracting top performers will require growth in research investment. To facilitate world-leading research and achieve our first key objective we will need to diversify our income sources and to triple our income to $150 million by 2024. While we are expecting an accelerated performance in medical and engineering research, and associated research income, in addition to increasing our Category 1 funding we need to diversify and seek alternative sources for research income. This will include working closely with the Corporate Engagement and Advancement portfolio to strengthen philanthropic culture and practice across the University.

Attracting and retaining the best must be a philosophy and commitment that also holds true for our professional research support staff. Research management is developing as a profession in itself, reflected by the increasing education and professional development opportunities targeted at this group and the increasing activity of professional societies such as the Australasian Research Management Society. In addition to committing to the ongoing training and development of our professional research support staff, we must commit to inspiring them. Exposing our research support staff, and other professional staff whose support for research may be more tangential, to the depth and breadth of the outstanding and exciting research undertaken at Macquarie can only serve to increase their understanding of, and enthusiasm for, the research they are helping to make happen.

Macquarie must also strive to continuously improve its policies, processes and systems that support the pursuit of excellence and integrity in research and scholarship. This will entail investments in systems and technology to streamline and automate processes, together with the continued development of a strong service-oriented culture within our professional support teams. Data integrity and consistency are fundamental to the success of the framework and it will be critical that University efforts to deliver better quality data and analytical insight are prioritised to enable a rapid strengthening of our research-specific information needs.

Macquarie must develop University-wide guidelines for research productivity and performance for adoption by faculties as a basis for discipline-specific definitions of research productivity. The establishment of more consistent and transparent research-productivity expectations will provide a strong foundation from which to accelerate our research performance.

With the scale of investment in buildings, infrastructure and equipment in neighbouring countries such as China far outstripping those in Australia, Macquarie needs to make smarter investments in space and equipment. Cutting-edge equipment is costly and often beyond the ability of an individual researcher, research group or even a university to fund. We need to collaborate across the University and with external partners on the investment, maintenance and usage of large pieces of equipment. Co-investment and shared usage, in addition to sharing costs, offers opportunities for cross-disciplinary collaborations. Even within the University, shared use of centrally-managed equipment offers benefits such as 'accidental collaboration', operation and maintenance by trained technicians, and optimal usage of University infrastructure.

We must ensure that we take every opportunity to broadcast our message of excellence to the world. Macquarie needs to develop a purposeful and responsive strategy to promote its research excellence and its impact on the way we live. This should be coupled with clear information about the Macquarie research value proposition and the unique advantages of learning, working and researching at this University.

Finally, Macquarie must adopt an investment in outcomes philosophy that seeks to maximise returns on research investment. Through the investment of our internal research funding in funding schemes and in strategic opportunities, we will strive to generate income, outputs and impact that will sustain our future growth and underpin our research performance and reputation.

GOAL 1.1: TOP PERFORMING STAFF

Increase the number and proportion of research-productive staff

TARGETS

1.1.1	In the first instance, recruit 50 new Level A-C academics over 2014-2016 into areas of current or emerging research strength
1.1.2	Attract at least 10 world-leading researchers and their teams (where the return on investment is clear) in areas of current or emerging research strength
1.1.3	By 2024, 100 per cent of teaching and research and 'research only' staff will be research productive
1.1.4	Achieve a step change in gender and diversity balance among academic staff across disciplines, roles and levels over the life of the 10-year framework

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Establish annual faculty-specific research publication/output KPIs accounting for both quantity and quality and associated action plans	Faculties	DVC (R)
Establish processes that facilitate the recruitment of 50 new academic staff over 2014-2016	DVC(R), DVC (A)	Faculties
Develop a plan to inform the strategic recruitment of academic excellence and ensure that promotion guidelines reflect and facilitate the achievement of the University's ambitions	HR	Executive
Develop a new research-productive standard in line with our 2024 research KPIs	DVC (R)	Faculties
Explore the potential to establish incentives or awards that encourage high-quality publications in very high-impact journals or with prestigious publishers	RO	Faculties
Develop a long-term plan to achieve staff diversity in representation, distribution and participation in research for: Indigenous Australians, women, the GLBTIQ community, people with disability and those from culturally and linguistically diverse backgrounds, based on best practice and link the implementation of this to faculty KPIs	HR, Equity and Diversity Unit	Faculties
Revise the University's policies and processes governing eligibility of staff on short-term contracts to supervise HDR candidates and apply for competitive grant funding	DVC (R)	HDRO, RO, HR
Continue to implement robust and effective induction processes for new researchers and research support staff and provide ongoing mentoring and development opportunities for early career researchers	HR	Faculties, RO, HDRO, Library
Investigate the creation of a *Very* Early Career Researcher (VECR) category and the associated development of targeted mentoring and support program for this group	DVC (R)	RO, Faculties, HR
Identify cohorts of potential future research leaders at Macquarie and establish leadership development opportunities designed to enhance their leadership skills and provide pathways for succession planning	HR	Faculties, DVC (R), RO
Proactively and consistently raise the profile of our outstanding researchers through high-quality applications for prestigious awards and prizes	Faculties	DVC (R)

GOAL 1.2: WORLD-LEADING RESEARCH CONCENTRATIONS

Build on disciplinary areas of current and emerging research strength and enhance cross-disciplinary capability

TARGETS

1.2.1	95 per cent of our broad fields of research assessed under ERA as 'at world-class level or above' (with 50 per cent at ERA 4 and 25 per cent at ERA 5)
1.2.2	Achieve and concurrently maintain at least five Macquarie-led national Centres of Excellence or research programs (and participate in at least five national or international centres or programs) during the 10-year framework
1.2.3	Replicate the Australian Hearing Hub model (i.e. co-locating clinical services, industry and university researchers) in at least two cross-disciplinary areas of current or emerging research strength

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Identify and seed fund potential national Centres of Excellence or research program leadership opportunities	Faculties	DVC (R)
Identify and seed fund at least one research theme that has demonstrated the potential to be developed into a major research hub (referencing the Australian Hearing Hub model)	Faculties	DVC (R)

GOAL 1.3: GROWING RESEARCH INVESTMENT

Accelerate growth of external research income received to facilitate world-leading research

TARGETS

1.3.1	External research income of at least $150 million by 2024, comprising Category 1 – 4 funding

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Establish annual faculty-specific external research income KPIs and associated action plans	Faculties	DVC (R)
Adjust internal research funding to align with external income targets, applying a core philosophy of 'income for outputs'	RO	DVC (R)
Liaise with the Corporate Engagement and Advancement portfolio to establish the role of research in the Macquarie University Advancement Plan, furthering its goal of strengthening philanthropic culture and practice across the University and increasing philanthropic revenue	DVC (CEA)	DVC (R)
Work closely with the Corporate Engagement and Advancement portfolio to optimise the acquisition of Category 2 and Category 3 research funding through the development of targeted strategies, partnership introductions, and ongoing relationship management	DVC (R), RO	DVC (CEA), Faculties
Work closely with the portfolio of the Chief Operating Officer to raise the profile of Macquarie University and the impact of our research at State and Federal Government levels and respond comprehensively, and with agility, to government funding announcements	DVC (R), RO	COO
Work closely with the portfolios of the DVC (Corporate Engagement and Advancement) and the DVC (International) to develop a targeted strategy to increase the number of externally funded HDR scholarships	DVC (R), HDRO	DVC (CEA), DVC (I)
Develop a suite of central and faculty-specific development and mentoring opportunities to build skills in areas such as grant writing, project management, effective publishing, increasing citations, and managing relationships with collaborators	Faculties, RO	Library, HR

GOAL 1.4: PERVASIVE BEST PRACTICE

Continuously improve policies, processes and systems that support the pursuit of excellence and integrity in research and scholarship

TARGETS

1.4.1	Macquarie's Research Integrity Framework will be aligned with best practice in the sector and will support and facilitate a pervasive ethical research culture
1.4.2	Macquarie will have a robust, accurate, accessible, up-to-date and integrated research data management and reporting system
1.4.3	All core research administrative processes will be streamlined and be available online (and automated and pre-populated where appropriate)
1.4.4	Continuous improvement in researcher satisfaction with offices in the DVC (Research) portfolio as measured by a biennial client satisfaction survey

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Fully implement the University's Research Integrity Framework in order to adopt an educative and facilitative approach to research ethics and integrity across the University	Director, Research Ethics and Integrity	Faculties
Leverage the Business Process Improvement Initiative learnings and associated 'lean thinking' and apply this to core research support processes such as grant management and reporting	RO, HDRO, Dean (HDR), OoC, Library	COO, DVC (R)
Continuously improve research support systems and processes incorporating the principles of pre-population, automation, automatic data harvesting, and re-purposing of collected information	Informatics, RO	DVC (R)
Undertake a comprehensive IT-enabling review to specify future core research support system requirements that guide future systems selection and implementation	Informatics, RO	DVC (R)
Ensure that the University's management and reporting systems support the goals of removing barriers to cross-disciplinary research	Informatics	Finance, RO
Renew the University strategy to increase the size of the Research Performance Fund relative to the teaching load component of the faculty funding model to a ratio of 20:80 (excluding HDR funding)	Finance	Executive
Continue to maximise opportunities for professional staff development and participation in staff exchanges	HR	Faculties, Unit directors
Develop and implement a biennial online research portfolio client satisfaction survey	RO, HDRO, Dean (HDR), OoC	DVC (R)

GOAL 1.5: LEADING-EDGE INFRASTRUCTURE

Secure world-leading research infrastructure, facilities and equipment

TARGETS

1.5.1	Secure state-of-the-art, purpose-built and iconic facilities in the areas of science, engineering and biomedical research during the first five years of the 10-year framework
1.5.2	Upgrade, maintain and equip existing research facilities in all areas of research strength during the life of the 10-year framework
1.5.3	Establish at least three 'landmark' infrastructure-sharing collaborations, in national and international precincts, during the life of the 10-year framework
1.5.4	Lead at least two successful mega-infrastructure grants (NCRIS or equivalent) during the life of the 10-year framework
1.5.5	Increase the number and value of successful ARC LIEF applications

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Ensure that Macquarie's capital plan prioritises and enables the development of the facilities necessary to support the research aspirations of the University	COO	DVC (R)
Ensure that Macquarie's capital and operational budgets provide for the appropriate upgrade and maintenance of existing research facilities, information technology and equipment infrastructure	COO	DVC (R), Property, Informatics
Identify the most critical infrastructure gaps and scan for 'landmark' infrastructure sharing collaborations and mega-infrastructure grant opportunities	Faculties	DVC (R), Property
Assess and encourage efficient utilisation of space and equipment, including sharing across disciplines and faculties, to maximise the outcomes from capital and operational budgets and facilitate collaboration.	Property	Faculties
Work closely with Informatics to ensure the University facilitates research, its dissemination and re-use through open-access, and research data management and storage	Informatics	RO, Faculties
For relevant infrastructure, establish a central management structure that facilitates operation by trained technicians, ensures timely maintenance, maximises the use of equipment, enables acquisition and use of the latest technologies and offers cost savings through bulk purchases of consumables	COO	DVC (R)
Work closely with the Corporate Engagement and Advancement portfolio to identify opportunities for sharing infrastructure with collaborative partners	DVC (R)	DVC (CEA)

Key objective 2: Prepare world-ready higher degree research candidates

To prepare truly world-ready research candidates we will: attract higher degree research candidates of the highest quality; provide unrivalled and inspirational supervision; enable a transformative research experience; provide opportunities to engage with the real world; offer internationally-aligned programs with global relevance; and support them with personally-enriching experiences and excellent support structures.

Exposing our best and brightest undergraduates to Macquarie's research community is a key mechanism to creating a pipeline of outstanding students who identify themselves as being on a natural path to research. To this end, Macquarie has made great advances in its goal of providing an innovative higher degree research training experience with the introduction of the Master of Research (MRes). This has provided us with a decided edge in the Australian higher education sector by being the only university in the country to require a two-year research training program as the pathway to undertaking a PhD. This system brings Macquarie into line with practices in Europe and North America and complements the structure of the Chinese undergraduate to higher degree research structure. It will also assist the University in achieving the ambitious higher degree research targets set out by this framework because this category comprises the PhD, the Master of Philosophy and the Master of Research.

While this is one element of Macquarie's goal of producing world-ready higher degree research candidates, we propose to further enhance their experience by ensuring that most, if not all, candidates have the opportunity to be exposed to experiences external to the University. These may include student exchanges, undertaking a PhD under the cotutelle or joint PhD program, visiting the laboratories of international collaborators, being co-supervised by industry experts, attending presentations made by world-renowned researchers, or working with industry to solve real-world problems. Our world-ready research candidates represent not only the next generation of researchers, they are the industry, government and community leaders of tomorrow – each respected ambassadors for Macquarie.

This Strategic Research Framework challenges us to improve on-time research candidate completions alongside increasing exposure to industry and international experiences. This can perhaps only be achieved by coalescing the Master of Research and PhD into a truly integrated five-year program. On-time completions are possibly the greatest single indicator of success associated with this key objective. They are reflective of our ability to: attract and retain the best and brightest; provide them with outstanding and inspirational supervision; and surround them with a supportive environment and a culture that is infused with quality. Although our aspirational 2024 KPIs for higher degree research commencements and load are important, we must never lose sight of the inherent and holistic value attached to on-time research candidate completions.

To achieve the University’s ideal of world-leading research with world-changing impact and to offer our higher degree research graduates the best possible experience, it is essential that we closely align our higher degree research cohort with areas of current and emerging research strength. Higher degree research candidates are the engine room of a university and a more conscious alignment of the University’s higher degree research cohort has the potential to significantly increase the University’s research outputs and impact.

To maximise the number of higher degree candidates to whom we can offer an outstanding experience, we must increase the external funding the University receives to support higher degree research scholarship. We must increase and diversify these sources of funding, whether they are industry, Cooperative Research Centres or international government funding agencies.

Finally, as one of the key drivers of higher degree research candidate attraction, it is paramount that Macquarie actively promotes the profiles of our key researchers and maximises opportunities for associated communication and connection.

GOAL 2.1: ATTRACT QUALITY CANDIDATES

Attract high-potential higher degree research candidates

TARGETS

2.1.1	Annually increase the proportion of successful HDR applicants achieving a scholarship rating of ≥4/5
2.1.2	Annually increase the percentage of Macquarie undergraduates transitioning to the MRes to an optimal level
2.1.3	At least 80 per cent of those who achieve the highest results (>85 per cent) in Year 2 of the MRes transition to a Macquarie University PhD annually
2.1.4	Increase the number of highly ranked applicants receiving HDR scholarships in line with HDR load growth target
2.1.5	Increase the number of highly ranked applicants receiving scholarships from external sources

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Establish annual faculty-specific external HDR candidate load KPIs and associated action plans	Faculties	DVC (R)
Adjust the Macquarie scholarship scheme to more closely align scholarships to high quality candidates (i.e. consider establishing 'prestige' scholarships) and increase the transparency of the scoring system	Dean (HDR), HDRO	DVC (R)
Liaise closely with the Corporate Engagement and Advancement and International portfolios to develop a targeted strategy to increase externally funded scholarships	DVC (R), HDRO	DVC (CEA), DVC (I)
Adjust the scholarship rating criteria to better reflect the high performance of applicants from diverse fields and different international institutions and practices	Dean (HDR), HDRO	DVC (R)
Work with Marketing and Macquarie International to strengthen the University's strategies and communication to attract high quality HDR candidates	Marketing, DVC (I)	HDRO
Develop flexible online offerings for the MRes	Dean (HDR), HDRO	Faculties
Implement two intake rounds annually for the MRes	HDRO	Faculties
Establish an appropriate and clear articulation pathway into the MRes with strategic international partners	HDRO	DVC (I)
Continuously review and refine the MRes program to optimise its effectiveness	Dean (HDR), HDRO	Faculties
Investigate incentives for on-time and quality results associated with the completion of the MRes and the PhD	Dean (HDR)	HDRO, HR
Establish research internships in each faculty for undergraduate students to make research accessible and an obvious option	Faculties	DVC (A)
Implement initiatives that enable high-potential undergraduate student exposure to, and participation in, current and emerging areas of research strength	DVC (R), DVC (A)	Faculties
Work closely with the PVC (Learning, Teaching and Diversity) on the development of a structured curriculum to guide undergraduate students from entry to PhD	Dean (HDR), PVC (LTD)	DVC (R), Faculties
Encourage undergraduate participation in activities that actively promote participation in research (e.g. the Australasian Conference of Undergraduate Research)	Faculties	PVC (LTD)

GOAL 2.2: INSPIRATIONAL SUPERVISION

Provide outstanding supervisory expertise and mentoring

TARGETS

2.2.1	Reduce HDR candidate attrition to less than 10 per cent of annual commencements and reduce out-of-time completions to less than 5 per cent of the cohort by 2018
2.2.2	Increase the proportion of theses that are ranked in the top 10 per cent of HDR-level research worldwide as judged by examiners
2.2.3	Achieve continuous improvement in the scores from annual surveys of HDR candidate experiences (e.g. the external PREQ and the internal MUSEQ-R) in relation to satisfaction with supervision
2.2.4	Annually increase the number of active supervisors on the Macquarie University Supervisor Register, to meet projected HDR candidate load
2.2.5	Annually increase the percentage of HDR candidates submitting theses by publication (where relevant to the discipline)

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Establish annual faculty-specific HDR candidate completion KPIs and associated action plans	Faculties	DVC (R)
Expand supervision mentoring across the University to develop supervisory capacity and quality	Faculties	Dean (HDR), HR
Explore the option of establishing a 'senior supervisor' within each department, providing contextual guidance and mentorship to the department's HDR supervisors	Dean (HDR)	Faculties, HR
Strengthen those elements of the performance development and review process that will give managers better oversight of how staff are performing in relation to HDR supervision	HR	HDRO, Faculties
Celebrate HDR supervision at the annual Research Excellence Awards to highlight the esteem and value placed on outstanding HDR supervision	DVC (R)	Dean (HDR)
Improve the supervisor appointment policy to make better use of the range of supervisor categories (including the use of external supervisors)	HDRO	DVC (R)
Utilise the supervision load planning project to implement appropriate workload recognition that reflects the range of supervisor categories and situations	Faculties, Dean (HDR)	DVC (R), DVC (A)
All eligible staff to maintain currency on the Macquarie University Supervisor Register (MQSR)	Faculties	HDRO
More effective use of confirmation of candidature and annual progress reports by supervisors and departments to evaluate progress towards achievement of on-time completions	Faculties	HDRO
Expand and improve the Supervision Enhancement Program	Dean (HDR)	L&TC
Amend the Code of Supervisory Practice to place a greater emphasis on integrity and inspirational supervision	Dean (HDR)	Faculties
Adjust the faculty funding model to more accurately reflect the role and workload of supervisors under all supervision models	Faculties	DVC (R), DVC (A)

GOAL 2.3: TRANSFORMATIVE RESEARCH EXPERIENCE

Embed higher degree research candidates in areas of current and emerging strength

TARGETS

2.3.1	95 per cent of HDR candidates embedded in areas of current and emerging strength ensuring access to a critical mass of research-productive staff and peers

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Develop a program of workshops to encourage cross-disciplinary engagement among HDR candidates across the five years of the MRes and PhD	Faculties	Dean (HDR)
Investigate the merit of allocating a proportion of scholarships to areas of current and emerging strength	DVC (R)	HDRO
Ensure that HDR candidates have clarity around supervision and support in circumstances where they are undertaking cross-disciplinary research	Faculties	Dean (HDR), HDRO

GOAL 2.4: REAL-WORLD ENGAGEMENT

Provide opportunities for career-enhancing exposure to industry and the community

TARGETS

2.4.1	At least one-third of our HDR candidates are actively involved with industry, government, community, or external research agencies (as indicated by projects, placements, industry publications or co-supervision arrangements)
2.4.2	Annually increase the percentage of research funding sourced from industry-supported HDR scholarships

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Explore the potential of establishing PACE-style opportunities for MRes and HDR candidates	Dean (HDR), HDRO	DVC (CEA), DVC (A), PACE
Explore the potential of establishing internships for PhD students with our partners	Dean (HDR), DVC (CEA)	Faculties, HDRO
Explore the potential of increasing the number of jointly funded and supervised scholarships between Macquarie and external partners through the establishment of an Industry MQRES	Dean (HDR), HDRO	DVC (CEA)
Revise and simplify the University's policies and procedures around appointing external supervisors to supervisory panels	HDRO	HR
Develop a program of workshops involving stakeholders from industry, government, community, or external research agencies for the purpose of developing career readiness for HDR candidates in line with the broader HDR Professional Skills program	Faculties, Dean (HDR)	DVC (CEA)
Facilitate external collaboration and entrepreneurship opportunities for HDR candidates	DVC (CEA), Dean (HDR)	Faculties
Diversify and increase our research income with a deliberate and ongoing campaign focused on targeting external funding for scholarships for HDR candidates	HDRO	DVC (I), DVC (R)

GOAL 2.5: GLOBAL CHAMPIONS

Provide internationally-aligned degrees with global relevance

TARGETS

2.5.1	Annually increase the percentage of HDR candidates having recognised international experience (i.e. international exchanges, visits, visiting scholars at Macquarie, international conferences in Australia or overseas)
2.5.2	Annually increase the number of publications co-authored by HDR candidates and international colleagues
2.5.3	Annually increase the number of domestic HDR candidates undertaking a cotutelle or joint PhD program
2.5.4	Annually increase the number of cotutelle and joint PhD candidates, as well as the percentage of candidates with recognised strategic partners

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Develop and implement a MRes exchange program, focusing on Macquarie's strategic partners	Dean (HDR), HDRO	DVC (R), DVC (I)
Explore the establishment of the position of Associate Dean (International) in each faculty to support the University's international activities, including international collaboration and mobility for HDR candidates	Executive, DVC (I)	Faculties
Align schemes such as OSP to encourage mobility of cotutelle and joint PhD supervisors	RO, HR	HDRO
Increase the transparency of the faculty funding model to improve accountability around HDR candidature funding and understanding of allocations in the context of competing priorities	Finance	DVC (R), Faculties

GOAL 2.6: WORLD-CLASS SUPPORT

Provide personally enriching experiences and enabling facilities, policies and processes

TARGETS

2.6.1	Increase the percentage of HDR candidates participating in the Learning Skills program
2.6.2	Annually increase the number of HDR candidate visits and exchanges with external partners
2.6.3	Continuous improvement in the scores from annual surveys of HDR candidate experiences (e.g. the external PREQ and the internal MUSEQ-R) in relation to 'overall satisfaction'
2.6.4	Achieve annual improvements in turnaround times associated with administrative processes, particularly 'application to offer' and 'thesis submission to completion'
2.6.5	All core higher degree research administrative processes to be streamlined and available online (and automated and pre-populated where appropriate)

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Expand the scope of the HDR Professional Skills program to foster real-world engagement and personal and career development	Dean (HDR)	HDRO
Streamline the University's processes for international HDR candidate exchanges (e.g. MRes exchanges, cotutelle and joint PhD programs)	HDRO	DVC (R), DVC (I)
Identify opportunities for Macquarie University to participate in international consortia (e.g. IdeaLab)	Faculties, Dean (HDR)	DVC (R), DVC (CEA), DVC (I)
Improve administrative processes supporting MRes and HDR applications and thesis examination	HDRO	DVC (R)
Leverage the Business Process Improvement Initiative learnings and associated 'lean thinking' and apply this to relevant support processes with a view to improving the HDR candidate experience	Dean (HDR), HDRO	COO, Library, Faculties
Ensure the University is compliant with the national space allocation model for HDR candidates	Faculties	Dean (HDR)
Expand and strengthen induction, mentoring, and research skills support for new HDR candidates	Dean (HDR)	Library, Campus Wellbeing
Strengthen the University's mechanisms to ensure early identification of 'at risk' HDR candidates and provide support	Dean (HDR), Faculties	HDRO, Library, Campus Wellbeing
Include training about the Research Integrity Framework and the Macquarie University Code for the Responsible Conduct of Research in research skills programs	Dean (HDR), HDRO	RO
Investigate the opportunity to offer a 'publication scholarship' for students upon submission of their thesis	Dean (HDR)	Faculties, DVC (R)

Key objective 3: Engage as a world-recognised research collaborator of choice

Macquarie's existing local, national and international partnerships with industry, government, the community and other research institutions have been largely underpinned by enduring relationships, trust, respect and the pursuit of mutual benefit. To maintain existing relationships, forge new relationships, and expand them to truly establish our standing as a world-recognised research collaborator of choice we must: engage strategically in a more purposeful way; pursue deep and authentic collaborations nationally and internationally; forge synergistic end user partnerships; and facilitate efficient and effective partnerships through streamlined support processes.

There are more than 20 companies located on our campus and more than 90 companies, many of them multinationals, located in the adjacent Macquarie Business Park. We must take far greater advantage of locally based industry and actively seek to understand how our current and emerging areas of research strength can derive mutual benefit. The vast tract of land, and the on-site private teaching hospital owned by the University, offer points of advantage and differentiation that we must optimise. Our success at establishing and maintaining research collaborations with industry will be augmented by initiatives undertaken by the University's newly established Corporate Engagement and Advancement portfolio. It is important that we involve industry, government and the community in our research endeavours earlier and more meaningfully to better recognise and advance opportunities to develop solutions to challenges only experienced by potential end users.

Engaged universities are essential for Australia's economic and social future and engagement with the community is a core responsibility of higher education institutions. In addition to collaborating with industry we must encourage knowledge-driven interactions that have mutually beneficial outcomes for the University and community, be they business, schools, governments, non-government organisations, associations, Indigenous communities, multicultural communities, and the general public. As well as engaging through research that offers the benefits of making the University and its research accessible and generating opportunities for knowledge transfer, we must also engage for the purposes of public service and outreach. The University's research should be used to underpin our involvement in cultural events, public lecture series, exhibits, interviews, articles and performances.

Macquarie needs to promote its research strengths to local, state and federal governments with greater coordination and presence. It is important that we remain relevant and top-of-mind to government and that we maximise the opportunities to work collaboratively and contribute to solutions for local, state and national issues.

Internationally, we must use our research to embolden the University's recognition and international presence. We must focus our efforts around collaborations of real value and strength, building on existing partnerships and targeting new opportunities at multiple levels of engagement where long-term mutual benefit may be derived. This applies to international governments, particularly in terms of higher degree research candidates, but also to our colleagues at academic and research institutions around the world and to industries that are headquartered outside Australia. Linkages will be formed both from the ground up and the top down and will involve movement of staff and students to Macquarie from international partners, and from the University to our partners overseas.

It is important that our processes reflect and support our desire to collaborate and that our collaborating partners find us accessible, responsive and effective. We must improve many aspects of our engagement – from our initial approaches to our relationship management and the management of shared outputs. The value placed on collaboration by the University must be more transparent, with academic promotion guidelines a potential source of more explicit expectations in this regard.

Lastly, we must acknowledge the importance, and facilitate the achievement, of deep, durable and productive connections with academic colleagues external to Macquarie, whether located at other universities within New South Wales, undertaking fieldwork in remote locations in Australia, or leading a research institute on the other side of the globe. It is these collaborations that will play a pivotal role in raising our profile and advancing our reputation as a world-leading research-intensive university.

GOAL 3.1: STRATEGIC ENGAGEMENT

Pursue local, national and international partnerships to complement and enhance areas of current and emerging research strength

TARGETS

3.1.1	Annually increase the number of formal, active and productive local partnerships linked to areas of current and emerging research strength
3.1.2	Annually increase the number of formal, active and productive national partnerships linked to areas of current and emerging research strength
3.1.3	Annually increase the number of formal, active and productive international partnerships linked to areas of current and emerging research strengths
3.1.4	Increase the number of publications co-authored with partners external to Macquarie
3.1.5	Increase the number of industry partners who are adjuncts and supervise HDR candidates
3.1.6	Annually increase the value of the University's contract research income stream

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Work closely with the Corporate Engagement and Advancement and International portfolios to identify, establish and maintain local, national and international partnerships	DVC (R), DVC (CEA), DVC (I)	Faculties
Revise policies to enable the increased participation of external partners as adjuncts in HDR supervision	Dean (HDR)	Faculties
Align internal research funding to facilitate co-authorship with external partners	RO	DVC (R)
Increase the exposure of Macquarie researchers to potential collaborators, HDR candidates and the general public by providing leading-edge information management infrastructure that showcases areas of expertise and scholarly outputs	Informatics	DVC (R), RO, Library, Faculties, DVC (I)
Work with the Corporate Engagement and Advancement portfolio to investigate faculty-based resourcing options and support needs associated with research engagement and associated business and partnership development	Faculties	DVC (R), DVC (CEA)

GOAL 3.2: DEEP AUTHENTIC COLLABORATIONS

Build mutually-beneficial, long-term engagement with institutional, national and international colleagues

TARGETS

3.2.1	Increase the proportion of academic staff who co-author outputs with collaborators external to Macquarie
3.2.2	Increase the proportion of staff who are co-researchers on externally-funded grant applications with collaborators external to Macquarie

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Align internal research funding to promote new publication and research funding proposals with existing external collaborators	RO	DVC (R)
Establish a framework that supports and encourages joint appointments between the University and strategic research partners	HR	DVC (R), DVC (A), DVC (I)
Support outstanding academic staff and HDR candidates to submit competitive applications for fellowships that support international mobility (e.g. Endeavour, Rhodes, Humboldt, Fulbright)	Faculties	RO, DVC (I)
Adjust OSP guidelines to encourage and enable staff mobility and collaboration with strategic partners	RO	HR, DVC (I)
Promote the Vice Chancellor's Visiting Distinguished Fellow scheme and establish similar faculty-run schemes aimed at attracting a small number of leading researchers for extended periods each year (aligned with the five future-shaping research priorities)	Faculties	DVC (R)
Investigate a fellowship scheme designed to place researchers with industry or partners for an extended period	DVC (R), DVC (CEA), Faculties, RO	HR
Work with the International portfolio to expand staff exchange opportunities with international partners to deepen strategic collaborations	DVC (I), DVC (R), RO	Faculties

GOAL 3.3: SYNERGISTIC END USER PARTNERSHIPS

Pursue shared goals with end-users to maximise delivery of solutions and return on investment

TARGETS

3.3.1	Increase Category 2 income by an average rate of 11 per cent per annum over the life of the 10-year framework
3.3.2	Increase Category 3 income by an average rate of 11 per cent per annum over the life of the 10-year framework

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Align internal research funding with proof-of-concept seed funding opportunities where a business case exists to accelerate potential end user solutions	OoC, RO	DVC (R)
Collaborate with the Corporate Engagement and Advancement portfolio to seek and secure strategically aligned corporate partnerships that offer opportunities for synergistic research engagement	Faculties	DVC (CEA), DVC (R), RO
Leverage trends in PACE projects and outcomes as a means of understanding the research needs of industry and community groups	Faculties, PACE	RO, DVC (CEA)
Establish regular end-user 'showcase' forums, aligned around the future-shaping research priorities, to connect end users with Macquarie researchers	DVC (CEA)	Faculties, DVC (R), RO
Provide professional training in technology transfer and entrepreneurial skills to targeted academics	OoC, DVC (CEA)	RO
Revise the academic promotion guidelines to provide appropriate acknowledgement of effective and productive collaboration	HR	DVC (R), DVC (A)
Build Macquarie's engagement with all levels of government and raise awareness of the University's research, our researchers' capacity to advise on policy, and specifically target key government partnerships aligned with the future-shaping research priorities that offer synergistic research engagement	COO, DVC (R)	Faculties, RO

GOAL 3.4: STREAMLINED SUPPORT

Practice efficient and effective facilitation of research collaborations

TARGETS

3.4.1	We will at least halve our average contract turnaround time over the 10-year life of the framework and strive to bring our contract processes into line with industry expectations and standards
3.4.2	We will offer a seamless, relevant and effective engagement experience to our collaborators

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Undertake a targeted business process review, adopting 'lean thinking', of the core processes supporting collaborator contract development	RO, OoC	DVC (R), Legal Counsel, DVC (CEA), COO
Improve the University's Intellectual Property Policy, processes and administrative structures to ensure that they support and encourage effective research collaborations	OoC	Legal Counsel, DVC (CEA)
Explore the development of a 'Researchers' guide to working with industry' that helps facilitate more efficient and effective support for contract development, and is reflective of reviewed and revised processes	RO, OoC	DVC (R), Legal Counsel, DVC (CEA)

Key objective 4: Deliver research with world-changing Impact

Cross-disciplinary research, essential for finding solutions to the challenges facing the world today and in the future, must be expanded considerably while recognising that our cross-disciplinary research can only be as strong as the fundamental, discipline-focused research it draws from. For cross-disciplinary research to be possible at Macquarie, we need to remove all barriers to collaboration across departments and faculties. This includes the current faculty funding model, which must reflect the contribution of all participants on a research project or research output. The University's model for acknowledging the workload of supervising higher degree research candidates must also be revised to reflect the broad range of supervisory arrangements available. This greater granularity will enable more accurate reporting and apportioning of productivity.

The vision for research at Macquarie emphasises our commitment to research excellence above all. Our research is shaped by many factors including the Australian Chief Scientist's strategic research priorities, the nature of research funding, and the measures of research excellence. Most of our research, however, is discipline-based and is determined by the intellectual interests of individual researchers.

If our research is to have national or globally significant impact, whether that research engages with specific industry or community partners, or addresses broader social, health, or economic problems, we must have in place resources and processes to facilitate our ability to engage with those who will enhance the development of, or benefit from, our research.

We need to be highly visible to our colleagues within academia and couple this with a reputation for integrity and excellence. Macquarie researchers will have impact as fellows of learned academies, reviewers of competitive research grant applications, as members of advisory boards and as advisors to government. We will bring about changes in practice through our influence on policy and generate a lasting legacy through the development of world-ready higher degree research candidates.

To have impact outside academia we must be a sought-after collaborator with easily identifiable and navigable entry points. We need to be consistent and relevant and have more efficient, effective and streamlined processes and effective mechanisms for knowledge transfer, optimising our intellectual property, and commercialising our products and processes.

To compete, prosper and attract the funding that will enable world-leading research performance, we must strive to make a significant and measurable contribution to national and international productivity and wellbeing. It is the diversity of impacts represented by the powerful combination of cross-disciplinary research and world-class strengths in basic, disciplinary fields of research that defines a vibrant, creative, innovative, entrepreneurial and high-impact future at Macquarie.

GOAL 4.1: DISCOVERY FOR INNOVATION

Strengthen basic research capability to drive discovery and underpin innovation

TARGETS

4.1.1	At least five research breakthroughs recognised nationally or globally for their contribution to knowledge over the life of the framework
4.1.2	At least five major impacts of national or global significance over the life of the framework (e.g. patents, products, services, legislative or policy changes, and creative works).
4.1.3	Annual increases in commercialisation income (e.g. from licenses, royalties, start-up income and cashed-out equity)

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Identify the key research programs currently pursuing breakthrough research and/or seeking to contribute significantly to research breakthroughs and explore opportunities to accelerate their advancement	OoC, RO	Faculties
Identify the key research programs where there is evidence of real potential for major impacts of national or global significance and explore opportunities to accelerate their advancement	OoC, RO	Faculties
Align internal research funding with research programs that demonstrate evidence of real potential for major impacts of national or global significance	RO	DVC (R)
Undertake a review of the structure, responsibilities, targets and resourcing of the University's commercialisation activities with a view to positioning Macquarie to transfer more discoveries to practical impacts	DVC (R)	DVC (CEA)
Investigate the merit of creating a commercialisation pool of funding partially funded by the University's share of proceeds from royalties and licenses to reinvest in the in the transfer of discoveries	OoC, RO	DVC (R)

GOAL 4.2: CROSS-DISCIPLINARY INQUIRY

Optimise opportunities for inquiry across disciplines and organisational structures

TARGETS

4.2.1	95 per cent of research activity directly linked to our future-shaping research priorities and/or current and emerging areas of disciplinary research strength by the fifth year of the framework

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Align internal research funding to facilitate cross-disciplinary inquiry associated with our future-shaping research priorities and their linked research themes and streams	RO	DVC (R)
Align internal research funding with current and emerging areas of disciplinary research strength	RO	DVC (R)
Investigate and understand internal barriers to cross-disciplinary inquiry and develop policies, processes and mechanisms to reduce and remove barriers	DVC (R)	Faculties
Increase the transparency of the research performance fund to generate understanding and accountability in the context of competing priorities	Finance	DVC (R)
Develop a long-term and staged implementation strategy for each of the five future-shaping research priorities	DVC (R)	Faculties

GOAL 4.3: DIVERSITY OF IMPACT

Foster an environment that facilitates and values diverse forms of knowledge creation, application, and creative practice to benefit society

TARGETS

4.3.1	The development of an environment and culture that facilitates and values the breadth and diversity of our research impact on society

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Regularly recognise and publicise the breadth and diversity of Macquarie's research impact in internal and external communications	RO	Faculties
Ensure the Research Excellence Awards continue to acknowledge the breadth and diversity of our research impact	DVC (R)	Faculties

GOAL 4.4: CHALLENGE-FOCUSED RESEARCH

Conduct research that addresses national and global challenges and delivers significant benefits

TARGETS

4.4.1	Unequivocal recognition of at least five significant contributions to research that addresses national and global challenges over the life of the framework (for instance, in terms of: changing public perceptions; changing public policy; or 'game-changing' innovations)

SUPPORTING STRATEGIES	PRIMARY ACCOUNTABILITY	SECONDARY ACCOUNTABILITY
Align internal research funding to facilitate research that aligns with our future-shaping research priorities and their associated research themes and streams	RO	DVC (R)
Establish an annual future-shaping research priority seminar series to promote the research being undertaken around national and global challenges and/or delivering significant benefit	DVC (R)	Faculties
Ensure that an appropriate governance framework and operational support infrastructure is established to guide and enable the expansion of cross-disciplinary research linked to the five future-shaping research priorities	DVC (R)	Faculties, RO

Future-shaping research priorities

Our future-shaping research priorities have been identified as cross-disciplinary areas in which we either have, or wish to build, research capacity that aligns with the national research agenda and global challenges of significance. Research underpinning these cross-disciplinary and strategically aligned teams will be prioritised for resource allocation and investment.

Research aligned with our priorities, themes and streams will: span our departments and faculties; have identified leadership; possess a mandate to collaborate both internally and externally; adapt to changing challenges; and will be measured by outputs and impact.

The broad and inclusive future-shaping research priorities offer scope for faculties and individual researchers to continue to pursue their own research interests, but in the context of opportunities to contribute to areas aligned with the national research agenda and global challenges of significance.

Macquarie's research investment decisions will be weighted towards these future-shaping research priorities.

Future-shaping research priorities:

ONE: HEALTHY PEOPLE

Pioneering health, integrated healthcare and lifelong-learning for wellness in our ageing world

TWO: RESILIENT SOCIETIES

Understanding cultures in our changing world and building ethical, just and inclusive communities

THREE: PROSPEROUS ECONOMIES

Strengthening economic productivity to promote prosperity in our diverse world

FOUR: SECURE PLANET

Sustaining our interdependent world and exploring our place in the universe

FIVE: INNOVATIVE TECHNOLOGIES

Advancing our interconnected world with frontier technologies, systems, designs and creative practice

THE UNIVERSITY'S COMMITMENT TO THESE RESEARCH PRIORITIES IS A COMMITMENT TO IMPACT, TO MAKING A DIFFERENCE AND TO MEASURING THAT EFFECT. MACQUARIE WILL TAKE FOCUSED STEPS TO SUPPORT AND GROW THE AREAS ARTICULATED IN OUR RESEARCH THEMES AND STREAMS WHILE MAINTAINING AN AGILE AND OPPORTUNISTIC APPROACH TO NEW AREAS OF GROWTH POTENTIAL. AN OVERVIEW OF EACH FOLLOWS.

FUTURE-SHAPING RESEARCH PRIORITY 1: HEALTHY PEOPLE

Pioneering health, integrated healthcare and lifelong learning for wellness in our ageing world

THEME:

1.1	Pedagogies for health and lifelong learning

DESCRIPTION:

Cross-disciplinary research teams investigate and design pedagogies that effectively engage and educate Australians across the lifespan. The theme unites researchers who develop and use technologies to create and deliver learning resources and/or interventions in fields as diverse as mental health, rehabilitation, business, mathematics, science, literacy, speech and communication.

STREAMS:

- Pedagogies for person-centred learning
- The social context of learning
- The impact of education on health and wellbeing

THEME:

1.2	Health and resilience

DESCRIPTION:

Cross-disciplinary research teams seek to identify the genetic, physiological, psychological, environmental, social and economic basis of human health and resilience in our complex world. The theme seeks to identify markers of poor emotional and physical health and to develop and evaluate targeted interventions to promote and sustain emotional and physical wellbeing across the lifespan. Researchers also seek to enhance the productivity and sustainability of health care systems to support national wellbeing and improve resource allocation.

STREAMS:

- Individual factors in human resilience
- Interventions to develop human resilience
- Social dimensions of health
- Workforce wellbeing
- Performance of the health economy
- Ageing and disability
- Indigenous health and wellbeing

THEME:

1.3 Translational medical research

DESCRIPTION:

Cross-disciplinary research teams including clinical scientists work together to build discovery pipelines to address pressing clinical needs. The teams determine the fundamental origins of diseases – at molecular, cellular and systems levels – and then translate these insights into real clinical solutions for diagnosis, prognosis and treatment. A common thread in much of the research is the search for biomarkers, molecular fingerprints and key mechanisms of disease that can generate new directions for therapeutic developments, can be used for diagnosis and can guide prognosis and treatment of patients.

STREAMS:

- Cancer detection, treatment, prognosis and survivorship
- Infection and immunity
- Neurological disease
- Cardiovascular disease and treatments
- Biomedical and surgical innovations

THEME:

1.4 Sensory and cognitive processing

DESCRIPTION:

Cross-disciplinary research teams seek to understand the neural and cognitive mechanisms for interpreting the world around us. In understanding the mechanisms that underlie our sensations and cognitive functions, it becomes possible to develop strategies to improve the acquisition, interpretation, and response to environmental information for people whose capacity is either restricted or maladapted. This theme links these strategies to fundamental research identifying the structures and mechanisms that underpin normal, exceptional and disordered processing with applied research.

STREAMS:

- Fundamentals of sensation, perception, cognition and action
- Impairments and enhancements of sensation, perception, cognition and action
- Remediation of deficits and training for enhancements of capacities in sensory, perceptual, cognitive and motor processing
- The evolving human brain and mind

THEME:

1.5	Hearing, language and literacy

DESCRIPTION:

Cross-disciplinary research teams explore the processes of hearing, language and literacy acquisition and advances in language and literacy across contexts and cultures. This enables insight into the various ways in which people express, and learn to express, their meanings and intentions effectively, and informing the design of evidence-based strategies for education, training and clinical intervention. This research also uses cognitive models to understand the processes of hearing, reading and spelling, and to guide empirical research into the causes, treatment, and assessment of developmental and acquired hearing, reading and spelling disorders.

STREAMS:

- Language acquisition and language disorders
- Hearing, language, speech and literacy
- Reading and spelling: Processes, development, and disorders

FUTURE-SHAPING RESEARCH PRIORITY 2: RESILIENT SOCIETIES

Understanding cultures in our changing world and building ethical, just and inclusive communities

THEME:

2.1 Societal transformation

DESCRIPTION:

Cross-disciplinary research teams undertake analysis, measurement and critique of social, political, economic, religious and environmental change from ancient to contemporary societies. The theme seeks to understand the impact of transformation on societies at global, national and local levels while also exploring the impacts of societal transformation on people's identities, intimate and family lives, and their perceptions of their place and role in society.

STREAMS:

- Migration, mobility and diversity
- Religions and society
- Social impacts of economic and organisational change
- Intimate life and lived experience
- Cultural transformations of mind and self
- Dynamics of the human environment

THEME:

2.2 Modes of communication

DESCRIPTION:

Cross-disciplinary research teams undertake linguistic and historical research on ancient to contemporary languages, and the oral, written and material transmission and interpretation of cultural traditions. Researchers also investigate how people generate, interact and engage with creative writing and performance in contemporary environments, and undertake research on changing media technologies and their social and economic impact.

STREAMS:

- Language: Oral and written cultures
- Language and literacies in society
- Media and performance cultures
- Creative practice and creative industries

THEME:

2.3	Ethics, governance and justice

DESCRIPTION:

Cross-disciplinary research teams explore the normative and practical foundations of ethics, the law, governance and regulatory structures, including human rights regimes and other mechanisms of global governance, together with the impact of scientific, technological and environmental change on ethical and legal norms, practices and institutions. The theme also seeks to inform and analyse public and social policy and responsible business practices, and to investigate how institutions can support the empowerment of disenfranchised individuals and social groups.

STREAMS:

- Ethics in theory and practice
- Human rights and social justice
- Governance, institutions and social policy
- Gender and equity
- Justice and ethics in organisations

FUTURE-SHAPING RESEARCH PRIORITY 3: PROSPEROUS ECONOMIES

Strengthening economic productivity to promote prosperity in our diverse world

THEME:

3.1	Role, operation and risks in global financial and economic systems

DESCRIPTION:

Cross-disciplinary research teams explore how financial systems operate given their increasing importance in world affairs and geopolitics. With financial interdependence of economies, organisations and individuals presenting many social and economic challenges for the world's governments and regulators, the theme explores ageing and superannuation, the operation of financial markets, corporate financial management, financial and systemic risk, and employment risk and measurement. As financial and economic systems are socially integrated, researchers explore the consideration of human factors in finance, financial decision-making and financial sustainability.

STREAMS:

- Risk and regulation in financial systems
- Mortality, insurance and superannuation
- Audit, measurement, reporting and governance
- Human factors in business and finance
- Business cycles and crises

THEME:

3.2	Organisation sustainability, productivity and competitiveness

DESCRIPTION:

Cross-disciplinary research teams explore the impact of technology, changing work patterns, new products and services, as well as increasing competition, and changing power structures as the global economy changes at an ever-increasing rate. The theme focuses upon Australia's role in the dynamic socioeconomic hub of Asia and a future in which Australia's economic growth can thrive through sustained increases in national productivity to enhance Australians' wellbeing.

STREAMS:

- Workforce productivity
- Global integration and competitiveness
- Demographics of the workforce
- Safe, healthy and productive work
- Sustainable use of resources and technologies
- Economic development in the Asia Pacific
- Energy security

FUTURE-SHAPING RESEARCH PRIORITY 4: SECURE PLANET

Sustaining our interdependent world and exploring our place in the universe

THEME:

4.1 Living in a changing environment

DESCRIPTION:

Cross-disciplinary research teams explore and understand the environment including biological, climatic, chemical and physical variation across space and time. With climate change among our greatest environmental, social and economic challenges, this theme seeks to manage risks, reduce vulnerability and promote resilience to its inevitable impacts on human and natural systems. This research is critical to inform management practices and provide the basis for effective decision-making.

STREAMS:

- Evolutionary biology and animal behaviour
- Climate change – risk, impact, adaptation and mitigation
- Environmental management and environmental health
- Science communication
- Coupled human-nature systems
- Understanding life on our planet
- Complex biological and ecological systems

THEME:

4.2 Exploring planet Earth and beyond

DESCRIPTION:

Cross-disciplinary research teams with expertise in astronomy and astrophysics, and Earth and planetary sciences investigate the constitution and physical properties of major components of our universe. These include Earth, the rock and gas planets and other bodies of our own solar system, extra-solar planets around other stars and the evolution and distribution of their host stars and galaxies. The theme combines in-depth multidisciplinary knowledge of the internal Earth and the wider cosmos with improved observations, analyses, numerical models and simulations, technology and experiments to develop knowledge across these fields. This includes shedding light on the internal structure of the Earth past and present, the habitability of extra-solar planets, the evolution of their host stars and surrounding environments, parent galaxies and out to the furthest reaches of the universe.

STREAMS:

- Exploring planet Earth, its internal processes and origin
- Experimental and comparative planetology
- Understanding planets, stars and galaxies

FUTURE-SHAPING RESEARCH PRIORITY 5: INNOVATIVE TECHNOLOGIES

Advancing our interconnected world with frontier technologies, systems, designs and creative practice

THEME:

5.1	Science and engineering technologies for the 21st Century

DESCRIPTION:

Cross-disciplinary research teams seek to engage in breakthrough science to invent, and explore the consequences of, the technologies of tomorrow that will provide competitive advantages for our industry partners and equity to global citizens in a rapidly changing world. From our platform of discovery in science, researchers will develop new technologies that will need to be ever more complex, integrated and smarter, while offering sustainable and ethical solutions including more energy- and time-efficient systems and processes.

STREAMS:

- Quantum science and technology
- Wireless and photonic technology
- Bio-engineering, nanotechnologies and synthetic biology
- Biomolecular technologies and 'Omics'
- Smart, safe and sustainable systems
- Securing and managing water and food quality in a changing environment

THEME:

5.2	Big data: Acquisition, analysis, application and assurance

DESCRIPTION:

Cross-disciplinary research teams explore massive scientific datasets, so-called 'big data', and the challenges these petabyte data streams present to our ability to assimilate, analyse and scientifically evaluate such vast sources of diverse data across multiple research fields. The theme seeks to develop common solutions to generic data problems via a new big data support centre, offering high-impact opportunities for Macquarie and our collaborative partners.

STREAMS:

- Big fast data: data Acquisition and manipulation
- Data science and analytics theory
- Big data: Theory, analysis and application
- Cyber-security and privacy

APPENDIX A: OVERVIEW OF THE 2024 KEY PERFORMANCE INDICATORS

INDICATORS AND SUB-INDICATORS	BASELINE		TARGET
	2012	2013	2024
Higher degrees by research			
HDR commencements	347	539^	>1100#
HDR load	1903	2197^	>3000#
HDR completions	270	297	>800#
Research income			
HERDC research income	$44m	$48m	>$150m^^
Research block grant	$28m	$31m	>$ 75m^^
Research publications			
HERDC research publications	1850	1,849	>5000
Citations (normalised impact)*			
SCImago	1.37	1.37	1.39
CWTS Leiden	1.20 (6th in Aust.)	1.30 (5th in Aust.)	1.35 (4th in Aust.)

ERA ratings	ERA 2010	ERA 2012	
ERA 3, 4 and 5	71%	85%	95%
ERA 4 and 5	29%	40%	50%
ERA 5	24%	15%	25%

University rankings	2013 Aust	2013 World	Australia	World
ARWU	8/9	200-300	Top 6	Top 150
CWTS	7	251-275	Top 4	Top 100
THE	11	263	Top 6	Top 150
QS +5 stars	9	263	Top 6	Top 150

Notes: ^ - HDR load and commencement figures in 2013 are inclusive of Master of Research candidates. # - 2024 HDR commencement, load and completion targets comprise PhD (including combined degrees), M Phil and M Res. ^^ - 2014 dollars. * - Citations (normalised impact against World) – the average number of citations of the publications of the university, normalised for field differences and publication year. An MNCS value of 1.3 means that the publications of a university are getting cited 30 per cent above world average.

APPENDIX B: GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ACRONYMS	
ARC	Australian Research Council
ACER	Area of Current or Emerging Research
ACG	Australian Competitive Grants
ACGR	Australian Competitive Grants Register
ARWU	Academic Ranking of World Universities
COO	Chief Operating Officer
CRC	Cooperative Research Centre
CWTS	Centre for Science and Technology Studies
DVC (A)	Deputy Vice-Chancellor (Academic)
DVC (CEA)	Deputy Vice-Chancellor (Corporate Engagement and Advancement)
DVC (I)	Deputy Vice-Chancellor (International)
DVC (R)	Deputy Vice-Chancellor (Research)
ERA	Excellence in Research for Australia
ESI	Essential Science Indicators
GLBTIQ	Gay, Lesbian, Bi, Transgender, Intersex and Queer
HDR	Higher Degree Research
HDRC	Higher Degree Research Committee
HDRO	Higher Degree Research Office
HERDC	Higher Education Research Data Collection
KPI	Key Performance Indicator
L&TC	Learning and Teaching Centre
LIEF	Linkage Infrastructure, Equipment and Facilities
M PHIL	Master of Philosophy
MQRES	Macquarie University Research Excellence Scholarship
MQSR	Macquarie University Supervisor Register
MRES	Master of Research
MUSEQ-R	Macquarie University Student Evaluation Questionnaire - Research
NCRIS	National Collaborative Research Infrastructure Strategy
NHMRC	National Health and Medical Research Council
NPI	Nature Publishing Index
OOC	Office of Commercialisation
OSP	Outside Studies Program
PACE	Participation and Community Engagement
PHD	Doctor of Philosophy
PREQ	Postgraduate Research Experience Questionnaire
PVC (LTD)	Pro Vice-Chancellor (Learning, Teaching and Diversity)
QS	Quacquarelli Symonds
RO	Research Office
RSPC	Research Strategy and Policy Committee
THE	Times Higher Education
VECR	Very Early Career Researcher

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