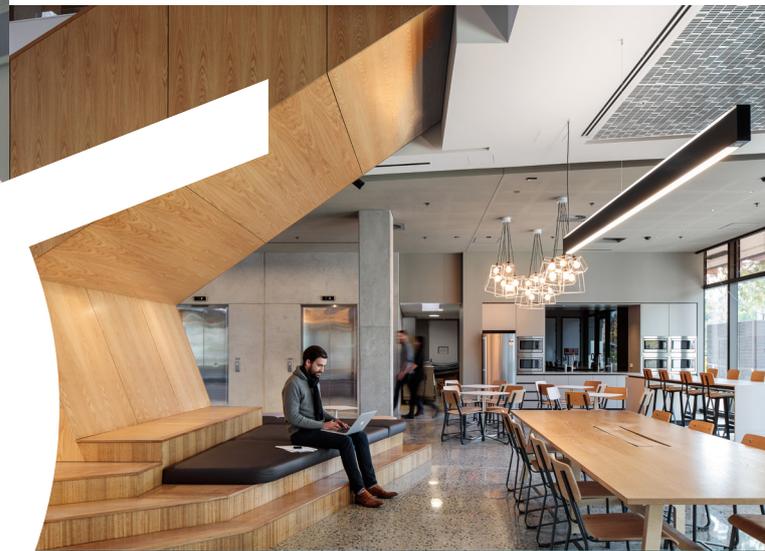


ANU College of
Engineering & Computer Science

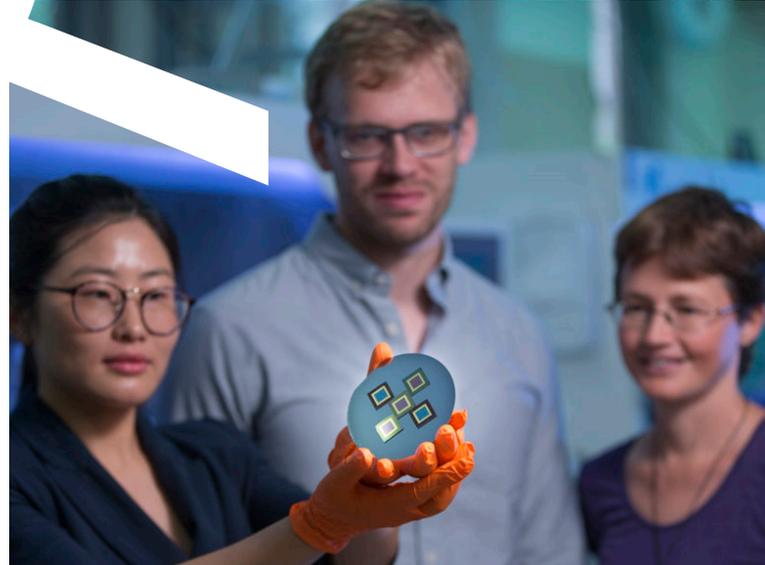


R E I M A G I N E



Reimagine Engineering
and Computer Science

Strategic Intent
2019 – 2025



Australian
National
University



R E I

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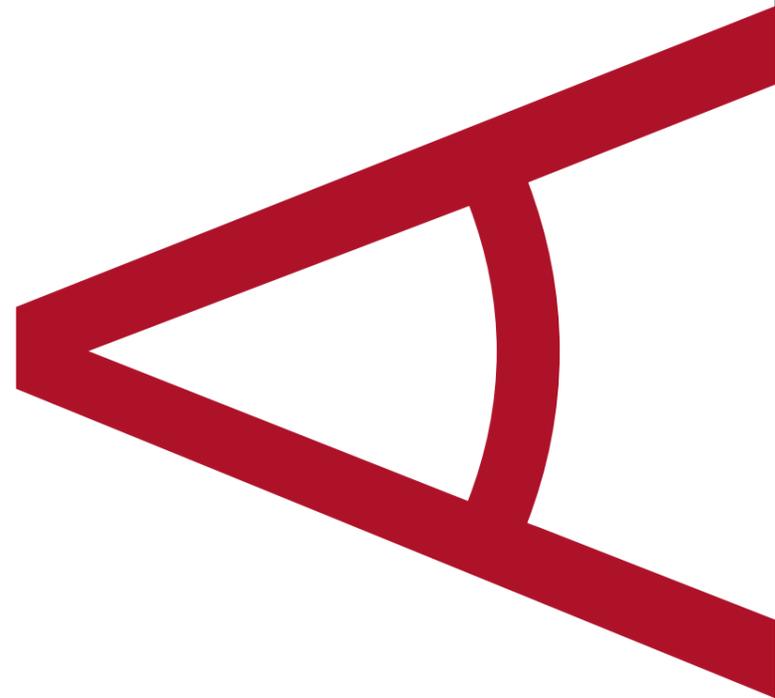
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Acknowledgement of Country

“

We acknowledge and celebrate the First Australians on whose traditional lands we meet, and pay our respect to the elders past, present and emerging.

”



Our Fundamental Purpose



Professor Brian Schmidt AC FAA FRS

Vice-Chancellor and President
The Australian National University

Australia today remains in transition. We face economic and societal change, and international instability. Government, industry and social institutions all face challenges to their legitimacy and longevity. In response, ANU must innovate in research, teaching and learning, and elevate our understanding of contemporary Australia and our world.

This is the fundamental purpose of the national university, which we will remain as long as we continue to serve Australia with distinction. Our unique place in the nation is inseparably linked to this contribution.

It is my hope that the Australian National University's research, education and contributions to public policy-making will change Australia and change the world. To this end, we are also committed to identifying emerging areas of need for the nation and provide research and education that will equip Australia to cope with challenges not yet imagined.

Nowhere is this more evident than in our commitment to the College of Engineering and Computer Science. In 2018, the University agreed to make the most significant investment since its foundation in that College to accelerate its vision to fundamentally change engineering and computing for Australia and the world. Our university seeks to become one of the most influential and progressive voices for engineering, computing and the use of technology in the world. The Reimagine investment is a 15-year, multi-hundreds of millions of dollars' commitment to capability and capacity building. I am incredibly excited about the ways in which the College will reinvent itself, and in so doing, reimagine Engineering and Computer Science for the twenty-first century. It is a bold plan, and an important one, and has the University's complete backing.

Our ambition for the future of ANU is as great as the ambition of our founders. Our Reimagine investment in conjunction with the broader ANU Strategic Plan will ensure that this unique and remarkable institution is able to meet its contemporary mission as Australia's national university, and one of the world's greatest.

Message from the College Dean



A ANU was founded in 1946, with a suite of disciplines and a set of tasks that reflected the global context in which Australia found itself at the time. Three quarters of a century later those foundational activities remain central to the place of ANU in the world, but the national and global context has changed. Our enduring mission remains unchanged: to create capability for a nation seeking its place in the world.

Building a New Legacy

Australia today faces rapid economic and societal change that evolves in complex interplay with advances in technology. Countries, economies, companies and other institutions are changing their macro-settings as they orient to this new strategic environment. Universities too must adapt. Our traditional place as a trusted societal institution is being eroded by non-traditional competitors who are willing to experiment with new ideas about education; others who can do research at a pace and scale previously not seen; and some who are more willing to be collaborative across sectoral boundaries.

I believe our world needs people who think deeply about how to design and operate highly heterogeneous and interconnected systems of physical, environmental, biological and computational objects, data and people-at scale. We will need to reimagine the traditional engineering and computer science disciplines. We will need to bring together expertise in social, technical, ecological and scientific systems to build a new approach. The University's commitment, through the Reimagine investment in the College, allows us to do exactly that.

In the College of Engineering and Computer Science, we will draw on our disciplinary foundations to find and solve problems of global importance. We will build on our traditional, world-class expertise and take it in creative, unconventional directions. We will inspire a new generation to develop and use engineering and computing skills. We will give them transformational experiences with a distinctive focus on technological problem formulation, with expertise drawn from the humanities, social, natural and life sciences. We will build world-class facilities that attract and inspire.

We will also invest heavily in the renewal of the College culture, in line with the University's focus on collegiality and engagement. Our people will explicitly connect to disciplines across ANU; we will become more engaged with business and industry; and we will redefine the way that we engage with society. We will increase the diversity of our staff and students to better reflect the society we serve. We will always act with integrity and we will measure our successes by the difference we make in the world around us. In short, we will have the strength and courage to be intellectual and cultural leaders.

I am proud to be the Dean of this College. I am proud of our staff, students, alumni and critical friends. We inherit the legacy of generations of adventurous engineers and computer scientists before us. With the Reimagine investment, we have the privilege and the responsibility to build a new legacy for the University, the country and even the world. I know we can do this – it is our future.

Professor Elanor Huntington

Dean, College of Engineering and Computer Science

Our History and Context

Our College has a layered history with many antecedent organisations, and signal events. The first courses in Computer Science were taught in 1971. The University appointed the first Professor of Computer Science in 1978 and the first Professor of Engineering in 1981. The first stand-alone Engineering and Computer Science entities appeared in the 1980s. The Research School of Information Sciences and Engineering was created in the 1990s and was run in parallel to the Faculty of Engineering & Information Technology. Both entities were finally merged into an Engineering and Information Sciences Institute briefly in 2004 before assuming our current name in 2005.

Today, the College of Engineering and Computer Science is comprised of four schools — the Research Schools of Electrical, Energy and Materials Engineering; Aerospace, Mechanical and Environmental Engineering; Design Engineering; and Computer Science — and three Innovation Institutes — the Cyber Institute, the Software Innovation Institute and the Autonomy, Agency and Assurance (3A) Institute. Our community includes students, faculty and professional staff, and numbers more than two thousand. Our alumni can be found in all corners of the world, and in all walks of life; their accomplishments and impact are an important measure of our work here. We can claim with justifiable pride our traditions of excellence in research, creativity in quality education, being at the intellectual forefront of whatever we do and taking a progressive and forward-leaning view of our disciplines.

The world around us has continued to evolve and change. The best universities in the world are being astute in their response and looking not just to scale, but also to reorient engineering and computing. In 2018 alone, at least four world-class universities committed more than \$1Bn each to activities that impact on engineering, computing and the use of technology in the world. They are taking a differentiating position that builds on university strengths and potential, and frequently looking to break down the old disciplinary and sectoral boundaries.

RE E I M A G I N E

For the ANU, the Reimagine investment represents a 15-year, multi-hundreds of millions of dollars’ commitment to the bold vision for renewal in its College of Engineering and Computer Science. It comes at a time when the College has already embarked on a significant set of transformative activities:

- > In 2017, we created two new Innovation Institutes—the Cyber Institute and the Autonomy, Agency and Assurance (3A) Institute. The Software Innovation Institute—a “software teaching hospital”—was established in 2019. The 3A Institute is already piloting a new curriculum and a named Masters qualification with industry sponsorship and an attached research program.
- > In 2019, the Research School of Engineering was renamed by the staff of the school to be the Research School of Electrical, Energy and Materials Engineering so as to provide focus and disambiguate from other Research Schools at ANU. We also created and will staff two new Research Schools: The Research School of Aerospace, Mechanical and Environmental Engineering; and the Research School of Design Engineering.
- > We have made significant investments in our facilities and environment. The Hanna Neumann Building was completed and officially opened in 2019, signalling new facilities for collaboration as it brought together the Mathematical Sciences Institute with the Research School of Computer Science and also houses the ANU collaboration with the Australian Signals Directorate. We also commenced work on the repurposing of the Birch building which will house two new schools.

“

How greatly things have changed, but how much more they need to change! ... The present CECS is like a musical quintet asserting to the world it is a symphony orchestra. The music might be lovely, but it is not really symphony orchestra sort of music, and lacks its impact.

”

- Distinguished Professor Brian Anderson

Research School of Electrical, Energy and Materials Engineering

These activities are only the beginning. We have a unique set of national responsibilities and an obligation to have a degree of impact befitting the only national university. This document spells out our ambition and the direction we will take in reimagining Engineering and Computer Science for the twenty-first century.

Our Principles and Values

The Reimagine investment signals a shift in scope and scale for the College of Engineering and Computer Science. It also demands an evolution of our culture. It is an opportunity to restate our principles and values.

Act with purpose and professionalism

We will progressively review and adapt the way that we govern, manage, organise, co-ordinate and collaborate within and across the College. We will make deliberate choices about what to start, stop and do more of in recognition of the increased expectations, scale and complexity of our College, and its comprising units. We will invest in trials to explore, establish and institutionalise new business models, methodologies, stakeholder groups, and ways of achieving impact.

“
Reimagining Engineering and Computer Science: Strategic Intent is a timely and compelling manifesto for engineering to again move to a higher level in contributing to the ANU Mission.
 ”

- **Emeritus Professor Robin Stanton**
 Research School of Computer Science

Be creative and bold

Ours will be an environment that fosters intellectual and cultural leadership. We will do this through comparisons to the best, a spirit of high aspirations and a culture that is not averse to risk. We will be deliberate, learning from our failures and successes.

Be open and inclusive

The technology we teach and the research we do is at the service of society. We value the full diversity of society and acknowledge the richness diversity brings to creative disciplines. We will make our College one where staff and students are open to, and representative of, the richness of the society we serve.

Act with integrity and with awareness of how we behave

We will build a strong community; one that respects, welcomes and openly acknowledges difference in expertise, experience, perspective and access to power. We are all accountable for our actions and behaviour. They mean something. We will operate with respect, seeking to build trust.

Measure success by the difference we make

The work we do affects how people live—shaping societies, governments and technologies. We will measure our achievements by the difference they make, and against the objectives articulated for our work.

R E I M A G I N E



Charting A New Course

The enduring pillars of the ANU College of Engineering and Computer Science are to: conduct the research that underpins the creation and use of technologies twenty, thirty, and even forty, years from now; educate the technological leaders who will flourish over that timescale; and make a positive difference to the way that Australia and the world engage with technology—societally, economically and culturally. To achieve this, the time for action is now.

None of this is possible without the initiative and engagement of the community of staff, students, alumni and critical friends that make up our College.

Over the next 5 years, we will focus on:

- > a strong community;
- > transformative educational experiences;
- > high impact research;
- > meaningful engagement;
- > world class infrastructure.

“

The reimagine work is leading engineering from a place of detached comfort and into a new scale of place, people, purpose and culture. There is a clear vision for a greater role in the shaping a future where engineers no longer create things for us, but rather they engineer the systems that will become us.

”

- **Honorary Professor Glenn Dickens**

Principle Architect of Convergence, Dolby
ANU Engineering Alum

R E I M A G I N E



A Strong Community

Our people will have the strength and courage to be intellectual and cultural leaders and will sharpen their skills throughout their lives. Over the course of this plan, we will change the human face of our College dramatically, growing in number and diversity, whilst fostering an inclusive culture.

We expect many faculty to hold joint appointments across multiple academic units within the College, across ANU and beyond. We will target demographic representational parity in our admissions processes and as we hire.

Our learning environment will allow our students to thrive. Our professional support services will be an exemplar of best practice. We will invest in our alumni and build a vibrant and extended community of allies, supporters and champions. As part of our commitment to diversity and in acknowledgment of the special relationship with the traditional owners of the land on which our University is situated, we will actively facilitate participation by indigenous students and staff in our learning and research.

We will increase the diversity of our community. Our students, like those in many Engineering and Computer Science university student cohorts, are far from representative of the full diversity of the population from which they come and which they will ultimately serve. We will implement long-term outreach programs and use the new ANU admissions scheme to target underrepresented groups. Our benchmark is demographic representational parity. Initially we will prioritize our imbalance in women and Indigenous students, who are conspicuously underrepresented. We will work alongside changes in the admissions process to greatly diversify our international student cohort.

We will grow both our faculty and our student numbers. At the core of our plan are higher aspirations, raised expectations and dramatic changes in scale. To meet these goals, we will recruit outstanding staff and students and change the way we work.

Our students will be inspired by faculty who will be intellectual leaders and who will through their teaching, immerse students in the transformational power of engineering and computer science.

Our students will thrive in an inclusive self-sustaining culture, fully-supported by complete, at-scale service delivery.

We are changing our recruitment processes, focussing on active search beyond our existing professional networks. To ensure all staff, particularly professional staff, have clear pathways that allow them to fulfil their true potential, we will provide active support for, and celebrate, multiple pathways into and out of the College.

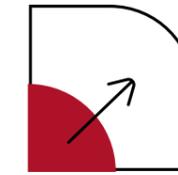
A culture of inclusion, adaptation, high aspirations, and of learning from both success and failure will be key to retaining our staff. We will develop and deliver a professional development process that hones the skills of our people, setting them up for long term career success on whatever pathway they choose.

We have created and will operate the Reimagine Fellows scheme over the life of this plan. The Reimagine Fellows will be selected from staff and students of the University, who will be invited to define and deliver strategic projects. They will be given the same leadership development and cohort experiences as the new hires and their projects will be resourced to succeed.

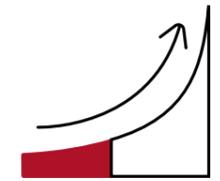
We will progressively review and adapt all aspects of the way that we work. We will begin with a three-year project targeting new ways of working and organising ourselves to suit the new structure, scale and focus of the College.



FEMALE FACULTY
Increase percentage of female faculty members from **10%** to **30%**



GLOBAL REPRESENTATION
Increase global representation amongst international students



INDIGENOUS REPRESENTATION
Increase by **10** times in Indigenous representation



FACULTY NUMBERS
Grow faculty numbers by **100%**



COLLEGE STAFFING
Grow college staffing from **245** to **340**

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Transform cyber for the betterment of humanity.



- Cyber Institute

College of Engineering and Computer Science

Transformative Education Experiences

We will inspire a new generation of high-potential creative people in engineering and computing with a diverse range of backgrounds, interests, motivations and perspectives. We aspire to be intellectual leaders in education—its content, types of experiences, and delivery mode. We will deliver a transformational education that gives our students a distinctive edge. We will expand our offerings as our College grows and broadens its intellectual foundations. Grounded in Engineering and Computer Science, our offerings will be distinguished by their engagement with the breadth of world-class ANU expertise from the sciences, social sciences, humanities, and fine arts. We will adapt and evolve, as our disciplines change, as the market moves, and as opportunities arise in education and training. We will lead our students to materially and intellectually enhanced careers.

We will create pathways for our students to return for multiple educational experiences. We will develop and offer micro-credentials to allow students to take an agile approach to their life-long education.

We will take a long view of student career pathways, identifying and engaging with prospective students early to achieve the breadth and depth of our student profile targets.

We will increase the agility with which we develop and deploy curriculum, including deployment at-scale. Evolving our curriculum will include adapting our existing qualifications to fold in new disciplines. It will include adapting to market conditions and updating pedagogy where it makes sense. We will begin by reconsidering our offerings and approach in a 'co-design' process bringing the College community together with diverse participants including future students and employers as well as external educational experts.

We will actively seek to work with and integrate into other disciplines, while maintaining a clear identity of a coherent intellectual foundation in Engineering and Computer Science.

Throughout this we will maintain a continuous focus on the quality of the educational experience we offer.

“
Delivering a state of the art software engineering teaching program with world leading work integrated learning.
”

- **Software Innovation Institute**
College of Engineering and Computer Science

“
Creating a new Applied Science to manage the AI safely to scale.
”

- **3A Institute**
College of Engineering and Computer Science



POSTGRADUATE STUDENTS
Increase percentage of postgraduate students from **40% to 48%**



STUDENT TO STAFF RATIO
Decrease student to staff ratio from **28:1 to 17:1**



CECS STUDENTS
Grow CECS students from **2130 to 3200**



FEMALE STUDENTS
Increase percentage of female students from **25% to 35%**

High Impact Research

We will build an intellectual agenda of lasting impact that advances the state of the art in Engineering and Computer Science. We will conduct the research that underpins the creation and use of technologies of the second, third and fourth decades from now. We will recraft disciplinary boundaries through global intellectual leadership. We will achieve national outcomes in bringing important new intellectual agendas to Australia and nurturing them to achieve scale and impact beyond ANU.

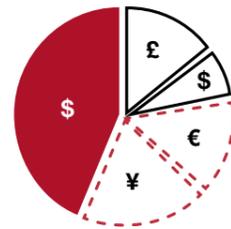


As we transition from the foundation School of Engineering to the Research School of Electrical, Energy and Materials Engineering we are committed to addressing the grand challenges presenting the planet's transition to a sustainable future.



- Research School of Electrical, Energy and Materials Engineering

College of Engineering and Computer Science



RESEARCH INCOME
Increase diversity in research income



Transform data science into tech delivering public good.



- Software Innovation Institute

College of Engineering and Computer Science

We will reinforce areas of traditional strength through the “foundation” Research Schools. The Research School of Electrical, Energy and Materials Engineering will set a strategic direction which aligns to the Reimagine investment and then recruit additional faculty to build critical mass and focus in areas and ways that align to their strategic plan. The Research School of Computer Science will do the same.

We will maintain Innovation Institutes and give them strategic priority to achieve their ambitious interdisciplinary agendas on behalf of the University. We expect to establish at least one further Innovation Institute after the 3A Institute becomes the Research School of Design Engineering.

We will develop a hiring strategy that actively seeks to work with and integrate into other disciplines, while maintaining a clear identity as a coherent body of expertise.

We will maintain a research portfolio with an appropriate mix of short, medium and long-term activities. We will achieve scale, focus and quality by planning strategically and directing resources towards leadership of globally-relevant, multi-institution, multi-disciplinary research programs and alliances.

We will ensure relevance and broad visibility of our track record, current and future agenda. We will benchmark ourselves against our aspirational peers, both domestic and international, to create the practices and research environment that underpin that success.

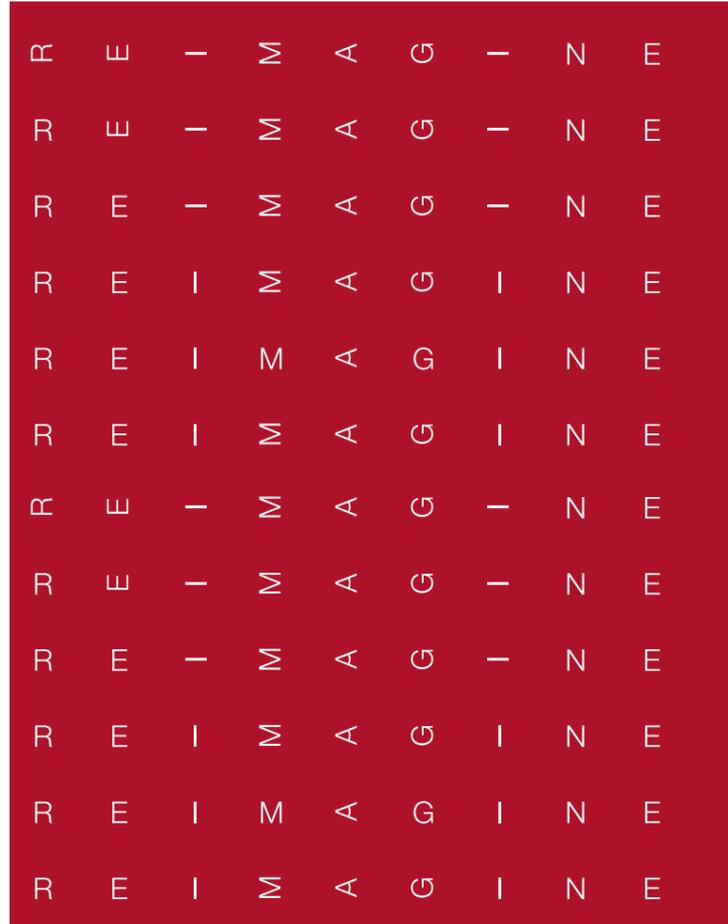


Focus on tackling the problems emerging around next generation cyber-physical systems and their impact on humanity.



- 3A Institute

College of Engineering and Computer Science



Meaningful Engagement

We are committed to better outcomes for our community, our nation and the world. We believe our work should deliver on our unique national responsibilities. We will make a positive difference to the ways that Australia and the world engage with technology – societally, economically and culturally. We will engage broadly, within and beyond the University, with government and industry.

We will identify and engage strategic partners based on a mutual value proposition to partners, our staff and our students. We will actively establish opportunities for the exchange of ideas and people with our partner organisations.

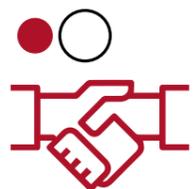
We will host a series of events over the life of this plan, to bring together employers, government, parents, schools, industry, humanists, scientists and social scientists to develop a shared view about our future.

We will form genuine relationships with our alumni, staff and students such that they are actively advocating on behalf of the College, our staff and our students; based on transformative experiences while they were with us.

We will strategically position people to be considered trusted voices in leading discourse relating to technology and its interaction with society and strategically position people to be a trusted voice in decision/policy-making.

We will develop a metric to track our engagement with a focus on gaining an external point of reference on that engagement.

We will deepen and diversify our funding streams, including developing a higher and more evenly distributed external income base. We will also support and expand non-traditional research activities, working with government, industry, and external organisations.



INDUSTRY COLLABORATION

3,000m² set aside for industry collaboration



REIMAGINE FELLOWS PROGRAM

Five years of the Reimagine Fellows Program



“

Inventing the computing platforms and methodologies that underpin our complex society, for the common good, with applications in areas as diverse as healthcare, energy, and urban systems.

”

- **Research School of Computer Science**

College of Engineering and Computer Science

World Class Infrastructure

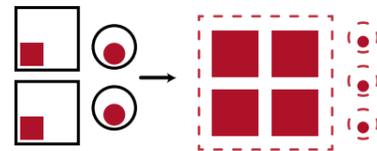
We will invest in world-class space and infrastructure that attracts and inspires. We will build new infrastructure to support the new scale and nature of activities in the College. A significant fraction of our infrastructure will be used for industry interaction. We will progressively rework and optimise our existing infrastructure.

We will complete precinct planning and start to implement the precinct plan. We will establish and co-design facilities to inspire partners to join us on campus thus creating an inspiring technology precinct on campus.

We will map out the resources required to achieve our education, research and impact goals. We will map out the resources required to sustain experiments in research, education, partnership and new ways of being. We will prioritise and establish facilities accordingly.

We will develop and implement a digital strategy. We will also deliver an underpinning IT strategy to sustain the digital strategy as well as our ongoing research and education needs. We will improve the overall digital experience of our community.

We will develop infrastructure of national importance in partnership with government, industry, and other organisations.



COLLEGE EXPANSION

Invest in our new structure of four schools and three institutes



FOOTPRINT

Increase footprint from 13,000m² to 36,000m² (including 3,000m² dedicated to industry collaboration)



Create leading cyber professionals to meet the demands of our fast changing world, at the intersection of real-time operations, research and policy.



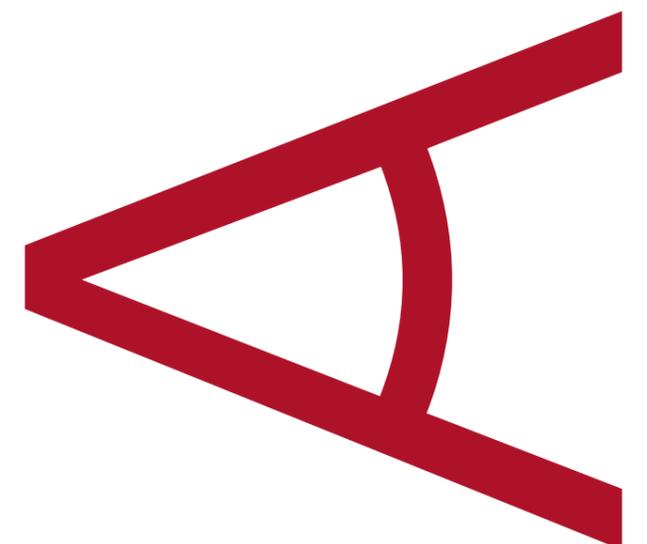
- Cyber Institute

College of Engineering and Computer Science

Measuring our Impact

We will be renowned for the quality of our research, which is international in scope and quality, always measured against the best in the world. Our research investment will be strategic, taking a long-term view and focus on high-quality activities, high-impact infrastructure and areas of high national importance. We will be renowned for the calibre of our undergraduate and graduate education, and our commitment to transformative experiences. We will be renowned for the quality of the contribution our research and education make to societal transformation.

Through the Reimagine investment, the College of Engineering and Computer Science will profoundly reinvent engineering and computing for the twenty-first century. We will take a phased approach and monitor our progress against our operational and business plans. The Reimagine investment continues until 2033.



ANU College of
Engineering & Computer Science

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Reimagine Engineering and
Computer Science
Strategic Intent, 2019-2025

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Australian
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University

cecs.anu.edu.au/reimagine