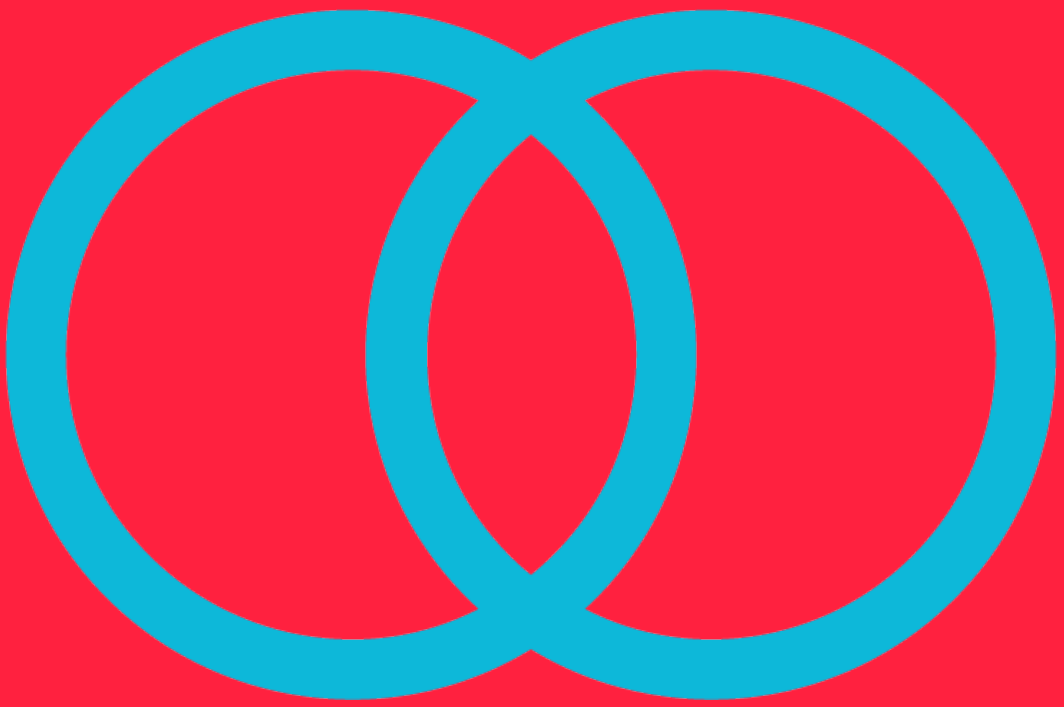
Engagement or extinction?

Breaking down barriers between industry and universities through good design



Hassell

Contents

Hassell
61 Little Collins Street
Melbourne VIC Australia 3000
T +61 3 8102 3000
hassellstudio.com
@hassell_studio

Contact
Michaela Sheahan
Senior Researcher
msheahan@hassellstudio.com
+61 03 8102 3132

Previous page: Ecosciences Precinct, Brisbane, Australia Photography by Christopher Frederick Jones

INTRODUCTION

Research funding pressures and relentless calls for innovation have thrust industry engagement, a long-standing but largely back-seat activity at universities, into the spotlight. For academics, it's not 'publish or perish' anymore – its 'engagement or extinction'. And for businesses, access to expertise and facilities are crucial to getting one step ahead of the competition.

It's no secret that forming productive relationships is challenging. How do effective engagements come about, and what's stopping more from happening?

The barriers are, in simple and totally unsurprising terms, time and money. Throw in security concerns and a lack of flexible space, and talented people on both sides of the equation are left wondering how they can bring all their good (and lucrative) ideas to life.

We asked the question – can design help overcome barriers to industry engagement? And the answer was yes. While design is not a driver of collaboration, it is an enabler. Buildings, spaces and places that prioritise proximity of partners, visibility of activities and flexibility to change are vital to more, and better, collaborative partnerships on campus.

Ecosciences Precinct, Brisbane, Australia
Photography by Christopher Frederick Jones

HEADLINE FINDINGS

Industry engagement is the go-to strategy for governments, businesses and universities in the all-consuming pursuit of innovation. At Hassell, we design buildings, places and spaces that aim to encourage the creative and productive output of businesses and universities, so it's in our interests to understand the motivations and barriers to innovation, and how to overcome them.

According to the Brookings Institution, innovation ecosystems are made up of three overlapping assets — economic, social and physical.[1]

In the context of industry engagement on campus, they translate to funding, organisational culture and space. As designers, our focus is on physical assets, but we can't ignore the interplay of space with the economic and social elements of funding arrangements, institutional management, organisational culture and business strategy.

This project explores all of these elements to help us help our clients articulate and then overcome the barriers to collaborative partnerships.

What our research participants told us is that barriers to industry engagement are largely economic and social (money, time and alignment of goals), but physical assets can and do lower some of these hurdles.

Industry and academia should invest in infrastructure that:

- → Saves time by co-locating, to develop trust and understanding of each other's goals
- → Saves money through shared and flexible facilities that allow growth and change
- → Attracts partners and funding through a corporate-facing front door

In other words, proximity, flexibility and visibility.

And if you're looking for something a little more concrete than that, the type of facility that will deliver the greatest boost to engagement on campus according to those at the coalface, is incubator co-working space.

Research method

We surveyed 85 representatives of corporate relations, research and facility planning teams from universities and businesses across the world.

We asked how and why their university engaged with industry and vice versa. We also interviewed ten executives and researchers directly involved in industry engagement about their spaces (or why they didn't need one), and how co-location and building design have helped them deliver collaborative projects.

The survey explored:

- → Motivations for industry and academia to engage — do they align?
- → Barriers to engagement — are these spatial, organisational or financial?
- → Current engagement activities — what's happening and in what type of spaces?
- → Future expectations for engagement spaces — where to next?

Limitations

Industry engagement at universities covers a range of activities, including student training and employment. For the purposes of clarity and focus, we investigated research and commercialisation activities only.

Although the data represents a wide range of countries and roles, participants are mostlly university representatives, due to a lack of publicly available contact details of industry partners. To counter this bias, we interviewed business and government representatives. Further research would benefit from a stronger business voice.

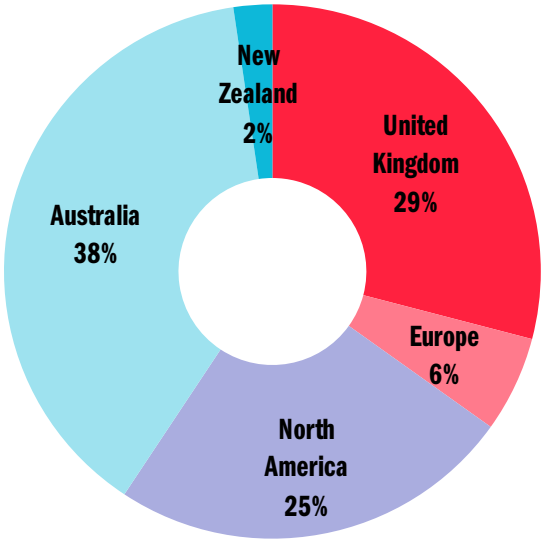


Fig.1. Where are you located?

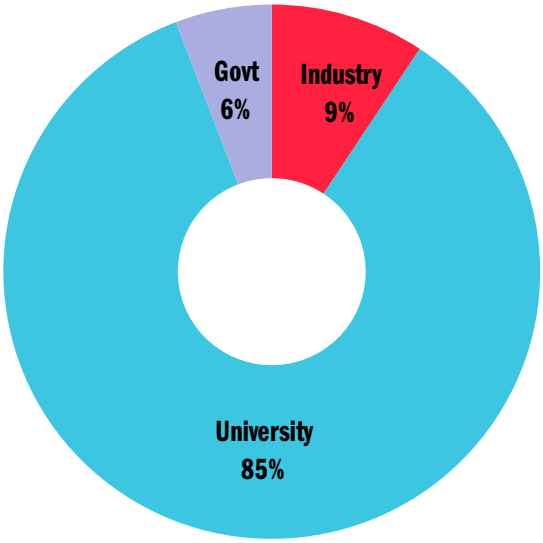


Fig 2. By which sector are you employed?

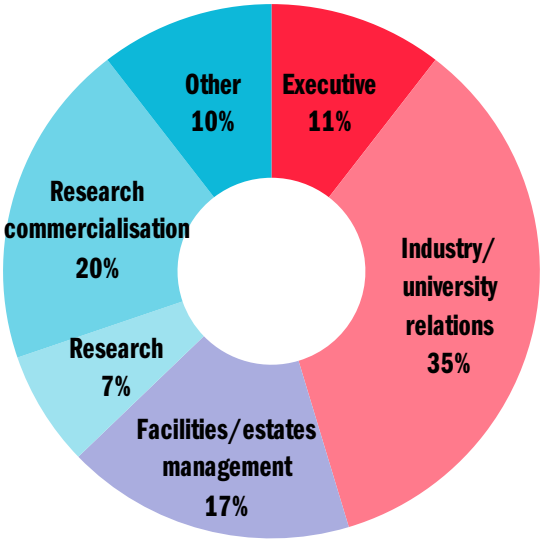


Fig 3. What is your main role?

1.

2.

3.

4.

1. Ecosciences Precinct, Brisbane, Australia. Photography by Christopher Frederick Jones
2. Advanced Engineering Centre, University of Brighton, United Kingdom. Photography by Jim Stephenson
3. Flinders at Tonsley, Flinders University, Adelaide, Australia. Photography by Peter Bennetts
4. National Centre for Motorsport Excellence, University of Bolton, United Kingdom. Photography by Cristina Pedreira

THE MONEY TRAIL

Industry engagement with universities has a long and important history as the bridge between theory and real-world applications. Because of that, it's a vital economic tool. But bringing business onto campus to work with academics isn't easy. It requires well designed spaces, strong social networks, time, and of course, money.

Cash-strapped governments are keeping a close eye on the effectiveness of academic research. Looking to shift the burden of funding from the public to the private sector, and to boost research impact, businesses are being encouraged to collaborate with universities.

While this might seem a little cynical (and potentially invite corporate pressure for biased research), there are enormous economic benefits.

Formal collaborations between Australian businesses and universities generate over $12 billion a year in company revenues, and 38,000 jobs.[2] No wonder the politicians love it!

In the US during the post-recession period from 2010 to 2015, the share of R&D funded by the government declined from one third to a quarter of total investment, with industry making up the shortfall.[3]

In 2015, businesses forked out 62 per cent of all US research funding, and in the UK, around 48 per cent. Germany tops the list at a staggering 70 per cent.[3] Not all of this money goes to universities, but the figures are indicative of the declining interest from governments to fund research.

Between 2000 and 2017, Australian private sector research funding increased by 90 per cent, to $730 million, or about 15 per cent of all university research spending.[4]

Around the world, the proportion of spending on applied research is growing in a similar pattern to Australia, at the expense of basic research,[3] as competition for product innovation increases.

All this collaborative R&D brings with it a need for space. And that's where we come in. But first, let's look at the motivations and barriers to engagement.

THE WHY AND WHY NOT

Motivations for engagement

What drives businesses and universities to want to work together, and what stops this collaboration from happening more often?

The motivations are not the same for the respective parties, reflecting the goals of two very different types of organisations. In blunt terms, it's transactional: money for knowledge.

Figures 4 and 5 show the weighted average of survey responses on a scale where one is strongly disagree, three is neutral and five is strongly agree.

Our survey reveals that for business, the primary and very strong motivations for engagement are to access expertise, recruit new talent (a bit cheeky) and to use facilities and equipment.

For universities, the motivations are spread much more evenly (and less emphatically) across many different aspects — funding, networking opportunities, reputation enhancement, access to expertise product development and a general expectation that it is a required part of an academic role. On the other hand, businesses are not *expected* to engage — they want to, because it's a logical path to a clear outcome.

For the many and varied academics, there are many and varied reasons to form partnerships with business, not all of which have an obvious outcome. Collaborative research for an academic may be a vehicle to product development, but it could just as easily be an altruistic calling, or a method to train students. It may simply be a direction from a departmental supervisor (engagement or extinction!).

The relative clarity and strength of motivations for business compared to universities points to a common barrier to successful partnerships – the misalignment and misunderstanding of goals.

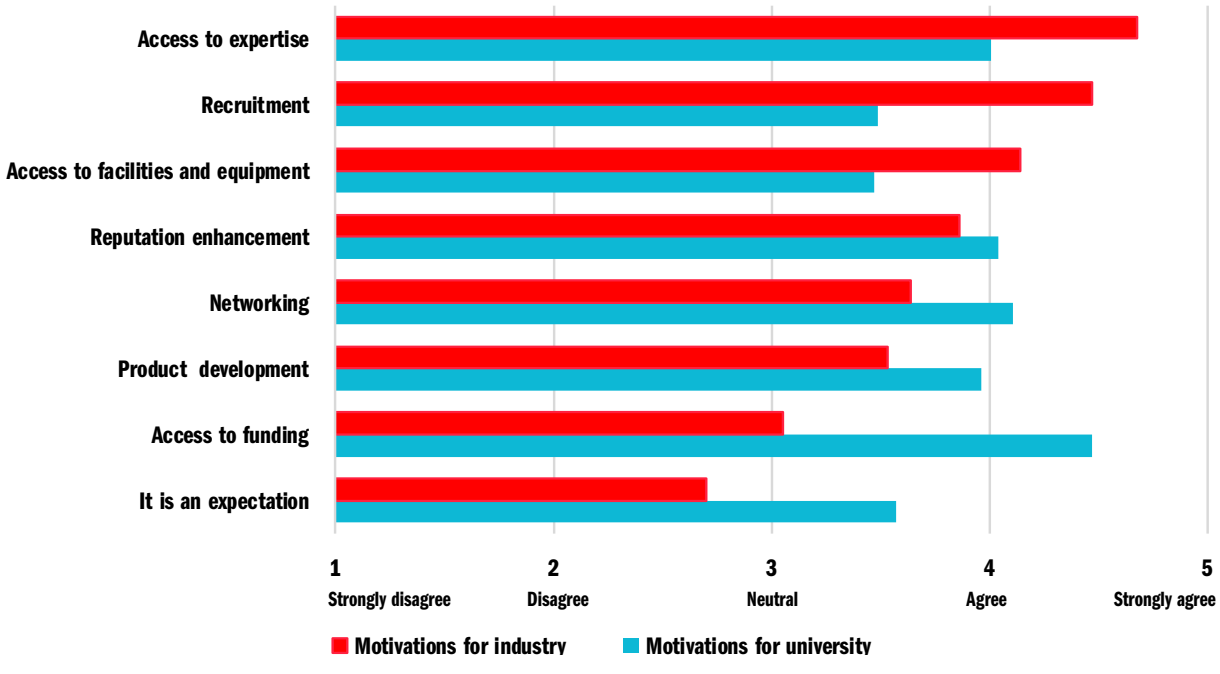


Fig 4. What are the motivations for universities and industry to engage?

Barriers to engagement

Conflicting goals are certainly a barrier. But conflicting time scales are the main problem. Businesses must operate at a much faster rate than universities would like or are able to, as one of our interviewees pointed out succinctly and without blame.

"We need an innovation in a product every few years, or customers will stop buying it. Businesses measure results, while universities explore ideas instead. This is how it should be."

Petr Střelec, Senior Director of Research and Development, Thermo Fisher Scientific

Sometimes this is procedural (bureaucratic grant applications, ethics approval, time commitments to teaching, etc.). At other times it's a desire on the part of universities for theoretical exploration and depth-of-knowledge over fast, learn-as-you-go, practical solutions.

Both are valuable, and experienced research partners negotiate a middle territory before setting out on any successful research collaboration.

One extra barrier to industry presence on campus identified in the interviews was security (for example the Pirbright Institute and ANU Physics, see case studies).

The requirement to restrict access to equipment and secure confidential or biologically sensitive material limits some companies from co-locating with university partners.

Many use spatial zoning and security measures that separate confidential activities from public access areas to limit the potential for intellectual property breaches, biological contamination and unsupervised use of equipment.

But overall, the most common barriers to engagement appear to have little in common with physical assets on campus, falling squarely into the economic and social categories. Space availability and space costs relate directly to university budgets, and a lack of appropriate facilities rates well down as a barrier.

So design is neither a driver, nor an impediment to engagement. It can, however, deliver efficiencies and cultural change to amplify the motivations, and overcome the barriers. Design is an enabler.

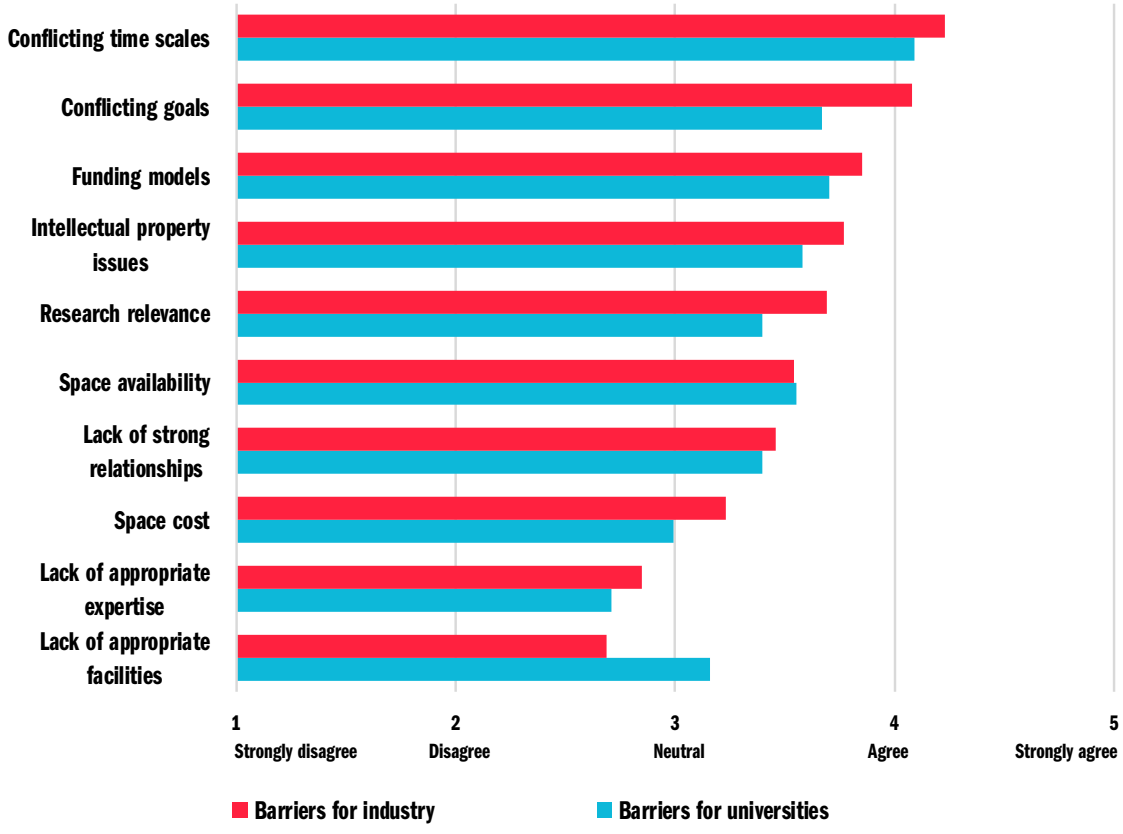


Fig 5. What are the barriers to industry engagement?

THERE'S NO PLACE LIKE CAMPUS

A university campus provides a unique environment that nurtures innovation through a combination of people, place and knowledge. This distinctive mix of economic, social and physical assets can entice businesses onto campus to solve issues across the spectrum of human activity.

The intense focus on innovation for economic growth has led to a wave of investment in research buildings, particularly in health sciences and engineering.

New medical research and STEM (Science, Technology, Engineering and Mathematics) facilities represent the bulk of capital spending from the Russell Group universities in the UK, and promise the best return on investment for the government.[5]

Our research shows that medical sciences and engineering dominate engagement activities on campus. This reflects well-established patterns of research investment over time.

It makes sense for industry and universities to share the valuable space and expensive equipment that research needs, particularly in the sciences.

Smaller companies and start-ups can rarely afford investments in equipment — far better to borrow university assets that may be under-utilised than to spend precious capital on technology for untested ideas.

But it is not only technical equipment and labs that are required — incubators, co-working areas and social spaces are in high demand too, simply to bring people and ideas together.

While the range of activities is broad, taking in everything from equipment hire to guest lecturing and work-integrated learning, the industry engagements considered most important by our survey participants are medium and long-term research partnerships, graduate employment and incubator programs.

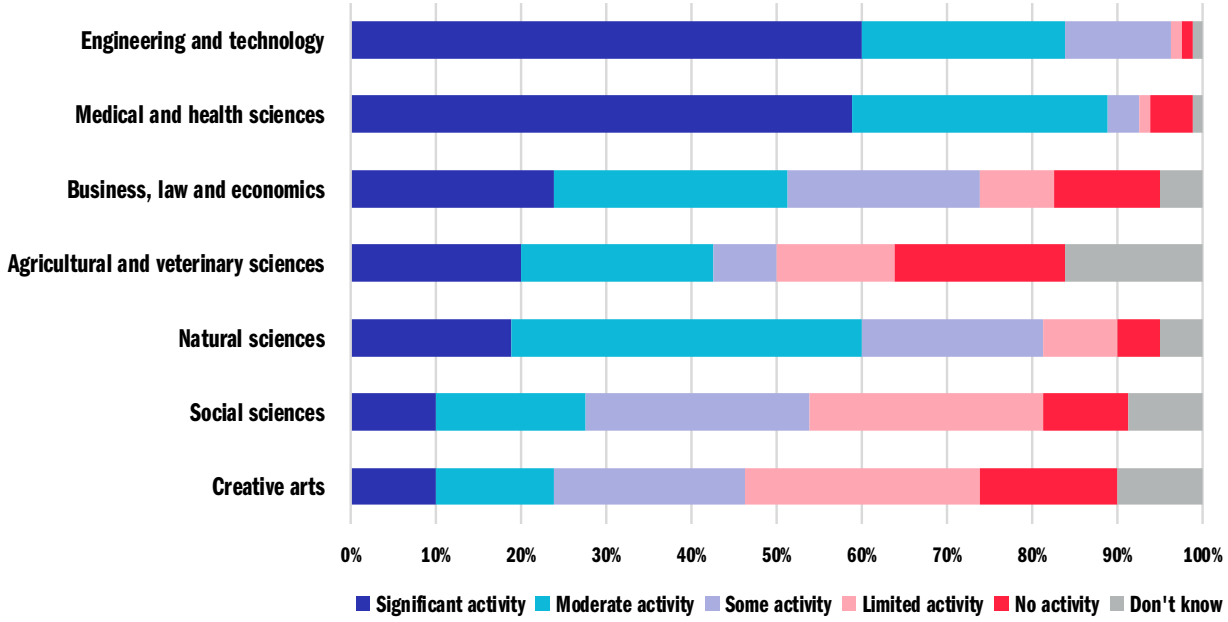


Fig 6. How much engagement occurs at your organisation in these disciplines?

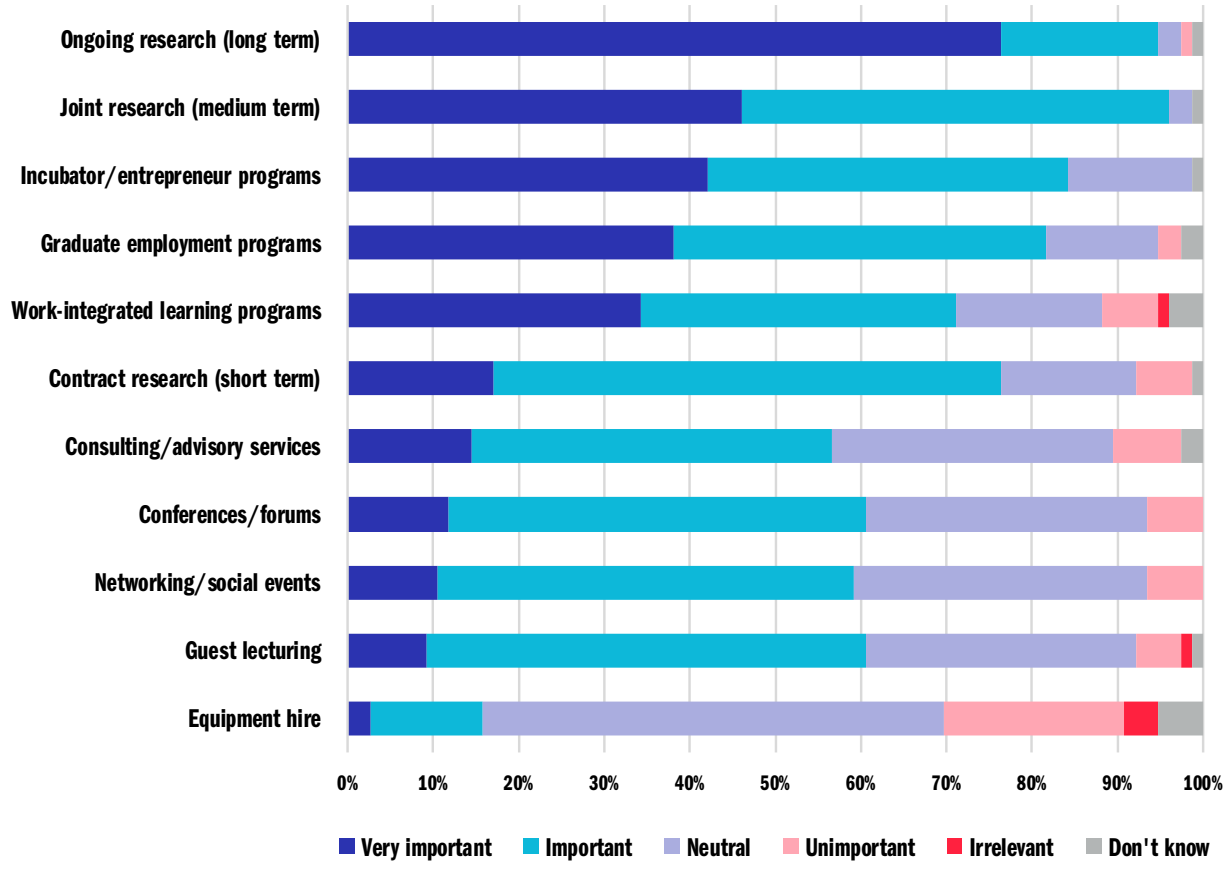


Fig 7. How important to your organisation are these types of engagement activity?

Making space work harder

Space is in short supply on many campuses, and under pressure to work hard for universities. Inviting industry in for collaborative projects adds another layer of demand, but also a level of complexity in where and when they can use space and how it is accessed and secured. And sharing space means sharing costs.

Universities are getting strategic with their real estate, seeking to increase space utilisation and subsidise research revenue streams. Many major programs of engagement are housed in university-owned space that is leased or hired to businesses.

Occasional venue hire for forums and networking events is a common ongoing source of activity and income on campus. Universities encourage the use of both large conference venues and theatres as well as smaller gathering spaces.

Design briefs increasingly call for flexible teaching facilities that can be converted to exhibition or social spaces to support knowledge sharing and networking relationships between the sectors. Three Canadian universities (Toronto, York and Ryerson) are partners at MaRS, a private, bio-tech incubator in Toronto.

A large atrium space connecting the researchers and start-ups working in the towers is also used for community events, publicising research activity to a much broader audience.

Membership-based incubator spaces serve the already strong and growing demand for start-up programs and business support that underpin the growing focus on entrepreneurialism in higher education.

Expansion to new campuses

As the space squeeze intensifies on inner-city campuses, universities are also looking to industrial zones for their larger engineering and advanced manufacturing operations.

The University of Sheffield brought Siemens onto the city campus in its signature building, The Diamond. But it's also working with industry further afield at the Advanced Manufacturing Research Campus. The University's Factory 2050 on the outskirts of Sheffield provides ample space for industrial-scale technology used by the university, Boeing, Siemens and other companies.

1. Community event, MaRS, designed by B+H Architects, Toronto, Canada
   Photography by Michaela Sheahan
2. Diamond Building, designed by Twelve Architects, University of Sheffield, UK
   Photography by Michaela Sheahan

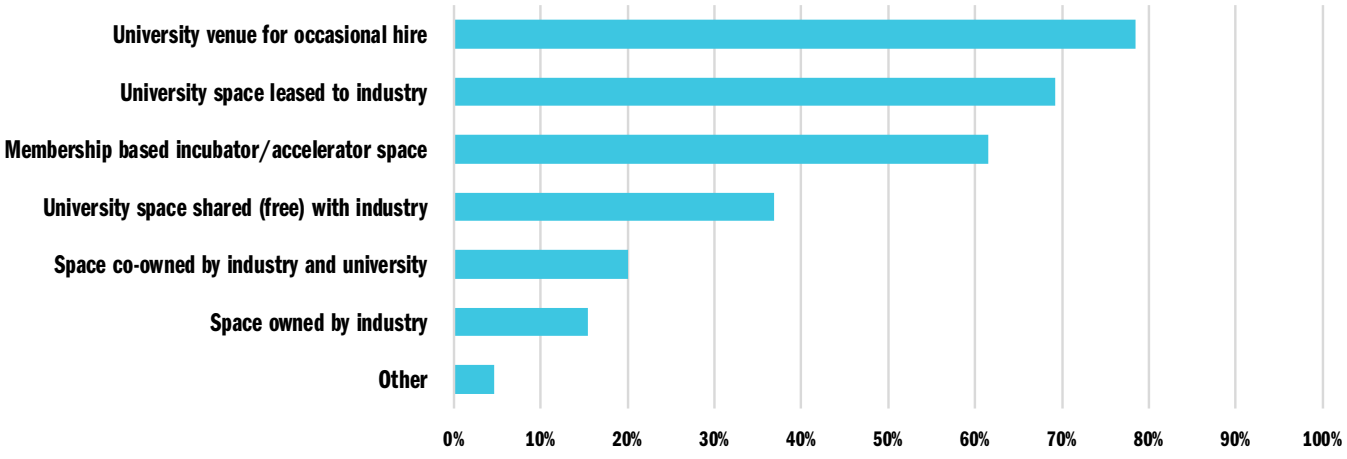


Fig 8. What space arrangements for industry are currently used on your campus?

What's needed next?

We compared how respondents viewed current space types on campus with what they believed their university would need more of in the future for greater industry engagement.

Given the focus on research in science and engineering, the current use of labs (wet, dry, engineering) is not that surprising. They are an integral part of the scientific process.

But the respondents indicated that new labs are not the most pressing need on campus, which perhaps reflects the downturn in basic research to focus on applied research and commercialisation.

And in line with that thinking, there are only two types of facilities our survey respondents believed were in need of growth on campus: advanced manufacturing and co-working incubator spaces.

The North American scene is different

Regional differences in the data were generally small, but overall, the UK/Europe and Australia/New Zealand regions' responses were more closely aligned than those from North America.

Overall there was less appetite for new or more engagement spaces on campus in the North America region.

For example, while 82 per cent of Australia/New Zealand and 68 per cent of UK/Europe respondents believed more co-working incubator space was required, only 53 per cent from North America thought that was the case.

This higher demand may indicate co-working incubator space is already well catered for on campuses in the US and Canada. Alternatively, as the birthplace of incubators, the US may have more privately-operated incubator spaces that universities support off-campus.

Similarly, for social networking spaces, around 50 per cent of Australia/NZ and UK/Europe respondents believed more social space for networking was required. Only 35 per cent of respondents from the North American region thought it necessary.

The North America region respondents also indicated much more polarised areas of interest, with a significantly greater focus on medical and engineering engagement activities than the other regions.

And going back a few chapters to the 'Why and Why Not' for a moment, there was also a discernibly higher focus on commercialisation in the US/Canada data. Intellectual property issues were the most significant barrier to engagement for universities in that region, while hardly rating a mention in other regions. And product development was a much more important motivation to engage in North America than elsewhere.

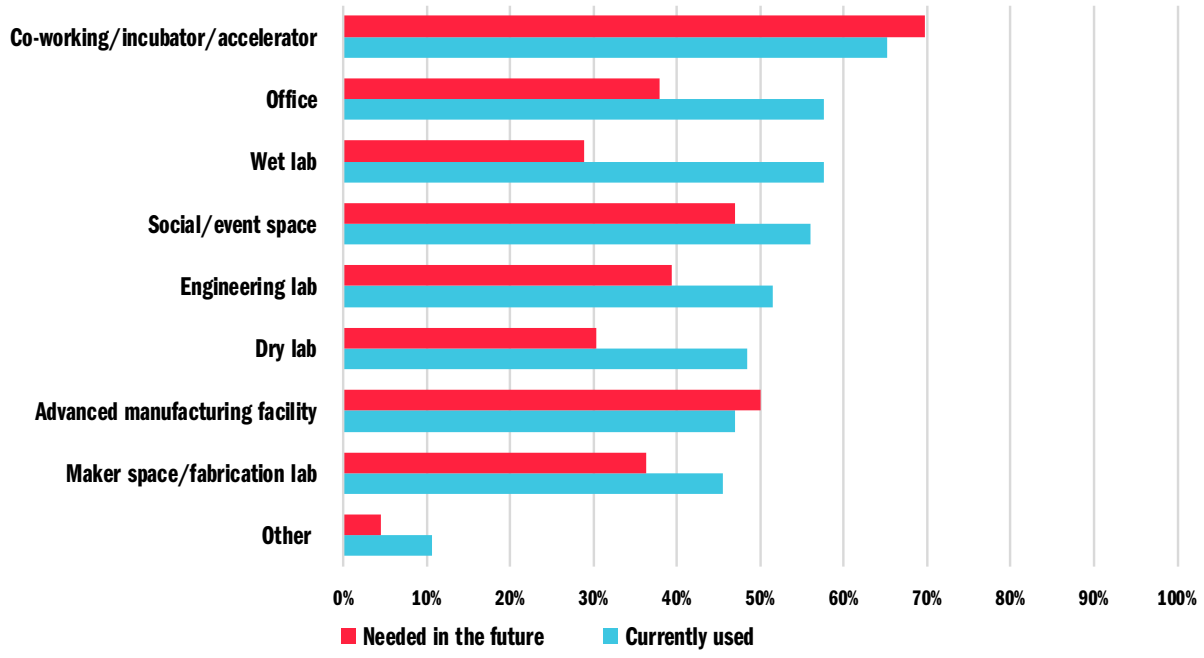


Fig 9. What types of engagement spaces are used now on your campus, and what types are needed in the future?

DESIGN FOR ENGAGEMENT

Proximity, flexibility and visibility

How can buildings and space help overcome conflicting time scales and goals, or solve funding shortfalls and tussles over intellectual property?

A new building will not solve these complex issues outright, but good design can build in space and time efficiencies and nurture co-operation.

Our research identified three important principles of design that contribute to organisation change and financial efficiencies:

- → **Proximity** – bringing people from different organisations together for regular and meaningful interaction
- → **Flexibility** – in spaces and programs that allow fast turnaround and growth of companies, people and ideas
- → **Visibility** – making researchers and their activities visible, and therefore transparent and accessible

The following case studies explore the practical application of these principles.

PROXIMITY

Few would disagree that physically bringing people together to work is a productive and efficient model. Sharing space develops trust and facilitates communication and connection.

At the individual building scale, research shows that innovation is an inherently social phenomenon. Proximity to colleagues in communal areas promotes creativity.[6] Our research participants certainly thought so too.

In the book *Where Good Ideas Come From*, Steven Johnson concludes that significant innovations in history have resulted not from competition, but from openness and connectivity. He explores Granovetter's theory of 'weak ties', in which acquaintances are more important for the generation of ideas than friends.[7] Open networks encourage innovation, while closed networks support productivity. Whichever the goal (and for industry engagement it is inevitably both), proximity is the key.[8]

The benefits of face-to-face interaction to build trust, familiarity and co-operation are widely acknowledged.

One often-quoted study from the University of Michigan showed that when scientific researchers share a building, and especially a floor, the likelihood of forming new collaborations and obtaining funding increased dramatically.[9] This is as applicable to the business context as academic pursuits, so combining the two sectors in one place makes perfect sense.

*A quick word about proximity

Not all research partnerships need co-location. Sometimes, the transaction is as simple as industry providing the data for researchers to apply theory to a real-world situation.

Arup recently delivered a research project with the RMIT University School of Computer Science and IT in Melbourne that measured through artificial intelligence the perceived concentration of staff in two workplaces.[10] In a similar vein, AMP has collaborated with the University of Sydney on thermal comfort and movement patterns of building occupants.

But where research needs large equipment, laboratory testing, physical prototyping, and product development, usually in the fields of engineering and sciences, co-location can be invaluable.

Ecosciences Precinct, Brisbane, Australia
Photography by Christopher Frederick Jones

CASE STUDY:
Boggo Road Precinct, Brisbane, Australia

Proximity was the underlying principle in the co-location in 2010 of the Queensland State Government research groups in primary industries, fisheries, natural resources, water, environmental protection and six divisions of CSIRO.

The Ecosciences Precinct project provides collaborative research and office space within a larger precinct known as Boggo Road.

This wider area includes the Princess Alexandra Hospital, the Translational Research Institute (TRI) and The University of Queensland's Pharmacy Australia Centre of Excellence (PACE).

It includes a biopharmaceutical manufacturing facility operated by Patheon, Thermos Fisher Scientific. Start-ups such as Vaxxas and Microba are housed within the TRI.

The Boggo Road Precinct is an exemplar of co-location of the full spectrum of partners (government, industry and university) and activity, from basic research through to manufacturing and commercialisation.

And while it is adjacent to a university campus, the number and variety of co-located partner organisations within it make the Precinct a campus all of its own.

"Universities pursuing connections to industry could look to co-located joint facilities off campus. These have a greater capacity to draw industry in to co-locate with scientists, clinicians and creators of intellectual property."

Meredith Nolan, Manager, Science Strategy and Partnerships, Queensland Department of Environment and Science

Global Change Institute, The University of Queensland, Brisbane, Australia
Photography by Peter Bennetts

VISIBILITY

Memories of visiting or working in a facility leave significant impressions, and the character and quality of an institution contributes to its identity and reputation on the world stage.

Shared purpose and cooperation are central to the translational research endeavour. The building or space in which it operates should demonstrate this overtly.

Many industry engagement projects emphasise the importance of 'putting their work on show'. Generous voids, atria and open stairs enable visibility of activity throughout a building.

These design elements allow those within the building to understand the bigger purpose of the organisation and its occupants.

Shared communal and circulation spaces, both horizontally across floors and vertically between them drive familiarity and common purpose.

This can be achieved through transparency of purpose, but also, visibility of activity, which was an important factor in the planning of the new ANU Physics facility (see page 19).

Similarly, the Global Change Institute at The University of Queensland, makes sustainability central to the building, as well as the work within it. This helps to communicate the shared environmental values and goals of the University, the Institute and all those who work there.

CASE STUDY:
Global Change Institute, The University of Queensland Brisbane, Australia

Transparency of purpose is critical to the Global Change Institute (GCI) at The University of Queensland.

Completed in 2013, the building process was itself an exercise in industry engagement. Ambitious and early collaboration with project partners enabled new building technologies and products to be developed, including a geopolymer concrete.

This initiative supported the project's larger aims of leadership, engagement and advocacy on global change.

The Institute is a symbol of the ecological transformation of the campus, achieving 6 Star Green Star rating and Living Building Challenge certification through material selection, energy and water systems, natural ventilation and a living wall.

It is also the public face of the University's research into environmental issues in oceans, food security, energy and water. It provides an identifiable and iconic destination for cooperative engagement projects that don't fit into one specific department or faculty.

Industry and philanthropic investment from Paul G Allen, Vulcan, Bloomberg, Tiffany, and Catlin Insurance group (now Axa), has funded the Oceans program that researches reef quality and poverty in coastal areas in the Seaview Survey, a worldwide baseline survey of coral reefs. WWF is a partner, as is the United Nations World Food Programme.

The building, intentionally corporate in atmosphere, is for research coordination, rather than research (no labs, and no teaching).

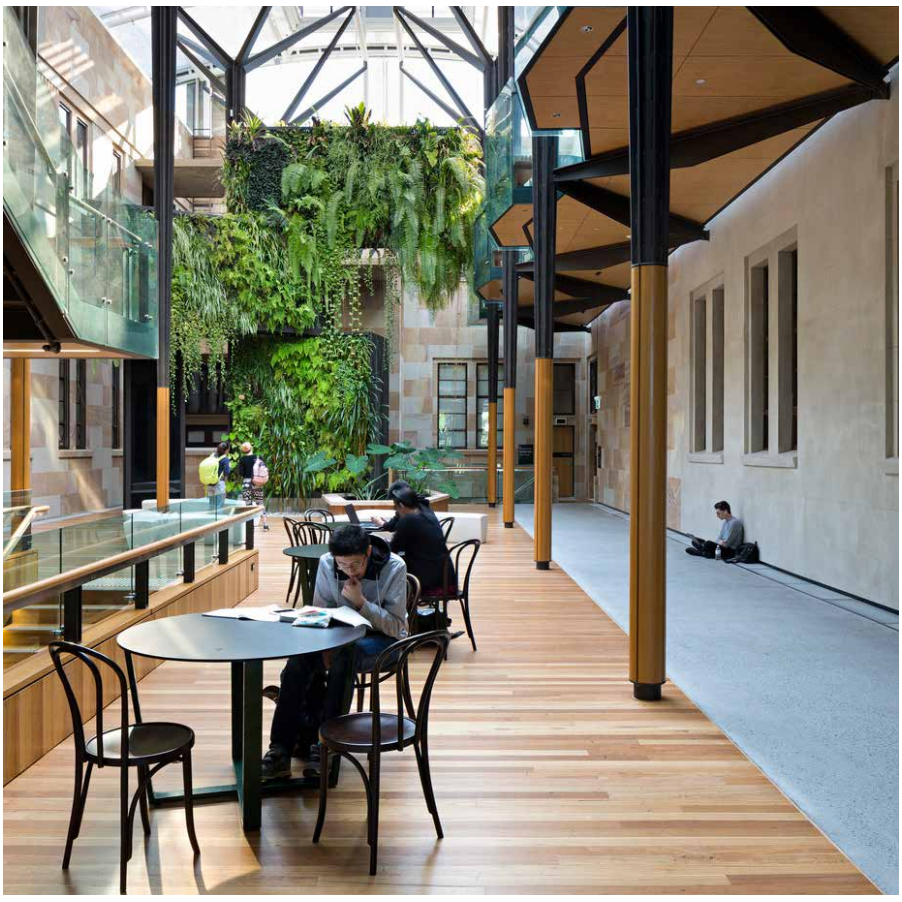
The industry partners have changed over time, but around 20 per cent of the building is occupied by non-university staff. This is a building designed to invite people in to talk.

"The building is a drawcard for partners because of its beauty, it sustainability credentials and its corporate atmosphere."

Ove Hoegh-Guldberg, former Director, Global Change Institute

The spaces are open and flooded with natural light and greenery. There are no solid walls around the shared office spaces, and there's a boardroom on every level to accommodate corporate gatherings.

As a consequence, it's a space well loved – management of academics who love the building and just cannot seem to finish a project is difficult, but necessary!



Global Change Institute,
The University of Queensland, Brisbane, Australia
Photography by Peter Bennetts

Ecosciences Precinct, Brisbane, Australia
Photography by Christopher Frederick Jones

FLEXIBILITY

Flexibility is crucial for financial and time efficiencies — as ideas, projects and partners change (and hopefully grow), the spaces that hold them should be able to change and grow with them.

This idea of adaptability is the essence of the legendary “Building 20’ at Massachusetts Institute of Technology, a temporary plywood structure that housed, amongst many other famous discoveries, the development of radar technology.

For more than 40 years, Building 20 was hacked (literally, with screwdrivers to run cables through walls) and altered to accommodate the needs of scientists as they experimented their way to some of the 20th century's great breakthroughs.[11]

Once MIT staff were finished with it, the building became a place for start-ups, pre-empting the current explosion of incubator spaces.

As well as speeding and freeing up the creative process, flexible incubator spaces mitigate the financial risk than can come with allowing ideas that have been developed (and funded) at the university to disappear when it's time to scale-up simply because of a lack of larger spaces.

Because space on campus is tight and expensive, alternative space arrangements have emerged to give tenants more flexible leases with which to support their space and equipment needs.

One commercial co-working provider (WeWork) is managing space for start-up teams on a US university campus.[12]

While uptake of this idea has been slow from other providers, and most co-working spaces are run by the university that uses them, the findings of this research suggest a stronger market for this in the future.

Universities have started developing facilities that lease space to small but growing enterprises that can benefit from access to expertise, support services and equipment. The Catalyst building at the University of Newcastle, UK, which houses the National Innovation Centre for Ageing and the National Innovation Centre for Data is one such project. Manufutures at Deakin University in Geelong, Australia, which provides advanced manufacturing space, is another.

And where profitable, private industry is stepping in to provide generic lab and office space with short and medium term lease options that universities are reluctant (or unable) to provide.

CASE STUDY:
BioMed Realty
United States of America and United Kingdom

BioMed Realty is a leading provider of real estate solutions and state-of-the-art facilities for the life science industry. Established in the US, but now also operating in the UK, BioMed Realty developed perhaps the first high rise speculative lab development in the world — Centre for Life Sciences Boston in the Longwood Medical Area.[13]

Most recently, it has delivered BioMed@Babraham, a high-end lab and office building at the Babraham Research Campus (BRC) in Cambridge, UK.

The Babraham Institute is a world leader in basic cell and molecular biology. The BioMed Realty facility provides critical follow-on space for smaller tenants on the Campus.

Orestis Tzortzoglou, Senior Development Director at BioMed Realty, explained this new development would provide critical expansion space for growing businesses that would have otherwise relocated elsewhere. Departing businesses miss out on direct interaction with the Institute, in the meantime, the Campus loses a success story.

"Providing readily available and truly flexible space is critical to attract and retain the best talent. We've already seen great success from companies locating here, with increased funding and partnerships with larger pharma and biotech firms."

Orestis Tzortzoglou, Senior Development Director, BioMed Realty

Over 60 companies are co-located around the Institute. The 1400 people on site can take advantage of an accelerator program, a regular schedule of social and networking events, and technical equipment such as electron microscopes that would otherwise be too expensive for smaller tenants to fund.

Centre for Life Sciences, Boston, US
Designed by Tsoi/Kobus and Associates
Photography by Michaela Sheahan

In a report commissioned to measure the regional economic effects of the Campus, over three quarters of campus companies considered their location on the BRC as either a very important or critically important factor in helping them access lab and office space on flexible and affordable terms.

And more than half of respondents believed their location had been either an important, very important or critically important factor in advancing their scientific ideas.[14]

CASE STUDY:
Research School of Physics
Australian National University, Canberra, Australia

Australian National University Research School of Physics (ANU Physics) neatly brings together all three principles of proximity, flexibility and visibility.

The Faculty's 30-year master vision is to recollect the redundancy in legacy buildings into a school based on shared, flexible laboratory infrastructure and co-located office tribes.

The first phase, three conjoined buildings under one roof, aims to embody collaboration by intersecting the public auditorium with the staff tea room and entrance. In phase two, the workshop, so often tucked away out the back in these types of projects, will be prominent to ensure that the School's foundational work is brought to the fore for the benefit of staff and potential partners.

Physics at ANU supports many industry engagements, from long-term partnerships with large multi-nationals to sole researchers just starting up.
Professor Tim Senden, the Director of Physics at ANU, believes the early phases of research development in particular need proximity to university expertise and facilities.

"An important part of catalysing an effective synergy between academics and business is the technical staff and workshops."

Professor Tim Senden, ANU

Physics coordinates with ANU Business Development Officers to foster in-house start-ups by providing lab and office space, and access to workshops within a two-year limit. Generous IP terms ensure companies are not encumbered.

Start-up development is important to ANU Physics but it is the longer partnerships with larger companies that are most productive. Up to 25 per cent of the School's research income comes from external partners.

The School has decades long associations with companies in the oil and gas, scientific instrument, mining, optics, security and defence sectors. These partnerships are based on fundamental research, but devices, software and services frequently evolve out of a need to support the partner's direction.

"Our partners all have R&D departments, but they come to us because of the potent mix of fundamental research and technical creativity."

Professor Tim Senden, ANU

A ten-year partnership with Thermo Fisher, a global scientific instrument company, has been a particularly productive industry engagement in developing 3D X-ray microscopy technology.

One of the engineers required on site was Petr Střelec, a Senior Director of Research and Development at Thermo Fisher Scientific, who believes that his relocation from the Czech Republic to Canberra for a year was essential to the partnership.

"I needed to be with the people that have the technical knowledge, because that knowledge is unique."

Petr Střelec, Thermo Fisher

And while the differing goals of the university (exploring ideas) and business (developing a product) were challenging, the innovative idea ANU was pursuing was of great value to Thermo Fisher. Now, as the project moves to commercialisation and market penetration, there is no need to be on campus, reflecting Professor Senden's position that the early stages are when co-location count most.

On the demarcation of organisation goals, Petr Střelec and Professor Senden also agree wholeheartedly — academics are not bound to, nor trained for, the time frames of business. The first part of any partnership negotiation is aligning project goals and schedules.

There are differences between the university culture of experimentation and the business culture of innovation and results, but a well-considered overlap is valuable for both.

And of the physical space itself, Professor Senden believes that despite the importance of safety, buildings should be open and accessible to reflect the university culture of sharing and transparency.

To that end, the first phase of the redevelopment of the Physics School will emphasise social interaction for all building users and a democratic view of Canberra's beautiful Lake Burley Griffin for all to enjoy.

Research School of Physics
Australian National University, Canberra, Australia
Image by Hassell

CASE STUDY: The Pirbright Institute, Surrey, United Kingdom

With over 211 partner organisations in 51 countries, collaboration is fundamental to The Pirbright Institute — just not on site.

The Institute receives strategic funding from government through the Biotechnology and Biological Sciences Research Council (BBSRC) at UK Research and Innovation. It is a world-leading centre for research and surveillance of viral diseases of livestock and those that spread from animals to humans, like foot-and-mouth disease and Zika virus.

As a Major Hazard site that handles highly infectious pathogens, bio-security is a major consideration. The campus is shared with just one partner — Boehringer Ingelheim, a foot-and-mouth disease vaccine manufacturer.

The Institute operates a Level 4 large animal containment facility, which means that entry to and movement around the site is highly restricted. While the site is open to security-checked authorised visitors, engagement with the public and other partners is largely off-site, at universities and other research facilities, or online.

A new Institute master plan proposes spaces for administration, conferences and public engagement before the secure zone.

"The open access area planned for the Pirbright campus is designed to facilitate greater knowledge exchange and public engagement, and promote a culture of transparency and open access, fostering an improved understanding of the research undertaken at Pirbright and its impact globally."

The Pirbright Institute master plan[15]

Speaking more generally about the global research environment, Joan Shadwell, a Program Manager for the BBSRC, notes that one of the greatest barriers to successful commercialisation of research is the weak and under-funded bridge between early research and large-scale manufacturing.

Small-scale manufacturing that takes research to the next developmental stage needs its own specific type of facility, which industry is reluctant to fund. These facilities may need to be funded by government, and will most likely find their home in what used to be called business and research parks, but are now more commonly known as innovation precincts.

Precincts that of course, more often than not, have a strong university presence.

The BBSRC National Virology Centre: The Plowright Building. Photography courtesy of HDR Architecture, Inc.; © 2014 James Brittain

INCUBATORS: THE GROWTH SPACE

Research often turns up what you expect. We weren't surprised to find that co-location, flexibility and transparency of purpose are important to the research community. We hear it a lot. But there was something a little unexpected in the data. One specific type of space is in greater demand than any other — incubator co-working space.

Our research indicates that medium-scale flexible space for growing start-ups that have made it to scale-up stage is the missing piece of the engagement space puzzle.

Most, if not all, universities now have co-working spaces for students, and many run incubator and accelerator programs in them. In Australia, 73 start-up programs are operating in universities alone.[16]

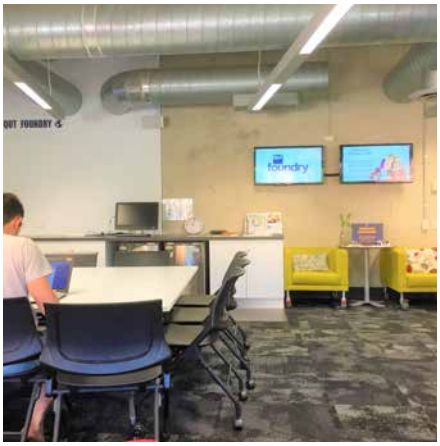
These programs are often opportunistically housed in leftover or under-utilised space — low risk, low cost experimentation.

Queensland University of Technology's The Foundry incubator began in an unused teaching space, but has now upgraded to a custom-designed home.

Adaptive reuse of quirky heritage space is also common, like the refurbished Blackfriars Schoolhouse that houses the UTS Energy Lab in Sydney.

But the focus is changing, from student to businesses, and from leftover space to corporate sophistication as more entrepreneurs take advantage of university expertise and equipment.

For universities that want to maintain links to successful start-ups and their intellectual property, providing space that can accommodate a growing team is critical. Just as commercial co-working operators have become more sophisticated in the spaces and services they offer, so too have universities.



1. The Foundry, QUT, Brisbane, Australia. Designer not known. Photography by Michaela Sheahan
2. EnergyLab, UTS, Sydney. Designer not known. Photography by Michaela Sheahan

CASE STUDY:
New Ventures Institute, Flinders University Adelaide, Australia

The New Ventures Institute (NVI) at Flinders University was an early adopter (2015) of corporate co-working space for start-up talent within a university setting. Located in a unique building that allows industry, students and academia to share spaces, Flinders at Tonsley is the front door to the University for industry engagement.

Students and new companies have thrived on ready access to academic expertise, equipment, fabrication labs, accelerator programs and office space.

The Institute's originally small co-working space has expanded organically into more public areas and offices as start-ups proved their value well beyond the Institute's expectations.

Matt Salier, former Director of NVI and now at RMIT Activator, believes that flexible arrangements for companies that embraced the NVI approach is central to the Institute's success.

Start-ups and small businesses that have hired students as interns, experimented with university technology for novel uses, and contributed to a vibrant social community have created value for the University well beyond their own innovations, and made it hard for the Institute to break ties.

Many have been allowed to stay on well past their original lease terms. Others that have had to move on due to a lack of space have not moved far from the NVI ecosystem.

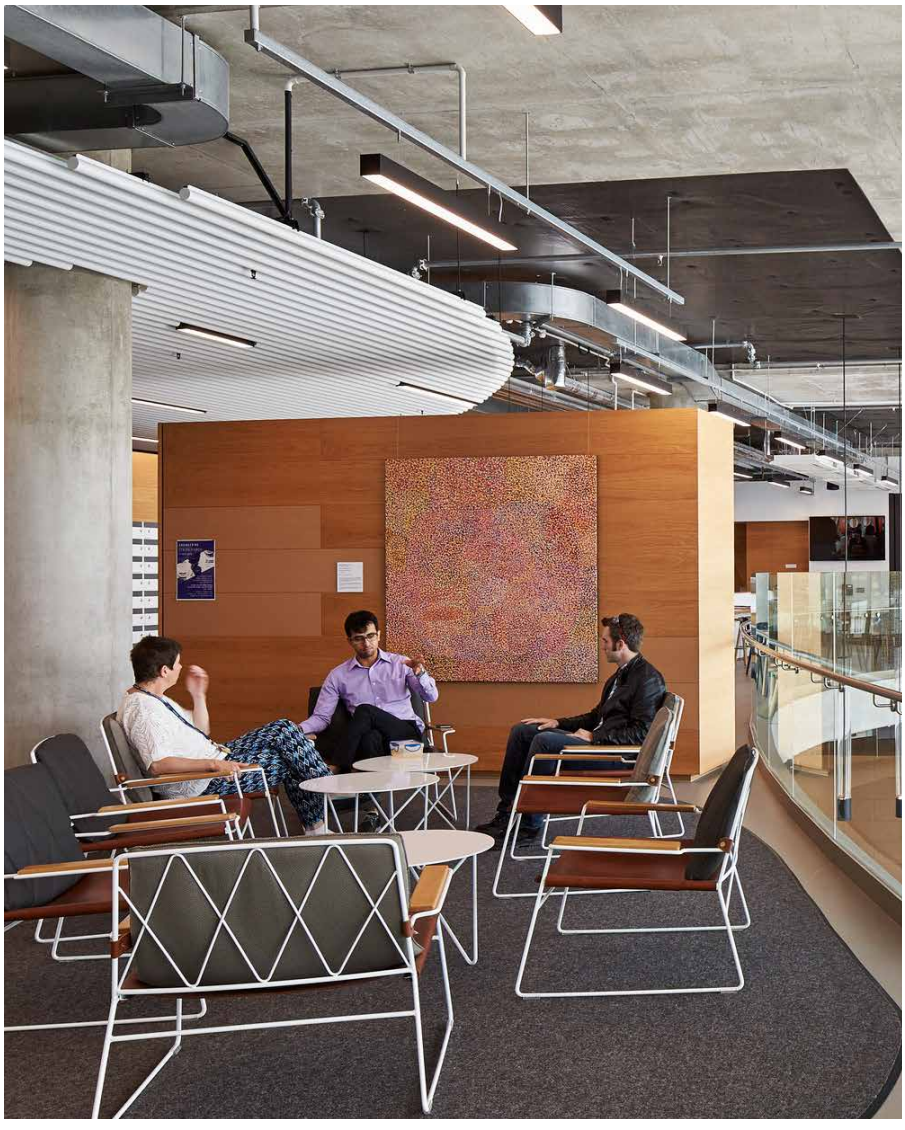
Long-lasting connections are the truest measure of success for industry engagement. Finding the space to keep those connections close and strong is the challenge for university incubators and co-working spaces.

New Ventures Institute, Flinders at Tonsley, Flinders University, Adelaide, Australia
Photography by Peter Bennetts

73
start-up programs in Australian universities[16]

New Ventures Institute, Flinders at Tonsley, Flinders University, Adelaide, Australia
Photography by Sam Noonan (left) and Peter Bennetts (below)

34%
of all UK incubators funded by universities[17]



240
university incubators in the US[18]

CONCLUSION

Despite all the economic, time and space pressures on campus, basic research and long-term relationships between industry and academia are critical to solving big problems. And they will continue to need large scale laboratories, workshops and advanced manufacturing facilities to do so.

The most dramatic change in the research landscape is the focus on product development and commercialisation. The early phases of innovation are where strong connections to university expertise and equipment can make the most difference.

While extinction is a big call, perhaps 'endangered species' might better describe universities that can't provide highly interactive, small to medium-scale spaces (think incubators and co-working) to house entrepreneurs and growing businesses developing their products for rapidly evolving markets.

REFERENCES

1. Katz and Wagner, 2014. The Rise of Innovation Districts, Brookings Institute, Washington D.C.
2. Universities Australia, 200. Clever Collaborations 2020. Website https://www.universitiesaustralia.edu.au/wp-content/uploads/2020/04/Clever-Collaborations-stats.pdf
3. National Science Board, 2018. Overview of the state of US Science and Engineering Enterprise in a global context. Website https://www.nsf.gov/statistics/2018/nsb20181/report/sections/overview/r-d-expenditures-and-r-d-intensity
4. Norton, A, and Cherasditham, I. 2018. Mapping Higher Education in Australia Grattan 2018. Website https://grattan.edu.au/wp-content/uploads/2018/09/907-Mapping-Australian-higher-education-2018.pdf
5. Biggar Economics, 2014. Economic Impact of the Russell group Investment Plans. Website https://www.russellgroup.ac.uk/media/5256/economic-impact-of-the-capital-investment-plans-of-the-russell-group-universities.pdf
6. Watson, R. 2010. Future Minds: How the Digital Age is Changing Our Minds, Why This Matters and What We Can Do About It. Nicholas Brealey Publishing.
7. Johnson, S. 2010.Where Good Ideas come From. Penguin Publishing Group.
8. Cherry, S. 2013. Telecommuting, Serendipity and Innovation. Spectrum podcast. Website www.specturm.ieee.org/podcast/at-wrok/innovation/ telecommuting-serendipity-and-innovation
9. Kabo, Felichism. Yongha Hwang, Margaret Levenstein & Jason Owen-Smith. 2014. "Shared Paths to the Lab: A Sociospatial Network Analysis of Collaboration."Environment and Behavior. http://www-personal.umich.edu/~jdos/papers/Shared_Paths_to_the_Lab.pdf
10. Rahaman, M. Lion, J., Ren, Y., Shan, J., Kudo, S., Rawling, T., Salim, F. 2020. An Ambient-Physical System to Infer Concentration in Open-plan Workplace, IEEE internet of Things Journal, Vol. 0, No. 0, January 2020
11. Hilts, P. 1998. Last Rites for a Plywood Palace That Was a Rock of Science. New York Times, 31 March, 1998. Website https://www.nytimes.com/1998/03/31/science/last-rites-for-a-plywood-palace-that-was-a-rock-of-science.html
12. WeWork, 20020. Website https://www.wework.com/en-GB/buildings/university-of-maryland–college-park-md–MD
13. Beaver, R. 2008. Tsoi/Kobus & Associates: Architecture, Planning, Interior Design. Images Publishing.
14. Cambridge Economic Associates, 2020. Identifying, Capturing, and Demonstrating the Benefits and Impact of the Babraham Research Campus Report, in association with Cambridge Econometrics, Cambridge University Centre for Business Research, Savills and Professor Lisa Hall. Website https://www.babraham.com/media/2076/babraham-master-final-may-26th-2020.pdf
15. Pirbright Institute, 2020. Master plan. Website at https://www.pirbright.ac.uk/site-development/master-outline-planning-application
16. Alexander, J., 2018. Australia's Startup Ecosystem is Booming and Universities are Jumping In. Smart Company online, May 8th 2018. Website https://www. smartcompany.com.au/startupsmart/news/australias-startup-ecosystem-is-booming-and-universities-are-jumping-in/
17. Bone, J., Allen, O. and Haley, C. 2017. Business incubators and Accelerators: The National Picture. Website https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/608409/business-incubators-accelerators-uk-report.pdf
18. Accelerator Info, 2020. Website https://www.acceleratorinfo.com/see-all.html

Hassell would like to thank all those who participated in our global survey and the following people who generously contributed to this research through interviews:

- Professor Ove Hoegh-Guldberg, The University of Queensland, Brisbane, Australia
- Meredith Nolan, Queensland Dept. of Environment and Science, Brisbane, Australia
- Sonya Winnington-Martin, Queensland Dept. of Environment and Science, Brisbane, Australia
- Tim Rawling, Arup, Melbourne, Australia
- Tom Treffry, AMP, Sydney, Australia
- Professor Tim Senden, Australian National University, Canberra, Australia
- Petr Střelec, Thermo Fisher, Brno, Czech Republic
- Joan Shadwell, Biotechnology and Biological Sciences Research Council, Surrey, United Kingdom
- Orestis Tzortzoglou, BioMed Realty, Cambridge, United Kingdom
- Matt Salier, RMIT Activator, RMIT University, Melbourne, Australia

Studios

Brisbane
36 Warry Street
Fortitude Valley QLD Australia 4006
T +61 7 3914 4000
E brisbane@hassellstudio.com

Hong Kong
22F, 169 Electric Road
North Point Hong Kong
T +852 2552 9098
E hongkong@hassellstudio.com

London
1 Curtain Place
London EC2A 3AN United Kingdom
T +44 20 7490 7669
E london@hassellstudio.com

Melbourne
61 Little Collins Street
Melbourne VIC Australia 3000
T +61 3 8102 3000
E melbourne@hassellstudio.com

Perth
Level 1
Commonwealth Bank Building
242 Murray Street
Perth WA Australia 6000
T +61 8 6477 6000
E perth@hassellstudio.com

San Francisco
Level 7 650 California Street
San Francisco CA 94108 United States
T +1 415 860 7067
E sanfrancisco@hassellstudio.com

Shanghai
12F base 45 Caoxi North Road
Xuhui District Shanghai 200030 China
T +8621 5456 3666
E shanghai@hassellstudio.com

Singapore
33 Tras Street
#02-01 078973 Singapore
T +65 6224 4688
E singapore@hassellstudio.com

Sydney
Level 2 Pier 8/9
23 Hickson Road
Sydney NSW Australia 2000
T +61 2 9101 2000
E sydney@hassellstudio.com