THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

CREATE CHANGE

Designing the Next Generation of Built Environments

RSP REPORT

April 2023

Image credit: Judit Losh

RESEARCH SNAPSHOT

Designing the Next Generation of Built Environments (DNGBE) was funded by the Federal Government's Research Support Package from July 2021 - December 2022. The research project brought together 18 sub-projects in the School of Architecture and related built environment disciplines across The University of Queensland. The research grounded technical innovations and aspirational agendas within social, cultural, environmental, commercial and political contexts with a view to making a direct impact on all facets of the built environment.

The built environment is estimated to use around 30% of all energy and 40% of all materials produced globally. Yet research on impacts of the built environment and scope for action on sustainability remain fragmented and the relevance overlooked Never before has it been more important for research on the built environment to challenge business-as-usual, remove traditional research silos, and plot a course for the future.

The DNGBE project, led by Chief Investigator Professor John Macarthur, sought to achieve this by fostering collaboration at school, faculty and institutional levels, and by actively engaging with industry and government to identify priority research areas, and assess roadblocks to implementation.

Researchers came from a range of specilisations, including architecture, electrical engineering, civil engineering, and water engineering (ACWEB).

Highlights from DNGBE include a new Visualisation Laboratory that has already been utilised by UQ and industry partners to enhance research, teaching and engagement; a full feasibility study into energy security for a rural town in the Atherton Tablelands; a collaboration with a building company to test prototypes for modular housing; a dossier on design governance published in Australia's leading architectural magazine; government engagement to ensure research aligns with, and influences, future policy; the preparation of grants to further the research of a number of the sub-projects; and an upcoming major exhibition at State Library of Queensland, which will showcase six of the research projects from DNGBE.

THE SCHOOL SELECTED SUB-PROJECTS THAT ADVANCED THE BROADER AIMS OF DESIGNING THE NEXT GENERATION OF BUILT ENVIRONMENTS TO INCREASE COLLABORATION ACROSS THE UNIVERSITY AND CROSS-INSTITUTIONALLY, AS WELL AS WITH INDUSTRY AND GOVERNMENT.

Image credit: Carroll Go-Sam

Above: The landscape of Mornington Island, the location for one of the sub-projects.
Left: The interior of the Visualisation Laboratory, a major piece of infrastructure from DNGBE.

DESIGNING THE NEXT GENERATION OF BUILT ENVIRONMENTS

18
RESEARCH PROJECTS

8
CROSS-INSTITUTIONAL COLLABORATIONS

10
POSTDOCTORAL RESEARCH FELLOWS EMPLOYED

31
RESEARCHERS

21
GOVERNMENTAL COLLABORATIONS

14
RESEARCH ASSISTANTS EMPLOYED

17
UQ SCHOOL, CENTRE OR DEPARTMENT COLLABORATIONS

37
INDUSTRY OR COMMUNITY COLLABORATIONS

1 NEW LABORATORY

The Visualisation Laboratory provides a 360° immersive environment allowng data visualisations to come to life. This will enhance research, teaching and engagement with other Schools and Faculties and with industry.

Image credit: Judit Losh

PUBLICATIONS
51

LECTURES, WORKSHOPS OR PRESENTATIONS
29

COURSES INFORMED BY RESEARCH
14

GRANT SUBMISSIONS
9

EXHIBITIONS
5

BOOKS OR BOOK CHAPTERS
4

PROJECT OVERVIEWS

The 18 research sub-projects within the DNGBE project explored a range of topics, from design governance and designing with communities, to digital twins and timber processing innovations. In examining ways to drive and support the future of the built environment, sub-projects investigated challenges and tools including sustainability, climate change, digitisation, material innovations, city planning amendments, new approaches to housing typologies, and community involvement in design and planning conversations.

Cities and Suburbs

Designing and Developing Next Generation Urban Villages – a Cairns Case Study

Project Contact: Mr Peter Hyland

In October 2022, The University of Queensland, in partnership with James Cook University, held a workshop that discussed the complex urban development problems facing Cairns, and explored opportunities for new approaches in the future. The workshop brought together 24 professionals from the areas of architecture, planning, urban design, development, agriculture, sociology, civil engineering, Indigenous groups, local council and state government.

Six pillars were identified as core principles to guide recommended future research:

1. Adaptive – A resilient, sustainable, and decentralised built environment and infrastructure adaptive to climate change and able to live with water in a regional, tropical location.

2. Connected – Enhanced transport and mobility options to connect geographically dispersed communities.

3. Community – Facilitation of connection within the urban village community through intentional design interventions.

4. First Nations Partnerships – Collaborations with Indigenous communities to inform sustainable patterns of urban growth, restoring natural and cultural systems, and integrating layers of cultural heritage to inform a distinctive urban form.

5. Productive – New architecture for the next generation of the Cairns economy, including new approaches to agriculture and home-based small businesses.

6. Inclusive – Ensure the growwth of Cairns prioritises diversity, inclusion, and opportunity.

These pillars require innovation in the property sector to demonstrate that housing, transport, resilience, and social wellbeing can be successfully integrated in Northern Australian regions. Key to the changes needed is a shift from low-density to medium-density housing, planned as urban villages where appropriate.

A white paper presented to Minister Craig Crawford sought Government funding for future research, and collaboration opportunities have been explored as part of UQ's The Queensland Commitment.

Image credit: Tope Adeniyi

Left: Participants at the proposed site of the urban villages during the Cairns workshop.

Next page top: Opportunities to maximise vistas are shown with the red arrows, while the pink circles identify key intersections of the colonial boundaries. These intersections present an opportunity to celebrate the river's edge, forgotten cultural legacy, and unite the disparate commercial and residential urban forms.

Next page bottom: 2016 land use profile of inner-Brisbane.

Inner Brisbane

Project Contact: Mr Peter Hyland

As central business districts lose their vitality and sense of purpose in the modern era, UQ School of Architecture researchers have explored the value of reframing these areas into central connectivity districts (CCDs). Using Brisbane as a case study, researchers Mr Peter Hyland and Dr Ayodeji Adeniyi assessed the unique benefits Brisbane offers – excellent climate, a strong connection to the river, and burgeoning knowledge economies – and where opportunities exist to improve liveability, vibrancy and business growth in the inner-city. Ultimately, they examined how best to harness the power of organic growth in Brisbane's inner-city.

Benchmarking Brisbane against ten river cities around the world, five key areas were identified as having the position to produce significant impacts: equity, enterprise, connectivity, creativity, and sustainability.

Inner-Brisbane has a competitive advantage in health, education and liveability, and potentially in sports-medical research and music. But these advantages must be strategically leveraged to see Brisbane through the next two decades of growth.

The research proposed a shift from city planning that is based primarily on function, to planning that prioritises connectivity. This includes:

- Interventions in the urban planning of strategic intersections in Brisbane's inner-city where the potential exists to celebrate the river's edge and forgotten cultural legacy, and unite disparate commercial and residential urban forms.
- Improved residential opportunities around business precincts to ensure vibrancy in the inner-city every day of the week.
- The creation of 'third places', located between home and work, providing much needed opportunity for the collision of ideas across industries and disciplines, while taking advantage of Brisbane's unique landscape and climate to foster more vibrant inner-city communities.
- Strategic activation of spaces around existing knowledge precincts to facilitate public communication of projects and break down existing barriers to the private sector, allowing for greater competitive opportunities to be discovered.
- Support of the next stage of growth in the knowledge economy in Brisbane, which requires a shift in government support towards identifying market-derived growth, rather than adhering to prescriptive and rigid growth standards.

Image credit: Tope Adeniyi

Through the optimisation of existing capital and resources, and strategic shifts in planning and policy, inner-Brisbane has the potential to be a highly competitive, liveable and vibrant city well into the 21st century.

These findings were strategically presented to the Brisbane City Council (BCC) together with a delegation from the Barcelona Olympics as part of the BCC 'City Centre Masterplan and Inner City Framework' initiative, and presented to the Committee for Brisbane as part of their 'Designing the Inner City of Brisbane' initiative.

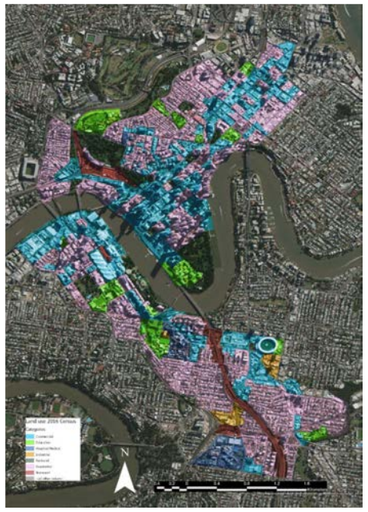


Image credit: Tope Adeniyi

Image credit: Mojtaba Moravej

Left: Mapping of existing development and infrastructure at the suburb scale in Greenslopes.

Collaborative Water Sensitive Design, Urban Performance Analysis, and a Pathway to Future-Proof Housing Standards

Project Contact: Dr Paola Leardini

Middle-ring suburbs in Brisbane face a unique set of challenges, including aging housing stock and water infrastructure, changing demographics, and planning codes that prevent densification while not mandating sustainability requirements. The consequences of these challenges, if left unaddressed, are increased severity of climate events such as flooding, vulnerability to droughts and more severe heat islands, insufficient housing supply for future population needs, and housing that does not perform at the levels required to meet sustainability targets.

Two projects – Collaborative Water Sensitive Design and Urban Performance Analysis; and The Development of a Pathway to Future-Proof Housing – jointly focused on the suburb of Greenslopes. The projects mapped an exemplar of the current state of Brisbane's middle-ring suburbs, modelled the consequences should business-as-usual (BAU) continue, and developed alternative, water and climate sensitive housing typologies to provide better outcomes for Brisbane's suburbs in the future.

The current state mapping developed in this study identified 44 different housing typologies in the suburb. Across these, there is a trend of plot subdivision and larger house-to-land ratios, resulting in a 30–40% reduction in private greenspace due to reduced backyard sizes, a 20–30% increase in roof areas, a 10–14% increase in pavement and driveways, and fewer large trees providing natural canopy shade.

Modelling of the BAU continuation of this form of housing typology and plot development approach demonstrated an increase in overland flow events by 38%, an increase in water demand by 58%, and an average increase in air temperature on a common hot summer day at the individual property level by 3˚C.

As a counter-proposal to BAU, new housing typologies were jointly investigated with two architecture practices, where the integration of sustainable life-cycle approaches was prioritised and new ways of living explored. The roll out of these exemplar typologies was then modelled at a suburb scale, including housing as well as blue, green and grey infrastructures. This demonstrated a significant increase in greenspace for use by locals, improved water management reducing the likelihood of flooding, the exceeding of sustainability targets, and likely improved liveability for the local population.

A key finding from the research indicated that for the identified solutions to be implemented effectively, a critical transformation is needed across the full spectrum of built environment management and decision-making. This would require a change in municipal strategic planning, including the introduction of new zoning and building codes allowing for precinct-scale renewal, innovative design of medium- to high-density dwellings, implementation of an optimised array of on-site water servicing technologies, and clusters of property owners who can be encouraged to take advantage of the increase in value from amalgamating land parcels motivated by new urban planning regulations.

The research has generated two reports and a number of journal articles. It was also presented to Queensland Urban Utilities as part of their Future Strategies Seminar, and to the Planning Institute of Australia as part of their Resilient Homes and Suburbs webinar.

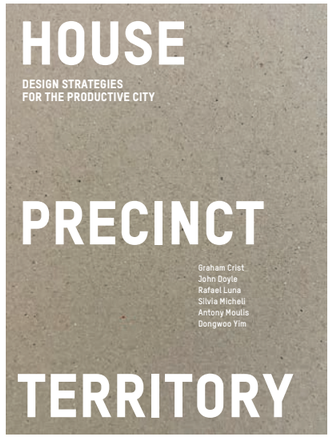
Productive Cities

Project Contact: Dr Silvia Micheli

This project built on an existing multi-disciplinary, design-led research project on how to shape economically resilient communities, and identified opportunities for urban production and trade at different scales and locations in the urban environment. Three cities in the Asia Pacific region were considered as case studies for three different models of productive city: Melbourne (regional), Seoul (urban) and Brisbane (domestic). Through observational surveys, ethnographic drawings and data analysis, the study identified siting opportunities within existing urban developments in Brisbane and tested the application of new design models.

Culminating in a book titled *House Precinct Territory: Design Strategies for the Productive City* (2023), the project addressed planning, governance and policy issues with a view to adapting regulations, economies, and behaviours towards the development of resilient and productive communities.

Key to the success of this project is the collaboration that has been fostered with the UQ Business School, as well as cross-institutionally with RMIT, Hanyang University, and Hongik University, and with industry partners including DFAT, PRAUD Architectural Practice, URBIS and Phorm Architecture + Design.



Left: Cover of *House Precinct Territory: Design Strategies for the Productive City,* Oro Editions, 2023.

Right: Cover of *Floating Cities: Buoyant Urbanism, Legal Change & Amphibious Architecture,* Paper Boat Press, 2023.

Below: A house containing a small business in Brisbane's inner suburbs.

Floating Cities

Project Contact: Dr Brydon Wang

Buoyant urbanism is a concept supported by the United Nations in response to rising sea levels and the need to house climate refugees, yet it requires legal changes and new ways of thinking about the city to support the transition to design and planning to facilitate the realisation of this concept.

This project amalagamated work by a number of researchers on this uncharted area of built environment, culminating in *Floating Cities: Buoyant Urbanism, Legal Change & Amphibious Architecture* (2023). Here, a raft of new floating architectural proposals sought to engage with the future of our cities to make them more amphibious, human-centred and flood-resilient.

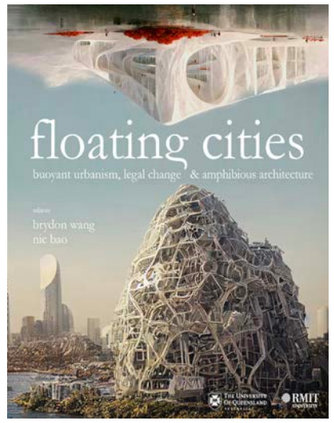


Image credit: Anjanette Hudson

Regional and Remote Infrastructure

Small Town Power Resilience

Project Contact: Dr Mashhuda Glencross

Energy security is a concern for many Australians, particularly those in remote communities who are regularly affected by severe weather events causing lengthy power outages. This is the case for the small town of Millaa Millaa in the Atherton Tablelands, where its population of around 1000 people can go for up to two weeks without power after a cyclone.

This project, run in partnership with the Centre for Energy Data Innovation, examined how a microgrid might be established in Millaa Millaa utilising existing alternate energy sources (such as diesel generators and solar panels) to support community needs in the event of extended loss of power.

Bringing together the energy provider, consumer advocacy groups, local council, and homeowners, researchers developed more accurate assessment tools for the existing power grid and worked closely with all stakeholders – through town hall meetings and social media engagement – to ensure the design solutions responded to a range of needs.

The result was a Full Feasibility Study for the Millaa Millaa Microgrid. The Feasibility Study forms the basis for ongoing research and an opportunity to explore this approach to energy security in small towns across Australia.

Image credit: Steve Snow

Above: Town hall meeting in Millaa Millaa.

National Parks

Project Contact: Dr Timothy O'Rourke

This project investigates the role and significance of infrastructure design in Australian national parks. The design of infrastructure and capital works mediates the experience of different groups of national park users, including tourists, researchers and traditional owners. The two primary uses of national parks— recreation and environmental conservation—are often regarded as contradictory.

The project explores how design might balance the requirements of the different users of national parks and the need to minimize damage to the natural and cultural environments in protected areas. Given tourists are one of the threats to conservation, the primary research question is to ask 'how might design improve the tourist experience while minimising threats to biodiversity?'

The project began with research into the history of national parks in Australia to elicit themes, which reflect changing uses, policies, and advocacy campaigns that have direct and indirect influences on infrastructure design – walking tracks, accommodation, and visitor centres. The project also investigates changing design conditions in national parks based on novel and escalating threats such as high visitor numbers, climate change, bushfires, and pathogens. In addition to historical analysis, and given new challenges, the project aims to critically evaluate selected types of infrastructure/ capital works, with an emphasis on exemplar projects across different Australian states.

This research will inform a larger study of infrastructure design in Queensland and Australian national parks, with potential to expand to a multidisciplinary project that extends methods for data collection and analysis. A grant submission is planned for 2024.

Below: Carlo Sandblow in the Great Sandy National Park

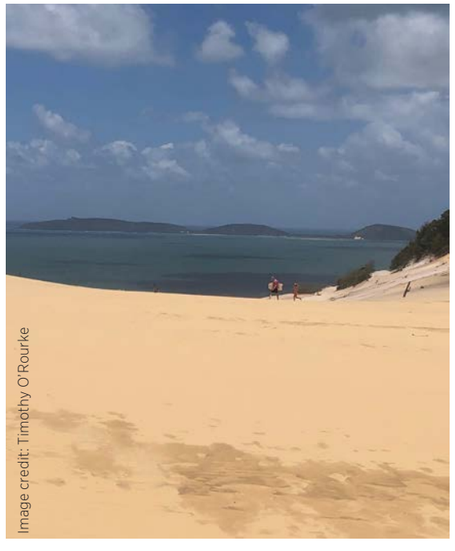


Image credit: Timothy O'Rourke

Sustainability and Governance

Climate Literacy and Action in Architecture Education

Project Contact: Dr Liz Brogden

The release of the 2021 National Standard of Competency for Architects (NSCA) prompted a national review at every level of the architectural profession, from degree accreditation to professional registration requirements. Most notably, new Professional Competencies have been introduced, requiring that architects and educators engage with climate change and sustainability issues, as well as First Nations care for country principles.

This project is concerned with how schools of architecture are foregrounding climate change issues in parallel with architectural practice. This same National Standard aligns architecture degrees with professional competency for registration and informs continuing professional development (CPD) for practicing architects.

Initial research surveyed students, PhD researchers, sessional academics, and faculty staff in all architecture schools in Australia and New Zealand, to gather perceptions about education in climate change and sustainability. The second phase of the project involved a national survey of industry perspectives on climate literacy and action in architectural practice. A combination of quantitative and qualitative data was sought to compare and contrast current activities in architectural practice with findings from the architecture schools survey.

The results of the research will be presented in a new report published mid 2023.

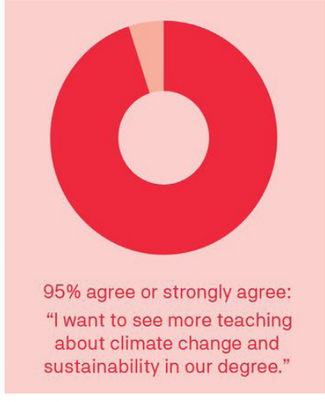


Image credit: Liz Brogden

Above: Survey from the second phase of the Climate Literacy project.

Design Governance and the Architecture Profession

Project Contact: Dr Susan Holden

Design-led governance is emerging as an effective way to include consideration of design quality in strategic planning and complex multi-stakeholder projects and ultimately to improve the quality of built environment. Yet it is under-researched and under-valued as an aspect of architectural knowledge and part of professional practice. This project sought to remedy this by exploring the place of architecture in design governance.

Particular governance processes and policy types were examined including the role of state government architects and other design leaders in state and local government, design review panels that involve professional experts, and policies that shape the built environment including procurement, heritage and cultural policy. The research also looked more generally at the role of institutions in managing built environment values.

Concepts from governance theory, policy studies and the sociology of the professions guided the interrogation of how design governance might recast notions of professional expertise and citizenship.

The research found that some of the most effective forms of design governance operating in Australia are informal (non-statutory) and rely on capacity- and culture-building in organisations and political commitment. This expertise is tacit and comes from direct experience, thus requiring specific methods to understand it. However, the profession does not currently collect data on architects in built environment governance, making it difficult to evaluate and expand this expertise.

This project resulted in a recommendation to review international benchmarks in order for Australia to advance design governance expertise, and prompted a dossier on the subject in Australia's leading architectural journal, *Architecture Australia.* Several grants have also been approved or are pending for further research.

Image credit: Susan Holden

Right: Dr Susan Holden and Dr Kirsty Volz hold a copy of March/April 2023 issue of *Architecture Australia.*

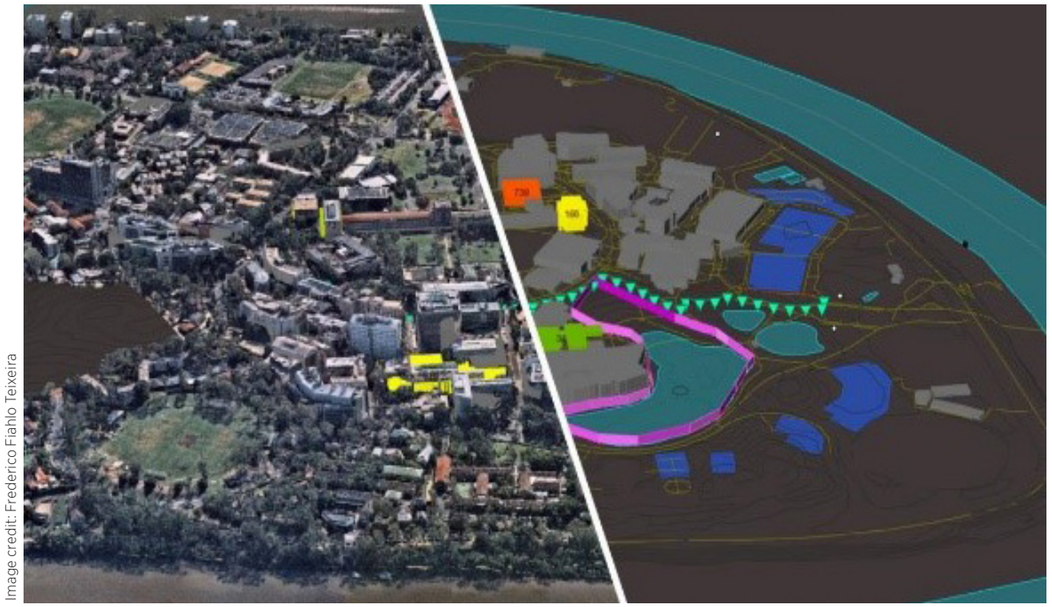


Image credit: Frederico Fiahlo Teixeira

Digitisation of Architecture

Digital Twin of the UQ St Lucia Campus

Project Contact: Dr Frederico Fiahlo Teixeira

Rapid progress in digitalisation and artificial intelligence is providing numerous opportunities for human-interaction research. Connecting the real world to the digital world using digital twins is one such opportunity that is more feasible than ever before thanks to increased availability of sensor information, allowing new applications in many different areas to be explored.

For this reserach project, existing data from various locations at UQ's St Lucia Campus was utilised, and new data generated, to model, simulate and forecast changes around campus. These models include flood simulations, mobility around campus and how it's affected by construction, building occupancy assessment with spatial data, and mapping of building age in relation to campus infrastructure.

This facilitated the discovery of key opportunities for efficiency in campus management, such as the use of 3D point-clouds for Properties and Facilities, and also developed reproducible workflows to enable adaptation at scale. Additionally, it highlighted the benefits of cross-departmental collaboration in the University as staff from Architecture, Civil Engineering, ITEE and Properties & Facilities collaborated to generate optimal outcomes.

This project demonstrates what the future of built environment management can look like. It showcases the possibilities of digital twin technology in the strategic management of the Campus and its facilities, and presents a pilot study for broader-scale application of spatially enabled digital twins at the urban scale. A Mega-CRC grant will be submitted in 2023 for ongoing research.

Above: Digital twin overlay of the UQ St Lucia campus.

Right: Point-cloud visualisation of Jocks Road at the UQ St Lucia campus.

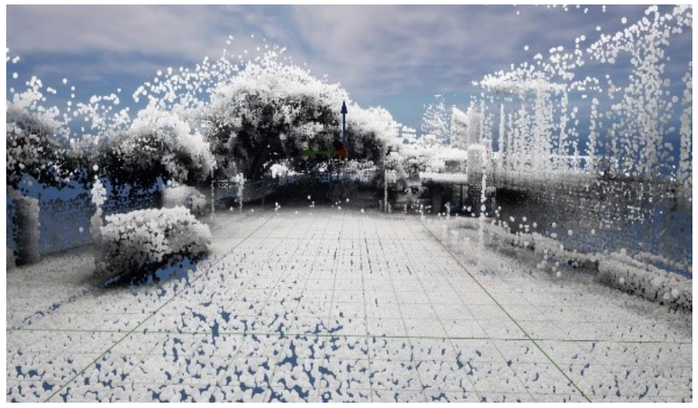


Image credit: Frederico Fiahlo Teixeira

Remote Robotic Additive Manufacturing

Project Contact: Dr Frederico Fiahlo Teixeira

This project investigated remote robotic 3D printing of clay-based bio-materials to produce blocks with improved structural and environmental performance. Using a UR10 collaborative robot, varying percentages of algae were combined with clay to explore the relationship between the percentage of algae in the mixture and the resulting structural integrity of the printed blocks.

This material exploration was paired with an examination of diverse geometries inspired by biomimicry patterns, testing the proposition that the versatility of robotic 3D printing enhances material and geometric properties and optimises the use of bio-composites in construction.

A computational script was also developed. This provided a user-friendly augmented reality interface for designing blocks as well as controlling the robotic 3D printer that can be utilised by people with no or limited experience in the field.

The research aimed to improve clay-based construction in remote communities and move towards a carbon-negative future by introducing a new digital and material culture in these communities. It contributes to the structural improvement of localised resources and supports a more sustainable and resilient mode of construction.

The research was shared as part of the SHERobots workshops and exhibition at the University of Sydney, and will inform an ARC LIEF grant being submitted in 2023.

Image credit: Maryam Shafiei

Augmented Reality for Design and Manufacture

Project Contact: Dr Frederico Fiahlo Teixeira

This project sought to develop a framework for Augmented Reality studies in the optimisation of the Architecture, Engineering and Construction (AEC) industry. Specifically, it addressed both the ad hoc adoption and distribution of BIM component parts, assemblies and fixturing in the manufacturing industry, and the siloing of design, manufacturing, production planning and assembly operations within organisations. With the ability to aggregate and expand data, the potential for new insight into advanced manufacturing and operations was explored through the total process simulation of an actual production process. Going beyond the digital twin with the Augmented Reality experience, the key outcome was a connected digital design and fabrication process in real-time, through an executable digital model of a physical system which brings in learning and experiences taken from the real-world processes to update a digital twin process.

This project forms part of the Digital Twin Mega-CRC grant application being submittted in 2023.

Above: Dr Maryam Shafiei using the robotic arm to 3D print a block.

Right: Bio-block made with red raku clay and algae (chlorella).

Below: Visualisation of the augmented reality design process.

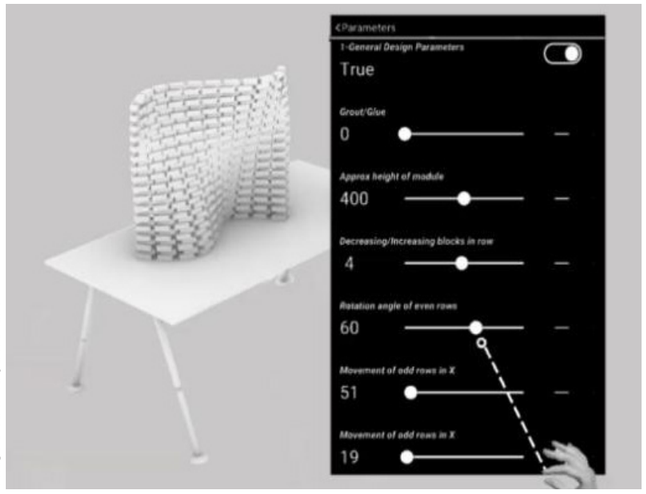


Image credit: Maryam Shafiei

Digital Heritage Standards

Project Contact: Dr Susan Holden

As the built environment industry moves towards digitisation, a question arises regarding the integration of digitised heritage buildings and the need for a standardised approach in the digitisation process. This project seeks to clarify this question in order to influence future policy at a national level, and ensure heritage buildings are adequately incorporated into the digital cities of the future.

The researchers created a 3D digital scan and model of UQ's Zelman Cowen building, which was then incorporated into the Digital Twin on Campus project. This demonstrated the ability for integration of digitised heritage buildings into BIM models and digtial twins.

The team also sourced and archived sets of drawings of the Zelman Cowen building from various architects who have worked on the building over decades.

Designing With Indigenous Communities

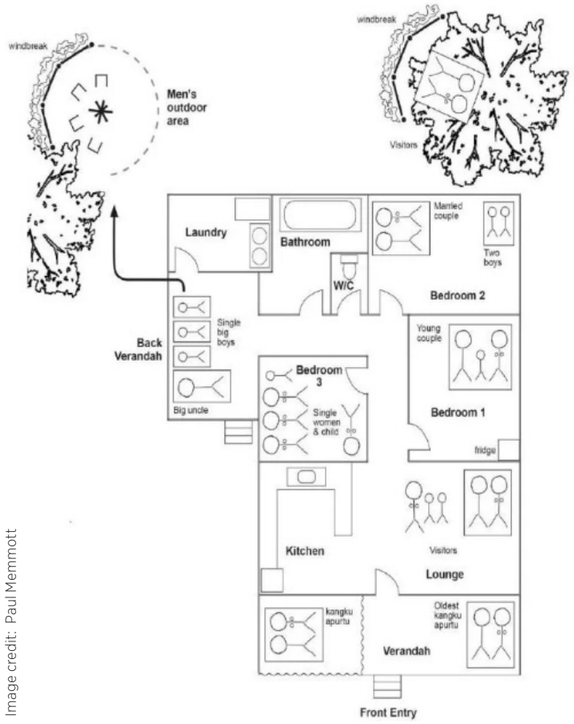


Image credit: Paul Memmott

Indigenous Health and Housing

Project Contact: Professor Paul Memmott

This partnership builds on an existing collaboration between the UQ research team and the Anyinginyi Health Aboriginal Corporation, in Tennant Creek, Northern Territory (Anyinginyi). The collaboration gathered new data on hygiene-related infectious diseases and the likely association with unintended crowding and unrepaired social housing, with considerations of climate change impacts. Further research throughout 2022 included linkage to additional organisations interested in investigating the influence of a healthy living environment on reducing the current high rates of Chronic Kidney Disease (CKD) in Aboriginal communities of remote Northern Territory: TelethonKids Institute and their Stopping Acute Rheumatic Fever Infections to Strengthen Health (STARFISH) project; and the Western Desert Nganampa Walytja Palyantjaku Tjutaku Aboriginal Corporation (WDNWPTAC), who provide the area's 'Purple House' kidney dialysis service.

The team published three journal articles, presented at three practitioner conferences, prepared three project reports (one published by Anyinginyi Health), made two grant submissions (one successfully) with a third in preparation, published two media pieces, and won a prestigious UQ research prize. Additionally, the team continued to emphasise the importance of sharing their research findings with key decision makers on housing, health and Indigenous wellbeing to ensure policy and budgeting decisions affecting Indigenous housing and health are evidence-based. The project also assisted the research team to successfully aply for a major reserach grant (NHMRC Synergy grant, $5 million).

The Future of Housing and Urban Design on Gununa

Project Contact: Dr Carroll Go-Sam

Gununa (Mornington Island) is facing a range of problems familiar to many in remote Indigenous communities: housing that is not fit for purpose, both culturally and environmentally, with too little housing for the community and energy security disparities.

Engaged by the Mornington Shire Council to provide guidance on a future development on the Island, the research team for this project began by surveying existing housing stock and infrastructure. They spoke with home occupiers to determine the current state of the built environment on the Island, and assessed the needs of the community for the future.

This informed a report for the Mornington Shire Council, which aimed to better inform the Council about how to improve current procurement practices and implement design for housing on the Island in a way that considers the community cultures and the environment. It includes a guideline called Gununaean Design Principles, and a Briefing and Procurement Model.

The aim is to produce dwellings that are economically sustainable for residents and government cost models, as well as climatically and culturally appropriate. Recommendations include siting dwellings with passive design principles in mind to maximise breezes, reduce sun exposure, and provide ample shaded outdoor spaces; offering greater diversity of housing options to allow for a range of family types and sizes; facilitating privacy; and supporting community interaction.

Future research will integrate energy experts to go beyond housing design, and look at broader infrastructure issues connected with disparities on the Island embedded in the built environment.

Image credit: Year 6 school student on Mornington Island

Material Explorations

Mapping Forest to Fibre, Fibre to Building

Project Contact: Mr Kim Baber

This project was a collaboration between UQ, Wide Bay Water (WBW) and the Department of Agriculture and Fisheries (DAF). It explored novel ways to process timber thinnings as rounds and create joints using parametric design to facilitate cost-effective ways to utilise this previously discarded resource.

This project exemplifies a holistic approach to sustainability and resource management:

- The source of the native spotted gum thinnings is a forest near Hervey Bay that is watered with treated affluent from the nearby water treatment facility. This keeps the waste water out of the ocean, helping to reduce water pollution and damage to the nearby Great Barrier Reef. It also provides a green belt protecting Hervey Bay from bush fires in surrounding National Parks.
- Fraser Coast Council has engaged local Indigenous communities to assist with the planting of stands in the forest, and have incorporated their feedback regarding culturally important sites into the planning of the forest.
- Timber thinnings are a normal by-product of timber forests that are undervalued because the cost to process them outweighs the potential revenue they can generate. By exploring processing methods to efficiently manufacture reproduceable round timber logs, and concurrently utilise data-driven design to create customisable joints, this research produces a viable second life for this 15-year-old timber, and simultaneously supplies a new timber option for the built environment.

Potential outcomes from the research include: novel ways to build with timber; maximising the amount of timber utilised from every felled tree; utilising timber of greater grade variance in construction settings; and demonstrating the benefits of integrated approaches to resource management. These will be further explored through a UQ Future Timber Hub project in 2023.

Image credit: Kim Baber

Above: A timber joint created using parametirc modelling.

Left: A modular joint and connector assembly prototype for modular configurations shown in exploded form.

Previous page top: Drawing from a child on Gununa showing what they love about their Country.

Previous page bottom: Floorplan of a crowded house in Tennant Creek.

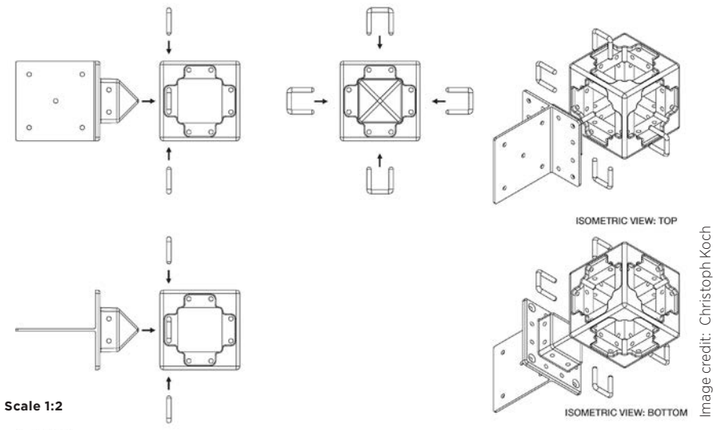


Image credit: Christoph Koch

Modular Housing

Project Contact: Dr Andrew Wilson

Queensland has a long history with prefabricated housing, but in recent years its benefits have waned due to its inherent lack of adaptability to location and client customisation desires, and the high cost of installation and connection of services.

Exploring housing as a basic infrastructure system that allows for an array of customisation, this project seeks to develop a modular housing system that makes it easier for houses to be tailored to client and site needs, and allows for cost-efficient servicing. Importantly, it also allows for implementation in medium-density residential housing, which typically suffers from negative cost implications in the face of unique design approaches.

The project has successfully developed: a strategy for creating an economical foundation and service core unit; a prefabricated structure and connection joint system options, allowing for configuration in different arrangements as well as changes over time; and a structural frame armature allowing input from owners for interior and exterior fit out negotiated through a catalogue of fit out options.

The researchers have also formalised a collaboration with Hutchinson Builders, with future plans to test ideas through protypes in the Hutchinson yard.

RESEARCH HIGHLIGHTS AND IMPACT

DEMONSTRATING THE POTENTIAL OF IMMERSIVE DIGITAL ENVIRONMENTS, THE VISUALISATION LAB HAS FACILITATED MORE INTEGRATED DUAL MODE WORKSHOPS, ALLOWED PROPERTY AND FACILITIES TO DEEPLY ENGAGE WITH THE CAMPUS DIGITAL TWIN, AND PROVIDED A PLATFORM FOR VIRTUAL INDUCTIONS WITH STUDENTS.

Image credit: Jacki Drinnen

Image credit: Architecture Media

DOSSIER IN AUSTRALIA'S LEADING ARCHITECTURE JOURNAL

The work of Dr Susan Holden and Dr Kirsty Volz (QUT) was the focus of the dossier in the March/April 2023 issue of *Architecture Australia*. Across six articles with 17 contributors, the dossier focuses on the increasingly influential role that architects can play in government and highlights the skills required for design governance positions as well as the ways these positions can be leveraged to improve public outcomes.

Opening the dossier is an insightful roundtable discussion led Dr Holden and Dr Volz between all current state and territory government architects who, for the first time, are all women.

Designing the Next Generation of Built Environments research has directly impacted the School's teaching and research methods, its engagement with industry and government in reserach planning and execution, and its reputation as a leader in the field of built environment research across academia and Queensland communities.

VISUALISATION LAB LAUNCH

The Visualisation Lab was funded through DNGBE and provides a 360° immersive environment for display of a broad range of computer-based visuals while also integrating with Virtual Reality (VR) and Augmented Reality (AR) headsets. Championed by Dr Frederico Fiahlo Teixeira, the Lab is designed to allow visualisations to come to life, which enhances research, teaching, and engagement with other schools, faculties, and industry.

The launch of the Visualisation Lab showcased the opportunity the space provides for different disciplines to come together, with academics and industry guests from architecture, planning, IT, electrical engineering, and Property and Facilities in attendance.

This is reflected in the Lab's usage over the past six months, which has included:

- Research workshops reporting significantly better integration of online and in-person attendees, and improved outcomes as a result.
- The Planning and Infrastructure at Springfield City Group using the Lab twice after seeing the School's work on digital twins in the virtual lab, with potential for adoption for Springfield.
- Sullivan Nicolaides Pathology using the Lab for development of a functional pathology tool training module in VR, as well as a fully interactive laboratory experience in XR.
- UQ Serious Games Society using the Lab for an education and training program to incorporate a competency-based assessment framework to Mechanical and Mining Engineering focused around training and assessment.
- UQ Property and Facilities using the Lab to visualise the campus digital twin (developed by Dr Teixeira) in 360 degrees and compare drawings to as-built projects through the use of point-clouds.
- Teaching and Learning Enhancement Team using the Lab for multiple EAIT inductions focused on completion of additional field training requiring spatial understanding.
- UQ XR Community using the Lab for enhancing the use of XR technologies by EAIT students.
- Architecture Master Thesis Development promoting quantitative and qualitative immersive experiences of the Digital Twin.
- DAQA Workshop in teh Lab focusing on the development and use of the Digital Archive of Queensland Architecture (DAQA) through amplified visualisation of the data.

Image credit: Jacki Drinnen

Image credit: Cecilia du Plessis

Government Engagement

A number of projects actively engaged with local councils or state government to ensure research aligns with, and influences, future policy directions.

The Inner-Brisbane Project

Researchers Peter Hyland and Dr Tope Adeniyi presented their report to Brisbane City Council (BCC) councillors and an Olympic delegation from Barcelona who were working on the Brisbane "City Centre Masterplan and Inner-City Framework'. The framework considers the broader planning implications, and opportunities, of changes to inner-Brisbane as part of 2032 Olympic Games preparations, and the research offered a unique perspective on approaches.

Productive Cities

The Productive Cities project team met with a number of Brisbane City Council (BCC) councillors and the BCC Better Suburbs Initiative Board to present their findings on home-based businesses, and discuss the need to better identify the range of business types and scales taking place in Brisbane's suburbs. Councillors agreed that the research was critical to resolving an existing gap in information regarding small businesses based in residential settings, which is needed for Council to develop strategies to support this active yet underrepresented part of Brisbane's economy in the future.

Designing and Developing Next Generation Urban Villages – a Cairns Case Study

A two-day workshop held in Cairns in October 2022 brought researchers and industry together with local council and state government. The workshop identified priorities for all stakeholders, and where these priorities aligned versus where road blocks existed. This allowed for a broad needs assessment and identified a way to progress the proposition that a significant change is needed to urban design, planning, transport, and housing typologies in order to address the needs of a growing population in Cairns.

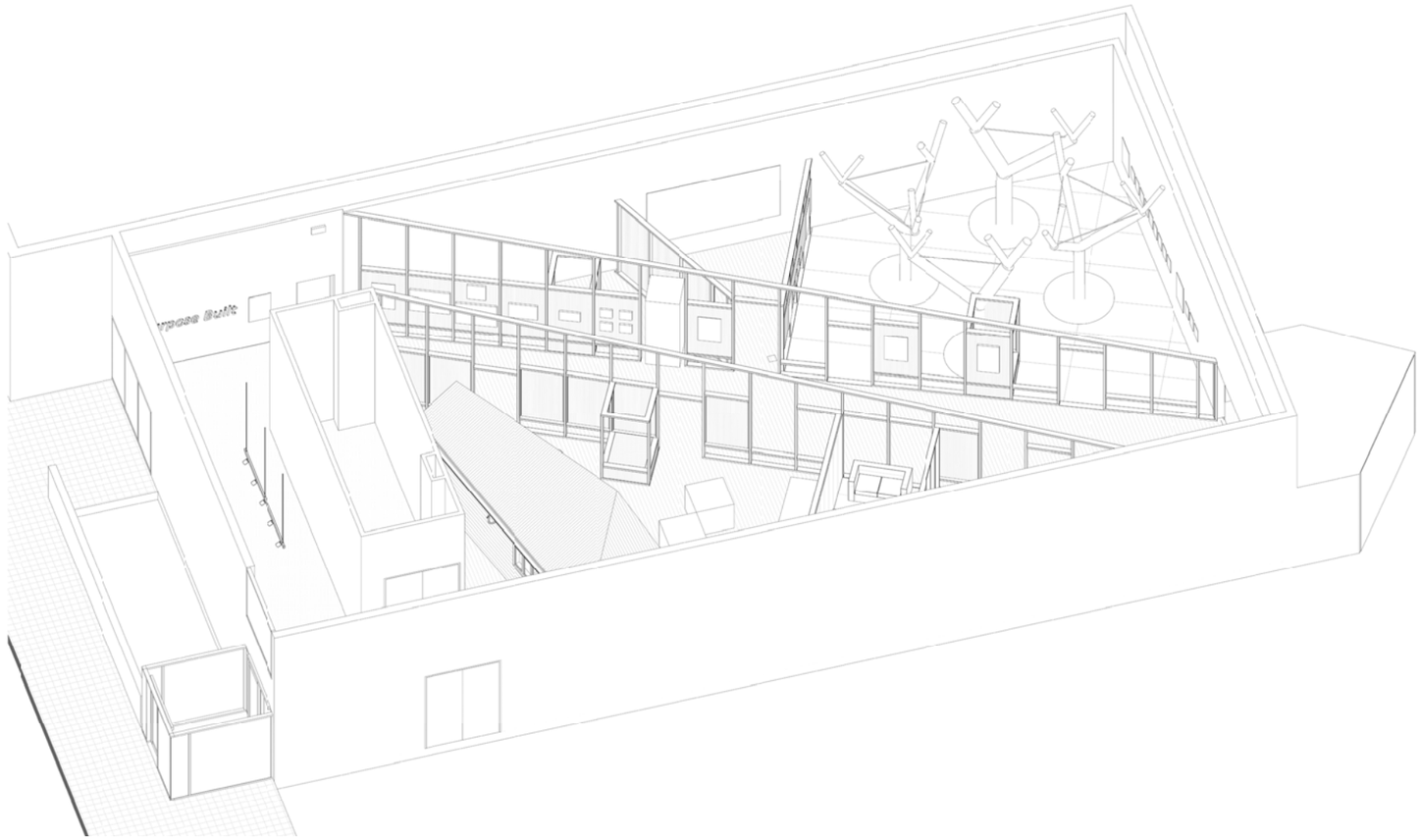


Image credit: Speculative Architecture

STATE LIBRARY OF QLD EXHIBITION

In August 2023, the School of Architecture will open an exhibition at the State Library of Queensland showcasing eight research projects from Designing the Next Generation of Built Environments.

Titled Purpose Built: Architecture for a Better Tomorrow, the exhibition will juxtapose the SLQ Collection content as historical precedent and current state context with the School's research into resilient design and innovation in the built environment.

The design and content of the exhibition aims to appeal to a broad audience while provoking a reconsideration of built environment policy and cultural norms in advocating for the change required to meet sustainability targets and improve living standards for changing populations.

The exhibition will extend from slq Gallery across Level 2 into the Asia Pacific Design Library. The projects included are:

- Mapping Forest to Fibre, Fibre to Building
- The Future of Housing and Urban Design on Gununa
- Digital Twin of the UQ St Lucia Campus
- Collaborative Water Sensitive Design and Urban Performance Analysis
- A Pathway to Future-Proof Housing Standards
- Augmented Reality for Design and Manufacture
- Remote Additive Robotic Manufacturing

The research content will be further amplified by public programming over the course of the exhibition period, allowing strategic engagement with policy makers, stakeholders, students, industry groups, and the broader public.

Image credit: Kirm Baber

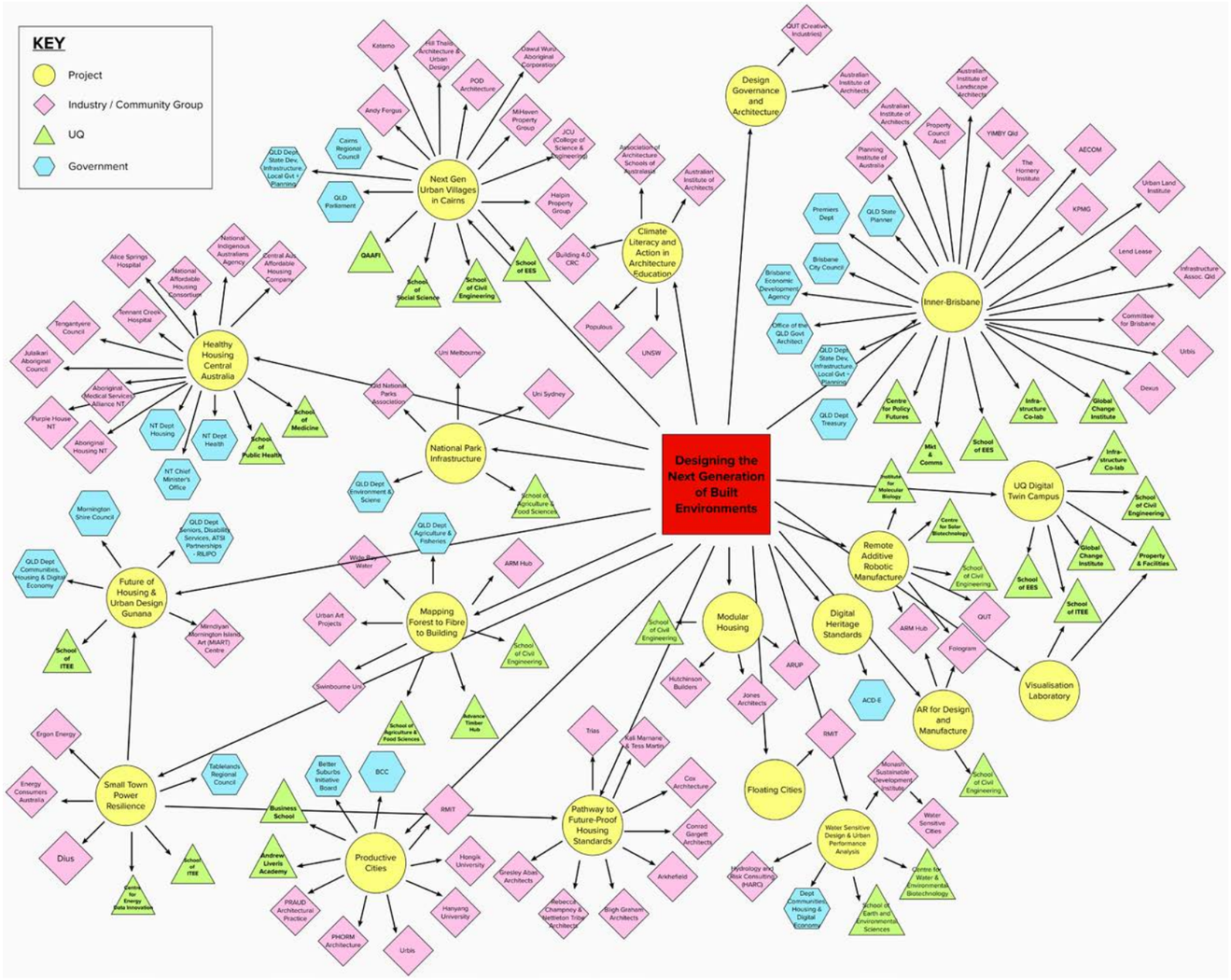
Image credit: Studio Bland

Top left: Participants at the Cairns workshop

Top: *Purpose Built* draft exhibition design.

Middle: Mapping Forest to Fibre, Fibre to Building installation in *Purpose Built*.

Bottom: *Purpose Built* visual identity mock-up on the State Library of Queensland exterior.



RESEARCH NETWORKS

The School of Architecture further strenghtened its network across the full scope of the built environment during the DNGBE grant period. This included stong inter- and cross-institutional collaborations, industry involvement, and government consultation.

RESEARCHERS

School of Architecture, Faculty of EAIT

Professor John Macarthur (CI)
Dr Kim Baber
Dr Liz Brogden
Professor Cameron Bruhn
Carroll Go-Sam
Dr Kelly Greenop
Dr Susan Holden
Peter Hyland
Dr Mark Jones
Dr Tim Kastelle
Dr Catherine Keys
Dr Chris Landorf
Dr Paola Leardini
Dr Dan Luo
Professor Paul Memmott
Dr Silvia Micheli
Associate Professor Antony Moulis
Dr Timothy O'Rourke
Dr Ashley Paine
Dr Nicole Sully
Dr Frederico Fiahlo Teixeira
Dr Deborah van der Plaat
Dr Bryan Wang
Dr Andrew Wilson

Postdoctoral Reserach Fellows, School of Architecture

Dr Ayodeji Adeniyi
Dr Peyman Akhgar
Dr Steven Chaddock
Dr Christoph Koch
Dr Kali Marnane
Dr Islam Mashaly
Dr Paul Matthew
Dr Mojtaba Moravej
Dr Maryam Shafiei
Dr Stephen Snow

Other UQ Researchers

Associate Professor Remi Ayoko
Dr Joe Gattas
Dr Mashhuda Glencross
Dr Antony Heynen
Dr Neil Horrocks
Dr Steven Kenway
Dr Nina Lansbury

External Researchers

Paul Jones
Dr Kirsty Volz
Dr Andrew Redmond

COLLABORATORS

UQ Schools, Centres and Institutes

Advance Timber Hub
Andrew N. Liveris Academy for Innovation and Leadership
Australian Centre for Water and Environmental Biotechnology (ACWEB)
Business School
Centre for Energy Data Innovation
Faculty of Medicine
Global Change Institute
Infrastructure Co-Lab
Office of the Vice-Chancellor (Government Relations & Policy)
Properties & Facilities
QAAFI
School of Agriculture and Food Sciences
School of Civil Engineering
School of Information Technology and Electrical Engineering
School of Earth and Environmental Sciences
School of Social Science
School of Public Health

External Institutions

Hanyang University
Hongik University
JCU
QUT
RMIT
Swinburne University
University of Sydney
University of Melbourne

Industry

Aboriginal Housing NT
Alice Springs Hospital
Andy Fergus
Central Australia Affordable Housing Company
Cox Architecture
Conrad Gargett
Halpin Property Group
Hill Thalis Architecture + Urban Projects
Hydrology and Risk Consulting (HARC)
Katarno
MiHaven
National Affordable Housing Consortium
National Indigenous Australian Agency
OMA Australia
Origin Energy
People Oriented Design
PRAUD Architectural Practice
PHORM Architecture + Design
Tennant Creek Hospital
UAP / Farm Architectural
Urbis

Community Groups

Aboriginal Medical Services Alliance NT
Anindilyakwa Housing Aboriginal Corporation (AHAC)
Dawul Wuru Aboriginal Corporation
Energy Consumers Australia
Julalikari Aboriginal Council
Mirndiyan Mornington Island Art (MIART) Centre
Purple House, NT
Tangentyere Council, Alice Springs, NT
WDNWPTAC

Government

Better Suburbs Initiative Board
Brisbane City Council
Brisbane Economic Development Agency
Cairns Regional Council
Department Foreign Affairs and Trade
Mornington Shire Council
NT Department of Health
NT Department of Housing
NT Chief Minister's Office
Qld Department of Communities, Housing and Digital Economy
Qld Department of Environment and Science (QPWS)
Qld Department of Seniors, Disability Services, Aboriginal and Torres Strait Islander Programs – Remote Indigenous Land and Infrastructure Program Office (Rilipo)
Qld Department of State Development, Infrastructure, Local Government and Planning
Qld Department of Treasury
Qld Government Architect
Qld Member for Barron River
Qld Member for Cairns
Qld Premier's Department
Qld State Planner
Tablelands Regional Council
Wide Bay Water

OUTPUTS 2021–2022

Books

Crist, G; Doyle, J; Luna, R; Micheli, S; Moulis, A; Yim, D. (2023). *Precinct Territory: Design Strategies for the Productive City*. Oro Editions.

Wang, B; Bao, N. (2023). *Floating Cities: Buoyant urbanism, legal change & amphibious architecture*. Paper Boat Press.

Book Chapters

Micheli, S; Moulis, A; Akhgar, P. (2023). 'Profuction in suburbs' in Crist, G; Doyle, J; Luna, R; Micheli, S; Moulis, A; Yim, D. *Precinct Territory: Design Strategies for the Productive City*. Oro Editions.

Teixeira, M; Shafiei, M; Caldwell, G; Donovan, J; Teixeira, F; Lotfian, S. (2022). 'RoboBlox' in Reinhardt, D; Loke, L; Turnbull Tillman, D. *SHErobots, Tool, Toy, Companion*. (pp. 74-78).The University of Sydney.

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Baber, K. 'Inventory constrained design of a variable diameter round timber structure' (abstract acceptance pending). *Integration of Design and Fabrication: Symposium of the International Association for Shell and Spatial Structures 2023* (IASS 2023). Melbourne, Australia. 10-14 July, 2023.

Brogden, L. Keynote: 'Designing Architecture Education: A "Climate Literate" Future for the Profession'. *Architectural Science Association Conference*. Perth, Australia. 1-2 December, 2022.

Brogden, L. 'The future as the hypothesis: a systems-scale experiment in architecture education'. *Association of American Collegiate Schools of Architecture (ACSA), Teachers Summit: Summit for Climate Agency.* New York, USA. 6-7 July, 2022.

Brogden, L; Kessler, C; Oldfield, P; Stead, N; Knapp, C; Reinhardt, D. 'An International Review of Climate Action and Literacy in Architecture'. *Association of American Collegiate Schools of Architecture (ACSA) 2022 Research Conference, Resilient Futures*. Online. 6-7 October, 2022.

Greenop, K; Paine, A. 'Intangible Heritage'. *Amps 2023 Prague – Heritages*. Prague, Czech Republic. 28-30 June, 2023.

Hall, N; Simpson, P; Frank, P; Memmott, P; Redmond, A; Go-Sam, C; Nash, D. 'How housing maintenance and crowding can support or undermine health: A case study from the Barkly Region NT. *13th National Aboriginal and Torres Strait Islander Environmental Health Conference* (NATSIEH). Darwin, Australia. 5-8 September, 2022.

Holden, S; Daw, O. 'Watershed or Whimper: The Australia Year of the Built Environment 2004'. *Ngā Pūtahitanga / Crossings: Joint Conference of SAHANZ and the Australasian UHPH Group.* Auckland, New Zealand. 25-27 November 2022.

Holden, S; Paine, A; Chaddock, S; Macarthur, J; Greenop, K. 'Building Value: Assimilating Energy and Adaptability Values in Heritage Frameworks'. *ICOMOS General Assembly conference*. Sydney, Australia. 31 August - 09 September, 2023.

Holden, S; Volz, K. 'Women and Design Leadership: A new era of architects in the public sector'. *Ngā Pūtahitanga / Crossings: Joint Conference of SAHANZ and the Australasian UHPH Group*. Auckland, New Zealand. 25-27 November, 2022.

Lansbury, N; Memmott, P; Redmond, A. 'Crowding and WASH infrastructure affect COVID risks in remote Indigenous communities'. *WASH Futures Conference*. Brisbane, Australia. 13-17 February, 2023.

Lansbury, N; Memmott, P; Redmond, A. (2022). 'Environmental health and climate change in remote communities: opportunities to protect health through community-led initiatives.' *13th National Aboriginal and Torres Strait Islander Environmental Health Conference* (NATSIEH). Darwin, Australia. 5-8 September, 2022.

Micheli, S; Moulis, A; Akhgar, P; Ayoko, R; Kastelle, T. 'Re-thinking homes as spaces for improved resilient communities'. *Counter Architecture Repurposing Places Conference.* London, England. 23-24 March, 2023.

Micheli, S; Moulis, A; Akhgar, P; Ayoko, R; Kastelle, T. 'Domestic space and urban resilience: The productive house and suburban entrepreneurialism'. *AMPS Liveable Cities – New York Conference.* New York, USA. 14-16 June, 2023.

Mojtaba, M; Leardini, P. 'Design typological analysis for urban water management: why quantification is needed and how it can be done?'. *1st International e-Conference on Green & Safe Cities* (IeGRESAFE). 20-21 September, 2022

O'Rourke, T; Sully, N; Chaddock, S. 'From Rambling to Elevated Walkways: Piecemeal Planning Histories in National Parks'. *Ngā Pūtahitanga / Crossings: Joint Conference of SAHANZ and the Australasian UHPH Group.* Auckland, New Zealand. 25-27 November, 2022.

Paine, A; Greenop, K. 'Archives and authorship: a case study on the impact of digital architectural collections'. *Building Data: Architecture, Memory, and New Imaginaries, Ninth Annual Conference of Jaap Bakena Study Centre*. Delft, The Netherlands. 23-24 November, 2022.

Shafiei, M; Teixeira, F; Zhu, G. (2023). 'Structural Performance of Bio-Clay Robot Printed Blocks'. *CAADRIA International Conference*. Graz, Austria. 18-24 March, 2023.

Shafiei, M; Teixeira, F. (2022). 'Workflow for robotic sketching'. *Employing Robots in Architecture Education.* Brisbane, Australia.

Teixeira, F; Mashaly, I; Karlovsek, J. (2023). 'Implementation of an Academic Campus Digital Twin'. *ICSCTSD 2023: Smart City Technology and Sustainable Development Conference*. New York, USA. 05-06 June, 2023.

Teixeira, F; Mashaly, I; Karlovsek, J. 'Reconsidering Digital Twins'. *The 41st eCAADe Conference*. Graz, Austria. 20-23 September, 2023.

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Knox, K; Shafiei, M; Al-Dakheel, S; Teixeira, F. (2022). Urban Totems: Designing and fabricating artwork. *2022 Botanica Exhibition*. Brisbane City Council, Australia.

Micheli, S; Moulis, A; Akhgar, P; Ayoko. (2022). *Seoul Public Symposium, Domansa.* Seoul, Korea.

Shafiei, M; Knox, K. (2022). Digital Boot-Camp Workshop. *New Generation of Built Environments; Summer Festival of Digital Architecture 2021*. School of Architecture, UQ.

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Holden, S. (Lead CI). ARC DECRA22: Design Governance Futures: Valuing Architecture and the Built Environment.

Holden, S. (Lead CI), Liz Brogden (CI), Carroll Go-Sam (CI), Naomi Stead (CI), Justine Clark (CI). Women's Leadership and Development Program – Lead and Succeed Grant (2022): Centre for Women in Built Environment Design Leadership 2023-26.

Holden, S. (Lead CI). Whitlam Institute Fellowship (2023): From Designer to Advisor: The changing role of architects in government in Australia.

Liefooghe, M. (Lead CI); Holden, S. (CI). FWO (The Research Foundation Flanders) (2023): Defining High Quality Architecture: Understanding the Agendas, Practices and Expertise of Government Architects. (not yet submitted)

Lansbury, N. (Lead CI); Nona, F. (CI); Memmott, P. (CI); Redmond, A. (CI); Mosby, V. (CI); Lee, A. (CI); Beal, C. (CI). NHMRC Ideas Grant (2023): Living in Country: Aboriginal & Torres Strait Islander Peoples Navigating Their Health in a Golbal Warming-Affected Future (LOCATING).

Carapetis, J. (Lead CI); Bowen, A. (CI); Memmott, P. (CI); Pearson, G. (CI); Bloom, D. (CI); Ralph, A. (CI); Davies, M. (CI); Hall, N. (CI); Wyber, R. (CI); Barnett, T. (CI). MHMRC Synergy Grants (2021). Stopping Acute Rheumatic Fever Infections to Strengthen Health (STARFISH).

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Paine, A. (Lead CI), Holden, S. (CI), Macarthur, J. (CI). UQ Global Strategy and Partnerships: Seed Funding Scheme (2023): Defining Quality in Architecture: The governance of material and cultural values in the built environment.

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Brogden, L; Gonsalves, K; Oldfield, P; Stead, N; Kessler, C; Knapp, C; Reinhardt, D. (2023). Climate literacy and action in architectural practice: Australasian perspectives. Association of Architecture Schools of Australasia, Australian Institute of Architects.

Glencross, M; Horrocks, N; Snow, S; Naranpanawe, L; Angelowski, Z. (2022). Full Feasibility Study for the Millaa Millaa Microgrid.

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Image credit: Maryam Shafiei

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Mojtaba, M; Sochacka, B; Matthew, P; Leardini, P. (2023). Housing Typologies in Greenslopes, Brisbane.

Matthew, P; Leardini, P; Moravej, M; Matthew, P. (2023). Summary of Building Codes in Brisbane: Site setbacks, height limits and site cover restrictions.

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Holden, S; Volz, K. (eds). 'The Value of Architects in Government – Research Dossier,' *Architecture Australia* vol. 112 no. 2 (March-April 2023), pp.53-69.

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Brogden, L; Stead, N; Oldfield, P; Knapp, C; Reinhardt, D. 'A watershed moment: architecture education and climate change'. *Architecture Australia*, (July-August 2022). pp.60-61

Harrison, S; Chiew, J; Kirkman, E. 'Design Review Panels in Action'. *Architecture Australia* vol. 112 no. 2 (March-April 2023), pp.60-63. (Introduction by Volz, K. and Holden, S.)

Holden, S; Chaddock, S. 'Concrete on Campus: Material values of late-modern campus buildings'. *Change Over Time* 'Material Matters' issue. May 2023.

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Lansbury, N; Hoy, W; Shaw, B; Barnes, S; Memmott, P; Redmond, A. 'What is the link between housing, crowding, infections and high rates of kidney disease in a remote Aboriginal town?' [Letter to the edition] *Australian and New Zealand Journal of Public Health,* vol 47, no. 2:100030.

Lansbury, N; Memmott, P; Burgen, C; Redmond, A. 'Environmental health initiatives in the home to reduce Streptococcal A bacteria transmission and its contribution to the burden of rhematic heart disease in remote Aboriginal communities'. *PloS Neglected Tropical Diseases Journa*l.

Memmott, P; Lansbury, N; Go-Sam, C; Nash, D; Redmond, A; Barnes, S; Simpson, P; Frank, P. 'Aboriginal social housing in remote Australia: Crowded, unrepaired, and raising the risk of infectious diseases.' *Global Discourse Journal*, 12 (2), pp.255-284.

Moore, T; Fergus, A; Dodds, M. 'Pathways to Public Sector Roles'. *Architecture Australia* vol. 112 no. 2 (March-April 2023), pp.66-67.

Moravej, M; Renouf, M; Kenway, S; Urich, C. (2022). 'What roles do architectural design and on-site water servicing technologies play in the water performance of residential infill?' *Water Research* (213).

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Thomson, S. 'An Optimistic Act: From architecture to politics: Elizabeth Watson-Brown'. *Architecture Australia* vol. 112 no. 2 (March-April 2023), pp.68-69.

Image credit: Cathy Keys

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Brogden, L. *Australian Institute of Architects Climate Action and Sustainability Taskforce (CAST)*. 2022.

Brogden, L. *Australian Institute of Architects National Education Committee.* 2022.

Chaddock, S. *School of Architecture Research Seminar Series.* School of Architecture, UQ. 23 May, 2022.

Holden, S. Future research collaborations between UQ and UGhent on public design leadership. *Office of the Queensland Government Architect.* 04 April, 2023.

Holden, S. GANA. 13 June, 2022.

Holden, S. Public Launch of the March-April *Architecture Australia* Research Dossier 'The Value of Architects in Government'. 28 March, 2023.

Hyland, P. 'World's Best Projects' panel speaker. *Property Council of Australia Congress*. Hobart, Australia. April, 2022.

Hyland, P. 'Key Urban Trends Impacting the Future of Cities'. Advisory Board Centre, *Mega Trends Congress*. Brisbane, Australia. May, 2022.

Hyland, P. 'Designing the Inner city of Brisbane'. *Committee for Brisbane*. Brisbane, Australia. March, 2023.

Lansbury, N; Matthews, V; Atkinson, A-R; Mohamedi, J; Mosby, V; Nona, F; Ford, L.P; Beal, C; Memmott, P; Jupurrurlan, N.F; Quilty, S; Jackson, M; Lee, A; Redmond, A.M; Hempenstall, A; Burgen, C. *COP27: On Country, health and Indigenous knowledges*. Croakey. 07 November, 2022.

Leardini, P. *Resilient Homes and Suburbs [Webinar].* Planning Institute Australia. 8 December, 2022.

Leardini, P; Moravej, M. *School of Architecture Research Seminar Series.* School of Architecture, UQ. 17 October, 2022.

Macarthur, J. *Data Futures for Architectural History and Heritage workshop.* The Australian Cultural Data Engine in collaboration with the Digital Archive of Queensland Architecture (DAQA) and Curtin University Library. 23 November, 2022.

Mashaly, I. 'Values and Standards in Digital Twins'. *School of Architecture Research Seminar Series.* School of Architecture, UQ. 23 May, 2022.

Matthew, P. *School of Architecture Research Seminar Series.* School of Architecture, UQ. 21 November, 2022.

Micheli, S; Moulis, A; Akghar, P. Brisbane City Council and Better Suburbs Initiative Board (BCC). 06 December, 2022.

Micheli, S; Moulis, A; Akghar, P. Soft book launch. Design Hub, RMIT, *Melbourne Design Week.* 18 May, 2023.

Micheli, S; Moulis, A; Akghar, P. Soft book launch. URBIS Brisbane. May, 2023.

Mojtaba, M; Leardini, P. *RSP Project Concluding seminar.* 13 December, 2022.

Mojtaba, M. Queensland Urban Utilities. *Future Strategies Seminar series.* 7 March, 2023.

O'Rourke, T; Sully, N. 'Bovine pads, fungi and the sublime: Walking infrastructure in National Parks', *School of Architecture Research Seminar Series.* 17 October, 2022.

O'Rourke, T; Sully, N. University of Sydney. 2023.

Shafiei, M. 'Advanced Robotic Manufacturing for Development of Remote Settlements'. Nanjing University, School of Architecture and Urban Planning, China. 2022.

Shafiei, M. 'Augmented Reality for Architectural Design and Advanced Robotic Manufacturing'. *School of Architecture Research Seminar Series.* School of Architecture, UQ. 2022.

Shafiei, M; Knox, K. (2022). Digital Boot-Camp Workshop. *New Generation of Built Environments; Summer Festival of Digital Architecture 2021.* School of Architecture, UQ.

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Adeniyi, T. ARCH7091 – Making Tacit Networks Visible. (Sem 2, 2022).

Matthew, P; Mojtaba, M. ARCH7074 – Environmental Performance. (Sem 1, 2023).

Leardini, P. Masters Thesis – Miao Zhu. Understanding the water and water-related energy performance of precinct-scale urban redevelopment. (24 October, 2022),

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Kenway, S. WATR6105 – Integrated Urban Water Management. Sem 1, 2023.

Micheli, S. ARCH2100 – The Productive House (Sem 1, 2022 and Sem 1, 2023).

Micheli, S. UDAD7006 – Strategies of Production: New Urban Villages for Cairns (Sem 1, 2023).

Micheli, S. ARCH3144 – Productive City in Seoul (TP5 2023).

O'Rourke, T. ARCH7005 – Landscape and Architecture: Conserving biodiversity by design in national parks (Sem 1, 2022 and 2023).

Wang, B. ARCH7007 – Hybrid Floating Cities: Ecological engineering, buoyant urbanism and marine utopias. (Sem 1, 2022).

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