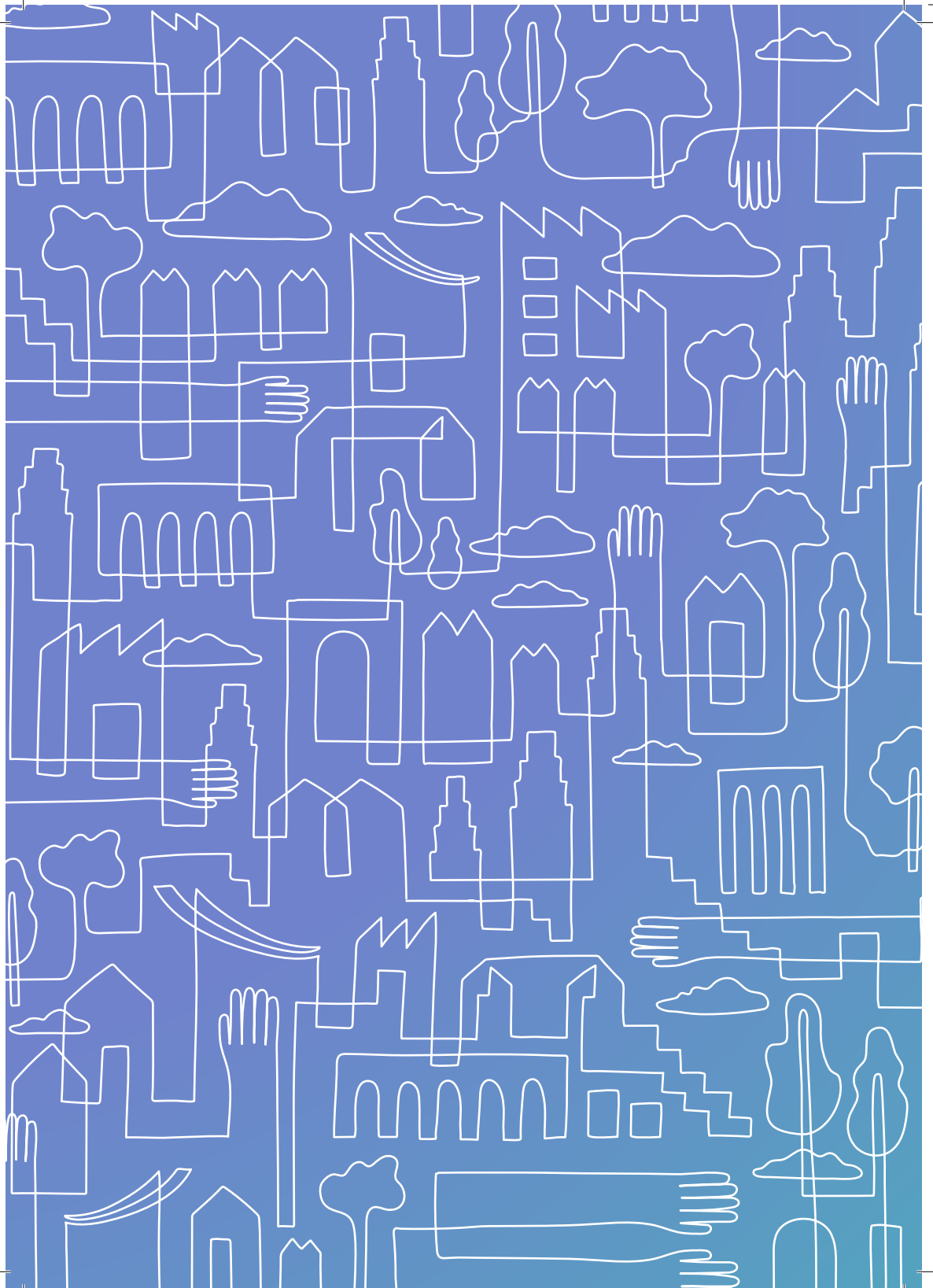


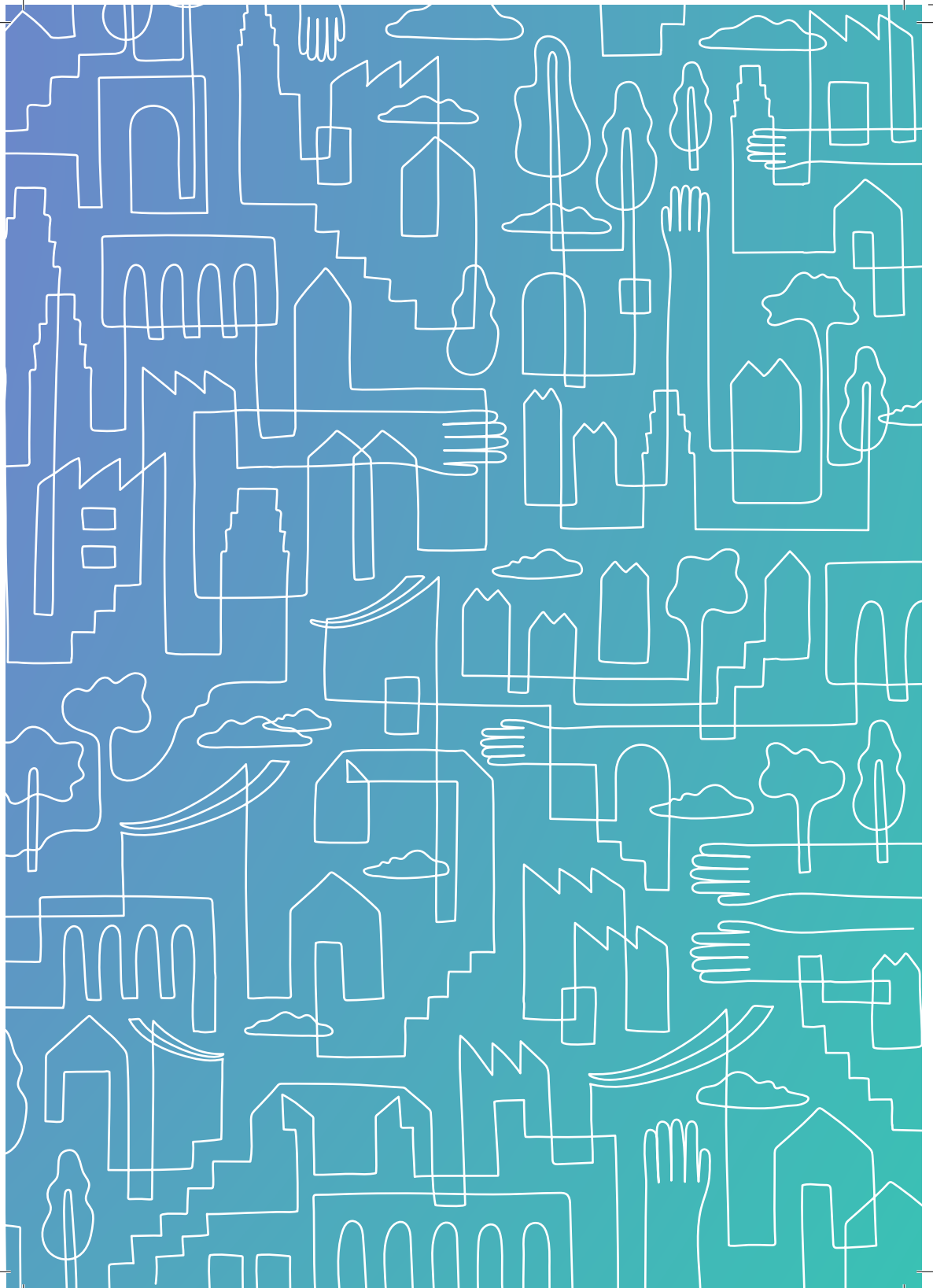
BUILDING RESILIENCE

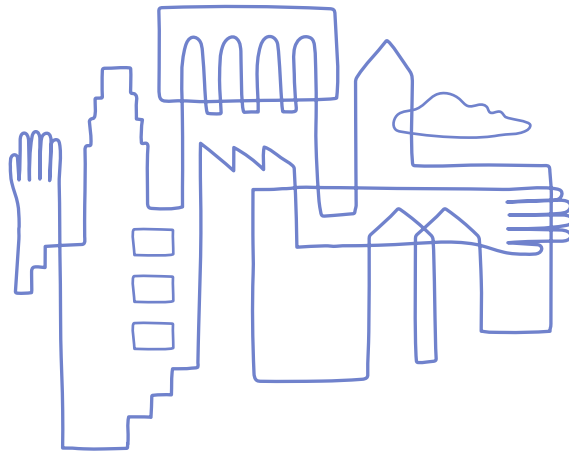
The main graphic features the words 'BUILDING' and 'RESILIENCE' in a large, outlined, sans-serif font. The letters are filled with a gradient from light blue to white. To the right of the text is a vertical stack of white line-art icons: a tree, a building, a cloud, a building, and a hand. The word 'BUILDING' is in a lighter blue color, while 'RESILIENCE' is in a slightly darker blue. The background is a solid dark blue.

**SCHOOL OF
ARCHITECTURE
AND BUILT
ENVIRONMENT**









www.buildingresilience.com.au

ISBN: 978-0-7259-0593-4

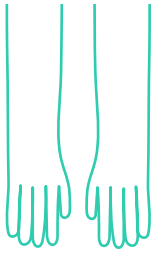
About SABE

The School of Architecture and Built Environment is an exciting community dedicated to teaching and research in support of the built environment professions. We have an international reputation for pioneering problem-based learning, research-led learning, and online and blended learning in both our undergraduate and postgraduate built environment programs.

There are more than 2,200 undergraduate and postgraduate students studying architecture, construction management, project and disaster management.

Design is a fundamental pillar of architectural practice and the School emulates this in its curricula and research. Strong design skills, supported by appropriate knowledge, skills and attitudes, provide graduates with the capacities to play a vital role in their profession.

The School of Architecture and Built Environment has always had a proud history of Teaching and Learning, being the first internationally to implement Problem-Based Learning across the Architecture curriculum. The quality of this model of professional education has been proved throughout the years since its introduction in the early 1980s. The quality of the work displayed in this exhibition demonstrate its success and validity.



Indigenous acknowledgement

We acknowledge and pay respects to the traditional custodians of the lands on which our campuses are located:

- The Pambalong Clan of the Awabakal Nation
Newcastle campus at Callaghan
- Darkinung People
Central Coast campus at Ourimbah
- Biripai People
Port Macquarie campus

We acknowledge Aboriginal and Torres Strait Islander people and pay our respect to their ancestors past and present and acknowledge future leaders.

Acknowledgements

Building Resilience exhibition is an experiment in itself – empowering the Construction Management Discipline to enter the world of translating research into non-traditional forms of outputs along with the Architecture Discipline. It is a testament for fusing multidisciplinary research work carried primarily by the researchers in the School of Architecture and Built Environment (SABE) on building resilience.

This exhibition would not have been possible without the enthusiasm of all the exhibitors and the immense support of Professor SueAnne Ware, Head of School, SABE. I am also indebted to Gillean Shaw (Watt Space Gallery Curator) and Dr. Warren Reilly, who assisted us in many ways to get this exhibition up and running. I would also like to thank Professor Lee Smith (PVC-CESE) and Professor Brett Ninness (former PVC- FEBE) for their support.

This event would not have been realised without the support of the SABE Professional Team: Ennia Jones, Joanne Connor, Kahlea Scheeren and Taona Afful. I would like to thank Ennia for taking an active and lead role in organising the exhibition and the sub-events.

My sincere thanks to Jo for her tireless efforts in assisting with exhibition operations. I would also like to thank Jedd Cranfield, Alexandra Morris, Sophie Brown and Priscilla Tan for their creative input.

I would like to acknowledge the advice and support from Ruth Pring (Engagement Manager) and Connor Brown (Office of Alumni and Philanthropy).

I would also like to thank our PhD candidates, colleagues and volunteers who are assisting the Watt Space gallery throughout the exhibition.

Thayaparan Gajendran
Associate Professor (Construction Management), Building Resilience Exhibition - Lead Organiser and Co-Curator, School of Architecture and Built Environment





Celebrating resilience

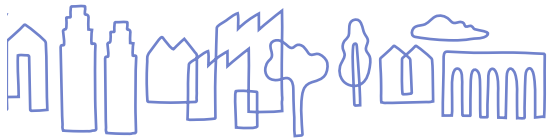
Resilience has become a very common word and sentiment in recent years, particularly with climate change and extreme weather events, a global pandemic, as well as general political and social unrest. So it's quite telling that this exhibition is multi-faceted, complex and deeply inspired. The exhibition and the events which celebrate it, are indeed the tireless works of many, all of whom I have had the distinguished pleasure of knowing and learning from in my time at the School of Architecture and Built Environment (SABE). This exhibition marks a key moment in time and a coming together of SABE's diverse community of scholars. It crosses boundaries between disciplines, media, geographic locations, and intellectual discourses; thus it is a rich palimpsest of resilience and adaptation in the Built Environment.

It is important to note that the works in the exhibition are both brave and hopeful, and that the authors do not claim to have all of the solutions to the multifarious challenges that they unpack. In many cases they open up and explore things in novel and considered ways; shedding new light and uncovering different perspectives which are both humble and courageous. So rather than problem solving, they discover methodological advances which others can apply

elsewhere. The works are specific to their physical and cultural contexts yet they transcend them. They examine our region and other specific places but have impacts in the greater world. They are embedded in resilience thinking investigating how the intertwining ecologies and interacting systems of humans, biotic and abiotic systems can best be revealed, understood, and reconnected. The most powerful works draw on our empathy for all living things in this world and our humanity for one another. The authors' collective agency is a call and an invitation for others to act.

Maya Angelou once famously wrote: "I can be changed by what happens to me. But I refuse to be reduced by it." (2009, Letter to My Daughter Random House, New York p.27) For me, Angelou's verse definitively, poetically portrays resilience and she encapsulates the spirit and fortitude of the authors and collaborators in these works. Angelou inspires us to overcome and adapt, with dignity and grace... the tacit message we must take forward.

Professor SueAnne Ware
Dean | Head of School, School of
Architecture and Built Environment



Building resilience

The Building Resilience exhibition engages the community to raise awareness of the multiple dimensions of resilience.

Resilience is becoming a unifying concept in the backdrop of climate change, mass migration, the fast pace of urbanisation, forced displacement, increasing social inequalities, developing accountable institutions, and maintaining integrity in transforming the cyber-human evolution. A growing number of education, government and private organisations focus on 'building resilience' as their central tenant or a push to drive change. This trend is underpinned by the urge to improve the human condition and develop the capacity to respond to collapses of complex systems.

International frameworks such as the United Nations Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction, provide us with opportunities to address the resilience agenda in a meaningful way.

This exhibition strives to find ways to build resilience at individual, community, systems and global level. Each exhibit aims to contribute to 'building resilience' via research, education and advocacy and address at least one sustainable development goal.

The exhibits are classified into seven building resilience themes. They are Building Resilience through:

1. Place and culture
2. Sustainable construction
3. Sustainable living
4. Capacity development
5. Institutions and policy ingenuity
6. Caring for the natural environment
7. Partnerships.

The exhibits develop a compelling narrative on how research, engagement and advocacy can bring resilience to the forefront of policy development and day to day living.

Thayaparan Gajendran
Associate Professor (Construction Management), Building Resilience Exhibition - Lead Organiser and Co-Curator, School of Architecture and Built Environment



CIFAL Newcastle

- Clean water and sanitation
- Climate Action
- Industry, Innovation and Infrastructure.

These are just three of the 17 United Nations Sustainable Development Goals (SDGs). These goals are a universal call to action by all countries to protect the planet and improve the lives and prospects of everyone.

To achieve the SDGs, the world must first fully understand them.

CIFAL Newcastle is a training and research centre affiliated to the United Nations through the United Nations Institute for Training and Research (UNITAR).

Hosted by the University of Newcastle, it is one of 21 CIFAL centres strategically placed around the globe.

CIFAL Newcastle is the only CIFAL centre servicing Australasia, and Pacific Island nations.

Each of the projects in the Building Resilience exhibition address at least one of the 17 Sustainable Development Goals in some capacity.

Read over the goals as you peruse the exhibition, and see if you can tell how exhibitors' research is contributing to an inclusive, sustainable and resilient future.



SUSTAINABLE DEVELOPMENT GOALS

1 NO POVERTY

2 ZERO HUNGER

3 GOOD HEALTH AND WELL-BEING

4 QUALITY EDUCATION

5 GENDER EQUALITY

6 CLEAN WATER AND SANITATION

7 AFFORDABLE AND CLEAN ENERGY

8 DECENT WORK AND ECONOMIC GROWTH

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

10 REDUCED INEQUALITIES

11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

14 LIFE BELOW WATER

15 LIFE ON LAND

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

17 PARTNERSHIPS FOR THE GOALS



United Nations Institute for Training and Research



unitar

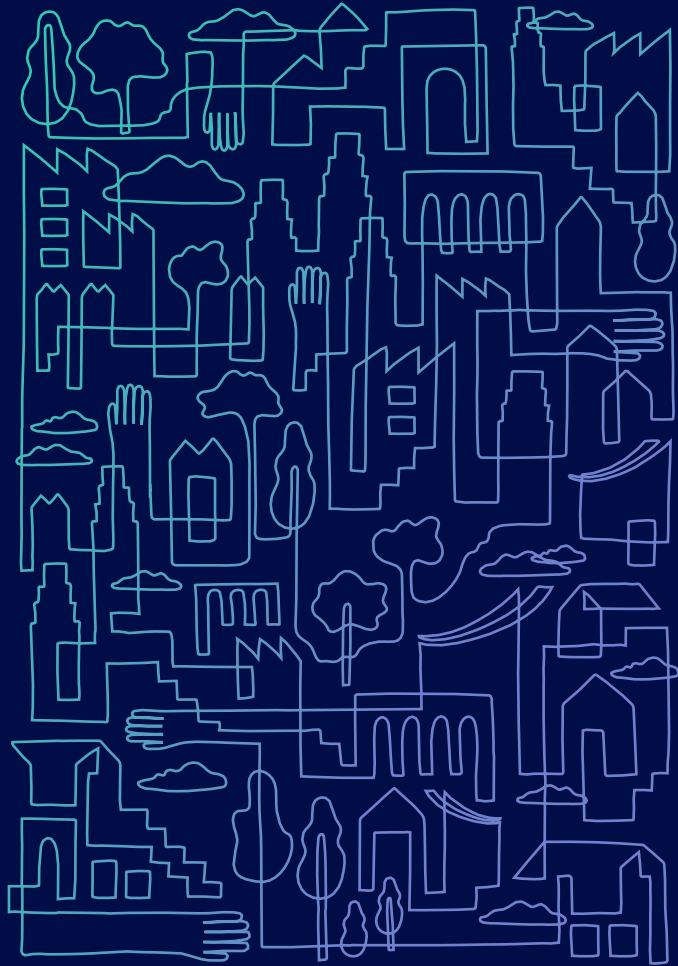


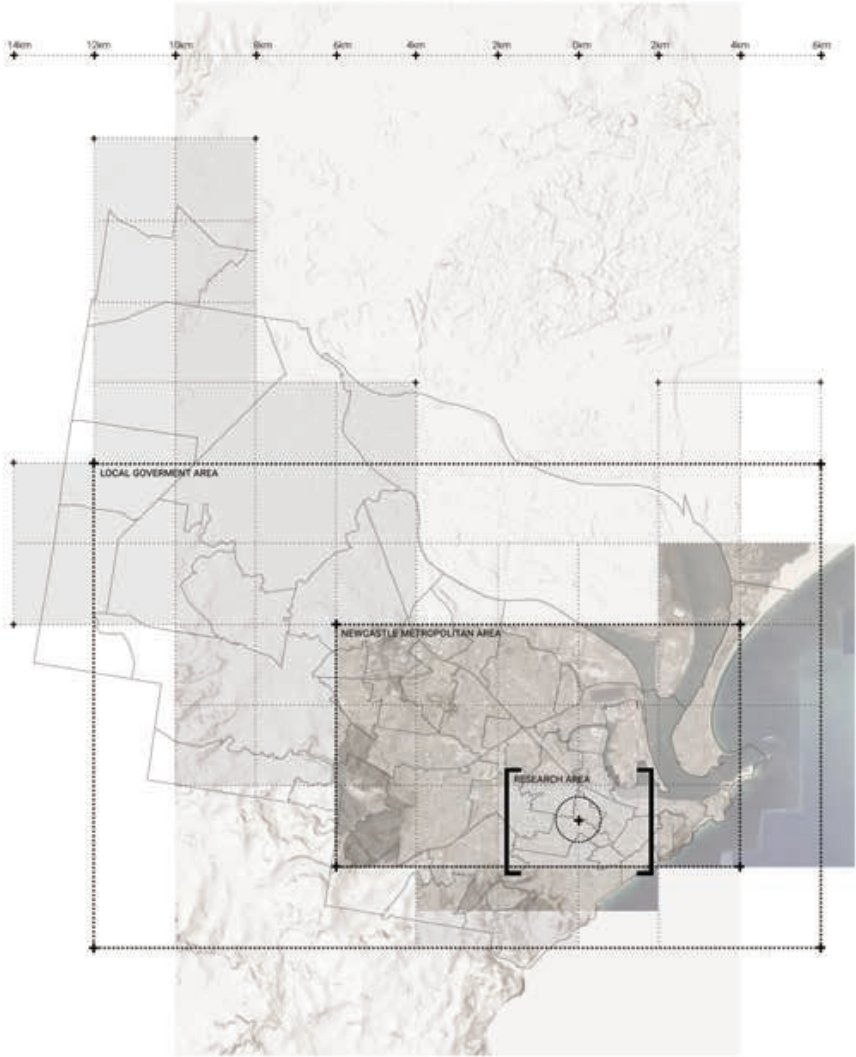
cifal

Newcastle

www.newcastle.edu.au/cifal

Building
resilience
through
**place and
culture**





32.9283° S, 151.7817° E



Placemaking: understanding the connection of place to the resilience of the community

Communities shape and are shaped by the built environments within which they exist, leading to the emergence of a sense of “place”.

Understanding this complex phenomenon has preoccupied architectural designers and urban planners and their studies describe different perspectives on “placemaking”, which in turn impact their professional practice.

Whilst placemaking is frequently observed as a snapshot in time, lived experience suggests “place” changes over time, and particularly in response to disturbances. The ability of a community to adapt to these whilst maintaining its identity is a measure of its resilience. Understanding the connection of place to the resilience of the community is an issue of importance, both for decision-makers with a top-down perspective and community members looking from the grassroots upwards.

Georgia Kissa (PhD candidate in Architecture and Urban Design) is conducting a longitudinal, multiple perspective, phenomenological investigation, which interrogates the lived experiences of all stakeholders, using the placemaking lens. Her study reveals both the impact and responses generated by natural and socio-economic shocks to a specific suburb of Newcastle, suggesting innovative and inclusive ways to design better and more resilient places at multiple scales.

**Georgia Kissa – PhD candidate,
School of Architecture and Built
Environment**



Kau-ma (multi-arts pavilion on Lake Macquarie)

10,000 years of continuous human habitation, adapting to and modifying the landscape of our site is shaping what we now see. But what of the 10,000 years to come?

The past is a known quantity, if sometimes difficult to pin down and visualise, but imagining the future is pure imagination. The first few years can perhaps be reasoned, but this quickly drifts into places that each of us can only guess and dream of. Capturing these futures as satellite images presents it ambiguously as an apparently real place, but also a reality that hangs by the threads of radical change.

How will the future weigh the effects of climate change, capitalism, socialism and technology?

What latency does the site that we walk across today hold of its past habitations?

How might its latency influence the years to come?

We all make choices, what's yours?

**Dr Chris Tucker, Jessica Siva and Associate Professor Patrick Tang
- School of Architecture and Built Environment**

**Samantha Bailey, Jye Whyte –
Architecture graduates**







Utilising tactical urbanism to promote human resilience

Pop up cafes and parks, guerrilla gardening, street libraries. Tactical Urbanism is everywhere. If you haven't heard of it, you've probably seen it. It refers to a city's inhabitants making informal, amateur modification upon public spaces to improve the community.

Industrial Designer and architecture PhD candidate Amber Sauni is researching how communities use informal, amateur design including tactical urbanism. She is exploring how DIY community solutions, processes and outcomes compare to the way professional designers work.

For her projects she applies tactical urbanism to food security. She looks at unofficial ways for people with low incomes to access nutritious meals. For university students and staff she built a bicycle powered blender, made of salvaged parts.

She built a movable feast (tried on Honeysuckle), for anyone and everyone to cook with. It came with a stove, barbecue, edible garden, food prep and dining space.

Amber Sauni – PhD candidate, School of Architecture and Built Environment



Unearthing country culture and comfort in remote Aboriginal Australia

Before starting his PhD, architect Brendan Meney spent 30 years working with remote Indigenous communities across the vast desert of central Australia. He worked with many diverse Aboriginal language groups with strong cultural connections to their traditional country and family kinships.

During this time, he observed how the non-Indigenous architecture imposed on remote Indigenous families created cultural stress within their housing environments. For example, so-called bedrooms are private living spaces for many other activities such as painting, storing food and tools. Some family members can't always share the same spaces and must culturally avoid seeing each other.

Brendan believes we must improve architects' knowledge around remote lifestyles and support more Indigenous architects. Designers need to be more culturally engaged to deliver appropriate lifestyle solutions with improved cultural comfort. His research examines how understanding culture can improve the way people design and build together, to increase the resilience in these communities.

Brendan Meney - PhD candidate, School of Architecture and Built Environment





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11 SUSTAINABLE CITIES AND COMMUNITIES

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Living with Informality

When you stay in a hotel, do you ever wonder about what or who was there before? Travellers want to experience new cultures, and countries must plan tourism in a way that preserves and showcases this.

Landscape Architect PhD candidate Vanessa Sooprayen is researching informal public spaces on Rodrigues Island of the Republic of Mauritius. Official maps of the island mark spaces as the colour white, indicating they can be privatised, so developers could potentially build hotels and other buildings here.

But developers aren't the only stakeholders. Using qualitative community consultation research techniques Sooprayen found these white spaces are used regularly by people who enhance the island's culture: local coconut vendors, octopus fisherwomen, local environmental agencies and other vendors.

Through her case studies, Sooprayen reveals how informal public space contributes to the island's daily life and culture. The better everyone understands its value, the better we can protect these informal spaces.

**Vanessa Sooprayen - PhD candidate,
School of Architecture and Built
Environment**



Valuing creative place making - the social, environmental and economic dimensions

Placemaking is a multi-faceted approach to the planning, design and management of public spaces, which typically involves governments, communities and individuals. When done well, it promotes people's health and happiness.

Examples of placemaking projects include live music performances and the food truck/street food events conducted in the Newcastle Rail Corridor. According to the Project Team, governments and industry need to understand the economic, social and environmental benefits of placemaking before they allocate funding.

Also, people with placemaking ideas need to know the right tactics and strategies to successfully fund and implement their projects.

The Project Team have created a toolkit for government and industry to better understand the benefits of placemaking.

From this toolkit, people can identify the value of these events: social, economic and environmental benefits, that will assist to encourage government and industry to plan and fund future placemaking activities.

Financial support for this research was provided by Landcom and the Hunter and Central Coast Development Corporation through the Landcom Roundtable. The authors wish to acknowledge their appreciation for the ongoing support of Landcom and the Hunter and Central Coast Development Corporation throughout development of the toolkit.

**Dr Kim Maund, Dr Thayaparan Gajendran, Dr Josephine Vaughan (University of Newcastle),
Dr Justine Lloyd (Macquarie University), Dr Cathy Smith (UNSW),
Dr Michael Cohen (City People).**



9
INDUSTRY, INNOVATION
AND INFRASTRUCTURE

11
SUSTAINABLE CITIES
AND COMMUNITIES



SABE cares

When people feel more connected, it fosters a sense of belonging. This is the theory behind the School of Architecture and Built Environment (SABE) professional team at the University of Newcastle.

The team identified five categories which could build resilience in students: community and culture, engagement, knowledge, soft skills and general well-being.

They organised a series of events and activities aimed to bring students together providing the opportunity to connect socially with other students, academic and professional staff.

The SABE team believes that social engagement is a great way for students to naturally build strategies around resilience.

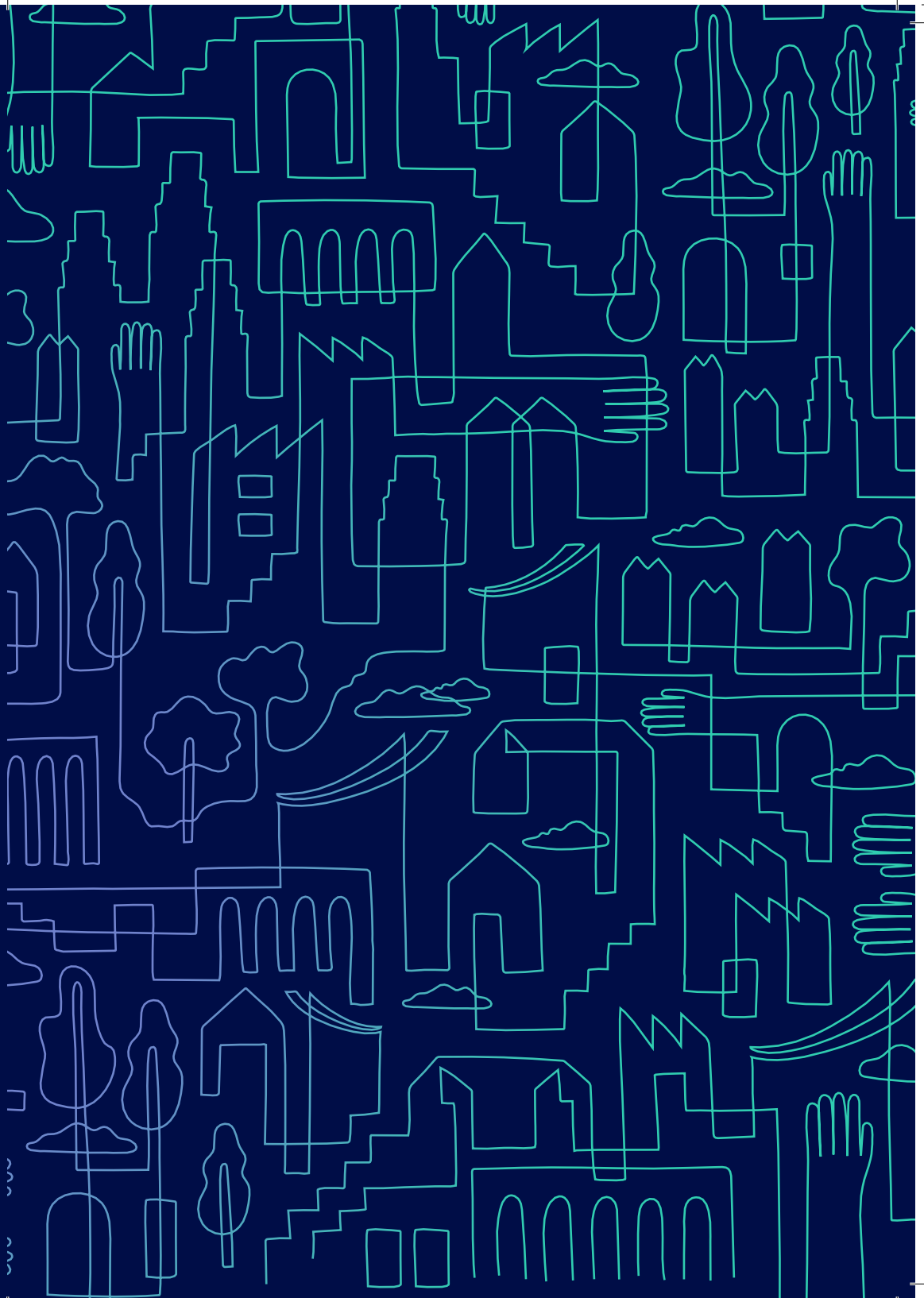
In the last two years, they have hosted regular events such as petting zoos, jumping castles and food trucks, and have plans for more activities throughout the year.

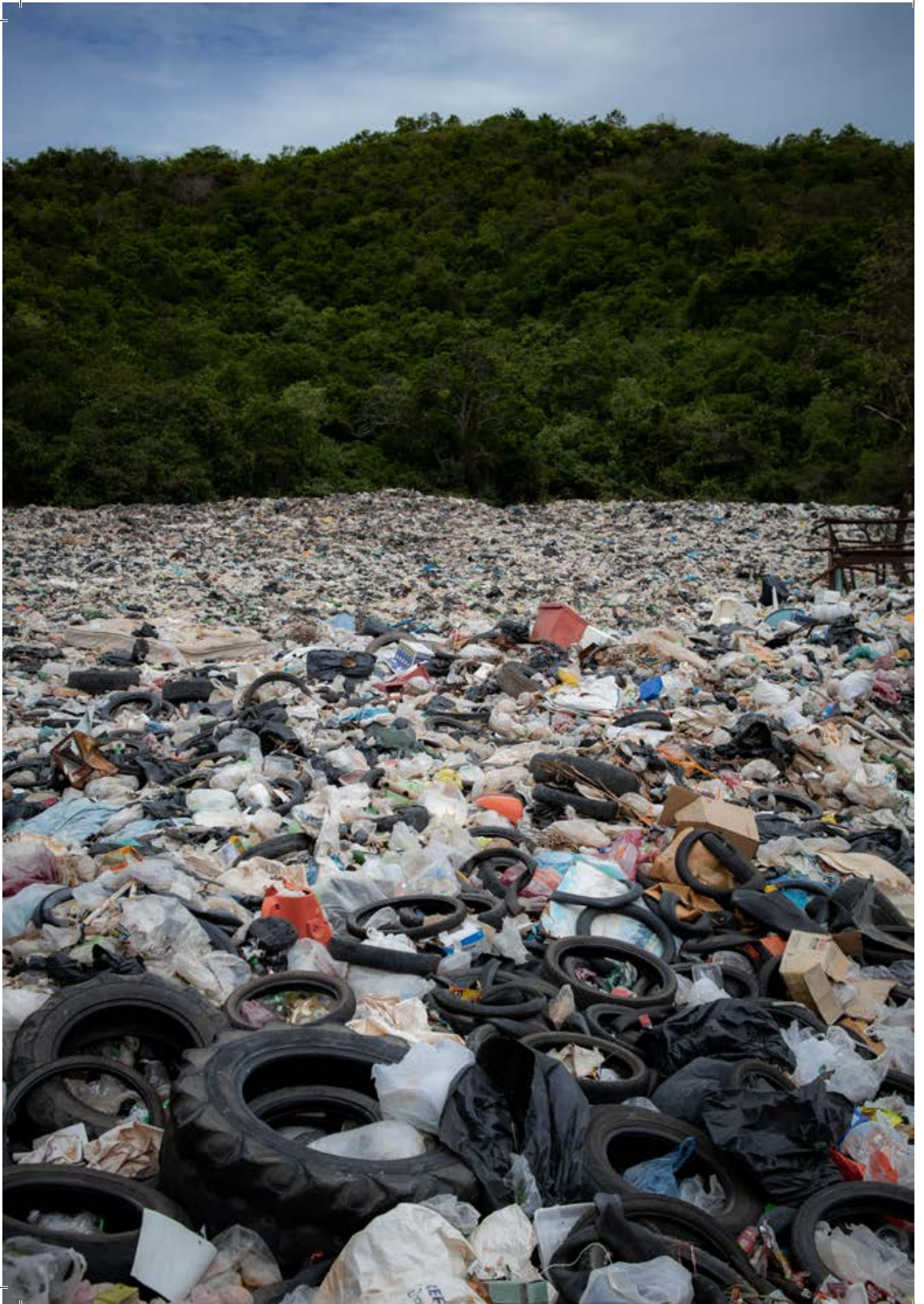
They have analysed the social dynamics of the school over this time, and current feedback indicates an increase in overall student satisfaction and interactions within SABE.

SABE Professional Team:
Taona Afful, Carrol Wood, Joanne Connor, Mary Kazembe, Priscilla Tan, Miranda Cunningham, Jedd Cranfield, Kahlea Schreen, Narelle Ratcliffe, Andrew Dunne and Professor SueAnne Ware



Building
resilience
through
**sustainable
construction**





Construction and demolition waste management in NSW

Waste on landfills doesn't disappear, and each year in Australia it's been increasing. In 2017, 22 million tonnes of waste were sent to landfill. Amongst these 22 million tonnes, 6.8 million were construction and demolition waste.

Engineer Laura Simon worked as a research assistant for a project aiming to identify problems and solutions of construction and demolition waste management in NSW. Interviews of waste management experts revealed issues related to lack of time, money and space. For example, sites often allow for only one bin.

Employees aren't well trained to recognise the waste. Recycling technology is lacking. The team used a form of AI to automatically recognise the content of a bin. In the future this could sort bins automatically.

After extensive interviews, researchers divided the different solutions into three categories: people, processes and organization. From here they can improve waste reduction and increase the amount of recycled waste.

**Conjoint Professor Peter Davis,
Dr Tanvi Newaz, Associate Professor
Willy Sher and Laura Simon PhD
candidate, School of Architecture
and Built Environment**



Green concrete for better sustainable environment

Green concrete is defined as concrete that uses waste material as at least one of its components, or its production process does not lead to environmental destruction, or it has high performance and life cycle sustainability.

At present, natural resources are running out. Using industrial and construction waste as raw materials for the production of cement and concrete can be regarded as a valuable resource for civil infrastructure construction.

Green concrete will not only contribute to a circular economy but can also help to reduce the amount of embodied energy and CO2 emissions associated with cement manufacturing as well as to mitigate the environmental threats associated with industrial waste materials.

The University of Newcastle has adopted a multi-disciplinary approach to the development of efficient, sustainable and superior green concrete products for a better sustainable environment.

Associate Professor Patrick Tang, Dr Chethana Illankoon and Dr Mehrnoush Khavarian (PhD candidate), School of Architecture and Built Environment



Standard concrete

Recycled aggregate concrete (recycled concrete)

Recycled aggregate concrete (recycled concrete, recycled glass)





Understanding the opportunities and challenges of compliance to safe building codes for disaster resilience in South Asia - the cases of Bangladesh and Nepal

In Australia, when a big storm whips up, you're likely to have faith that the building you're in has been built to standard and is quite safe and secure.

In places like Bangladesh and Nepal, building codes are not widely followed. The notorious garment factory collapse in 2013 in Bangladesh and the 2015 earthquakes in Nepal and their disastrous consequences demonstrate the extent of the problem. Without well-built structures, people are more vulnerable to disasters.

The UON team and partner universities from Bangladesh and Nepal researched this situation and created practical building codes with advice on protocol and materials.

Called the 'Grey Building Handbook', it targets builders and homeowners in Bangladesh and Nepal, offering guidance and important information associated with building in disaster-prone areas. The book is illustrated with examples of good practices.

While strategically designed for Nepal and Bangladesh, the book's theory could be applied to vulnerable communities elsewhere in similar contexts.

Associate Professor Iftekhhar Ahmed, Associate Professor Thayaparan Gajendran, Associate Professor Graham Brewer, Dr Kim Maund, Dr Jason von Meding - School of Architecture and Built Environment



Disaster resilience in temporary shelter

Disasters are never entirely natural. Natural hazards exist, however, it is only when they overcome our built environment that it becomes a disaster. Many people living in exposed regions of developing countries are vulnerable to disasters and relatively small hazards can trigger devastating disasters.

In places like Cox's Bazar, Bangladesh, where over a million Rohingya people are displaced in refugee camps, durable buildings are not a priority. PhD Candidate in the Field of Disaster Vulnerability, Thomas Johnson, investigated this situation with the NGO, Save The Children.

Through interviews with humanitarian workers, he evaluated whether resilience is effectively embedded within the projects.

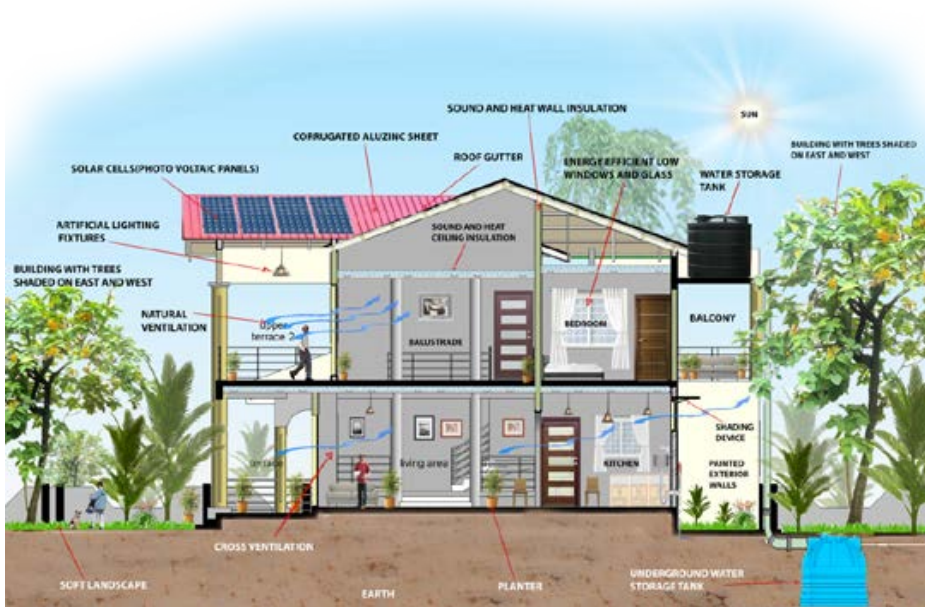
His research draws attention to the short-sightedness of some projects and how some activities can actually create disaster risk. For example, there are restrictions on the materials that can be used, shelter can't be built with concrete or steel, rather untreated bamboo which cannot withstand the windspeeds common in the region. Their risk is compounded, not reduced.

Research like Johnson's could help to build disaster resilience in refugee camps.

Thomas Johnson - Associate Lecturer, School of Architecture and Built Environment







Pathways to transforming the limited green construction adoption

What if you pour your values and budget into designing the perfect sustainable house and then nobody will build it because it's too expensive?

The construction industry is hardly an environmental one, but it doesn't have to be this way. Construction Management PhD candidate Samuel Fiifi Hammond is asking why green construction isn't taking off from a behavioural economic standpoint, despite the many incentives.

He collected data from Accra and Kumasi in Ghana, both of which have booming construction industries. He is discovering why rational building construction individuals are reluctant to adopt sustainable technologies and practices.

This exhibit reveals the key factors currently stopping the application of sustainable technologies and the interrelationships between these factors. In the future this research can help identify what the barriers are and how we can shift incentives moving forward. Future green building policies must be resilient, overcoming the current economic problem.

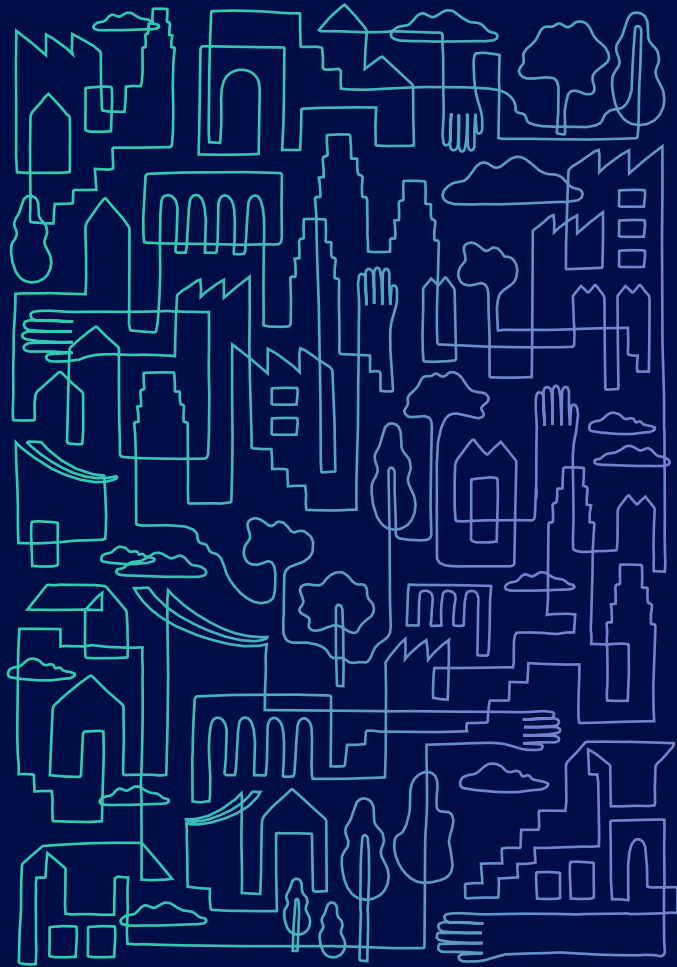
**Samuel Hammond – PhD candidate,
School of Architecture and Built
Environment**

**Associate Professor Thayaparan
Gajendran and Dr Kim Maund -
School of Architecture and Built
Environment**

**Associate Professor David Savage
- Greater Bank Financial Literacy
Laboratory Director, Newcastle
Business School**



Building
resilience
through
**sustainable
living**



Dark wilderness

Dark Wilderness is a concept and structure which requires emotional resilience to live within. It's a foldable, movable 4x4 meter stainless steel building. It's the minimum amount of shelter required for Architecture Professor Michael Chapman and his dog.

The building will have a receptacle for rainwater. He'll use the water for bathing and then recycle it to water his soybean plants. He'll produce renewable energy, hopefully enough to power his phone and laptop.

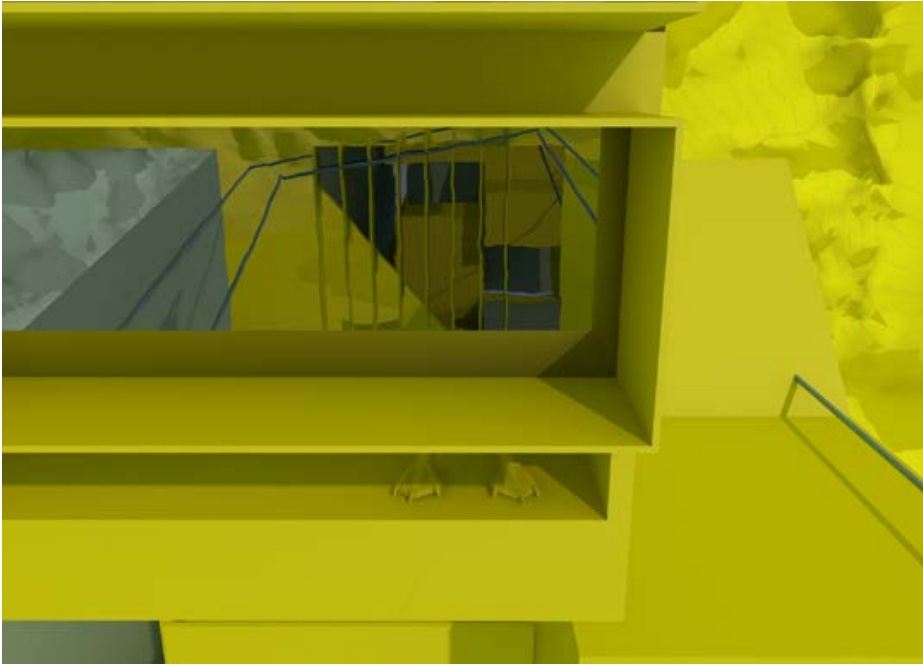
The average Australian requires seven hectares to support their lifestyle. If everyone in the world lived like this, we would need more than three planet earths. Dark

Wilderness explores a sustainable lifestyle for one planet, and the concessions and sacrifices required to realise this. It evokes thoughts of interconnectedness, solitude, love and individuality.

Chapman is currently building the structure as an extension to his house in Cooks Hill.

He plans to live in it for at least a week.

**Professor Michael Chapman –
School of Architecture and Built
Environment**





Chook bot

Rowan's creative practice explores ways of using agency to subvert traditional state-based mechanisms of control. He does this through the design, fabrication and inhabitation of barbarian-nomadic structures.

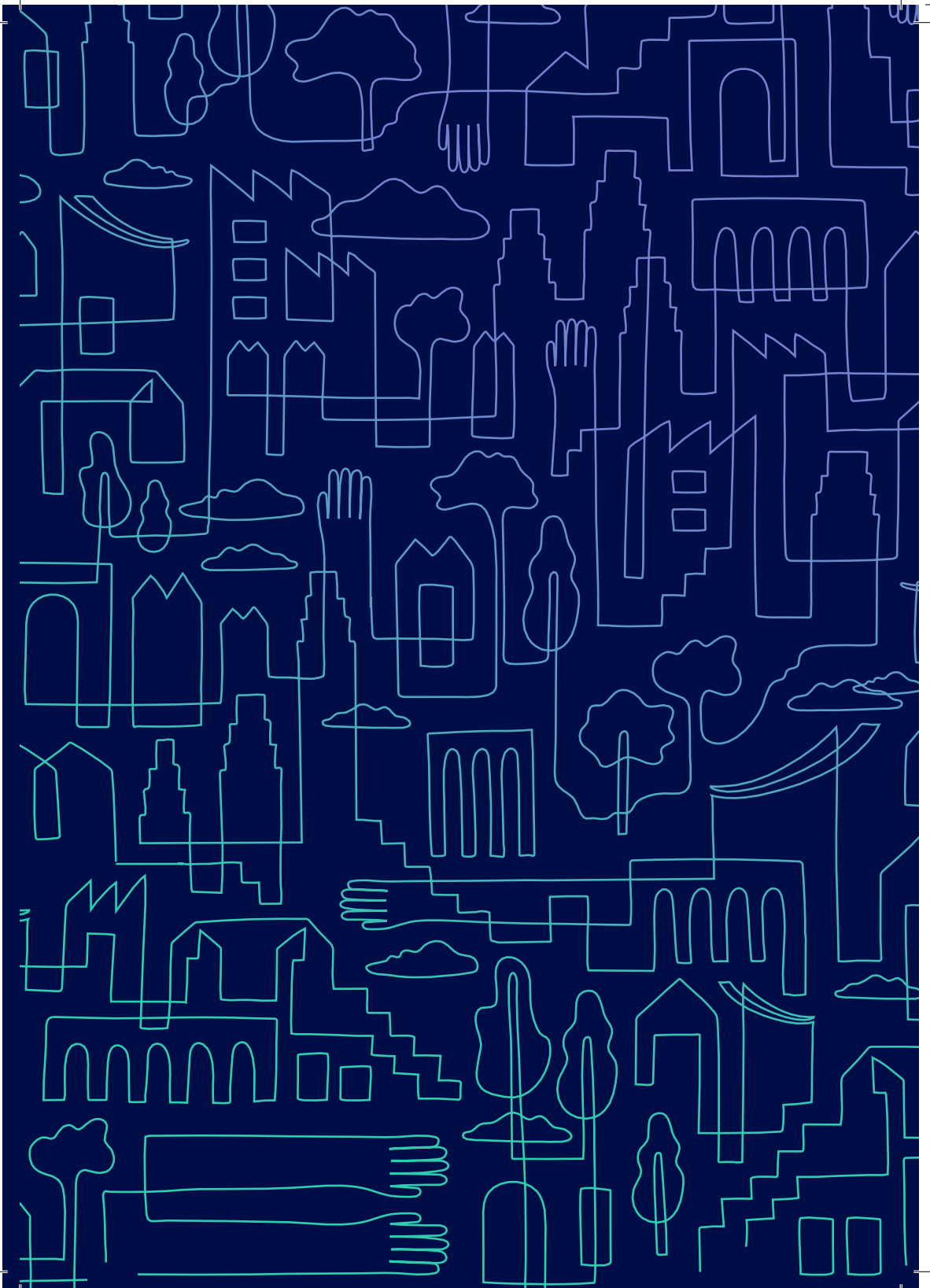
His research explores the role of agency in the production of this work and the relationship to artificial binaries of work-life that it sets out to undermine. The research explores a number of built (and ongoing) projects including: Rover – a deployable vehicle prosthesis, Fly Shed – a removable greenhouse-workshop hybrid, Fence Parasite - boundary inhabiting furniture, Fence Portal – a direct action urban intervention (or hole in a fence) Chook Bot – a surveillance vehicle for Chickens, Grow-Op - a productive lounge room, Hive 21 – an emergency mansion for bees.

In each case the design, fabrication inhabitation are used as ways to challenge boundaries, forms of control and social conventions. The research is finding that this pursuit creates an associated shift in lifestyle towards greater autonomy and resilience. The work explores the value of pre-state modes of existence and the potential that architecture has to engage with them.

**Rowan Olsson – PhD candidate,
School of Architecture and Built
Environment**



Building
resilience
through
**capacity
development**



Building capacity for Fijian disaster resilience; developing women community leaders

(supported by the Australian National Commission for UNESCO, DFAT)

The islands of Fiji are often impacted by natural hazards like floods and cyclones. In 2017, experts in disaster resilience, used a “training-of-trainers” approach to share knowledge and build local capacity on disaster risk reduction.

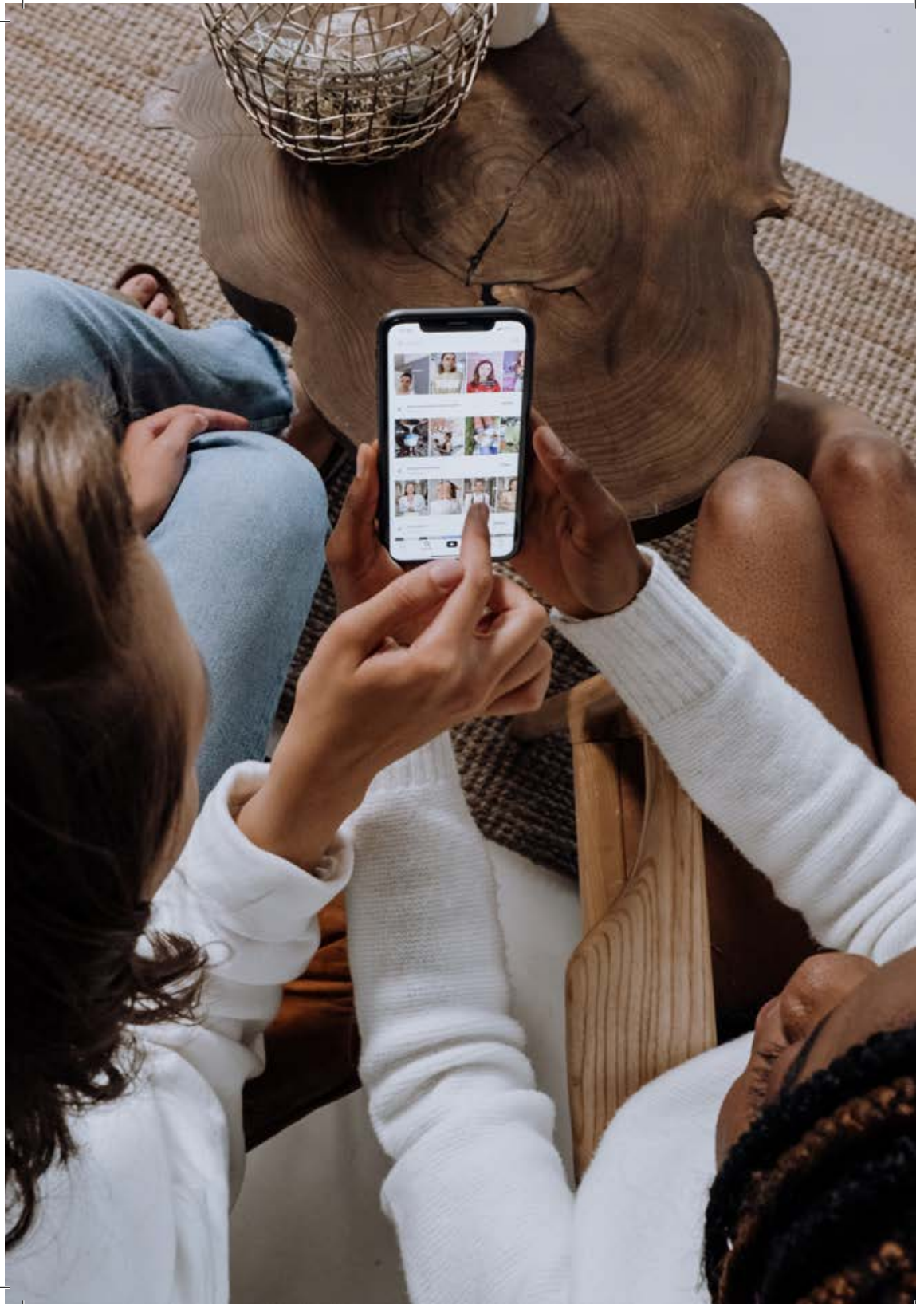
Fijian women tend to be natural leaders at home and in their communities, making them excellent candidates for promoting disaster resilience techniques. Therefore, this project focused on training women. After a training workshop in Nadi, experts assisted female police officers in running training for women in a village. These women learnt enduring ways to achieve disaster resilience. For example, attendees can now conduct systematic walks through villages while listening and looking for disasters and hazards. Their observations help them prepare or react accordingly.

Evaluations from the training showed that this research project spread life-saving information to large groups of people across Fiji. This means engaged at-risk communities could implement similar projects worldwide!

Associate Professor Iftekhar Ahmed, Associate Professor Thayaparan Gajendran, Dr Helen Giggins and Associate Professor Graham Brewer - School of Architecture and Built Environment







Big data analytics for building resilience in the construction industry

The increasing use of the internet is creating big data, much of which is generated from social media. These big data potentially could assist in obtaining valuable information to explore new social phenomena for building resilience. Traditional ways of collecting data, such as questionnaire surveys, are time-consuming and costly. Therefore, social media data allows for extracting information that benefits the construction industry in a responsive and inexpensive manner.

Dr Maggie Tang's research explores how to analyse social media data to generate valuable information and knowledge to build resilience in the construction domain. She conducted her initial trial analysis using Twitter data from the United States as a pilot study, due to Twitter's wide usage in the United States. She is studying four user clusters- namely workers, companies, unions, and media in the construction industry - using sentiment analysis and content analysis, in conjunction with geolocation analysis and timeline analysis, to generate information for building resilience in construction.

Dr Liyaning (Maggie) Tang
School of Architecture and Built Environment



Building resilience - developing a resilience toolkit for employability in built environment graduates

Construction Management (CM) careers require resilience.

Be it long work hours or short contracts, the range of expectations and challenges can be varied and difficult. Students who enter the profession need nurturing, guidance and support. Construction management can involve tight deadlines and budgets, short tempers and machine malfunctions.

Students in the field are also faced with the regular stresses of entering an academic environment.

Lecturers need to know the best practices to help their students.

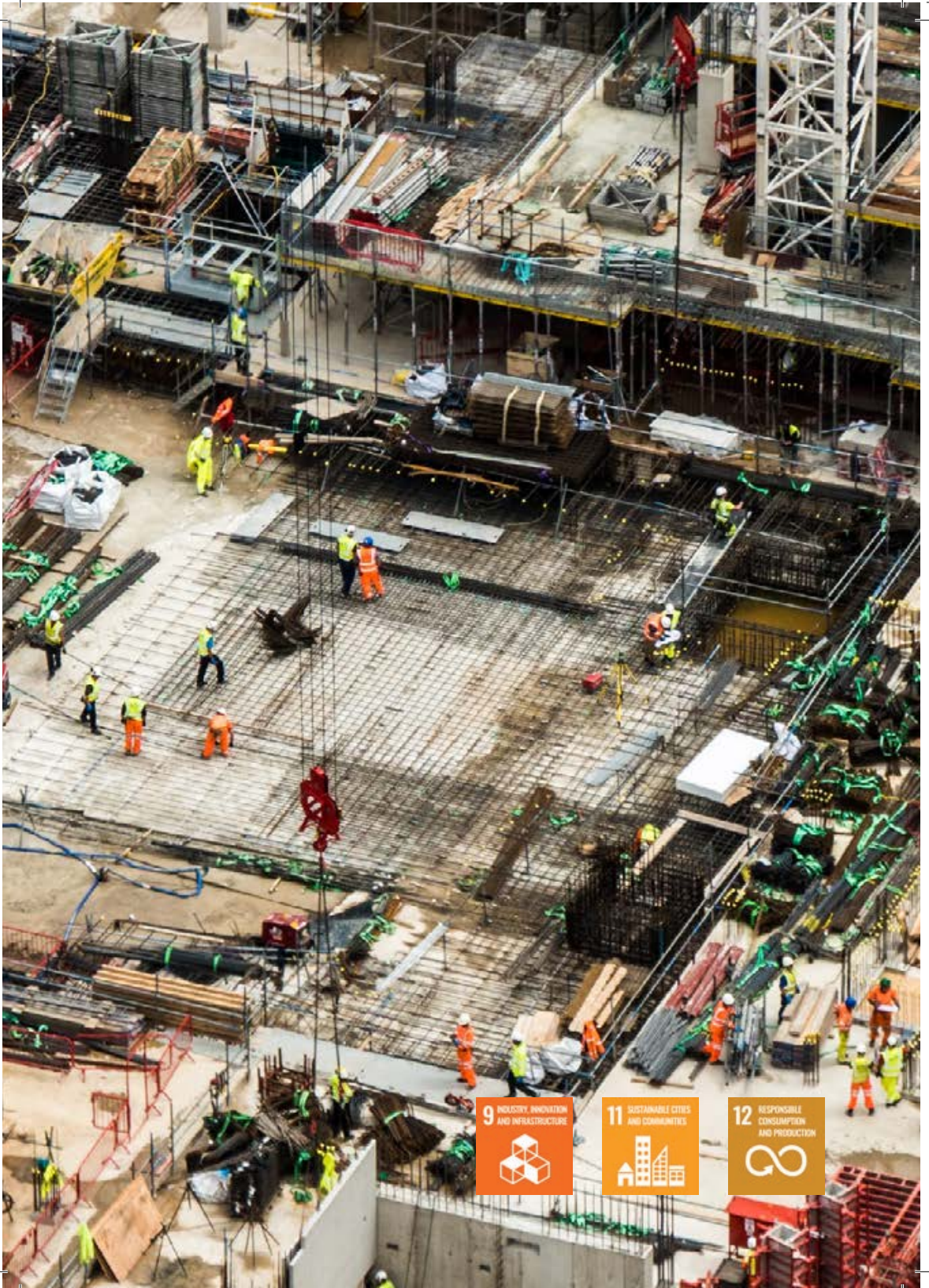
The research team interviewed several CM academics, students and professionals from various Australian universities to create a toolkit for academics to use to build resilience among their students as they enter their new profession.

The toolkit establishes a variety of solutions, emphasizing communication, role play and sessions with industry experts.

This toolkit could be applicable to academics at other universities as well, better preparing construction management students across Australia.

Dr Tanvi Newaz and Conjoint Professor Peter Davis, School of Architecture and Built Environment





9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



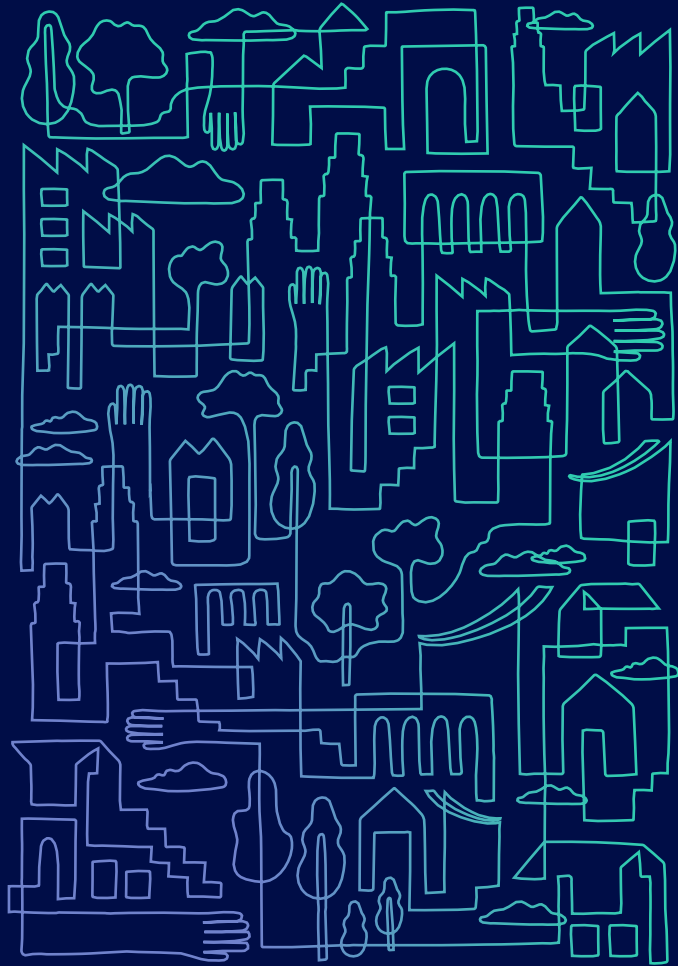
11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Building
resilience
through
**institutions
and policy
ingenuity**





A governance framework for mitigating flood risks in Nigeria

Disaster Management PhD graduate Toinpre Owi became worried about natural disasters in 2012 after he was personally affected by a three-month-flood in Nigeria. Floods are common in this country, regularly causing chaos and crisis. Owi wants to be a part of the solution.

During his degree, Owi began researching the best way to mitigate flood risks and prevent future devastation. He collected data from public Nigerian organisations to understand how and why the destruction continues to occur.

He found a range of institutional pressures cause many organisations to protect their own interests rather than the greater community's. The way citizens react to disaster can influence the government's response. Prevention is the best option, cheaper and safer than damage control. If floods continue to cause death and destruction under the same government, then the government and its institutions have issues.

Similar data for other disasters like earthquakes and fires could be collected worldwide to help create resilient communities everywhere.

Dr Toinpre Owi
PhD graduate



Decision-making in land use planning: the consideration of natural hazard risks when identifying land for urban settlement

After the recent bushfires, around 3,000 buildings were lost and more than 30 people died. Humans are resilient and rush to reconstruct. But some researchers are asking if town planners consider natural hazards such as bushfire, earthquakes and others when identifying land for urban settlement.

Dr Mark Maund reviewed strategic planning policies and interviewed with all levels of government.

He found that natural hazards need to be given higher priority when identifying land for urban settlements, to reduce placing communities at risk of disasters. Australia's population and construction industry are booming.

We increasingly build in previously undeveloped and often risky areas. All government levels provide and use information to identify land for urban settlement, but they need improved communication.

Future catastrophes may be reduced if we apply hazard knowledge, mapping and consistent decision-making. Dr Maund's research also found benefits in planning strategically and using a multi-criteria decision-making framework.

If we do things right in the future, we can reduce disaster risk and rebuild better.

**Dr Mark Maund, Associate Professor
Thayaparan Gajendran and Dr Kim
Maund - School of Architecture and
Built Environment**





9
INDUSTRY, INNOVATION
AND INFRASTRUCTURE



11
SUSTAINABLE CITIES
AND COMMUNITIES



12
RESPONSIBLE
CONSUMPTION
AND PRODUCTION





Enabling flood risk adaption in informal settings

The way people approach disaster influences the way disaster affects them. In Australia, the majority of us weren't planning or expecting the recent tumultuous bushfire season, so we were under-prepared.

Disaster Management PhD candidate Jerry Chati Tasantab is researching how people think about disaster risk. He collected data in Accra Ghana, which regularly floods. In Ghana, citizens are often uninvested or in denial about the dangers of their situation.

In the future, hazards like fires and floods will worsen due to climate change, so people need clear information on their vulnerability and disaster risks. Governments also need information on local knowledge and practices, to supplement scientific knowledge in disaster risk assessment and, using such information to develop and implement programs, policies, plans and strategies, that are tailored to the local context.

Tasantab has developed a framework to help governments and policymakers gather the right information on local risk perceptions and adaptation intentions, to enable adaptation.

With proper guidance and information, people everywhere can be better equipped for all disasters. Tasantab found solutions exist already in Ghana. For example: retrofitting existing buildings to make them floodproof, finding safe, flood-free places to relocate and even building houses which rises with water (amphibian architecture).

Moving forward with the right knowledge and strategies, we can create more resilient communities.

Jerry Chati Tasantab - PhD candidate, School of Architecture and Built Environment



Community partnerships in disaster preparedness

The information deficit model (IDM) suggests that disseminating relevant information to the public about an issue or concern can result in people changing their perception, beliefs and attitude leading to positive actions.

In the context of disaster preparedness, IDM suggests that providing information associated to disaster risk and response actions to concerned stakeholders should increase the level of disaster preparedness, leading to mitigation in the growing damages caused by disasters. Yet, despite a notable global and local strategy of disaster education and information campaigns, there has not been a commensurate success in flood preparedness worldwide.

The failure of IDM to result in behavioural change has awakened a call among disaster management practitioners and scholars to investigate the model and improve its effectiveness¹.

One of the key suggestions that has gained popularity in literature is the investigation of the effectiveness of IDM in the face of active public engagement². This paper builds on the current discourse on IDM, by revisiting the application of the IDM from a community participation perspective.

This proposal seeks to develop a model to test the mediating and moderating effects of 'community participation' on the relationship between 'information sufficiency' and 'intentions to prepare' using structural equation modelling (SEM). The findings of this research are intended to improve the robustness of information dissemination to the public about an issue or concern resulting in people's intention to changing their perception.

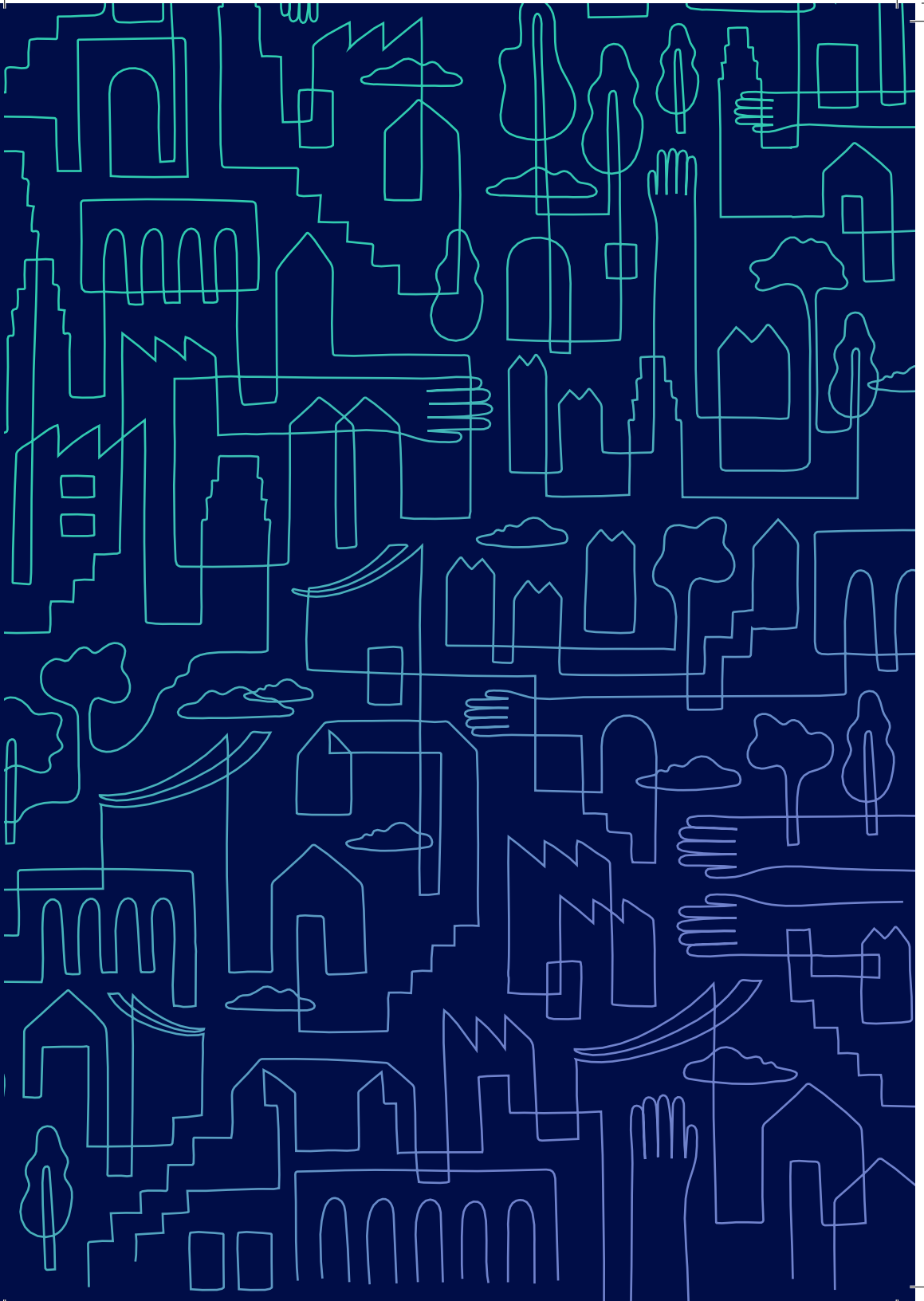
Dr Matthew Abunyewah
PhD graduate

¹ Cornes, Cook, Satizabal, & de Lourdes Melo Zurita, 2019;
Cook and Overpeck, 2019

² Stylinski, Storksdieck, Canzoneri, Klein, and Johnson, 2018;
Nadkarni, Weber, Goldman, Schatz, Allen and Menlove, 2019



Building
resilience
through
**caring for
the natural
environment**



Power plants and Delprat garden

The nature of heavy industry is anything but natural, and contaminated post-industrial sites proliferate Australia. Former power stations, mines and rail corridors – these vacant sites often actively rust, rot and leech toxins into the soil. Reversing this type of environmental damage is called remediation.

Traditional remediation techniques are not always ideal; often they relocate or temporarily cap tainted soil. Phytoremediation is an alternative, closed-loop plant-growing approach. Phytoremediation techniques are productive ecologies, beautifully rejuvenating degraded land. It explores the resilience of natural systems, restoring balance after cataclysmic human intervention. Low cost, phytoremediation can take 10-30 years.

In 2017, the University of Newcastle and other universities received funding to use phytoremediation for a post-industrial site in Sydney, the former White Bay Power Station.

The researchers planted toxin-absorbing annuals. (Sunflowers, mint and pigface are high performers and hyperaccumulators.) These plants metabolized pollutants over a year and each monthly harvest increased researchers' understanding of the process. A second garden has been constructed shifting the focus to Newcastle, where it occupies the grounds of Delprat Cottage, a heritage post-industrial site that sits at the fringe of the former BHP Steelworks.

Professor SueAnne Ware, D'Arcy Newberry-Dupé and Kalyna Sparks – School of Architecture and Built Environment, University of Newcastle

Chris Johnstone – Bosque Studio

Dr Megan Murray, Professor Penny Allan and Professor Martin Bryant - School of Architecture, UTS

Dr Ainslie Murray and Kuba Dorabialski (PhD candidate Art and Design), Faculty of Built Environment, UNSW

Financial support for this research project was provided by Landcom.



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE

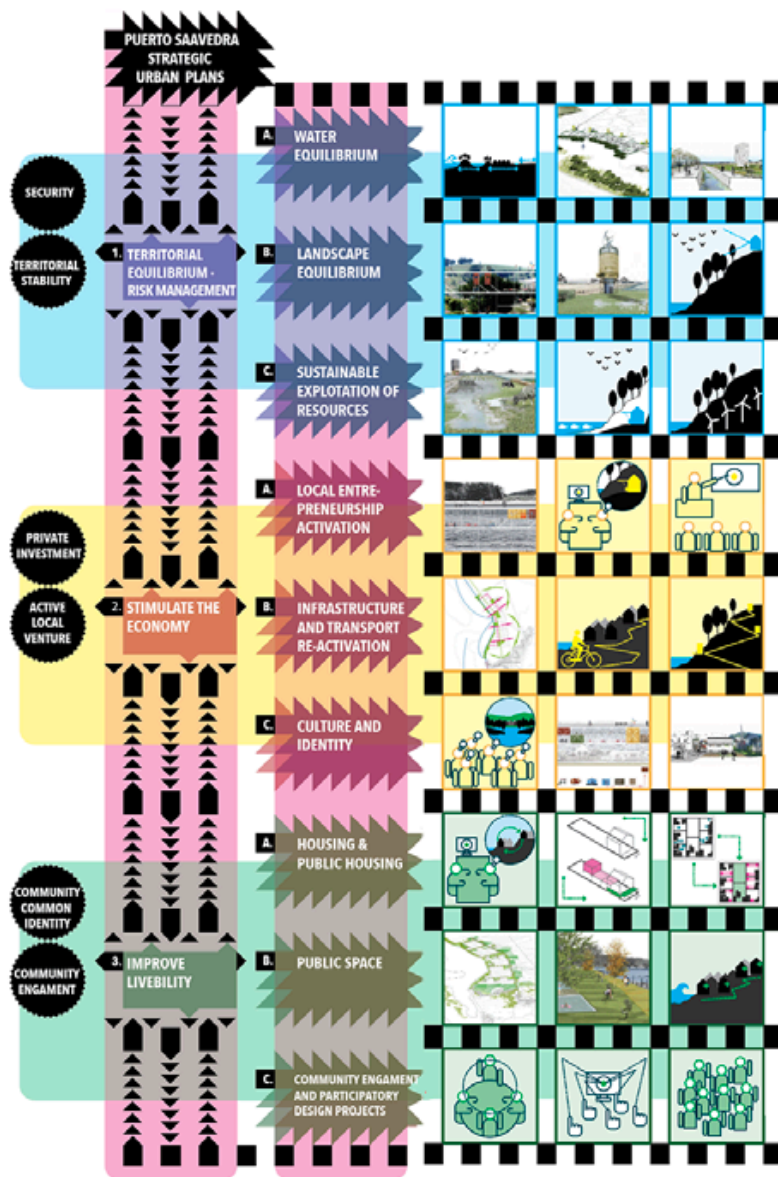


11 SUSTAINABLE CITIES
AND COMMUNITIES



12 RESPONSIBLE
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Urban and architectural approaches for an effective climate change adaptation in Latin America

America is, after Asia, the continent hardest hit by natural hazards and climate change. Often the risk is a result or consequence of human pressure on the environment, the overuse of resources and the lack of sustainable planning.

Petrópolis (Brazil) suffered dramatic rain episodes, causing disastrous consequences for the habitability of the territory. In Canal del Dique Region (Colombia) 'la Niña' phenomenon caused unprecedented floods in 2010. Puerto Saavedra (Chile) suffered two devastating earthquakes, tsunamis and the constant risk of flooding. In Cercado de Lima (Peru) and Chimalhuacán (Mexico), the risk is human, associated with the development of irregular settlements and informal urbanisation creating serious environmental damage and health vulnerability.

Between 2011-14 the Pan-American Observatory of Landscaping, Urban Planning and Architecture (OPPTA) researched, designed and implemented educational programs in these five sites affected by risk in Latin America. Dr Irene Perez Lopez, Senior Lecturer at UoN-SABE, is OPPTA's co-founder, president and former director.

Dr Irene Perez Lopez, OPPTA's co-founder, president and former director

Maria Carmen Varela Martinez, OPPTA's co-founder, current director and lecturer at the School of Agronomical Engineering ETSIAAB at the Polytechnic University of Madrid

Vanessa Cerezo Jimenez, OPPTA's observer, Senior Architect at Carlos Arroyo Architects



On / in the water - Newcastle's waterfront resilient strategies

Newcastle's waterfront, including the Hunter river estuary and the ocean shorelines, are unique landscapes strongly modified due to land reclamations, industrial activity and the destruction of vulnerable ecosystems. As many other delta and estuary cities, Newcastle is facing a challenging process of adaptation due to the effects of unpredictable events and climate change.

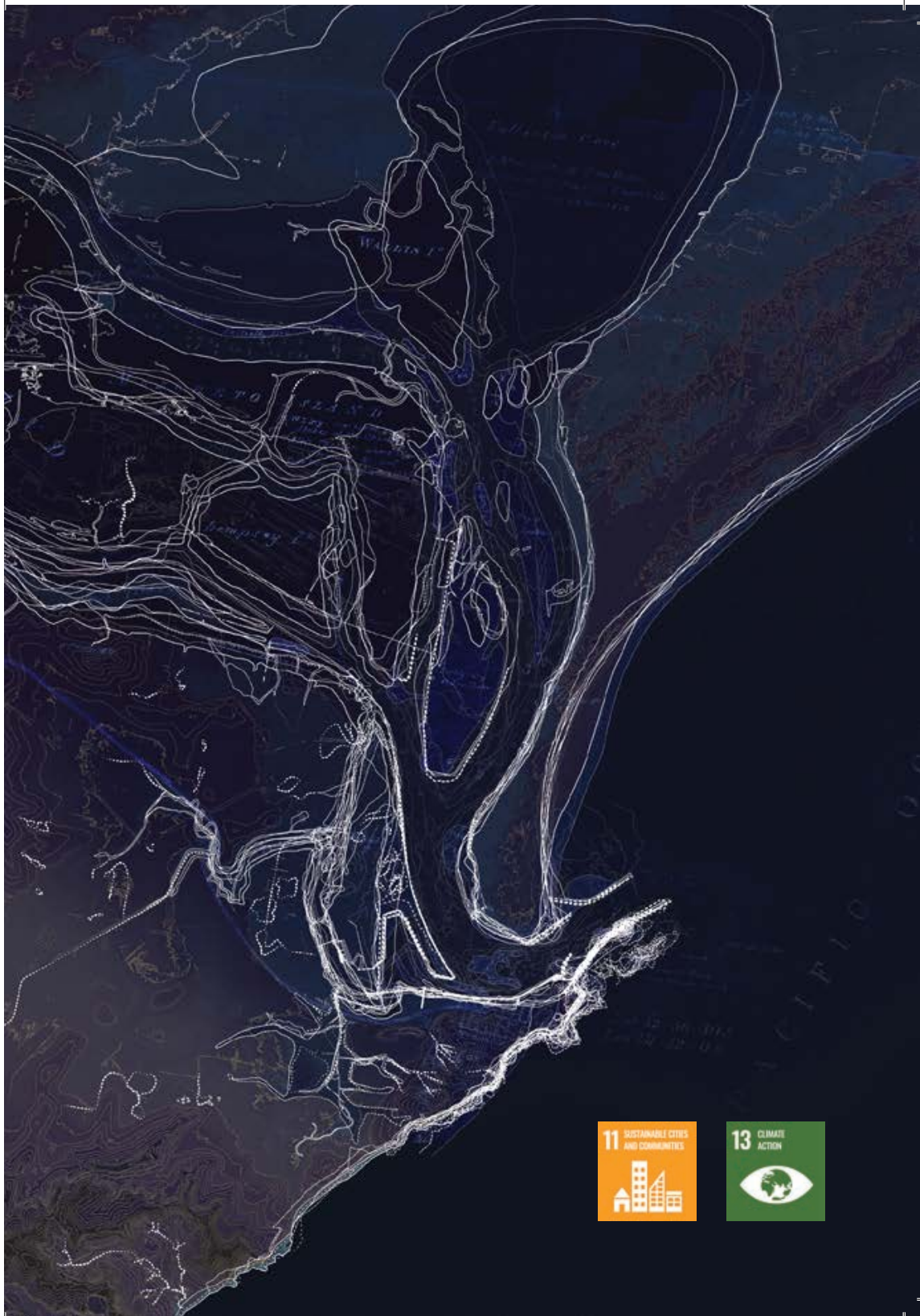
The Exhibition is presenting an interpretative cartography of Newcastle's environmental, urban and flooding conditions, together with the city shoreline evolution, dating back to 1797. Mapping is the instrument to identify worst case scenarios in the event of a dramatic climate change evolution and to recognise urban opportunities to increase resilience and reduce vulnerability.

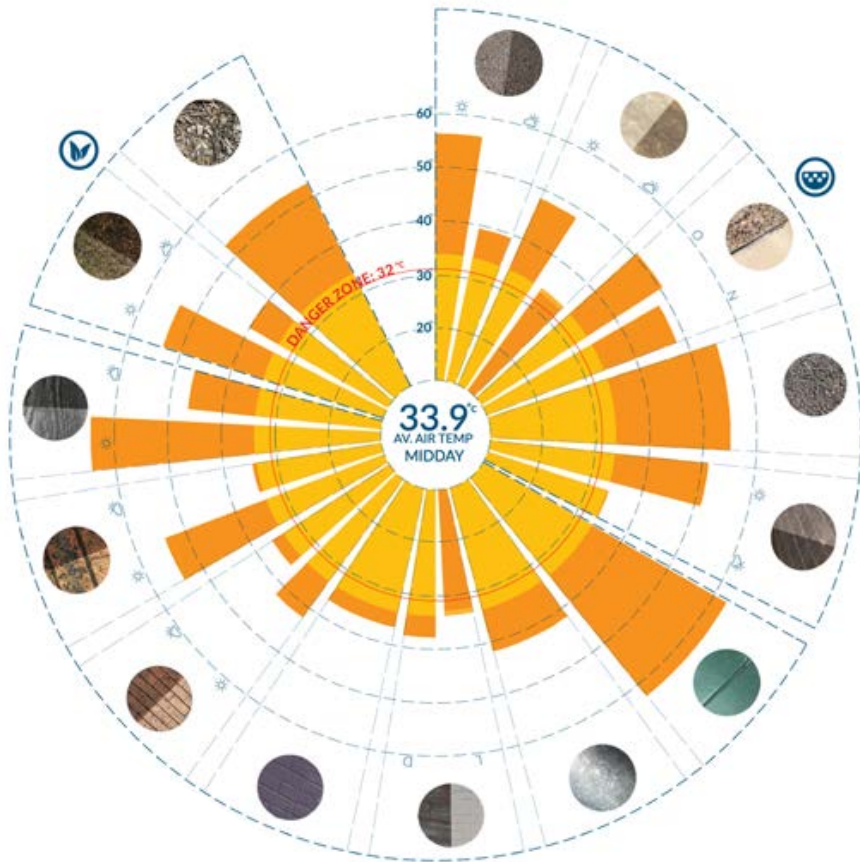
Dr Irene Perez Lopez, Senior Lecture at SABE-UoN, is working with water as an instrument of change to re-think the design of the city and the non-built environment, and to improve urban resilience and liveability in delta and estuary cities.

Dr Irene Perez Lopez - Senior Lecturer, School of Architecture and Built Environment

Research assistant: Jye Whyte

Contributor: Mark Glease






















KEY

- SURFACE TEMP (°C)
- AIR TEMP (°C)

MATERIALS

- | | | | | | |
|---|--------------------|---|-------------------|---|------------------|
|  | HARDSCAPE (GROUND) |  | HARDSCAPE (BUILT) |  | BRICK GARDEN PIT |
|  | BITUMEN PATH |  | TIMBER SEAT |  | BLACK GARDEN PIT |
|  | CONCRETE PATH |  | METAL SIGN POST |  | VEGETATION |
|  | CONCRETE GUTTER |  | GLAZED TILES |  | GRASS |
|  | BITUMEN ROAD |  | PAINTED BRICK |  | BARK |
|  | GLAZED TILE |  | BRICK WALL | | |

Smart trees - resilience strategies to combat urban heat island effect

In January 2019 for ten days straight and four times a day, School of Architecture and Built Environment (SABE) student research assistants took the heat, literally.

In a data collection exercise in collaboration with City of Newcastle, SABE investigated five urban heat islands: Watt Street, Worth Place, Newcastle Interchange, Wallsend and Beresfield.

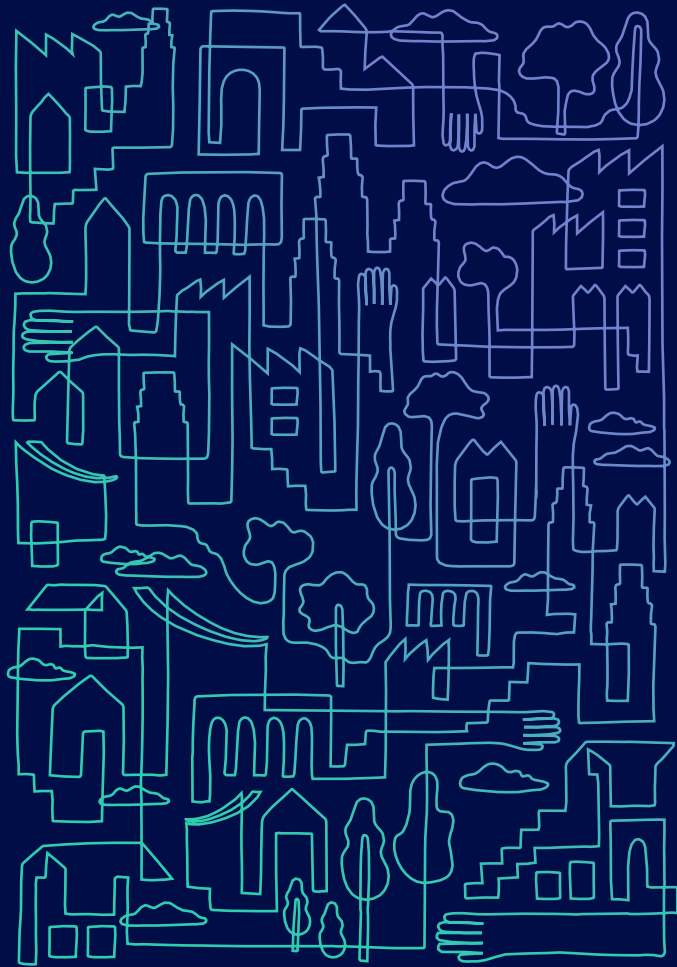
Urban Heat Island Effect is the retention of temperatures in the built environment. Certain materials hold heat and radiate it long after the sun's heat has passed. Extreme heat exposure poses physical danger, particularly for people over 65, young children, socio-economically disadvantaged groups and more. Increasing heat in cities leads to greater energy consumption. Urban infrastructure is also vulnerable and prone to failure/damage in high temperatures.

The data from the study was visualised to illustrate these risks. Researchers are working with Council to prototype mitigation strategies, ranging from a misting trellis to planting more trees. As climate change consequences spread, this research could help ours and other hot cities adapt accordingly.

Professor SueAnne Ware, Dr Timothy Burke, D'Arcy Newberry-Dupé (PhD candidate), Georgia Kissa (PhD candidate), School of Architecture and Built Environment



Building
resilience
through
partnerships



Rethinking megaproject governance: using governmentality theory to critique stories of power

A megaproject can range in size and definition. It could be the Sydney Opera House, an airport or a structure built to house the Olympics. They tend to be large-scale building ventures – think skyscrapers, seaports and city tunnels – which have the potential to impact millions of lives.

Megaprojects are impressive, but huge amounts of work go into them. PhD candidate of construction management Jessica Siva is researching the challenges and decision-making practices behind these projects including the power dynamics that exist between the project management team, the government and the clients.

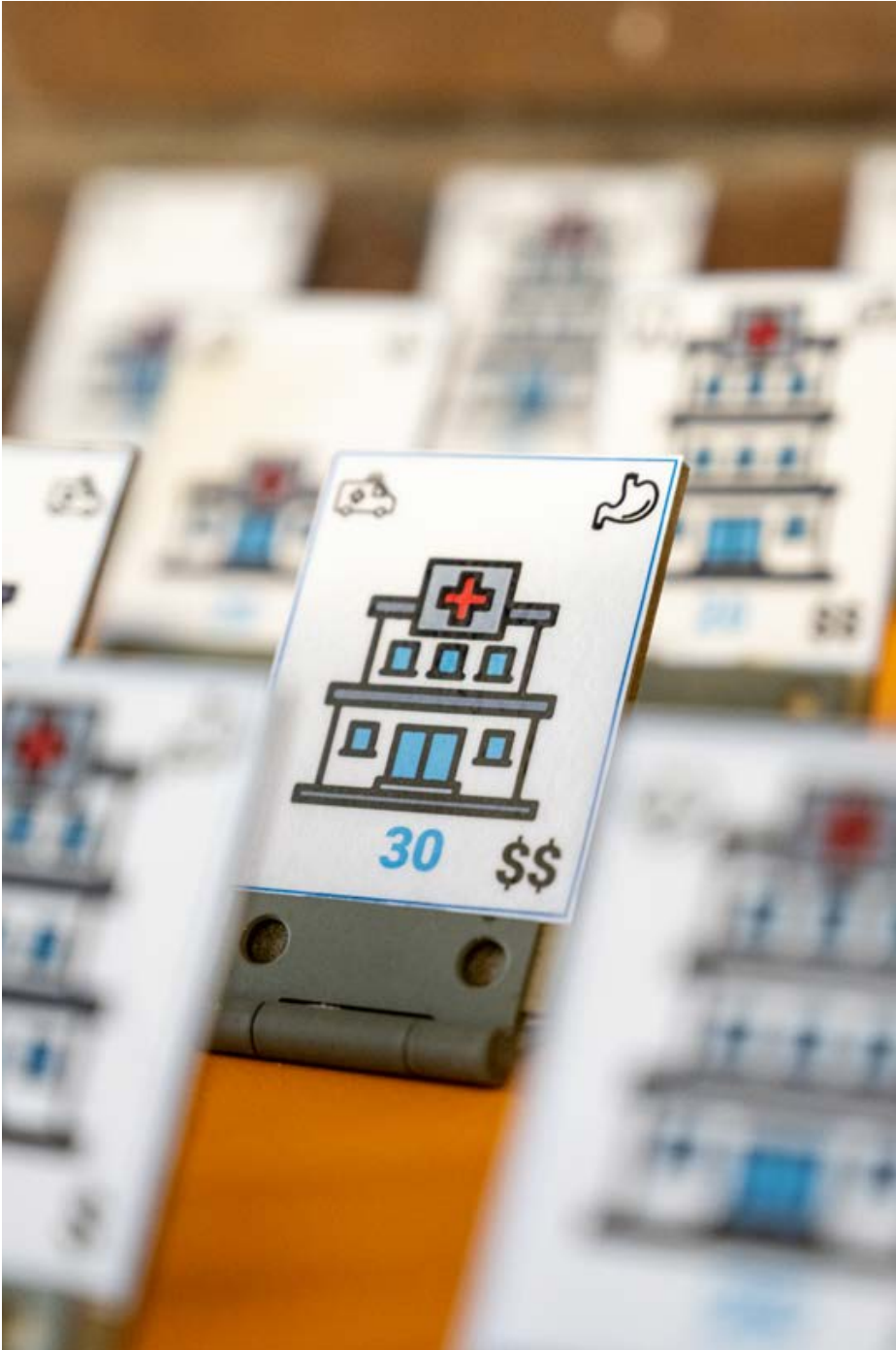
Siva is exploring two megaproject case studies in Singapore and Malaysia. From interviewing the project stakeholders involved she found people go about projects in three ways:

- by following the rules
- by stretching the rules
- by breaking the rules

Through a collection of stories narrated by participants, Siva's project examines the diverse forms of power, authority and subjectivity exercised within megaprojects.

**Jessica Siva – Associate Lecturer,
School of Architecture and Built
Environment**





Public and private partnerships

A well written, well understood agreement can be the difference between a thriving or failing building.

Construction Management PhD student Laura Simon knows a lot about contracts. In France she worked as a bid manager in the tendering department, and now she studies two local examples of Public and Private Partnership (PPP) in Australia: Grafton prison and the Northern Beaches hospital.

A PPP is a cooperative arrangement between two or more public and private sectors involving a construction. The building designer and building operator work together closely, meaning that, theoretically, the building is well designed. The contract typically lasts for 25 years, and a private company usually finances the construction, so the public entity doesn't have to pay right away.

Reading thousand-page contracts isn't exactly leisurely, but Simon's project focuses on the importance of communication and choosing the best companies to work with. The better the PPPs specifications are written and understood, the better the results.

Laura Simon – PhD candidate, School of Architecture and Built Environment



How to develop collaboration for building resilient project teams

A well-built structure can't exist without clear communication, though contracts, conversations and agreements are probably not the first things that come to mind when you admire the Sydney Opera House.

PhD candidate of Construction Management Shumank Deep is researching the relationships between contractors, subcontractors and everyone else involved in the project. These workers include architects, roof masons, suppliers, laborers and more.

Deep analyses how power and dependence affect the collaboration of subcontractors and main contractors in construction projects. He found that written contracts are less important than the ways in which people negotiate.

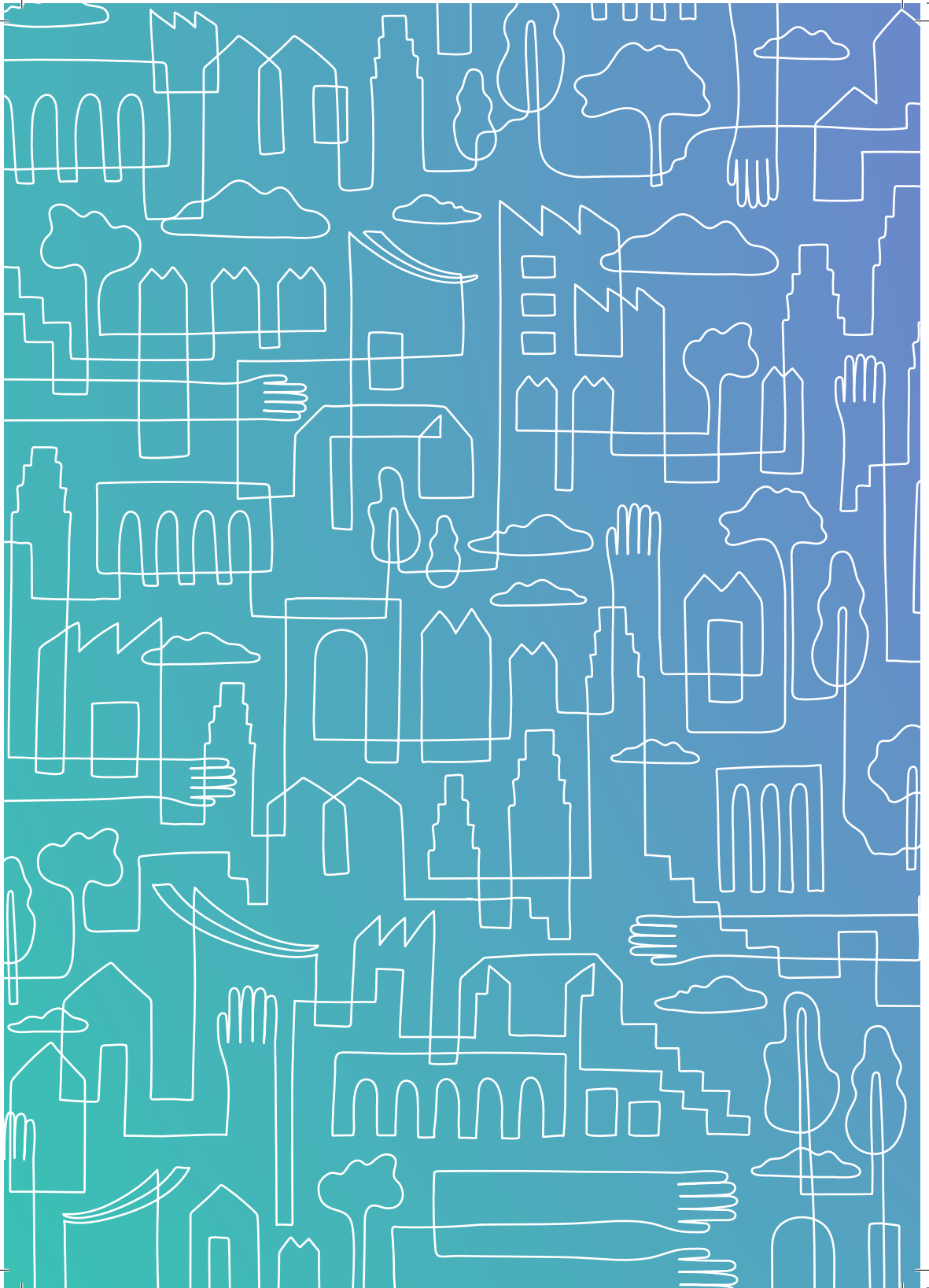
For example, The Fiona Stanley Hospital in Western Australia was famously delayed six months because of poor communication between subcontractors. When conditions aren't well understood, risks aren't evenly shared, which can delay projects.

His research could lead to useful insights in other big projects outside the construction industry including business-to-business relationships.

**Shumank Deep – PhD candidate,
School of Architecture and Built
Environment**









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