

Imperial College
London

Mind the gap

Bridging Urban Resilience Knowledge – Implementation Gaps

An Action Research Inquiry into the Role of
Systems Approaches and Social Learning

Submitted by Corina Angheloiu
For the degree of PhD
Supervisor Dr Mike Tennant
November 2022

Imperial College London
Faculty of Natural Sciences
Centre for Environmental Policy

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Supervisor Dr Mike Tennant

Statement of Originality

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This is dedicated to all those who ask, 'Oh, but why and how so?', who seek to enable equitable resilience, and who wish to cultivate spaces for radical abundance. Nevertheless, they persisted.

“I may not have gone where I intended to go,
But I think I ended up where I intended to be.”

Douglas Adams, author of *The Hitchhiker's Guide to the Galaxy*

Abstract

Minerva's owl always flies at dusk, is the old saying – wisdom always emerges in hindsight. This paradox has crippling effects in dealing with the challenges posed by the urgent need to adapt to the increasing effects of climate change and to strengthen the resilience of individuals, communities, and of our institutions and systems. As urbanisation gathers pace, nowhere is this need more urgent than in our cities. Urban resilience is a broad concept that connects disciplines such as engineering, psychology, disaster risk reduction, urban planning, or community development. The term's use has skyrocketed, leading to increasing gaps between resilience knowledge and its implementation.

This research explores the role of systems approaches and social learning in bridging these gaps. The thesis consists of two parts: defining the problem situation and intervening to improve it. The first part contains a review of relevant literature (Chapter 2) and the design of an empirical study (Chapter 4) to investigate how knowledge–implementation gaps emerge and how they might be bridged. The second part charts two interventions (Chapter 5): the design and facilitation of the 2020 Urban Resilience Summer School, and the co-facilitation of the ensuing Urban Resilience Community of Practice (2020-21), both aimed at mid-career professionals.

The original contributions to knowledge are theoretical and methodological. This research has advanced the current understanding of knowledge–implementation gaps. It has developed and tested a framework and demonstrated how it could enable professionals to cultivate systemic skills and capabilities from a lower towards a higher maturity. It has provided evidence of the need to extend capacity building beyond one-off programmes and has demonstrated the potential of transdisciplinary communities of practice in sustaining learning. Lastly, my first-person inquiry revealed the role facilitation plays in enabling capacity building and transdisciplinary collaboration.

Abbreviations

I00RC: I00Resilient Cities

ARC: Action Research Cycle

CoP: Community of Practice

COP: Conference of the Parties

ICLEI: originally International Council for Local Environmental Initiatives, now ICLEI – Local Governments for Sustainability

GRAA: Global Research and Action Agenda

IURA: International Urban Resilience Academy

MEL: Monitoring, Evaluation, and Learning

NUA: New Urban Agenda

PBL: Problem-Based Learning

SDGs: Sustainable Development Goals

SDU: Southern Denmark University

SUP: Summary for Urban Policy Makers

UCLG: United Cities and Local Governments

UN: United Nations

UNEP: United Nations Environment Programme

UNDRR: United Nations Office for Disaster Risk Reduction

UNDP: United Nations Development Programme

UNFCCC: United Nations Framework Convention on Climate Change

URCoP: Urban Resilience Community of Practice

URD: Urban Resilience Dialogues (Podcast)

WMO: World Meteorological Organization

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1.0 Introduction

This chapter introduces the global context within which this research is situated (Section 1.1), outlines the research aims and objectives (Section 1.2), sets out the research questions (Section 1.3), summarises the original contribution to knowledge (Section 1.4). Section 1.5 introduces my first-person inquiry thread and summarises the journey that has led me to explore the issues presented in this thesis.

1.1 Global context of urban action and research agendas in relation to climate change

To achieve the aims of the Sustainable Development Goals (SDGs) by 2030, we require a global effort named by the United Nations as the ‘Decade of Action’ (UNSD, 2019). In the context of compounding global crises such as Covid-19 and the devastating effects of climate change, this need for action has never been more acutely felt. The 6th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) evidences the growing significance of adaptation and resilience action to respond to climate change risks (IPCC, 2021). This widening spectrum of action – from mitigation to adaptation and resilience – posits the added challenge of discerning between the co-benefits and trade-offs afforded by different types of interventions and time horizons to achieve the goals set out in the SDGs.

The context of this thesis is set out by the Global Research and Action Agenda (GRAA) on Cities and Climate Change Science, the primary output of the Cities Intergovernmental Panel on Climate Change (IPCC) campaign (IPCC, 2018). Co-sponsored by the IPCC, the United Nations Environment Programme (UNEP), and the World Meteorological Organization (WMO), the Cities and Climate Change Science Conference was hosted in Edmonton, Canada, in 2018. The conference aimed to assess academic, policy, and practice-based knowledge regarding cities and climate change (Prieur-Richard et al., 2018). It was seen as a pivotal moment for local and regional governments (UCLG, 2018), as for the first time, the IPCC acknowledged the role of cities in addressing the causes and effects of climate change.

The GRAA is structured in three main areas: 1) Cross-cutting knowledge gaps; 2) Key topical knowledge gaps; and 3) Delivering on the Research and Action Agenda: Approaches to strengthen the science, practice, and policy interface. Within this, systems approaches are identified as a critical knowledge gap. The report contextualises the need to integrate diverse forms of knowledge, evidence, and data through a ‘holistic approach’ (Prieur-Richard et al., 2018, p. 4). The report also calls for advancements in ‘action-oriented research’ in recognition that there is a need for new methods that are better suited to assessing synergies, trade-offs, and co-benefits concerning both mitigation and adaptation climate action in urban areas (Prieur-Richard et al., 2018).

The report identifies the lack of capacity-building resources as a critical barrier to integrating different knowledge systems and the uptake of action-oriented research methods. It highlights the need to develop competencies such as understanding “differences in organisational culture, ethical and normative issues, the ability to translate between different knowledge schemes, the necessary self-awareness to recognise

gaps in capacity and the willingness to develop lacking capacities actively, by involving different perspectives” (Prieur-Richard et al., 2018, p. 22). This builds on evidence provided by the IPCC Working Group II on Impacts, Adaptation and Vulnerability that noted that as of 2014, around 70% of adaptation and resilience funding is targeted at ‘hard’ infrastructure, with only around 10% targeted at ‘soft’ interventions such as capacity building and learning, which have been historically underfunded (Revi et al., 2014).

In the context of climate adaptation challenges, resilience can be seen as a ‘mobilising metaphor’ (Béné et al., 2018) or as a ‘bridging concept’ (Deppisch & Hasibovic, 2013) that can foster a transdisciplinary dialogue between traditionally disparate communities such as disaster risk reduction, emergency management, community development, engineering, ecology or urban planning. As the term’s use has gathered pace, its meaning has diverged from a clear academic concept (resilience as the non-normative property of a system to absorb change or disturbances while maintaining its functions, cf. Holling, 1973) towards ‘fuzzy’ and ‘increasingly vague’ (Meerow et al., 2016) definitions that seek to address the normative dimensions of resilience for whom, of what, and for when in the context of socio-ecological systems (Bahadur & Thornton, 2015; K. Brown, 2014; Chelleri et al., 2015; Meerow & Newell, 2016; Vale, 2014).

The conceptual flexibility of resilience is both an advantage and a drawback. As Vale notes, “the biggest upside to resilience is the opportunity to turn its flexibility to full advantage by taking seriously the actual interconnections among various domains that have embraced the same terminology” (Vale, 2014, p. 198). However, while the academic discourse is putting forward theoretical advances in the conceptualisation of resilience, there is growing concern that, in practice, the term is being co-opted as a mechanism for implementing policies that support business-as-usual (Bahadur & Thornton, 2015; Brown et al., 2012; DeVerteuil & Golubchikov, 2016; Kaika, 2017), which has even led to questioning whether the term is ‘redeemable’ (DeVerteuil & Golubchikov, 2016).

This illustrates the dilemma of navigating an increasingly popular term across different academic disciplines and in the practice and policy spheres. Emerging gaps between resilience knowledge and implementation are strengthened by the gravitational pull of sectoral conventions. Efforts to address gaps fall back on a linear assumption that bodies of knowledge become ‘applied’ through implementation (Cook & Wagenaar, 2012; West et al., 2019). For example, despite recognising the need for action-oriented research and advocating for the integration of different types of knowledge, (Prieur-Richard, Walsh, Craig, Melamed, Colbert, et al., 2018), the IPCC itself remains anchored in a linear process of linking knowledge and action (West et al., 2019).

The spheres of science, policy, and practice operate according to different knowledge systems, time horizons and definitions of success, which can lead to the emergence of contrasting or even competing interests (Feagan et al., 2019; Gaillard & Mercer, 2013; Schiappacasse & Müller, 2018; Weichselgartner &

Kasperson, 2010). Higher education, professional development programmes, and professional accreditation bodies are still predominantly structured in ways that reinforce mono-disciplinary or mono-sectoral identity (Fam et al., 2020; McLeish & Strang, 2016; Woiwode & Froese, 2020). Knowledge silos also present challenges within disciplines, for example, between researchers, practitioners, and policymakers stemming from the same disciplinary background, with further barriers posed by paywalled knowledge products and the dominance of English-language publishing. As well as these structural barriers, relational features such as trust, leadership, values, and power can hinder knowledge development and implementation processes (Cundill et al., 2019).

1.2 Research Aims and Objectives

This thesis responds to the calls set out in the IPCC Global Research and Action Agenda (2018), exploring how action-oriented research and the development of systems approaches can help value and integrate different forms of knowledge to bridge urban resilience knowledge–implementation gaps. It builds on previous scoping work I have undertaken (Angheloiu & Tennant, 2020) and on over a decade of experience as an urban practitioner and researcher. The overall aims of this thesis are twofold:

- 1) To identify how gaps between knowledge and implementation occur in the context of urban resilience; and
- 2) To test how social learning and systems approaches can help bridge gaps between knowledge and implementation through two interventions – a capacity building programme and an ensuing community of practice.

To achieve these aims, the following objectives are pursued:

- a) To review how urban resilience knowledge-implementation gaps are currently portrayed and analysed in academic literature and to explore how they currently materialise for urban resilience professionals (researchers, practitioners, policymakers).
- b) To characterise different approaches to capacity building and explore how they help bridge knowledge-implementation gaps.
- c) To develop and apply a framework for training urban professionals in systems approaches;
- d) To explore how social learning can support the longer-term learning process beyond a one-off capacity building experience.
- e) To document the findings and set out key conclusions and future directions.

1.3 Research Questions and Scope

Given the global context set out in Section 1.1, this thesis takes an action-oriented research approach to identify how knowledge-implementation gaps occur in urban resilience and develop specific interventions that seek to bridge these gaps. Therefore, this thesis aims to address the following research questions (RQ):

- RQ1: What are the urban resilience knowledge-implementation gaps, and how do they occur?
 RQ2: How might systems approaches help bridge these gaps in the context of a capacity building programme?
 RQ3: How might a transdisciplinary community of practice support the onward learning and knowledge-brokering process?

Table 1 below sets out the scope of each research activity associated with the objectives.

Table 1. Research Scope.

Research question	Research objectives	Corresponding research activity and scope
RQ1: What are the urban resilience knowledge-implementation gaps and how do they occur?	To review how urban resilience knowledge-implementation gaps are currently portrayed and analysed in academic literature and to explore how they currently materialise for urban resilience professionals (researchers, practitioners, policymakers).	Review relevant literature I will undertake a literature review to identify how urban resilience knowledge-implementation gaps are currently portrayed and analysed in academic literature and to better understand which are the factors that contribute to the perpetuation of knowledge-implementation gaps.
	To characterise different approaches to capacity building and explore how they help bridge knowledge-implementation gaps.	The literature review will also investigate the potential of approaches to bridging knowledge-implementation gaps, such as capacity building and communities of practice.
RQ2: How might systems approaches help bridge these gaps in the context of a capacity building programme?	To develop and apply a framework for capacity building that supports professionals to apply systems approaches to urban resilience challenges.	Develop and apply a framework for training professionals in systems approaches I will develop a framework for taking a systems approach to an urban resilience challenge and will test it during a capacity building programme for urban professionals. The framework will help professionals to diagnose their urban resilience challenge, imagine preferable alternatives, develop actions that would enable those alternatives, and to develop monitoring, learning, and evaluation strategies.
RQ3: How might a transdisciplinary community of practice support the onward learning and knowledge brokering process?	To explore how social learning can support the longer-term learning process beyond a one-off capacity building experience.	Cultivate an urban resilience community of practice I will explore how social learning can support longer-term capacity building through the development of a community of practice to support urban professionals to take systems approaches in their day-to-day work and learn and reflect together.
	To document the findings and set out key conclusions and future directions.	Document the work in a thesis I will document the research, key findings, and implications for future research directions into this thesis for consideration for the award of a Doctor of Philosophy.

Stakeholder focus

This research aims to understand how knowledge-implementation gaps occur and how we might intervene to bridge them. The research focuses on practitioners (officers from international and intergovernmental

organisations, and staff from private sectors and non-profit organisations), researchers (PhD candidates, post-docs, research fellows, and lecturers from universities and research organisations), and policymakers (from national and subnational governments and public organisations) as three broad categories of professional stakeholders within the urban resilience field.

The three categories were predefined by the IURA Summer School organisers, as well as the focus on ‘mid-career’ professionals – defined by the IURA organisers as professionals with 5-10 years of professional experience. This follows the principles of convenience sampling, a non-probabilistic sampling method widely used in qualitative research. As the IURA organisers noted explicitly, the reasoning behind this choice was that, in their experience, mid-career professionals tended to be the least supported by further professional development programmes (that usually focus on either leadership development for senior leaders or early career support and mentoring). Meanwhile, mid-career professionals face increased managerial responsibilities while retaining project delivery responsibilities.

1.4 Original contribution to knowledge

The original contributions to knowledge are theoretical and methodological. This research has advanced the current understanding of knowledge-implementation gaps and the application of action research in the context of urban resilience. It has developed and tested a framework to Diagnose, Imagine, Act, and Learn (DIAL) and demonstrated how it could enable professionals to cultivate systemic skills and capabilities from a lower towards a higher maturity. It has provided evidence of the need to extend capacity building beyond one-off programmes and has demonstrated the potential of transdisciplinary communities of practice in sustaining it.

As “researchers, urban practitioners, and policy-makers often operate at different time and spatial scales and use different vocabularies” (Prieur-Richard et al., 2018, p. 22), my first-person inquiry into navigating the researcher/practitioner identities and the endeavour to integrate them rather than see them as dualities provides a prototype for boundary and domain spanning professionals. The first-person inquiry demonstrates the role facilitation plays in enabling capacity building and transdisciplinary collaboration.

The research highlights the role of learning systems in bridging urban resilience knowledge-implementation gaps through transdisciplinary collaboration. Adaptation and resilience capacity building and learning have been historically underfunded (Revi et al., 2014), despite increasing evidence of the high benefit-cost ratio (Global Centre on Adaptation, 2021). This research evidences the need to integrate social learning as a critical part of capacity building and institutional strengthening. It demonstrates how transdisciplinary communities of practice can provide a missing link between the individual and institutional scales.

1.5 How I came to urban resilience

Over the past decade, I have been on a journey from physical applications of design (such as architectural, urban, or product-service design) to the more abstract and conceptual implications of design (such as the design of change interventions and processes). In other words, I've been journeying from designing things to designing strategies that help challenge and reimagine why and how we do things.

I graduated in architecture from the University of Sheffield in 2011 and worked for the participatory architecture practice die Baupiloten in Berlin. In 2013, I returned to Romania and founded a Bucharest-based NGO to serve as a platform for knowledge exchange and urban experiments between Romanian and European cities. The NGO was invited to design the main pavilion for the 2013 Bucharest Architecture Biennale and to curate a programme of events and workshops on the theme of participatory urbanism.



Figure 1. A collage of activities run by the Bucharest Urban Lab I co-founded and ran between 2013-2016.

Our intervention led to a two-year collaboration (2014-2016) with two other local NGOs and the Nordic Urban Design Association. We refurbished a Luton van into a mobile office for 'collaborative city-making'. The mobile office, *Urboteca* (in Romanian, a wordplay between urban and library), partnered with Romanian municipalities to facilitate a travelling programme of talks, events, and training workshops that aimed to increase urban literacy in the context of a historic lack of public participation in decision-making during the socialism.

This chapter made me more aware of the complexity of problem-solving while only looking at the built environment as the site for intervention. To paraphrase Cedric Price:

Spatial tactics were the answer, but what was the question?

I became increasingly frustrated with the agency I didn't have and the conversations I couldn't influence as part of the traditional role of the architect. I was also challenged by the process of evolving from an informal, non-hierarchical, design-led collective into a formal civil society organisation that required navigating fundraising and reporting cycles and legal and audit compliance. I consequently spent the following years exploring alternative roles through which a design-led practice could contribute to broader social change. I was exploring an assumption that by developing prompts, artefacts, and narratives to critically interrogate relevant social issues, we can close the imagination gaps between the scale of change needed to stay within planetary boundaries and the dominant techno-optimistic imagined futures. I was charting my explorations through a blog entitled Future Tense, and my Twitter handle became @futuresforensics. This first-person inquiry eventually formed the basis of a series of design research collaborations and consequent conference and peer-reviewed papers (Angheloiu et al., 2017, 2018, 2019).

Although aspects of this chapter are still alive in my practice today (for example, in integrating my experience with design and futures methods as part of the present research design), an emerging inquiry question guided me in a different direction: how might I/we cultivate people's skills and capabilities to act and think systemically? This meant exploring beyond the urban as sole intervention site and beyond design and futures as primary disciplinary domains. This inquiry is partly attributed to one of my professional hats at the time – as I was working for the international non-profit Forum for the Future, which focuses on enabling systemic change, and partly to an ongoing collaborative inquiry Living Change, a shorthand for exploring what it means to seek systemic change while living it ourselves. In this period, I became more intentional about methodological approaches for experimental and experiential research, as action inquiry and action research became my methodological 'backbone'.



Figure 2. My MA Architecture thesis - 'The Shape of Things to Come' (2015), depicted the impact of sea level rise and increasing storm surges in the Wash, UK.

I arrived at resilience through a different inquiry thread. As part of my MA thesis at the Royal College of Art, I explored the implications of the increasing fragmentation of global environmental governance and the growing impact of interconnected phenomena such as climate change, species extinction, and urbanisation. I set out to explore the role of anticipatory design – how we might ‘design in’ buffer capacity for infrastructural resilience while igniting a societal conversation about what is of value – what we choose to protect and what we choose to let go of.

Through this design-led exploration of the difficult choices posed by climate adaptation, I identified resilience as control as a critical narrative gaining momentum. This was seen in metaphors such as ‘build back better’, adopted as a principle by UNDRR in 2015, the concept of ‘future proofing’, or seen in verbs such as ‘fixing’ or ‘controlling’ in relation to climate change.

The need to develop counter-narratives emerged from meandering conversations and disconnected inquiries between 2013-2018 when I formally started this PhD. They were part of a broader landscape shift, as organisations such as UNDRR were evolving their language (Fig. 3 below) beyond metaphors of control and management, or the quote below from the Re:Think initiative at

the Stockholm Resilience Centre.



Figure 3. From managing disaster to living with uncertainty, *Global Assessment Report on Disaster Risk Reduction, UNDRR (2019)*.

“We must acknowledge that resilience thinking is literally a different worldview about how change happens in the world. It is a view that clashes head-on with current ways of funding, designing, and managing projects that favours incremental, sectoral, local, and short-term initiatives underpinned by linear assumptions of development inputs.” (Reyers & Moore, 2017)

Having explored how we might enable urban change (via the fields of design and architecture), how we might enable systemic change (via the fields of action inquiry, systems thinking, and futures studies), and what resilience might mean (via the fields of complexity and climate adaptation) I felt that the parallel inquiries I’ve been following for nearly a decade required an integrative approach to explore and test different counter-narratives. I have sought to create the space for this as part of this journey, which brought me to this page today.

1.6 Chapter Summary

This chapter has introduced the global context within which my research is situated (Section 1.1), outlined the research aims and objectives (Section 1.2), set out the research questions (Section 1.3), and summarised the original contribution to knowledge (Section 1.4). Lastly, in Section 1.5, I introduced my first-person account of the journey that has led me to explore the issues presented in this thesis.

2.0 Literature review

This chapter presents three reviews that underpin the research of this thesis. Firstly, the chapter presents a review of the factors that lead to the occurrence of knowledge-implementation gaps in urban resilience (Section 2.1). Secondly, it reviews how social learning as an enabler of transdisciplinary collaboration emerged as a promising way of addressing knowledge-implementation gaps (Section 2.2). Lastly, it presents an overview of the required types of capacity, focusing on the core competencies that enable professionals to take systems approaches and the tools and methods that can be used to strengthen these. (Section 2.3).

2.1 A review of the factors that contribute to knowledge-implementation gaps in urban resilience

2.1.1 The growing pace of urban resilience

The urban resilience concept emerged from an engineering concern with disaster risk reduction (Vale & Campanella, 2005), while in recent decades, it has increasingly drawn from ecology (Holling, 1973; Berkes, Folke, & Colding, 1998; Walker et al., 2006), adaptation, and anthropology (Janssen & Ostrom, 2006). As cities are increasingly experiencing unpredictable and devastating effects of climate change (Bai et al., 2018), calls for urban climate adaptation and resilience action have climbed up the global agenda.

The Hyogo Framework for Action (UNDRR, 2005) provided the blueprint for disaster risk reduction efforts during 2005-2015. It focused on reducing disaster losses (measured through both lives and livelihoods as social and economic indicators). The framework emphasised improving risk assessment and enhancing disaster preparedness and early warning systems to achieve this goal. However, the success of the HFA remained limited, as institutional and legislative frameworks did not facilitate integration into national decision-making processes. These findings are depicted in the ‘Synthesis report on consultations on the post-2015 framework on disaster risk reduction (HFA2)’ (UNDRR, 2013), which notes that the exposure to hazards increased faster than the decrease in vulnerability across high-, mid-, and low-income countries. This conclusion formed the basis of the Sendai Framework (UNDRR, 2015), the successor instrument to the HFA, which sets a global policy framework on disaster risk reduction between 2015-2030.

The Sendai Framework centres the role of adaptation and resilience as overall critical approaches to reducing the risk of disasters. Importantly, it marks a shift away from a sole preoccupation with large-scale disasters (such as tsunamis or earthquakes) to addressing chronic shocks and stressors (such as floods, droughts, chronic food insecurity, water security, or rapid urbanisation). The Sendai Framework is also where the phrase “Build Back Better” is first mentioned in an official UN document, marking a narrative shift towards holistic recovery, rehabilitation, and reconstruction approaches.

Alongside the evolution of the disaster risk reduction frameworks, the Sustainable Development Goals (SDGs), adopted in 2015, marked the increased emphasis on the role of cities through the creation of the standalone SDG 11 Sustainable Cities and Communities, shortly followed by the adoption of the New Urban Agenda (NUA) (UN-Habitat, 2016), as part of the Habitat III, the Third United Nations Conference on Urban Settlements. NUA aims to operationalise the goal of SDG 11 (to make cities and human settlements inclusive, safe, resilient, and sustainable) through four fundamental mechanisms: national urban policies, urban governance, integrated urban planning, and urban financing frameworks. Taken together, these key frameworks – the Sendai Framework, the SDGs, and NUA – signal the increased importance of cities as intervention sites in mitigating and adapting to climate change, as well as their rise as formal actors claiming a near-equal status to nation-states (Acuto et al., 2021).

The role of the city as a formal actor (Acuto et al., 2021) has been supported by policy and advocacy member organisations that such as:

- UCLG, United Cities and Local Governments is the world's largest organisation of sub-national governments, with over 240,000 members in over 140 UN Member States.
- ICLEI, the International Council for Local Environmental Initiatives, represents 1,750 cities and towns in 126 countries.
- C40 Cities Climate Leadership Group comprises 97 cities representing one-twelfth of the world's population and one-quarter of the global economy.
- 100Resilient Cities, initiated by the Rockefeller Foundation to fund the post of a Chief Resilience Officer in 100 cities and associated programmes, to a total of \$160m in funding. In 2019, Rockefeller Foundation announced they would be moving the 100RC programme into a legacy phase, which since has divided into two standalone organisations, the Resilient Cities Catalyst (led by the former leadership team of 100RC) and the Resilient Cities Network (which aims to continue supporting the global network of Chief Resilience Officers).

These member-led organisations aim to complement UNDRR and UN-Habitat efforts to institutionalise urban resilience across local governments, notably through initiatives such as Making Cities Resilient (a UNDRR-led campaign) and the Medellín Urban Resilience Collaboration, an initiative launched in 2014, which gathers prominent actors committed to building resilience globally including UNDRR, The World Bank Group, Global Facility for Disaster Reduction and Recovery, Inter-American Development Bank, Rockefeller Foundation, 100Resilient Cities, C40, ICLEI and Cities Alliance, and which is chaired by UN-Habitat. Collectively the partners work in over 4,000 cities globally, with more than US\$2bn committed annually toward advancing resilience (UN-Habitat, 2014).

The rapid proliferation of the urban resilience discourse is mirrored by the rapid growth in peer-reviewed articles (Fig. 4). Between 2005 (the year of the Hyogo Framework for Action) and 2021, nearly 10,000

peer-reviewed articles regarding urban resilience were published. Of these articles, 19.9% were published between January - December 2021 alone.

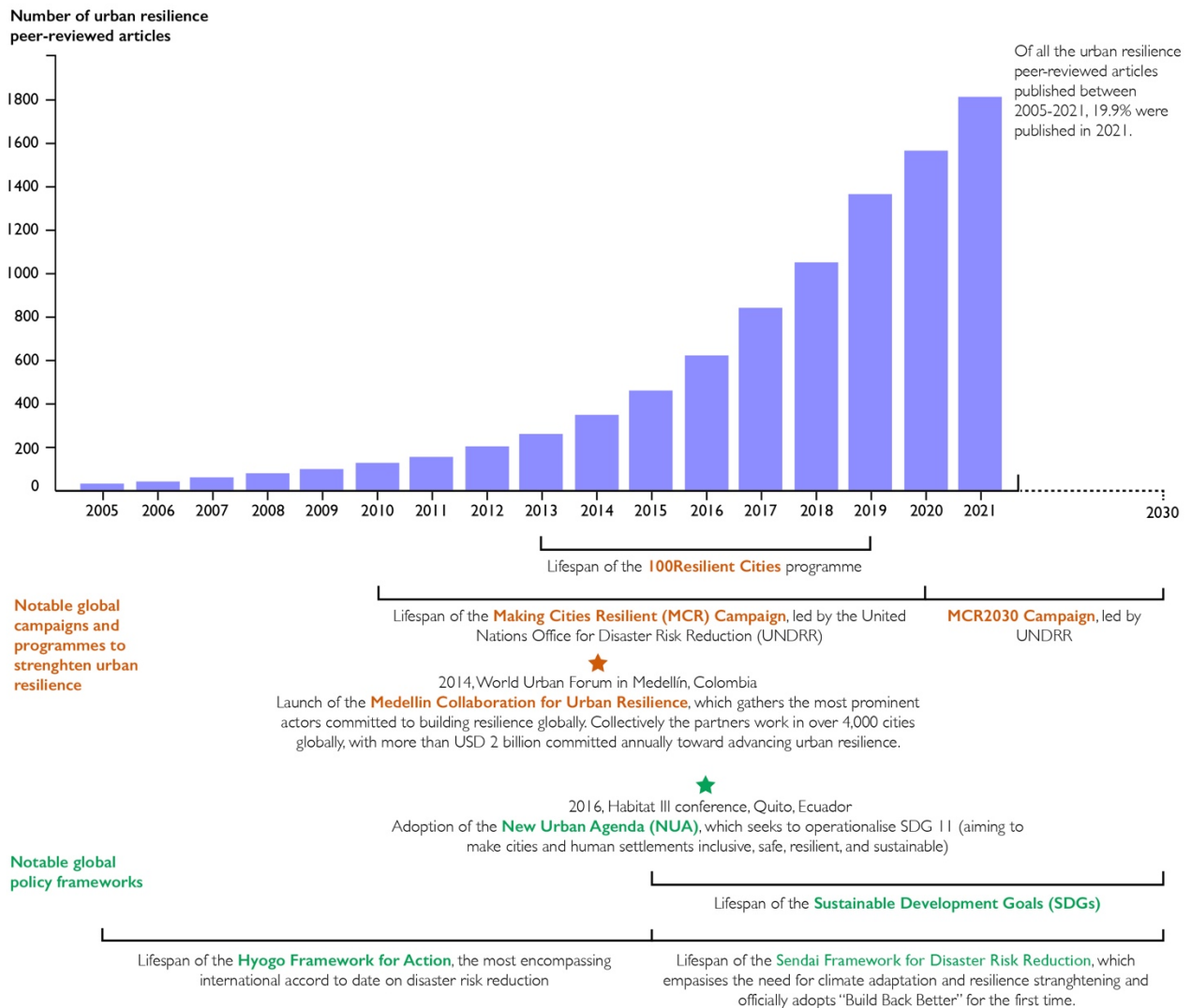


Figure 4. Growing pace of urban resilience: number of publications in the Web of Science database of articles containing "urban resilience", "resilient city", or "resilient cities" in their title, abstract, or keywords, set in the context of notable global campaigns, programmes, and policy frameworks.

As urban resilience grew in popularity, its definitions became increasingly 'contradictory' and marked by tensions (Meerow et al., 2016). In the academic literature, urban resilience refers to the ability of a city or urban system to cope, adapt, and transform in the face of shocks or underlying stressors. It evolved from being conceptualised as a non-normative property or attribute of a system or sub-system, which is neither inherently bad nor inherently good (Ahern, 2011; Chelleri et al., 2015; Zhang & Li, 2018). This meant that resilience encompasses the scope for both desired and undesired dimensions, which necessitate distinguishing depending on the specific context of the system or sub-system. Resilience as a

non-normative property can be seen as single-state equilibrium, multiple-state equilibrium, and dynamic non-equilibrium (Folke, 2006; Holling, 1996), also known as ‘engineering resilience’ and ‘ecological resilience’. In engineering resilience, single-state equilibrium implies that a system can revert to a pre-disturbance stable state. For example, an energy grid affected by damage to power lines during a storm could ‘bounce back’ to its normal functioning parameters following repairs. Ecological equilibrium posits that systems can have multiple stable states. In the event of a disturbance, they can ‘tip into’ a different stable state rather than reverting to the original pre-disturbance stable state.

The concept of equilibrium has been challenged by the school of thought of dynamic non-equilibrium, which proposes that urban systems have no stable state and are constantly changing and evolving (Pelling & Manuel-Navarrete, 2011). This position draws on earlier explorations by Donald Schön, who, in a series of Reith lectures in 1970, put forward the thesis that our institutions, norms, and societal structures are ill-equipped to navigate and respond to accelerating technological change. He coined the phrase ‘beyond the stable state’ (Schön, 1973) to conceptualise an emerging paradigm of a world in flux as opposed to a prevailing worldview marked by stability and constancy.

The implications of a dynamic non-equilibrium view of urban resilience highlight that taking a non-normative stance on urban resilience does not address issues such as equity, uneven resilience outcomes, or challenges associated with the limited funding and institutional capacity to implement resilient actions. As Vale (2014, p. 198) notes, “the biggest upside to resilience, however, is the opportunity to turn its flexibility to full advantage by taking seriously the interconnections among various domains that have embraced the same terminology”. This implies that in adopting a dynamic non-equilibrium worldview, urban resilience can allow different stakeholders (practitioners, researchers, policymakers) from other disciplines (planning, ecology, disaster risk reduction, psychology, etc.) to see how the term applies in interconnected ways across the various disciplines and modes of practice. At its best, this can mean that urban resilience becomes a flexible and pragmatic bridge to span theory and practice while remaining alert to the critical question of equity and justice.

To inform the decision-making process between which trade-offs are acceptable in bridging conceptualisation and operationalisation, Meerow & Newell put forward the ‘five Ws of urban resilience’ (Meerow & Newell, 2016, p. 16), depicted in Fig. 5 below. These questions seek to address the shortcoming of non-normative urban resilience by providing a framework for a dynamic understanding of urban resilience by asking why resilience and for whom, of what, for when, and

Questions to Consider	
Who?	Who determines what is desirable for an urban system? Whose resilience is prioritized? Who is included (and excluded) from the urban system?
What?	T What perturbations should the urban system be resilient to? R What networks and sectors are included in the urban system? A Is the focus on generic or specific resilience?
When?	D Is the focus on rapid-onset disturbances or slow-onset changes? E Is the focus on short-term resilience or long-term resilience? O Is the focus on the resilience of present or future generations?
Where?	F Where are the spatial boundaries of the urban system? F Is the resilience of some areas prioritized over others? S Does building resilience in some areas affect resilience elsewhere?
Why?	? What is the goal of building urban resilience? What are the underlying motivations for building urban resilience? Is the focus on process or outcome?

Figure 5. Five Ws of urban resilience (Meerow & Newell, 2016).

for where (Meerow & Newell, 2016; Bahadur & Thornton, 2015; Chelleri et al., 2015; Brown, 2014; Vale, 2014).

In asking these questions, different resilience trade-offs – political, financial, socio-economic, and socio-ecological – become apparent (Chelleri et al., 2015):

- Resilience for whom requires understanding the dynamics of inclusion and exclusion in urban systems as well as decision-making processes, as growing evidence shows that marginalised groups are more likely to suffer the effects of shocks or disasters, which in turn exacerbate underlying vulnerabilities and inequalities (Fitzgibbons & Mitchell, 2019; Lovell & Le Masson, 2014; Meerow et al., 2019). This challenges rapidly growing and poorer municipalities that often lack the financial and human resources of wealthier cities (Shi et al., 2016).
- Resilience against what requires defining and agreeing on the nature of the threat to be tackled and ensuring that building resilience in one urban system doesn't create additional vulnerabilities in a different system.
- Resilience for when highlights the importance of addressing both short-term responsive capacities and longer-term transformational ones while being aware of how resilience interventions might strengthen the former but weaken the latter. The trade-offs between different time horizons depict potential contradictions between urban sustainability and urban resilience interventions (Zhang & Li, 2018), as sustainability interventions that focus on efficiency and hyperconnectivity might be less resilient due to reduced redundancy and inflexibility (Redman, 2014).
- Resilience for where requires understanding the spatial interconnections between the administrative boundaries and the broader socio-ecological systems such as river basins, as well as between urban, regional, national, and international scales.

In summary, as the use of urban resilience has rapidly increased, its meanings have forked into two main branches – one that sees urban resilience as a non-normative property of a system and another that sees urban resilience as a dynamic, normative, and contested process of negotiating resilience for whom, for when, for where, and of what to what. As the meanings of the concept have diverged and have been debated in the academic literature, gaps in implementation emerge. The following section presents a systematic literature review that aims to uncover the critical gaps between the knowledge and the implementation of urban resilience.

2.1.2 Knowledge-implementation gaps in urban resilience

To better explore how knowledge-implementation gaps are currently conceptualised, a systematic literature review was drawn from a Web of Science search (covering the years 2005-2021) across the terms “urban resilience” and either of the following: “knowledge gap”; “implementation gap”; “knowledge implementation gap”; “operationalisation gap”. The search timeline covers the Hyogo Framework for

Action (HFA): Building the Resilience of Nations and Communities to Disasters (2005-2015) and the first phase of the 2015-2030 Sendai Framework for Disaster Risk Reduction. These two critical global policy directives have informed the operationalisation of urban resilience to date. The search included title, abstract, and keywords and yielded 47 results; after reading the abstracts, 12 results were excluded as they did not directly explore knowledge-implementation gaps. In total, 35 results were analysed using a content analysis approach (Vaismoradi et al., 2013).

Across the literature, knowledge-implementation gaps are explored under different terms: as operationalisation challenges (Baravikova et al., 2021a; Sanchez et al., 2018), as science-policy-practice nexus challenges (Weichselgartner & Kasperson, 2010), as theory – practice gaps (Brown et al., 2012; Brunetta et al., 2018), or as knowledge – action gaps (Gaillard & Mercer, 2013). These studies point to a ‘mismatch’ (Sanchez et al., 2018) between the conceptualisation and the operationalisation of urban resilience or between the available knowledge on urban resilience and its implementation challenges.

Seven key themes emerge from the analysis of the literature to portray the mismatch between the knowledge and implementation of urban resilience: 1) the term’s definition and applications; 2) knowledge production challenges; 3) ownership over the process of implementation; 4) navigating confidence and uncertainty; 5) processes to address trade-offs; 6) skills and capacity; and 7) social dimensions of resilience. The contributing factors that lead to knowledge-implementation gaps span many scales and conflicting priorities as well as issues regarding problem statements that start with ‘a lack of’ – a lack of resources, skills, individual and institutional capacity, staff, data, tools, collaboration, and communication. The diversity of factors is also mirrored in the broad spectrum of further research identified, which ranges from tools, methods, and parameters to power dynamics and ways in which knowledge production systems can be evolved. The following sub-sections will discuss the knowledge-implementation gaps identified and summarise priority future research as indicated in the literature.

Urban resilience definition and its application

The pluralisation and broadening of the meaning of urban resilience led to a lack of an overarching operationalisation model that can be easily replicated (and, therefore, consistently evaluated in different geographies). Different disciplinary departure points have shaped the meaning of resilience, encapsulating different views towards incremental/transformational resilience and equilibrium/non-equilibrium resilience. This has led to divergent applications of the term in practice (Sanchez et al., 2018). While the reading of urban resilience as ‘failing forward’ makes a case for improving urban systems in the aftermath of disasters, the notion of urban resilience as persistence points to the difficult choices put forward by trade-offs between the actions that need taking and the invariably limited resources that municipalities can mobilise. This distinction, clearly marked in the academic literature, does “not always result to be helpful for “real-world” policy-making and city planning” (Sanchez et al., 2018, p. 10). The conceptual development of the

term is not grounded in the “everyday practices of planners” (Coaffee & Clarke, 2015, p. 253), as planners struggle to translate high-level policy documents into their day-to-day work (Wamsler et al., 2013).

‘Resilience’ is not commonly used in urban policy documents, and there is patchy coverage of the term in regional and national policy documents (Handayani et al., 2019). Language barriers present additional challenges as ‘resilience’ does not always translate well in other languages. This hinders the use of urban resilience implementation tools and methods developed by international organisations such as 100Resilient Cities, C40 Cities, UCLG, and ICLEI, which are often only available in English (Baravikova et al., 2021a). Language barriers also create the challenge of learning from operationalisation, as monitoring and evaluation is undertaken in the local languages, increasing the gap between available tools and how they are applied. There is currently little evaluation of how knowledge products (such as toolkits and tools) improve urban resilience practice or policy-making (Ernst & Preston, 2020).

The literature identifies that further research is required in defining “mundane and often overlooked circumstances of projects functioning”, such as the need to agree on a common lexicon in implementation (Baravikova et al., 2021a, p. 254), as well as assessments of the policy coherence of urban resilience to test for consistency of urban resilience definitions and implementation (Chelleri & Baravikova, 2021).

Knowledge production challenges

Navigating urban resilience tools and assessing existing knowledge is challenging for practitioners and their positionality as they both “participate in the production of knowledge and have to use the growing abundance of its results” (Baravikova et al., 2021a, p. 254). Urban resilience knowledge production challenges arise from ‘homogenising strategies’ that use global scientific knowledge and the perceived difficulty of integrating local knowledge (Gaillard & Mercer, 2013). Current and historical power dynamics favour ways of knowing, often to the detriment of marginalised groups (Beauchamp et al., 2020a). Adding to the challenge of knowledge production, limitations to co-creation in implementation arise from a mismatch between researcher aims and policy and practitioner expectations (Baravikova et al., 2021a). For example, this is evident in the lack of research funding for integrating traditional and Indigenous knowledge. Addressing the dichotomy between local/inside and scientific/outside knowledge requires acknowledging the value of multiple ways of knowing to provide assessment and solutions.

However, converging ways of knowing presents the challenge of ‘uneven power dynamics’ between the perceived superiority of scientific versus local knowledge. A study of Jakarta’s approach to flood management (Goh, 2019) reveals that as the resilience measures have been based on quantitative metrics, the process of developing and implementing adaptation measures was driven by an assumption that socio-biophysical ecologies can be objectively tested and intervened in. This has led to further marginalisation of the city’s poorest inhabitants through the displacement resulted from the demolition of *kampung* settlements to make way for flood protection measures. Their resulting community organising and activism highlighted that the displaced communities did not necessarily oppose relocation; instead, they

wanted to actively shape the decision-making process and provide their accounts and knowledge of local water flows as part of the assessment. This demonstrates that despite attempts to improve existing decision-making processes, these have not led to improvements in the nature of decision-making itself to consider dimensions of justice and to rightfully integrate local knowledge (Grabowski et al., 2019).

Participatory mapping processes and a broader use of qualitative research methodologies can potentially integrate the knowledge arising from a lived experience of hazards and disasters, especially in informal settlements. Still, their successful use requires making explicit the intentions and interpretations between knowledge producers and knowledge users (Borie, Ziervogel, et al., 2019). Although an increase in the use of participatory methodologies has achieved the goal of identifying local knowledge and issues, “local government institutions and scientists have indeed been reluctant to seriously consider both the tools themselves and the knowledge they produce for improving policies” (Gaillard & Mercer, 2013, p. 102), as community engagement is perceived as time-consuming in the context of needing to ‘act quickly’.

Further research is required to develop learning infrastructures for multi-stakeholder knowledge coalitions (Robin et al., 2019), to explore the use of ethnographic methods for knowledge production at the interface of science-policy-practice (Baravikova et al., 2021a), as well as a broader reorientation towards valuing the research process as much as the findings (Beauchamp et al., 2020a). Future explorations of urban resilience knowledge production should demonstrate a deeper consideration of the stakeholders who drive research agendas and how local voices are represented (Beauchamp et al., 2020a).

Ownership over the implementation process

The ownership of urban resilience challenges often straddles different scales, mandates, and jurisdictions. Implementing resilience strategies across jurisdictional boundaries depends on the available social infrastructure for governance and collaboration between different agencies and institutions (Bixler et al., 2020b). The literature points to a lack of horizontal coordination between implementation agencies (Pitidis et al., 2018) and vertical gaps between local, regional and national plans (Young et al., 2019). As there is little dialogue and integration between urban emergency managers and urban planners tasked with resilience implementation, this widens gaps between preventive and reactive measures (Melkunaite & Guay, 2016).

A lack of long-term stewardship of resilience challenges is partly attributed to the cyclical policy cycle (Handayani et al., 2019), while social services are not involved in risk management structures, thus missing opportunities to monitor vulnerabilities and spot pre-emptive interventions in the case of shocks such as heat waves or floods (Zaidi & Pelling, 2015). These challenges further increase in the context of the rapid growth in informal settlements, which are outside of official plans and regulations (Wamsler et al., 2013) and the economic constraints that exert pressure on local risk management and exacerbate pre-existing challenges such as local institutional fragmentation (Fraser et al., 2020).

Further research is required to assess how resilience interventions fit in the local institutional and political contexts (Baravikova et al., 2021a) and how a spectrum of interventions from incremental to transformative can provide a range of possible adaptive measures (Wamsler et al., 2013), as well as longitudinal studies to assess resilience improvements (Therrien et al., 2020). Expanding the ownership over the implementation process requires empirical studies on community-based resilience to identify how resilience is built by civil society organisations and how they can be supported as effective post-disaster actors (Graham et al., 2016).

Navigating confidence and uncertainty

While there have been scientific advances in understanding risk (seen in tools such as simulation and measurement tools), the experiences of urban managers depict that they do not feel equipped to integrate such tools into decision-making (Heinzlef et al., 2020). Governance actors lack a fundamental understanding of probabilistic information and side-line complexity in favour of monocausal explanations (Beauchamp et al., 2020a), which means there is little understanding of the levels of uncertainty that inform the climate models upon which decision-making processes should be based. As resilience strategies focus on historical averages (for example, temperatures and water flows), buffers or redundancies are seldom included in policy documents (Wardekker et al., 2020).

The literature identifies that further research is required into how ‘uncertainty literacy’ can be increased and towards developing a classification of different approaches to navigate risk and uncertainty (Beauchamp et al., 2020a). Building on this, the role of decision support tools should be further examined to establish how they can best aid stakeholder negotiations around what is seen as desirable or optimal resilience (Heinzlef et al., 2020).

Processes to address trade-offs

The emphasis on ‘win-win’ solutions present in policy documents obscures uneven costs among different groups and time horizons (Therrien et al., 2020). For example, resilience implementation often prioritises technological solutions with narrowly defined impact indicators (Connelly et al., 2020a) that do not take into account considerations of who frames the urban resilience challenge and over what time scale impact is measured. This is also partly due to a lack of approaches to assess the temporal order in which to implement policies efficiently within existing theoretical frameworks (Labaka et al., 2019). Conversely, a lack of evidence on the benefits of interventions such as nature-based solutions limits the uptake by decision-makers (Sarabi et al., 2019a). In the cases where nature-based solutions are implemented, there is often a lack of consideration afforded to the trade-offs between human and non-human inhabitants (Bush & Doyon, 2019a).

Further research is required to establish the impact of indicators for climate resilient technologies and how they perform in practice (Connelly et al., 2020a), to explore the role of maturity models in aiding the temporal prioritisation of resilience policies (Labaka et al., 2019), as well as to further explore how

potentially conflicting values inform interventions – for example, through exploring the tensions between bureaucratic values such as efficiency and resilience values such as adaptability (Baravikova et al., 2021a).

Skills and capacity

Urban resilience implementation is hindered by a lack of skills and capacity across individual, community, and institutional scales, as professionals are seen to lack experience in working in transdisciplinary work environments (Doyle et al., 2017), which hampers collaborative efforts across academia, practice, and policy-making. The organising capacity of communities for resilience is influenced by pre-existing urban development dynamics (such as gentrification and inequality) and the existence of civic infrastructure, such as community-based organisations and grassroots initiatives (Graham et al., 2016). In a crisis, individual resilience (such as the ability to leave in the event of a shock) can come at the cost of wider community resilience as communities are depleted of the skills and capacity of the most mobile individuals (Therrien et al., 2020). At the institutional level, there is a lack of capacity for implementation, which results from a lack of access to information, limited resources, and unclear institutional mechanisms for decision-making (Handayani et al., 2019).

The literature identifies that further research is required in exploring how adaptive capacity skills can be built in multi-disciplinary and multi-professional environments (Coaffee & Clarke, 2015), as well as a better understanding of the role social learning and self-organisation in improving individual as well as institutional capacities for resilience (Zaidi & Pelling, 2015).

Social dimensions of resilience

The uptake of urban resilience strategies and whole-city approaches through the 100Resilient Cities programme has seen predominantly seen the participation of cities in the Global North (Fitzgibbons & Mitchell, 2019), and of those, few strategies focused on including vulnerable or marginalised groups in the strategy development process. As the cities that took part in the 100RC programme have moved from strategy development to implementation, resilience issues were often reduced to a technical dimension, which reinforces expert-driven and top-down decision-making (Leitner et al., 2018) as opposed to integrating locally-led approaches to resilience that build on local and traditional knowledge. This is mirrored by academic publication trends that reveal a focus on infrastructural, institutional, and environmental aspects of resilience, with a lesser focus on social and economic dimensions (Sharifi, 2020).

The underlying drivers of vulnerability (such as urban inequality, marginalisation, gentrification) are often not addressed in resilience implementation, thus missing out on the political dimension of resilience actions (Pizzo, 2015). Combined with limited data availability of vulnerabilities in informal settlements, this can lead to a lack of understanding of ‘everyday risk’ and fail to inform decision-making in those contexts that are seeing the most rapid urbanisation trends (Beauchamp et al., 2020, Satterthwaite et al., 2019).

Further research is required to explore how the plethora of resilience tools and frameworks account for diverse perspectives and social implications of resilience measures (Leitner et al., 2018) and to further integrate community-driven approaches to data generation, such as citizen science (Satterthwaite et al., 2019a). Research is required to develop selection criteria for resilience interventions that focus on social justice, equity, and inclusion (Fitzgibbons & Mitchell, 2019), as well as to further investigate the role human agency plays in determining the impact of urban resilience policies (Beauchamp et al., 2020a).

2.1.3 Summary and implications for how knowledge-implementation gaps might be addressed

Despite an increasing global research effort to understand issues regarding urban adaptation, vulnerability, and resilience, we have witnessed an increase in disaster-related losses of lives and livelihoods, with absolute economic losses concentrated in high-income countries and with an overwhelming human cost concentrated in low and middle-income countries (UNDRR, 2021). These have severe direct and indirect implications, such as productivity loss, supply chain disruption, investment loss, education loss, and a negative impact on mental health. This poses the question of whether the knowledge base is ‘inadequate’, whether existing knowledge is not applied, or whether existing interventions are leading to ‘maladaptation’ (Schipper, 2020; Weichselgartner & Kasperson, 2010).

The factors discussed in the section above depict how these three explanations intersect. They also illustrate the dilemma of navigating an increasingly popular term across different academic disciplines as well as in practice and policy. The spheres of science, policy, and practice operate according to different knowledge systems, time horizons and definitions of success, which can lead to the emergence of contrasting or even competing interests (Feagan et al., 2019; Gaillard & Mercer, 2013; Schiappacasse & Müller, 2018; Weichselgartner & Kasperson, 2010). Higher education, professional development programmes, and professional accreditation bodies are still predominantly structured in ways that reinforce mono-disciplinary or mono-sectoral identity (Fam et al., 2020; McLeish & Strang, 2016; Woiwode & Froese, 2020). Knowledge silos also present challenges within disciplines, for example, between researchers, practitioners, and policymakers stemming from the same disciplinary background, with further barriers posed by paywalled knowledge products and the dominance of English-language publishing. As well as these structural barriers, relational features such as trust, leadership, values, and power can hinder knowledge development and implementation processes (Cundill et al., 2019).

Building capacity for transdisciplinary collaboration is seen as a promising approach for bridging resilience knowledge-implementation gaps (Cundill et al., 2015, 2019; West et al., 2019). Seeking to integrate different disciplinary and sectoral worldviews, norms, and processes sits at the heart of transdisciplinary approaches, while a learning-oriented approach emphasises the role of critical reflection (Scholz & Steiner, 2015a, 2015b). However, to date, few attempts have explicitly explored the synergies between transdisciplinarity and resilience (Arora-Jonsson, 2016). As the section above depicts, this challenge cannot be underestimated in the context of knowledge users typically using “the research-based knowledge

available insufficiently” and that knowledge producers “typically produce insufficient knowledge that is directly usable” (Weichselgartner & Kasperson, 2010, p. 266).

As identified, several factors contribute to this, such as “divergent objectives, needs, scope, and priorities; different institutional settings and standards, as well as differing cultural values, understanding, and mistrust” (Weichselgartner & Kasperson, 2010, p. 266). This is echoed by Delgado-Ramos & Guibrunet (2017), who point to challenges such as the complexity of integrating different types of data, limited incorporation of participatory methods and the challenge of translating research findings and ‘inherent uncertainties’ into decision-making.

Transdisciplinarity has been defined as a “mode of knowledge production characterised by a hybrid nature, non-linearity, and reflexivity, transcending any academic disciplinary structure” (Lawrence, 2010, p. 127) and is depicted as action-oriented research that involves stakeholders across science, policy, and practice. While it has been seen as a promising approach to reduce the distance between different forms of knowledge (Gibbons et al., 1994; Thompson Klein, 2004; Thompson Klein et al., 2001), it is not yet commonly applied to address issues such as urban resilience and adaptation (Priour-Richard et al., 2018). This points to the potential of transdisciplinarity in tackling knowledge production challenges set out in this section.

Building on longstanding explorations of ‘knowledge-in-practice’ (Polanyi, 1958) or ‘actionable knowledge’ (Argyris, 2005), transdisciplinarity helps recognise and value a spectrum of knowledge types, such as practitioner, experiential, and traditional (Tengö et al., 2014) or individual, local, specialised, organisational, and holistic (Brown, 2010) that are relevant to tackling resilience challenges. Transdisciplinary research processes are positioned as linking two knowledge production processes – between the realms of science and practice (Jahn et al., 2012; Pohl et al., 2017).

However, the entry point is indicated by the keyword ‘research’, which sees researchers as initiators, process designers, and overall convenors. This creates a subtle hierarchy that can preclude practitioners and policymakers from holding these roles and creates further limitations due to potential mismatches between researcher aims and policy and practitioner expectations (Baravikova et al., 2021a).

Framing this process as transdisciplinary collaboration instead of research seeks to acknowledge and address this underlying hierarchy between different knowledge producers and the varied roles they might play. The need for collaboration, “to labour with or together” (Lewis & Short, 1879, p. 365), has become a taken-for-granted assumption when it comes to addressing complex issues such as resilience (Goldstein, 2012). Transdisciplinary collaboration is enabled by the “removal of hierarchical command and control structures” (Stout & Keast, 2012, p. 20), as well as by integrating learning and reflection in problem-solving processes (Goldstein, 2012).

While the project format has emerged as a standard unit of collaboration (Packendorff & Lindgren, 2014; Torrens & von Wirth, 2021), social learning approaches such as communities of practice (later explored in Section 2.3) provide an alternative form for organising transdisciplinary collaboration. The interface between domains of activity (research, practice, policy) and disciplines can create a fertile space for transdisciplinary collaboration and learning (Fig. 6).

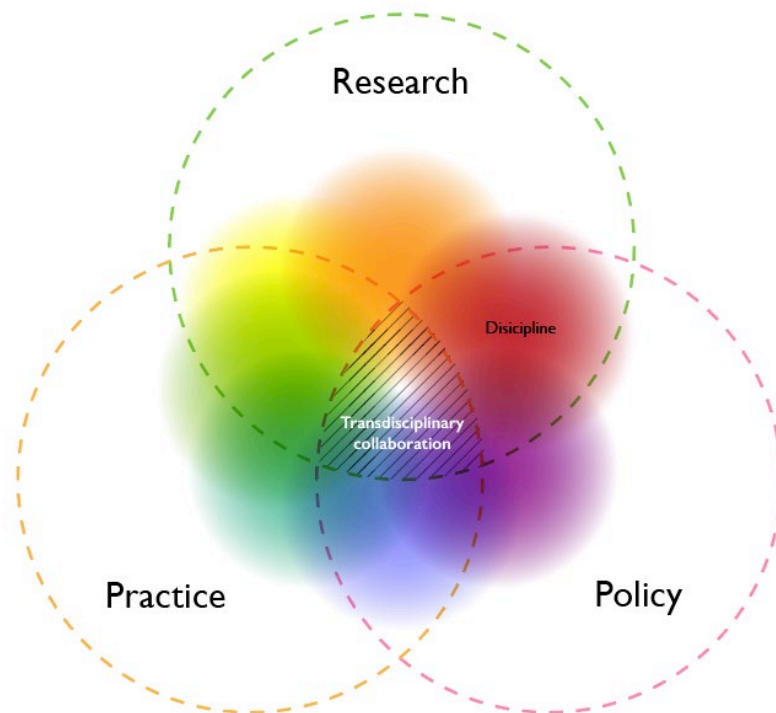


Figure 6. Transdisciplinary collaboration as the interface between different disciplinary and sectoral spheres.

Transdisciplinary collaboration focuses on two key objectives: bridging knowledge silos to improve decision-making and building capacity for action through ‘intense’ learning processes (Elzinga, 2008; Lang et al., 2012; Mobjörk, 2010). Learning involves “the enrichment of existing knowledge and the creation of new knowledge”; in this context, knowledge is seen as “a function of information, experience, skills, and attitudes” (van Der Veen & Korthals Altes, 2012, p. 1058). However, to better design and deploy the role of learning as part of building capacity for transdisciplinary collaboration, there is a need to explore how learning and knowledge production interact beyond the individual level.

The concept of social learning crystallised to denote the relational, co-creative process of knowledge production within knowledge communities. Therefore, to explore how transdisciplinary collaboration can bridge the knowledge-implementation gaps identified in the literature, the following section presents a review of social learning for capacity building.

2.2 A review of social learning for capacity building

2.2.1 The role of social learning in capacity building

The concept of capacity building first arose in the 1950s as a “core function of the United Nations development system” (Bester, 2015, p. 3) and gained prominence in the 1990s as the discourse of development organisations such as the World Bank or the United Nations Development Programme (UNDP) highlighted the importance of capacity building as part of their own strategy documents (Bester, 2015). Today, it is used interchangeably with the term capacity development, and its focus has broadened beyond human potential to encompass institutional and societal dimensions, as evidenced in the way it is currently defined by the United Nations Office for Disaster Risk Reduction (UNDRR):

“Capacity development is the process by which people, organisations, and society systematically stimulate and develop their capacities over time to achieve social and economic goals. [...] It involves learning and various types of training, but also continuous efforts to develop institutions, political awareness, financial resources, technology systems and the wider enabling environment.” (UNDRR, n.d.)

The term and its practice to date have largely focused on technocratic procedures and managerial leadership (Kaplan, 2000; Kenny & Clarke, 2010; Miller, 2010). A variety of capacity building approaches have emerged to support climate change adaptation and resilience building, which range from ‘train the trainers’ models that imply the trainee is required to “learn the skills which are to be ‘imparted’ by the trainer” (Kaplan, 2000, p. 524), to calls for creating enabling structures and policies for learning, critical reflection, and examination of power dynamics (Tschakert & Dietrich, 2010; Orleans Reed et al., 2013).

In urban contexts, these calls stem from the assessment that enabling cities to address the increasing effects of climate change and build their resilience requires new skills and competencies at different levels, spanning from individual households, urban communities, formal civil society, and municipal governments (Archer & Dodman, 2015). To this end, urban resilience programmes increasingly include specific capacity building activities that aim to improve the abilities of urban stakeholders to “plan, finance, coordinate, and implement climate change resilience strategies” (Brown et al., 2012b, p. 532).

Findings from resilience and adaptation planning processes recommend the continued strengthening of the capacity of urban stakeholders—for example, Anguelovski et al. (2014, p. 156) conclude that actions that seek to enable climate adaptation through focusing on learning demonstrate the potential to lead to more sustained, legitimate, and comprehensive adaptation plans and policies.

In the pursuit to define a hierarchy of capacity development needs, Potter & Brough (2004) identify four interconnected levels, also known as the Capacity Pyramid: tools; skills; staff and infrastructure; structures, systems and roles (Fig. 7). They note that the top of the pyramid is 'easier', more 'technical', and can be implemented quicker, while the bottom of the

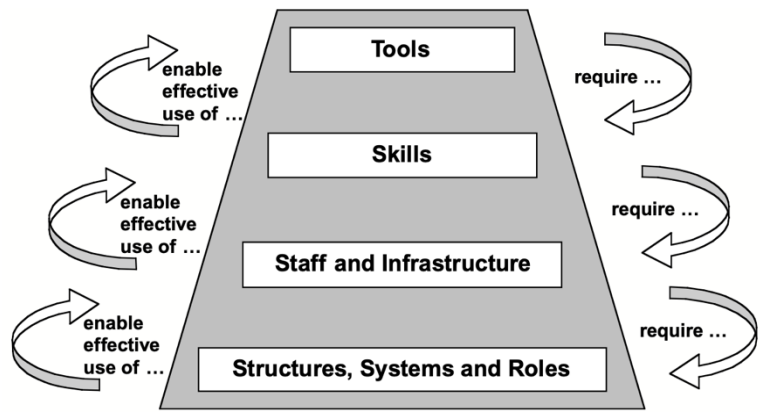


Figure 7. Capacity pyramid (Potter & Brough, 2004).

pyramid is 'harder', more 'socio-cultural', and thus requires longer time durations for improvements to measurable. Taken together, they emphasise how "systemic capacity building would improve diagnosis of sectoral shortcomings in specific locations, improve project/programme design and monitoring, and lead to more effective use of resources" (Potter & Brough, 2004, p. 336).

Applying this approach in the context of urban resilience requires a better understanding of the role learning – and specifically, social learning – plays in creating a connective tissue between the different levels of the capacity pyramid. While the meaning of learning is sometimes seen as the process of acquiring knowledge, Ison et al. point out that social learning comprises both cognitive enhancement, as well as moral development (Ison et al., 2000). They continue to define learning as the transformation in an actor's behaviour, as seen from an observer's perspective (Ison et al., 2000). This definition of learning provides an important distinction as it highlights the role the positionality of the observer plays in trying to ascertain where and how learning has occurred.

As Potter & Brough (2004) note, capacity development initiatives are often funded by governments or donor agencies, who might have differing views regarding how the lack of capacity manifests itself compared to the stakeholders who are seen as being the beneficiaries of capacity development (ranging from the programme implementation staff to local communities). Therefore, making the position of the observer's perspective explicit is key to understanding the potential limitations and biases in the learning evaluation process. It also emphasises the need to expand the focus beyond what has been learnt towards the institutional forces that influence the ability to learn and which determine "who feels or recognises whether learning has taken place" (Pelling et al., 2008, p. 871).

This evolved understanding builds on Schön's earlier work on learning systems as "systems capable of bringing about their continuing transformation" (Schön, 1973, p. 28). Reed et al. (2010) echo Schön's call for learning systems and propose an extended definition of social learning from a process of social change in which people learn from each other (Reed et al., 2010) to include a focus on learning beyond individuals, situated within social units or communities of practice (Reed et al., 2010).

The implication of this extended focus is that if learning is to be considered *social learning*, it must evidence that a change in understanding has occurred at the level of the individual, as well as beyond, in evidencing how learning contributes to changes in organisations or broader social systems. This goes beyond previous understanding that equates stakeholder participation or participatory methods with social learning; these are seen as means to facilitate social learning, though not social learning in and of itself. It also helps distinguish learning through social interaction, an implicit process we all do all the time, from social learning as an explicit process in social learning contexts such as communities of practice, which require participants to engage in a co-learning, co-developmental process enabled by critical reflection. As communities of practice emerged as a key social learning approach, the following section will chart their evolution and discuss their role in operationalising transdisciplinary collaboration.

2.2.2 Communities of practice as a social learning approach to operationalise transdisciplinary collaboration

The concept of communities of practice (CoP) (Lave & Wenger, 1991) emerged from observing professionals going about their day to day, how they dealt with everyday challenges, solved problems and onboarded newcomers. The ethnographic field research focusing on adult learning that Lave and Wenger undertook led to the emergence of a body of theory on the roles of CoPs as a key site of organisational learning and professional development (Wenger, 1999). A CoP is defined by three key characteristics: a shared domain of interest, a shared practice, and the active participation of community members to continuously develop their practice. Within a CoP, members have different levels of participation, which can change over time. This dynamic process between core and peripheral participation is a key feature of CoPs and can provide insights into how learning processes scale or diffuse through ‘legitimate’ peripheral participation (Wenger, 1999, 2000). Understanding learning as a relational process acknowledges the bidirectional flow and the interchangeability of the ‘giver’ and ‘receiver’ roles across different degrees of centrality between the ‘core’ and the ‘periphery’ of a CoP, as well as the influence of wider structural and systemic factors.

Building on these early explorations of the roles CoPs can play in problem-solving within organisational learning or professional development parameters, the exploration of CoPs evolved to view them as social learning systems (Wenger, 2010). CoPs are emergent; their boundaries are continuously negotiated; identity and meaning result from complex relationships; they are also nested within broader social systems. Alongside this expanded focus on the role of CoPs as part of social learning systems, their use also diverged into different applications – from vehicles for peer-to-peer learning in private or public sector organisations, to professional development spaces in education, to learning partnerships between patients and medical professionals in healthcare (Wenger, 2010). Soon enough, the potential of CoPs also reached the domains of climate adaptation and resilience. Pelling and High note that “little research has investigated the relationship between individual learning and the underlying communication pathways and institutional constraints through which adaptive capacity and action are negotiated within and between organisations”

(Pelling et al., 2008, p. 868), while Orleans Reed et al. (2013) argue that learning-based approaches are key to strengthening capacities for resilience and advocate for the role of social learning to support this.

Exploring the relationships between individual learning and broader institutional and societal transformation is rarely a neatly structured process in the context of adaptation and resilience (Tschakert & Dietrich, 2010; Wollenberg et al., 2000). Building capacities for resilience requires a dynamic relationship between learning, anticipating, and reacting in the context of complex present vulnerabilities and highly uncertain future risks. Adapting the format of communities of practice also needs to consider the multi-actor, multi-level setting of the climate adaptation and resilience domains (Iyalomhe et al., 2013). Gundel et al. (2013) note that if domains such as community-based adaptation are to embrace the CoP format as a way of organising, there is a need to better understand and evaluate the effectiveness of CoPs in multi-actor contexts.

These precautionary calls depict the challenges of adopting and adapting a format that had become popular within organisations or tightly regulated professions (such as teaching or nursing) to domains and practices that are less tightly defined (such as adaptation and resilience). However, despite these caveats, the proliferation of CoPs in adaptation and resilience emerged as a consequence of recognising the limitations of the project format as a unit of intervention in tackling knowledge-implementation gaps (Iyalomhe et al., 2013). Communities of practice, through their focus on a joint enterprise, knowledge sharing, and problem-solving through social ties, are seen to provide a complementary form of organising in addition to project-based organisations (Bettioli & Sedita, 2011).

Fig. 8 below depicts how professionals from different domains of activity (research, practice, policy) and different disciplinary backgrounds can benefit from engaging in transdisciplinary collaboration as part of communities of practice. The shared identity that develops from engaging in collaboration (which can take a variety of forms, such as learning-based, inquiry-based, or problem-solving) can, in turn, provide researchers, practitioners, and policymakers with newly developed skills, insights, or connections, which they can integrate back into their corresponding project-based work as part of their organisations.

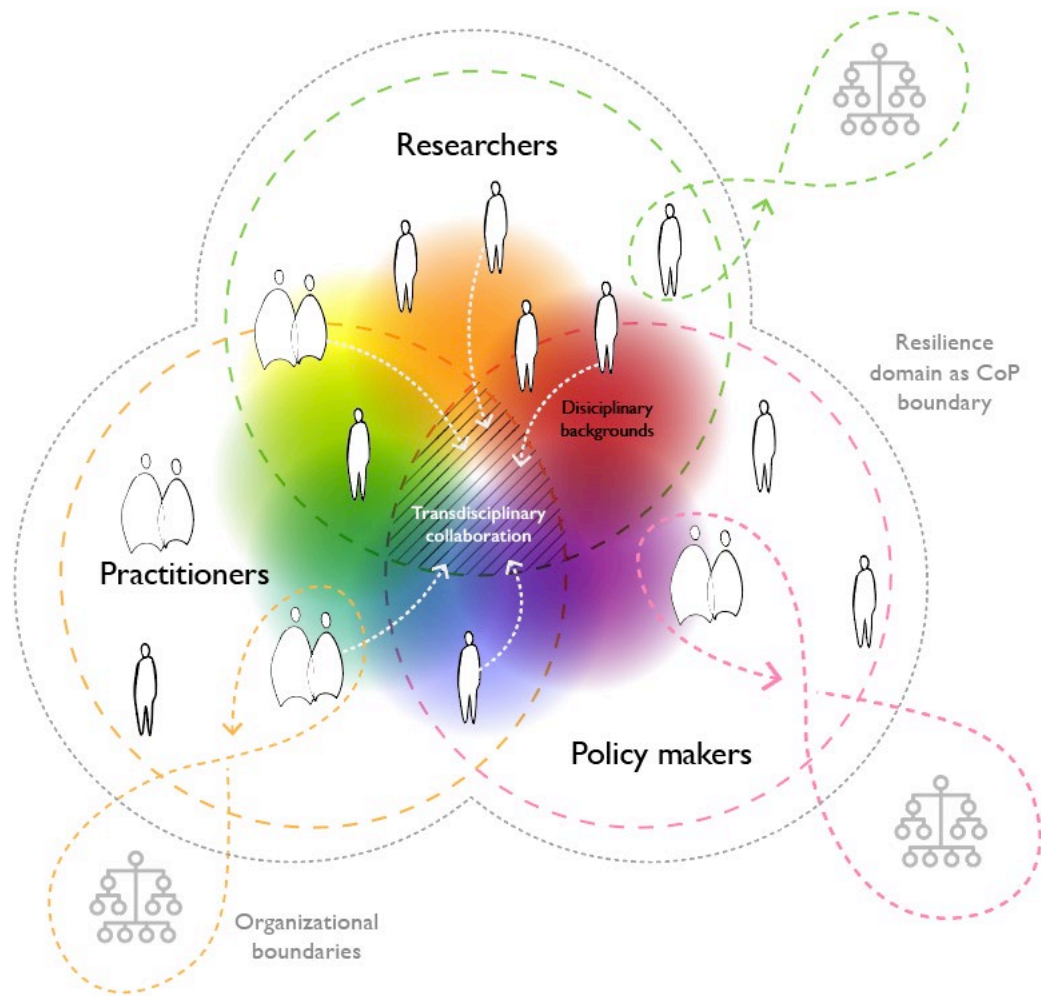


Figure 8. Communities of practice as a complementary form of organising for researchers, practitioners, and policymakers in addition to project-based organisations.

Across the current transdisciplinary CoPs that focus on tackling adaptation and resilience challenges, an emerging spectrum of typologies can be observed (Fig. 9). The horizontal dimension depicts the different ways in which the governance structures of transdisciplinary CoPs can take form, ranging from self-organising to institutionally hosted. The vertical dimension depicts the primary focus of the CoPs, ranging from learning (or inquiry) oriented or innovation (or problem-solving) oriented.

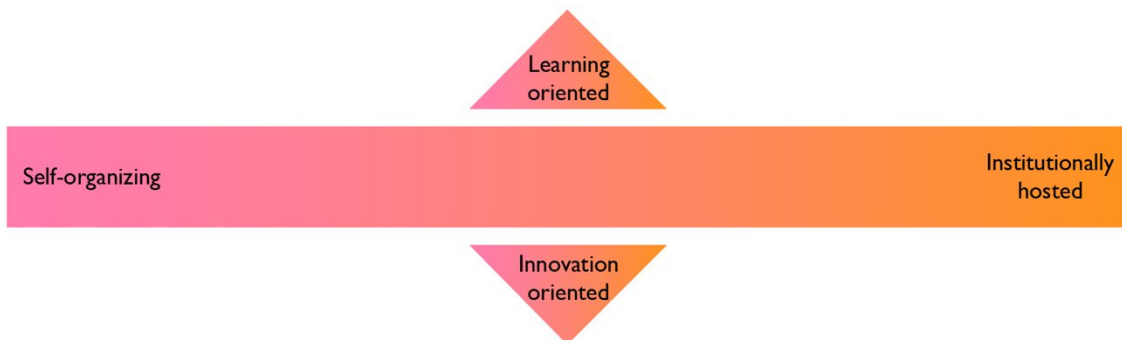


Figure 9. A spectrum of communities of practice for transdisciplinary collaboration in the sphere of adaptation and resilience.

These two dimensions – governance and focus – provide a key insight into the emerging criteria that differentiate current initiatives for knowledge and action brokering in adaptation and resilience. As explored above, transdisciplinary CoPs have emerged in recent years as a social learning approach to tackling challenges related to brokering collaboration between practitioners, researchers, and policymakers. They accompany project-based initiatives; however, they do not necessarily replicate the governance models of project-based initiatives in adaptation and resilience.

As a nascent form of organising, current examples can be categorised depending on whether one or more organisations or institutions host them. Institutional support ranges from visible affiliation on organisational websites, social media promotion and dissemination through their channels to the allocation of internal budgets for CoP activities, or the provision of paid CoP facilitators or even a Secretariat function. On the other hand, self-organising CoPs are run by volunteers, lack affiliation to a registered legal entity, and activities rarely have a funded component.

Institutionally hosted transdisciplinary CoPs

Among the institutionally hosted CoPs, learning-oriented typologies are the most prevalent. The Resilient Cities Network CoPs¹ are led by City Resilience Officers and include the Resilient Waste Management CoP, Resilient Recovery CoP, Racial Equity CoP, and the America Latina CoP. The Urban Africa Risk Knowledge² (ARK) is an umbrella initiative to foster CoPs and is hosted by the International Institute for Environment and Development (IIED). The Understanding Risk CoP³ brings together cross-sectoral disaster risk professionals and is hosted by the Global Facility for Disaster Risk Reduction and Recovery (GFDRR), part of the World Bank Group.

The International Society of City and Regional Planners⁴ (ISOCARP) hosts several CoPs, such as the Urban Innovation CoP, Urban Health CoP, and Urban Mobility CoP, while the Resilience Knowledge Coalition⁵ is hosted by the Global Resilience Partnership. Innovation-oriented CoPs include initiatives such as the Urban Water Resilience CoP⁶ hosted by the Resilience Shift and the Covid-19 Health Financing Resilience CoP⁷ hosted by the World Bank through their Collaboration for Development platform.

Self-organising transdisciplinary CoPs

¹ <https://resilientcitiesnetwork.org/communities/>, accessed Oct 2021.

² <https://www.urbanark.org/community-practice>, accessed Oct 2021.

³ <https://understandrisk.org/about/>, accessed Oct 2021.

⁴ <https://isocarp.org/news/open-call-for-the-isocarps-members-community-of-practice-on-urban-innovation/>, accessed Oct 2021.

⁵ <https://www.globalresiliencepartnership.org/what-we-do/convening-diverse-voices/>, accessed Oct 2021.

⁶ <https://www.resilienceshift.org/community-of-practice/>, accessed Oct 2021.

⁷ <https://collaboration.worldbank.org/content/sites/collaboration-for-development/en/groups/health-finance-resilience-program/groups/hfrc-community-of-practice.html>, accessed Oct 2021.

Self-organising CoPs have a much lesser digital presence. However, that is not necessarily an indicator that they do not exist. Visible examples include the Asian Community Based Organizations (CBOs) for Disaster Risk Reduction CoP⁸, which is run by and for local practitioners in eight countries. Understanding how these self-organising CoPs emerge and evolve can shine a light on how informal networks support individual and collective learning, as well as what opportunities, barriers, and limitations they face in comparison to institutionally hosted CoPs. However, there is currently limited empirical evidence of their practice, their potential to support the process of capacity building, and their limitations.

2.2.1 Summary and implications

This section has explored how social learning approaches – and CoPs in particular – have evolved to be seen as key to the process of operationalising transdisciplinary collaboration. As building capacity for transdisciplinary collaboration has been increasingly seen as a promising approach for bridging resilience knowledge-implementation gaps (Cundill et al., 2015, 2019; West et al., 2019), this section sought to explore how this process might be enabled. CoPs emerged as a counterpart to project-based organisations, aiming to offer a complementary approach through the dynamic learning spaces created at the interface between ‘core’ and ‘peripheral’ participation. CoPs evolved from defined learning spaces within organisations or regulated professions to fuzzier spaces that seek to enable transdisciplinary learning across complex challenges, such as resilience.

While CoPs are seen as a promising approach to tackling the enduring challenge of brokering transdisciplinary collaboration, their critique evidences the barriers that might see them fall short of their intended goal. Wenger et al. (2002) dedicate an entire chapter of their book on CoPs to exploring their potential downsides, while different comprehensive critiques have since emerged, charting the limiting factors of this concept (Duguid, 2012; Li et al., 2009; Roberts, 2006; Storberg-Walker, 2008). Dominant critiques revolve around how the original theorising of CoPs lacked an understanding of how power dynamics in a social group determine who dominates the negotiation of meaning, a lack of depth in integrating approaches to mediate conflict and build trust in meaning-making processes, as well as a concern that CoPs for expert professionals might further marginalise local and traditional knowledge.

In the context of transdisciplinary CoPs, their limitations mirror the barriers posed to transdisciplinary endeavours. CoPs are not stable or static entities, instead drawing their strength from the dynamism between their members' active/core and passive/peripheral participation. This can lead to a lack of consistency in the interpretation of CoPs, which can pose difficulties to their intentional design, implementation, and the evaluation of their effectiveness (Li et al., 2009). While this dynamic nature also presents challenges within organisations (as potential members might need managerial approval to participate in CoP activities), it raises further challenges in multi-stakeholder initiatives for transdisciplinary

⁸ <https://reliefweb.int/report/world/creating-community-practice-disaster-resilience>, accessed Oct 2021.

collaboration. These often require negotiating signed agreements such as Memorandums of Understanding between participating organisations even when no financial transaction occurs.

CoPs are defined by three key characteristics – a shared domain (the *what* - in the case of this research, urban resilience), a community formed of individuals with varied degrees of participation, and a shared practice (the *how*) to improve or transform. The Global Research and Action Agenda on Cities identifies the practice of and ability to take systems approaches to complex urban challenges as a critical gap in skills and capacities (Priour-Richard et al., 2018), finding reinforced by the further research identified in the literature review undertaken in Section 2.1. The *how*, therefore, is the array of systemic capabilities and systems approaches that need to be strengthened as part of capacity building efforts. The following section will evidence the need for systems approaches and provide an overview of the different skills, capabilities, and strategies contained by this umbrella term.

2.3 A review of systemic capabilities to address urban resilience knowledge-implementation gaps

2.3.1 The need for systemic capabilities

The urban resilience literature highlights three critical capacities to strengthen resilience (Béné et al., 2012). These transcend different scales, from the individual and household to the institutional and system level: coping (absorptive), adaptive, and transformative capacity, illustrated in Fig. 10 below.

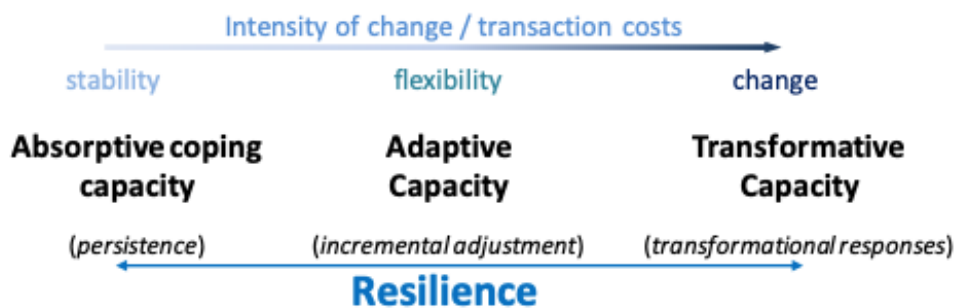


Figure 10. The 3D resilience framework (Béné et al., 2012).

The coping, or absorptive, capacity is the ability to prepare for, mitigate, or prevent negative impacts. When this capacity is exceeded by the magnitude of the shock or stressor, the adaptive capacity is required to enable incremental adjustments, which can be individual or collective and can take place at different governance levels. The transformative capacity is the third type of potential response in the face of the increasing effects of climate change in urban areas. The capacity for transformative responses “aims to reduce the root causes of vulnerability to climate change in the long-term by shifting systems away from unsustainable or undesirable trajectories” (Fedele et al., 2019, p. 118). Seeking to address the root causes that have contributed to the manifestation of the shocks or stressors entails a more profound structural transformation contingent on institutional reform, behavioural shifts, cultural changes, and technological innovation.

Evidencing approaches that enable transformative responses had previously been acknowledged as a gap in the literature (O'Brien, 2012; O'Brien & Sygna, 2013; Olsson et al., 2014), while the 2022 assessment of the IPCC Working Group II (WGII) on Impacts, Adaptation, and Vulnerability notes with high confidence that there is now a 'time-limited opportunity' to enable transformational adaptation and climate-resilient development (IPCC, 2022). Incremental (coping and adapting capacities) and transformative responses are both "important, but serve distinct roles in the interaction of urban systems, climate risk and risk management and in advancing social justice, just-transitions and climate-resilient development" (IPCC, 2022, p. 12). The WGII Report quotes evidence that the move from incremental to transformative responses could be enabled through education and capacity building (Vermeulen et al., 2018).

The capacity to take transformative responses relates to the different abilities, strategies, skills, and capabilities required to enable fundamental systemic changes that create "new states and interactions between socio-ecological systems" (Fedele et al., 2019, p. 118). Within the Working Group II report, the need for approaches that aim to enable 'system-level change' is mentioned 152 times. The report notes that systemic approaches are an option decision-makers should be considering 'today' rather than a 'future' or 'fringe' consideration (IPCC, 2022). Yet what this looks like in practice and how we might build the capacities and capabilities for systemic approaches at scales that vary from the individual to the organisational and 'whole-of-society' is noted as 'unclear' in the context of limited empirical evidence or practical examples (IPCC, 2022).

Attention must therefore be drawn to further interrogating what is meant by systemic approaches and the skills and capabilities that can enable this process. The following section will explore the umbrella term 'systems approaches' and identify the key skills and capabilities required to enable 'system-level change'.

2.3.2 Systems approaches: key skills and capabilities required to build transformative capacity

So, what is meant by the increasingly popular term 'systems approaches'? Donella Meadows, in the introduction of her *Thinking in Systems: A Primer* book, expands the definition by highlighting that systems are not just collections of 'things', but that

"A system is an interconnected set of elements that is coherently organised in a way that achieves something." (Meadows, 2008, p. 11)

Her definition of the term system posits that systems must have three constituents: elements, interconnections (or relationships), and a purpose (or function). She further expands through examples and case studies on how the purpose of a system is a 'crucial' determinant of its behaviour and notes that the espoused purpose is not always necessarily the enacted one. This tension, she follows, between the contradicting or even conflicting purposes of the systems that underpin our societies sits at the heart of many of our societal challenges. If we are to address these, she highlights the need to understand the

differences between the espoused and enacted purpose of a system and the roles that the interconnections and elements play in enacting the purpose.

Pinpointing the purpose of a system and drawing its boundaries is a socio-political process, as Meadows highlights that there are 'no separate systems' and that the world is a 'continuum' (Meadows, 2008, p. 97). If boundaries are of our own making, defining them needs to consider the different implications of what is 'inside' versus 'outside' the boundary of a system. Making the boundary judgement explicit is the first step to distinguishing between the multiple possible systems and their environment. To aid this process, Ray Ison proposes the term 'system of interest' as

“[...] the product of distinguishing a system in a situation, in relation to an articulated purpose, in which an individual or a group has an interest (a stake); a constructed or formulated system, of interest to one or more people, used in a process of inquiry.” (Ison, 2008, p. 142)

Defining the systems of interest and making a judgement about its boundary is a process of negotiation between the different perspectives and interests of the key stakeholders, with a view to then intervene and evaluate the effectiveness of the intervention concerning a “real problem situation” (Ison, 2008, p. 153). Ison charts the different lineages that give rise to the use of systems approaches – ‘practices’ that encompass both systemic “thinking and action” (Ison, 2008, p. 143). Arnold & Wade, in a literature review of key skills and capabilities required for systems approaches, define the term as a

“set of synergistic analytic skills used to improve the capability of identifying and understanding systems, predicting their behaviours, and devising modifications to them to produce desired effects” (Arnold & Wade, 2015, p. 675).

Three core competencies emerge from this definition: the ability to understand and diagnose dynamic systems, explore (future) alternatives, and develop interventions that influence the development of a system of interest. This complements explorations of the relationship between systems thinking as cognitive skills, towards systems thinking in practice as practical and social skills (Ison, 2010). Ison proposes that the former corresponds to the notion of systems literacy, which engenders the latter as the capability to apply systems thinking as part of practice.

Different authors have explored the critical skills required for systems literacy; commonly mentioned skills in the literature include being able to see multiple levels and perspectives within a system, mapping complex interrelationships, understanding how behaviour changes over time, understanding dynamics (feedbacks, stocks, flows, time delays, non-linearity), recognising recurring patterns and trends, as well as the ability to trace the implications of different system boundaries and purposes (Arnold & Wade, 2017; Plate & Monroe, 2014; Sweeney, 2014). The existing literature on systems thinking skills describes a vast array and diversity of skills. However, there is limited empirical evidence that depicts the testing of these

models, demonstrates which skills are relevant under which contexts, or describes how the development of these skills might be evaluated.

Arnold & Wade (2017) describe the process of moving between building systems literacy and systemic capability as spiralling out between gaining insights and using insights while working within a system of interest. Figure 11 presents the nested relationship between systemic sensibility as the “innate, intuitive or tacit appreciation of systemicity in the empirical world”, systems literacy as the cognitive and meta-cognitive skills that provide “clear concepts and a common language that gives people the capability to articulate and reflect on this innate sensibility”, and systemic capability as the ability “to act on it [on the systemic sensibility] in a considered way” (Edson et al., 2016, p. 3). This capability is then enacted through the different roles that systems-literate individuals, and communities can hold (shown in the innermost circle).

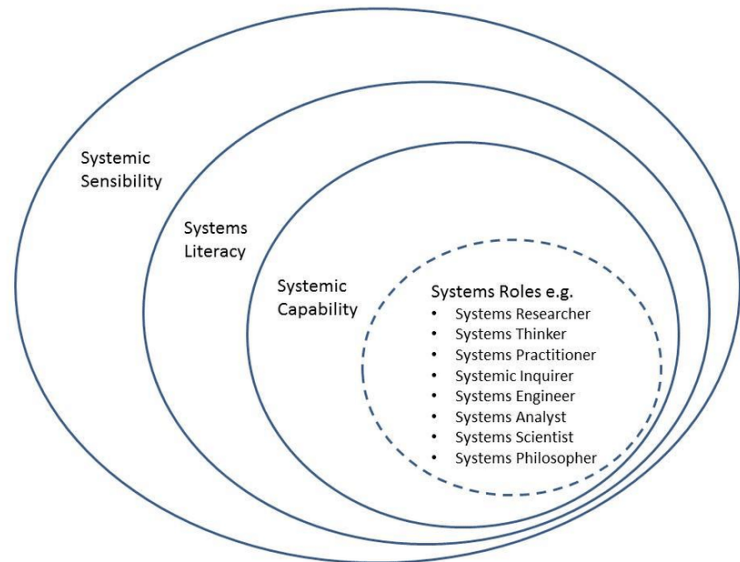


Figure 11. The nested relationship between systems literacy and systemic capability (Edson et al., 2016 building on Ison, 2010).

Beyond the theoretical development of skills and capabilities for systems approaches, an increasing number of learning and capacity building providers have been setting out different approaches to defining a core curriculum and learning outcomes regarding skills and capabilities. A review undertaken by researchers at the Harvard Kennedy School (Dreier et al., 2019) notes that these competencies are predominantly framed in the context of leadership development, aiming to support the development of ‘system leaders’.

The review analyses ten different programmes⁹ and identifies a ‘mainstreaming’ of systems approaches through an increasing diversity of stakeholders (academic institutions, foundations, international organisations, consultancies, as well as business-led networks) who offer courses and/or apply systems approaches as part of organisational strategy development or work programmes.

⁹ The capacity building programmes reviewed are offered by the [Dawn of System Leadership](#), the [Academy for Systems Change](#), The [Harvard Kennedy School Corporate Responsibility Initiative](#), [Wasafiri Consulting](#), [FSG](#), [Omidyar Network](#), the [Presencing Institute](#), [Reos Partners](#), the [School of System Change](#), and [Stanford ChangeLabs](#). Links accessed in March 2022.

Table 2 maps the key skills and competencies for bridging systems literacy toward building systemic capability as identified in the academic and grey literature.¹⁰ Drawing on this mapping exercise, the table below identifies three core competencies for taking systems approaches:

- 1) Understanding and diagnosing the dynamics within a system of interest.
- 2) Imagining alternative future pathways.
- 3) Developing commensurate interventions and learn to continuously improve them.

¹⁰ The review consisted of the stated curriculum of the capacity building programmes previously mentioned ([Dawn of System Leadership](#), the [Academy for Systems Change](#), The [Harvard Kennedy School Corporate Responsibility Initiative](#), [Wasafiri Consulting](#), [FSG](#), [Omidyar Network](#), the [Presencing Institute](#), [Reos Partners](#), the [School of System Change](#), and [Stanford ChangeLabs](#)) as well as drawing on Arnold & Wade's theoretical model of systems thinking skills (Arnold & Wade, 2017). Links accessed in March 2022.

Table 2. Key skills and competencies for taking systems approaches.

Core competency 1: Diagnose the dynamics within a system of interest (DIAGNOSE)	
Skill 1.1 Facilitate boundary choices	
Low maturity: Unable to identify the boundary and purpose or function and a system of interest	High maturity: Able to identify different potential system boundaries and their implications; able to facilitate dialogue with relevant stakeholders to create agreement on the system boundary
Skill 1.2. Explore multiple scales and perspectives	
Low maturity: Unable to identify and critically discuss their own position in a system of interest	High maturity: Able to actively consider multiple perspectives and positions in the system of interest and able to acknowledge the role of bias and positionality
Skill 1.3 Identify and characterise interactions and feedback loops	
Low maturity: Unable to identify stakeholders, feedback loops, stocks, flows, and non-linear relationships between them	High maturity: Able to identify and characterise key stakeholders, relational archetypes, feedback loops, stocks, flows, and non-linear relationships between them
Core competency 2: Imagine alternative future pathways (IMAGINE)	
Skill 2.1 Map the implications of part and current system behaviour	
Low maturity: Unable to describe past/current behaviour	High maturity: Able to describe past/current behaviour drawing on the identification and characterisation of relationships and feedback loops and identify patterns and trends that might influence future behaviour
Skill 2.2 Explore alternative future pathways	
Low maturity: Unable to identify/distinguish between possible, probable, preferable future pathways	High maturity: Able to identify and distinguish between possible, probable, preferable future pathways
Skill 2.3 Negotiate trade-offs between possible, probable, and preferable futures	
Low maturity: Unable to identify and critically discuss the trade-offs between alternative pathways and differing outcomes at different levels for different stakeholders in the system of interest	High maturity: Able to identify and critically discuss the trade-offs between alternative pathways and differing outcomes at different levels and perspectives in the system of interest
Core competency 3: Develop commensurate interventions and learn to improve them (ACT & LEARN)	
Skill 3.1 Design and deliver strategies and interventions	
Low maturity: Unable to develop implications from the diagnosis of a system of interest and the exploration of alternative pathways to develop interventions commensurate with the respective skills, assets, position in the system of interest	High maturity: Able to develop implications from the diagnosis of a system of interest and the exploration of alternative pathways to develop interventions commensurate with the respective skills, assets, position in the system of interest Able to understand where collaboration is required and convene and facilitate collaborative interventions accordingly
Skill 3.2 Embed critical reflection	
Low maturity: Unable to embed critical reflection as a habitual activity to inform and shape action	High maturity: Able to embed critical reflection as a habitual activity to inform and shape action at different levels (from the individual to system-level)
Skill 3.3 Learn towards continuously improving interventions	
Low maturity: Unable to develop a MEL approach beyond traditional input-output-outcome process	High maturity: Able to develop monitoring, evaluation, and learning strategies to assess outcomes across multiple levels (from the immediate/intermediate outcome level to system-level outcomes – including unintended ones) and embed learning as a day-to-day practice to continuously improve interventions and evolve the understanding of the system's behaviour over time

Based on Table 2 above, a further review was undertaken to ascertain whether any overlap exists between capacity building programmes explicitly aimed at urban professionals (researchers, practitioners, policymakers) and the skills and competencies highlighted above. This was done by comparing the learning

outcomes and curriculum of capacity building programmes¹¹ against the table above. The results are summarised in Table 3 below.

Table 3. Urban resilience capacity building programmes, mapped against the Diagnose, Imagine, Act and Learn capability areas for taking systems approaches.

Capacity building programme ¹² / systemic competency	Learning outcomes / curriculum focus	Diagnose	Imagine	Act & Learn
UN-Habitat Capacity Building on Urban Resilience	Urban and local planning tools Participatory mapping: CityRAP tool Needs prioritisation			
UNDRR Global Education and Training Institute (GETI) Making Cities Resilient 2030 training	Introducing Disaster Risk Reduction Local Government Self-Assessment Review (LG-SAT) City Action Plan development			
International Urban Resilience Academy	Process design methodology for urban resilience System thinking analysis of urban shocks and stresses Future scenario methods: forecasting, visioning, backcasting	x	x	
Resilient Cities Network Capacity Building Programme	Introduction to resilience frameworks Project design session Pitching and networking session Project shortlisting and link to funding			
Urban ARK capacity building programme	Develop city vulnerability assessments and multi-hazard analysis and climate downscaling Action research with risk and urban planning stakeholders			
Asia-Pacific Network for Global Change Research: India capacity building	Orientation program for elected representatives and training programme for city officials on 'Building urban climate change resilience'			
City Resilience Program	Planning for resilience Finance for resilience Partnerships for resilience			
ICLEI Urban Resilience Training	Introduction to tools for cities (City Works tool, Sustainable Energy Access tool and Climate Action Planning Tool, Green Climate Cities tool) Practical examples of how resilience assessment tools can be implemented			

¹¹ As the present research focuses on mid-career professionals, the review excluded taught academic programmes such as Master's degrees and focused solely on programmes aimed at further professional development.

¹² The programmes reviewed were: [UN-Habitat Capacity Building on Urban Resilience](#), [UNDRR Making Cities Resilient training](#), [International Urban Resilience Academy](#), [Resilient Cities Network programme](#), [Urban ARK programme](#), [Asia-Pacific Network for Global Change Research: India capacity building](#), [City Resilience Program](#), [ICLEI Urban Resilience Training](#), [UCLG Urban Resilience Training](#), [Mercy Corps Urban Resilience Measurement Training](#). Link accessed in July 2019.

	Introduction to the Transformative Action Program (TAP) to strengthen local governments' capacity in acquiring climate finance			
UCLG Urban Resilience Training	<p>Fundamentals of Resilient Governance and Development</p> <p>Key concepts in risk analysis and resilience building</p> <p>How to integrate DRR and resilience building into the policy cycle</p> <p>How to achieve robust risk governance with multi-level and multi-stakeholder participation</p> <p>How to identify available financing mechanisms and opportunities</p> <p>How to develop integral and inclusive DRR and resilience building strategies and action plans</p> <p>The roles local and regional government associations (LRGAs) can play to support resilience building</p>			
Mercy Corps Urban Resilience Measurement training	<p>Introduce resilience concepts, analytical frameworks, and measurement principles and how to apply a resilience lens within an urban context</p> <p>Breakdown resilience measurement into components, including capacities, systems, shocks and stresses, and well-being outcomes, and apply these to a monitoring and evaluation framework</p> <p>Introduce an approach for strategic urban resilience assessment</p> <p>Conduct fieldwork: interview communities, businesses and government officials and learn about systemic constraints, shocks, and stresses, and how these affect urban resilience</p> <p>Develop a systems map to better understand the urban resilience context, and use this to identify resilience capacities and an urban resilience theory of change</p> <p>Use resilience measurement methods and frameworks to develop a monitoring and evaluation plan for their urban theory of change</p>	x		x

Of the ten capacity building programmes identified as of 2019, only two explicitly include learning outcomes that focus on building skills and capabilities for taking a systems approach as previously mapped in Table 2. Of these two, the Mercy Corps training was only delivered as a closed programme, aiming to train programme officers and their respective urban programme implementing partners. The training resources were openly available to other urban professionals. The second identified programme, the International Urban Resilience Academy, advertised its first open training scheduled for September 2019.

This mapping exercise reveals the lack of available training and capacity building on taking systems approaches to urban resilience. Eight of the ten identified programmes focus on introducing key resilience concepts and tools predominantly to local government audiences. This indicates that despite the rapid growth in the usage of the concept as introduced in Section 2.1.1, the process of raising awareness, building trust and buy-in from local actors regarding the need and potential for urban resilience is slow. Urban

resilience capacity building programmes are found to predominantly focus on propositional knowledge (*know-what*) rather than helping professionals take systems approaches to urban resilience, which would see the focus on procedural knowledge (*know-how*).

Except for the Mercy Corps programme, capacity building programmes do not see the ongoing advancement of organisational learning and institutional capacity building as part of the remit, as they focus on training individual professionals and do not provide ongoing support post-training. The programmes identified above predominantly operate a 'pay to play' business model, which means that only a few professionals can benefit due to limited organisational budgets and time allocated by employers for professional development.

2.3.3 Tools and methods to develop core competencies for systems approaches

Developing the three core competencies outlined in the section above is an iterative process of lifelong learning (Ison, 2010). Different tools and methods can be used to develop core competencies for systems approaches to aid this learning process. They do not necessarily limit to the field of systems thinking, as other disciplines (such as design, futures studies, organisational development, and community development) have long-standing histories and have developed a wide array of tools and methods to support the process of understanding a complex challenge, the attempt to explore alternatives and develop interventions to improve it. The sections below will provide a brief overview of tools and methods used as part of the curriculum design of the ten systemic capacity building programmes reviewed by Dreier et al. (2019).

DIAGNOSE: Understand and diagnose dynamics within a system of interest

Understanding and diagnosing the dynamics within a system of interest is supported by tools and methods to map and explore the implications between different boundary choices, explore multiple levels and perspectives, identify and characterise relationships and feedback loops, and understand the past and current behaviour of the system of interest. An array of tools and methods are used across the different capacity building programmes:

- Snappy Systems (Ison, 2010) to explore the goal or purpose of a system of interest and therefore help articulate system boundaries;
- Multiple Cause Diagrams and Causal Loop Analysis (Lane, 2008) to explore the emergent behaviour of a system, recurring patterns (such as causal or feedback loops) and the relationships between the stocks and the flows in a system;
- Actor Mapping (also known as Power Matrix) (D. H. T. Walker et al., 2008; Sova et al., 2013) to visualise the different stakeholders and their relative interest and influence in the system of interest;

- Horizon Scanning (Schultz, 2006; Amanatidou et al., 2012) provides a structured way of exploring the different drivers, trends, and signals of change.

IMAGINE: Imagine alternative future pathways

Envisioning alternative future pathways in pursuit of systemic change requires the skills to explore possible changes over time and discuss and deliberate between the trade-offs that are posed by plausible, probable, and preferable futures (Bell, 2003; Dator, 2002; Dunne & Raby, 2005; Miller, 2010; Miller, 2010; Slaughter, 1996). An array of tools and methods for structured exploration are used across the different capacity building programmes:

- Futures Wheel (Montgomery & Woebken, 2016) to explore the primary and secondary impact of key trends and signals of change affecting the system of interest;
- Scenario Archetypes (Dator, 2009) to provide a rapid process for scenario development;
- Futures Cone (Dator, 2009) to explore the differences between possible, probable and preferable futures;
- Three Horizons (Sharpe, 2013) to explore how system-level change can happen in waves across different possible transition pathways at any one moment in time;
- Speculative Design (Dunne & Raby, 2013) to explore the use of fictional cultural artefacts, design probes, and prototypes in facilitating deliberation about future pathways;
- Axes of Uncertainty (also known as the 2x2 Method or Double Uncertainty) (Bishop et al., 2007) to explore how different variables can lead to the emergence of different scenarios.

ACT & LEARN: Develop commensurate interventions, and evaluate and learn to improve them

Developing interventions and learning from them requires the skills to develop strategies and interventions, identify where collaborative approaches are needed, embed critical reflection, and develop monitoring and evaluation approaches that can support the process of learning from interventions, as well as learning about the intended and unintended outcomes that might emerge at other levels within a system of interest. An array of tools and methods are used across the different capacity building programmes:

- Theory of Change methods (van Es et al., 2015; Green, 2017; Birney, 2018) to explore ways to address complexity, uncertainty, and non-linearity that might be addressed in implementing interventions;
- Leverage Points as a method builds on Donella Meadows' (Meadows, 1999) work and, in recent years, has seen the development of different ways to apply it as a reflective tool for intervention design (Omidyar Group, 2017; Enfors-Kautsky et al., 2019);
- Outcome Mapping (Earl et al., 2001; Smutylo, 2005) is a method for monitoring and evaluating interventions that aim to enable social change;

- Most Significant Changes (Dart & Davies, 2003) a story-based tool to facilitate programme improvement and evaluation;
- Key Performance Questions (Omidyar Group, 2017; Enfors-Kautsky et al., 2019) as an evaluative method for developing qualitative learning questions rather than relying only on quantitative performance indicators.

2.3.4 Literature review boundaries and exclusions

This chapter has presented three distinct literature reviews deemed relevant to the research questions explored in this thesis. Firstly, it reviewed the factors that contribute to urban resilience knowledge-implementation gaps. Secondly, it reviewed how social learning approaches such as Communities of Practice can contribute to the process of capacity development. Thirdly, it reviewed the different capabilities that fall under the wide umbrella of systems approaches. Taken together, the three reviews aim to set the scene for the explorations undertaken in the two action research cycles, ARCI and ARC2.

This builds on a previously published scoping study of four umbrella concepts concerning urban-led change: urban sustainability, urban transitions, urban transformation, and urban resilience (Angheloiu & Tennant, 2020). The study charted the evolution of the four key concepts to their present-day usage and mapped the myriad of fields and disciplines that feed into them: ecosystem resilience (ecology), child resilience (psychology), social resilience, material resilience (engineering), disaster risk reductions, climate resilience, social transformation (sociology), urban transformations, urban ecology, urban sociology, urban theory, urban planning, human geography, transition management, technological innovation systems, socio-technical systems, and transition studies. Given the peer-reviewed study presented an ample scoping that set the scene for the present research, the current chapter has presented three succinct literature reviews, therefore excluding several contributing fields such as urban sociology, urban social theory, collaborative planning, architecture, or urban planning in order to provide a focused overview of the current discourse regarding knowledge–implementation gaps in urban resilience.

2.3.5 Summary and implications

The wide array of tools and methods (and the different disciplines they draw on) used as part of capacity building programmes that aim to build the skills and abilities for taking systems approaches points to a diversification of the practices that can be taken under the umbrella of *systems approaches*. While this mirrors the diversity of the different systemic challenges stakeholders seek to address, questions remain regarding the optimal design to support individuals, communities, and organisations to evolve from a low maturity to a high maturity in taking systems approaches.

Comparing the learning objectives and curricula of capacity building programmes that focus on taking systems approaches versus the programmes aimed at urban resilience professionals reveals gaps between the focus on procedural knowledge (*know-how*) of the first and the focus on propositional knowledge

(*know-what*) of the second. This confirms the capacity gap identified by the Global Research and Action Agenda on Cities, which calls for capacity building approaches to develop the practice of and ability to take systems approaches to complex urban challenges (Prieur-Richard et al., 2018).

Given the limited experience and exposure to systems approaches of urban professionals, the ability to use associated tools and tailor them to specific urban contexts presents additional challenges (BeLue et al., 2012). For example, systems tools are not intended as a replacement but as a complement to other tools that focus on identifying linear relationships and interventions (Trochim et al., 2006). While the literature posits systems approaches as a way of tackling the shortcomings of linear or reductionist approaches, stakeholders (both individuals and organisations seeking capacity building) have to weigh the additional benefits of systems-informed urban interventions compared to the additional cost of financial and human resources, as well as the time required for training (BeLue et al., 2012).

Compared to the identified need for scaling capacity building in the context of adaptation and resilience (Prieur-Richard et al., 2018; Revi et al., 2014), both types of programmes (focusing on systems approaches / on urban resilience) have a relatively small reach, with each programme ‘graduating’ cohorts of 20-30 participants.

Teaching the ‘how’ of transformation (Leichenko et al., 2021) is a challenge well documented. While there have been growing calls for learning approaches that address the need for new ways of ‘being’ and ‘knowing’ in society (Burns, 2018; Leichenko et al., 2021), beliefs, worldviews, and paradigms are rarely linked to deliberate attempts to transform unsustainable systems and structures (Leichenko et al., 2021; O’Brien & Sygna, 2013). Significant challenges remain in the context of a lack of empirical evidence on the optimal incentives and mechanisms required to understand capacity building needs and how to best scale such programmes.

2.4 Chapter summary

This chapter has presented three reviews that underpin the research of this thesis. Section 2.1 presented a review of the factors that lead to the occurrence of knowledge-implementation gaps in urban resilience. It identified building capacity for transdisciplinary collaboration as a promising approach for bridging resilience knowledge-implementation gaps. To further explore the role of transdisciplinary collaboration, Section 2.2 reviewed how social learning, the co-creative process of knowledge production within knowledge communities, can operationalise transdisciplinarity through building capacity for co-learning and co-inquiry processes in formats such as communities of practice. Section 2.3 evidenced the different types of capacity that are required, focusing on the capacity of professionals to take systems approaches and provided an overview of the different skills, capabilities, and strategies contained by this concept, as well as of tools and methods to develop core competencies for taking systems approaches.

3.0 Methodology

This chapter outlines the different dimensions of the action research methodology I have deployed in this thesis and presents an overview of the research design. The two sections provide an overview of action research as an epistemological and methodological orientation towards inquiry. Following this, Section 3.3 provides an overview of the research design, data collection and analysis, and the ethical and quality considerations that arise from choosing action research as methodology. Finally, Section 3.4 continues the first-person thread of this thesis and provides reflections on Marshall's concept of 'living life as inquiry' (Marshall, 1999).

3.1 Epistemological groundings

3.1.1 Constructivism and action research

"It is through systemic thinking that we know of the unknowable. It is with action research that we learn and may act meaningfully within the unknowable." (Flood, 2010, p. 142)

The term 'action research' (AR) was first used in 1946 by Kurt Lewin to draw attention to the need for new research methods appropriate for the scale of the critical social challenges of the time. The first article to mention the term was entitled "Action Research and Minority Problems" (Lewin, 1946), denoting the urgency of finding epistemological alternatives beyond traditional science to not only understand but intervene in social issues previously side-lined. In parallel to Lewin's development, an interdisciplinary group that later became the Tavistock Institute of Human Relations was exploring similar lines of inquiry in the context of new approaches to research fit for the social and political challenges during and post-World War II.

Over the following decades, action research emerged to signify "a pioneering approach toward social research which combined generation of theory with changing the social system through the researcher action on or in the social system" (Susman & Evered, 1978, p. 586). In their seminal paper "An Assessment of the Scientific Merits of Action Research", Susman and Evered chart the 'deficiencies of positivist science': persons are seen as objects (as opposed to subjects) of inquiry, the role of history and context is not of concern in the generation of knowledge (as opposed to being central to the process of knowledge generation), and that the system is defined only to the extent that a "denotative language exists to describe it" (Susman & Evered, 1978, p. 586) (as opposed to encouraging inquiry into the role of tacit values, norms, and beliefs). These assumptions are seen as insufficient in providing a scaffolding to generate knowledge "for use in solving problems faced by members of organisations" (Susman & Evered, 1978, p. 601).

They posit action research as a way forward to 'correct' the deficiencies of positivist science and highlight six characteristics that can enable this: orientation towards the future, collaboration, developmental, agnostic, situational, and theoretical groundedness in action. As AR seeks to deal with the "practical concerns of people" (Susman & Evered, 1978, p. 589), its future orientation acknowledges the aim of

improving future conditions into more desirable states. Its collaborative characteristic acknowledges that the relation between the 'research' and the 'client system' is one of interdependence, as AR challenges the objective or distant observer role of the researcher and urges them to clarify and represent their ethics and positionality as part of the AR process. AR aims to be developmental, as it seeks to enhance the capacity to identify and solve problems by creating appropriate structures, strategies, and procedures that build the required competencies. The agnostic and situational characteristics arise from the premise that action researchers recognise that the full extent of the consequences of their actions cannot be known ahead of time and that the relationships between people, events, and structures (such as policies) at a moment in time will define the outcomes of the AR process.

Susman and Evered state that positivist science cannot support these characteristics and put forward different philosophical viewpoints that can legitimate action research as a scientific endeavour. These diverse viewpoints range from the Aristotelian concept of praxis (as the 'art' of acting on the conditions one experiences to change them) to hermeneutics, existentialism, pragmatism, process, and phenomenology.

In this context, the epistemological rooting often most relevant to action research is constructivism, as a "view of human beings as actively constructing knowledge, in their own subjective and intersubjective realities and in contextually specific ways" (Hershberg, 2014, p. 2). This contrasts positivist and some post-positivist approaches rooted in the belief that events and objects are nested within a singular reality experienced by all people in the same way. Constructivism sets out to acknowledge that "reality can only be known through multiple mental constructions based on experience and socialisation that are specific and local in nature" (Hershberg, 2014, p. 5).

Within AR, a constructivist epistemology emphasises the active process of knowledge as co-constructed through a research process rather than the passive process of knowledge as 'discovered' (Guba & Lincoln, 2005). Heron distinguishes the different approaches regarding social research, whereby the positivist emphasis is that of research *on* people, the postpositivist is *about* people, while AR requires the recognition of research *with* people and not *on* or *about* (Heron, 1996). This participatory paradigm is also a central tenet highlighted in a common definition of AR from the Handbook of Action Research:

"Action research is a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities." (Reason & Bradbury, 2013, p. 1)

Taking a participatory stance focuses on the need to interrogate the relationship between the researcher and the participants in the context of the knowledge production process. As Nicolaidis and Raymaker note, “equal weight and consideration may be given to the contributions of both [...], but the nature of those contributions covers different areas” (Nicolaidis & Raymaker, 2015, p. 170). As the collaborative nature of knowledge production does not assume that the contributions to the process are equal, the role of reflexivity in a constructivist epistemology of AR is critical. Charmaz notes that researchers must inhabit reflexive stances to make explicit and address potentially unequal power dynamics among these different contributions (Charmaz, 2006). The scope of reflexivity needs to extend from the process of knowledge co-construction to the nature of knowledge(s) being produced (Gaventa & Cornwall, 2008). Linked to the definitional pursuit of solutions to issues of pressing concern, this speaks to a normative dimension of action research.

The implications of reflexive AR within constructivism have seen calls for an extended epistemology. Reason and Torbert argue that constructivism does not address “how we inquire in moments of action when our subjective framing of situations is unclear, ambivalent, falsely clear, or in conflict with others’ framings” (Reason & Torbert, 2001, p. 5). They continue to state that meeting the characteristics of action research that Susman and Evered called for decades ago requires a transformation towards an ‘action turn’, moving away from “a primarily reflective science about action and toward critical inquiry-in-action” (Reason & Torbert, 2001, p. 6). Within this extended epistemology, four aspects of knowing emerge:

- Experiential (direct encounters, lived experience).
- Presentational (imagery, vocal, and verbal art forms which emerge from and are grounded in experiential knowing).
- Propositional (knowing in conceptual terms), and
- Practical or procedural (knowing how to do something) (Reason & Torbert, 2001).

Integrating these ways of knowing is critical to the pursuit of developing ‘actionable knowledge’ as they are complementary and non-substitutable – as for example, an accumulation of propositional knowledge does not necessarily tell us how to mobilise it as practical ‘knowing how’ (Sexton & Lu, 2009). By actionable knowledge, we understand knowledge that can “change professional practice or social institutions through the active and transformative participation of those working within a particular setting” (Crawford, 1995, p. 239) while meeting the ‘criteria and needs’ of scientific communities (Adler et al., 2004). Although fulfilling the needs of scientific communities is still a core preoccupation of action research, the sentiment of the ‘action turn’ refocuses the primary purpose of research away from the “tradition to contribute to an abstract “body of knowledge” (Reason & Torbert, 2001, p. 7) to the contribution to practical knowing and the development of an *action science* (Argyris & Schon, 1974; Argyris, Putnam, et al., 1985). To this end, Reason and Torbert use the form of research/practice to encapsulate the intertwined nature of the two purposes.

3.1.2 Summary and implications

This section has provided an overview of the epistemological underpinnings of this research. An extended approach to constructivism offers the epistemological underpinning of this research, emphasising the process of knowledge production as actively co-constructed and requiring reflection-in-action in the pursuit of actionable knowledge. The following section will discuss the methodological implications of the ‘action turn’ that inform my approach to action research.

3.2 Methodological groundings

After exploring the epistemological context of action research and the implications of the action turn, this section will explore two lenses of importance to developing a methodological approach. Firstly, it will discuss the contribution of first-, second-, and third-person research/practice; secondly, it will explore the role of single-, double-, and triple-loop learning.

3.2.1 First-, second-, and third-person action research

To increase the validity, practical significance, and its transformational potential, AR must not simply be seen as ‘another’ methodology but rather as an “orientation to inquiry” (Reason, 2016, p. 106). Mobilising this orientation to inquiry requires new strategies and frameworks (Reason & Torbert, 2001). They note the need to depart from forms of ‘third-person research’ as separate from practice and propose first-person and second-person research/practice as dimensions of inquiry to counterbalance it. These three dimensions build on an earlier exploration of research for *me*, for *us*, for *them* (Marshall & Reason, 1994) as critical audiences of AR. They consequently become more widely adopted in the AR field and become a key strategy for mobilising the orientation to inquiry as presented in the introduction of The SAGE Handbook of Action Research (Reason & Bradbury, 2013):

- First-person action research/practice skills and methods address the ability of the researcher to foster an inquiring approach to their own life. First-person research can have an ‘upstream’ orientation, seeking to clarify the intentions, ethics, and positionality of the inquirer and the purposes of inquiry for themselves and others. It can also have a ‘downstream’ orientation to critically examine day-to-day behaviour and the gaps between espoused and enacted values and theories to create the enabling conditions for epistemic reflexivity.
- Second-person action research/practice addresses the ability to inquire ‘face-to-face’ with others into issues of mutual concern. Different roles in the cycles of action and reflection are possible, ranging from co-researchers/co-inquirers (designing and deciding in relation to the AR process) to co-subjects (participating in the action being researched). A significant aim of second-person AR is to make explicit processes that already have an implicit or tacit second-person inquiry form – for example, the doctor-patient relationship or the relationships between co-workers or collaborators.

- Third-person research/practice aims to extend the reach of relatively small-scale inquiries through wider communities of inquiry by involving relevant actors (disciplinary, sectoral, institutional) in the broader transformation of practice being sought.

Seeing these three levels as the methodological grounding can help discern the scales at which knowledge is developed and mobilised – I, we, us. Traditionally, positivist and interpretivist research falls into the category of third-person research (Reason & Torbert, 2001); although this level of research is influenced (or, as Torbert (1998) says, co-generated) by first- and second-person research, this is not usually seen as the primary focus of the research process. Action research seeks to provide a methodological grounding for a research/practice that accommodates the interrelations between the three levels and makes their contribution explicit through a systematic cycle between action and reflection.

To do so, Chandler and Torbert distinguish between first/second/third-person practice (as defined above) and voice as: “1. the subjective, first-person voice; 2. any given particular set of intersubjective, second-person voices; and 3. the objectivity-seeking third-person voice” (Chandler & Torbert, 2003, p. 140). Deploying the research/practice levels and voices can support action researchers to navigate the wide choice of research methods and data collection processes by being able to systematically situate the relationship between the AR cycles and the levels from which knowledge claims emerge.

3.2.2 Single-, double-, and triple-loop learning

“We must, in other words, become adept at learning. We must become able not only to transform our institutions, in response to changing situations and requirements; we must invent and develop institutions which are ‘learning systems’, that is to say, systems capable of bringing about their own continuing transformation.” (Schön, 1973, p. 28)

The role of learning in enabling systems transformation has been a long-standing inquiry in action research. AR emerged through a pursuit of new methodologies to address organisational development (Schön, 1973; Senge, 1990; Susman & Evered, 1978), how people learn, and the relationship between individual learning and organisational transformation.

The need to distinguish between different levels of learning emerged as Gregory Bateson maintained that our attempt to understand learning is limited by an inability to characterise the types of learning (Bateson, 1972). He proceeds to distinguish between five levels of learning:

- Learning 0 is characterised by a right or wrong response to stimuli without making changes based on experience (“I ‘learn’ from the factory whistle that the time is 12 o’clock”, 1972, p. 289).
- Learning I (or proto-learning) emerges through generalising based on experience (here, he gives the example of Pavlovian conditioning, where learning occurs in the context of reward and avoidance).

- Learning II (which he calls 'learning to learn' or 'deutero-learning', from the Greek term *deuteron*, meaning second, next, or farther from) is "a corrective change in the system of a set of alternatives from which choice is made" (Bateson, 1972, p. 298). Thus, learning here becomes intentional, as the learner focuses on the learning process and seeks to maximise the potential of Learning I.
- Learning III sees changes in Learning II, therefore positing that corrective changes would be seen in the sets of alternatives. Bateson notes that this type of learning is complex and likely rare as it requires constant questioning of assumptions that can bear risks for the learner. It might only be experienced in "psychotherapy, religious conversion, and in other consequences where there is a profound reorganisation of character" (Bateson, 1972, p. 307), thus alluding to the transformative rather than incremental character of this level of learning.
- Learning IV would see changes in Learning III, and Bateson posits that it 'probably' does not occur in any adult living organism given the difficulty of stepping outside one's worldview to 'learn to learn'.

Chris Argyris and Donald Schön drew insights from the work of Bateson and extended the definition of the types of learning by coining 'single loop' and 'double-loop' learning as a framework for understanding the interplay between individual and organisational learning (Argyris, 1999; Argyris & Schon, 1974). Argyris notes that single-loop learning occurs "whenever an error is detected and corrected without questioning or altering the underlying values of the system". In contrast, double-loop learning occurs "when mismatches are corrected by first examining and altering the governing variables and then the actions" (Argyris, 1999, p. 68).

Through their work on organisational learning and learning systems, Argyris and Schön popularised the concept of 'loop learning' (Tosey et al., 2012), with 'triple-loop' learning later introduced by several other authors (Swieringa & Wierdsma, 1992; Yuthas et al., 2004). Tosey et al. (2012), in their review of the evolution of triple-loop learning, note the synergies and lineage between the five levels proposed by Bateson and the triple-loop learning model.

While in Bateson's explorations Learning III is equated with a change in epistemology, Tosey et al. (2012) note that the implications of triple-loop learning for organisations involve normative judgements and that the literature cited in their review 'blurs' the implications of this conceptualisation. They call for wider explorations of the reconfigurations required for organisations to achieve triple-loop learning and question whether the rhetoric is matched by action given the 'dearth' of empirical research they found in their review of the existing literature.

They note that Bateson's Learning levels contrast with constructions of triple-loop learning as a "consultancy offering or a form of 'deeper' strategic thinking" and caution against seeking utopian solutions through "ever higher orders of learning" (Tosey et al., 2012, p. 24). While triple-loop learning has become the most prominent of concepts in the organisational learning literature, it is presented with considerable

challenges as it requires transforming the forms of organising and knowledge production themselves (Tosey et al., 2012). They conclude by noting that while transformative outcomes are often espoused, many organisations would benefit more from strengthening competencies for single- and double-loop learning.

3.2.1 Summary and implications

So, what does this mean for those seeking to better understand individual and organisational learning in pursuing their transformative learning and broader societal changes? How might we know where and how loop learning occurs (Tschakert & Dietrich, 2010) and what might be the implications in the context of the key capacities for resilience (coping, adaptive, transformative)?

The concepts introduced in this section – first/second/third person research/practice and voice, single-, double-, and triple-loop learning can help us navigate the levels at which knowledge is developed and mobilised to improve the real-world context of a problem situation. This section proposes that as the aim of action research is the pursuit of change, this is intrinsically linked with the pursuit of learning.

First/second/third-person research/practice and voice can help discern between the scales at which learning takes place, providing a methodological grounding to explore the interface between individual and social learning. Fig. 12 below combines the model developed by Chandler & Torbert (2003) to chart where single/double/triple-loop learning takes place across the three levels of research/practice, thus providing a way to map the learning taking place.

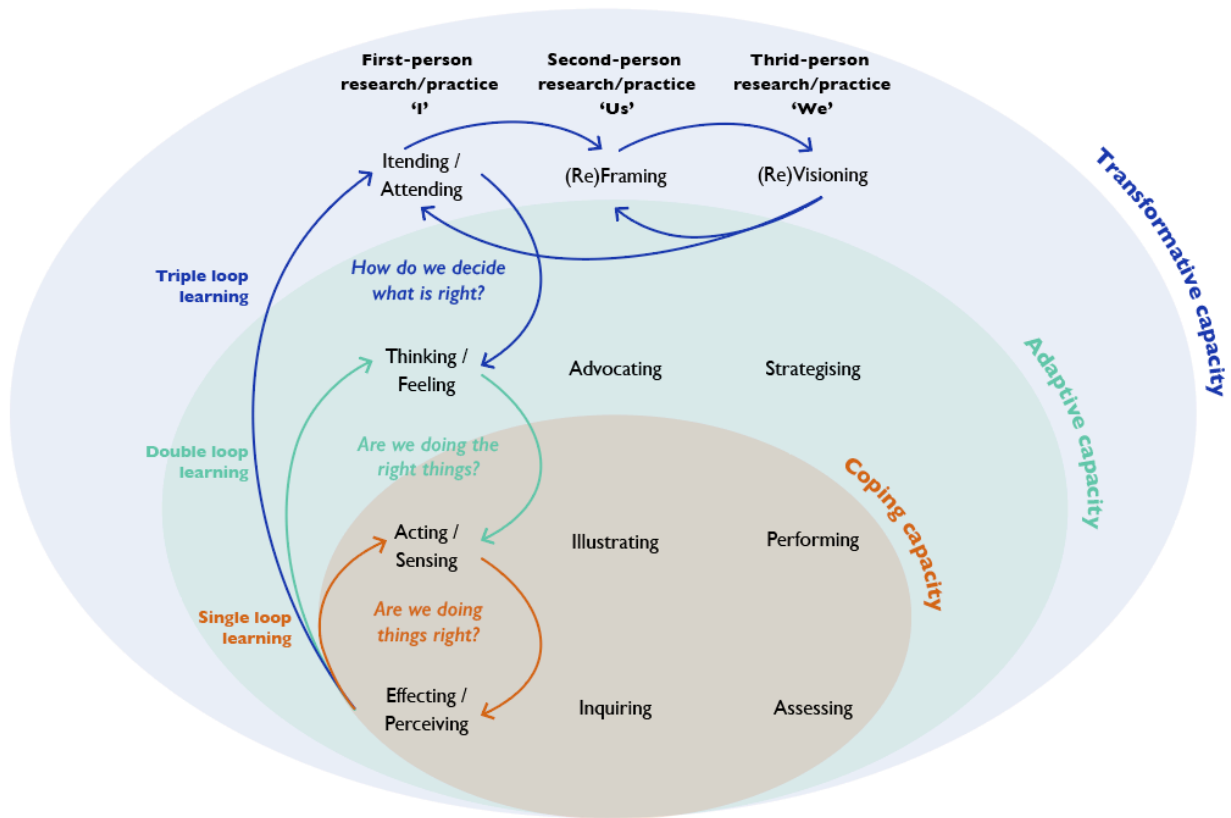


Figure 12. Resilience learning framework integrating first-/second-/third-person research/practice (Chandler & Torbert, 2003), the 3D resilience framework (Béné et al., 2012), and the triple-loop learning model (Argyris & Schön, 1997; Cartwright, 2002).

Through visualising the ‘territories of experience’ (Chandler & Torbert, 2003) against the three key capacities for resilience (Béné et al., 2012), Fig. 12 above depicts the non-linear relationships between the level of learning, the scale at which learning takes place, and the type of resilience capacity it contributes to.

3.3 Research design overview

The research questions explored in this thesis build on previous scoping work I have undertaken and published in a literature review of four key concepts regarding approaches to tackle urban challenges – urban sustainability, transformations, transitions, and resilience. This was peer-reviewed and published as part of a special issue of the journal *Cities* on ‘Re-framing Urban Resilience Implementation: Bridging the Gap between Theories and Practices’ (Angheloiu & Tennant, 2020).

The findings indicate that although the literature advocates for systemic change towards sustainability as an outcome of a large palette of urban interventions, less consideration is given to the means of achieving these. The scoping study highlights the need to focus on processes as much as on outcomes when advocating, devising, or implementing interventions. This requires a process of understanding and negotiating trade-offs and the different worldviews and values that underpin them. Addressing this entails

going beyond technocratic skills through cultivating reflexivity, effective communities of practice and new forms of organising for knowledge production, and interrogating our roles and agency as urban researchers, practitioners, and policymakers (Angheloiu & Tennant, 2020).

The research questions draw on empirical explorations into the use of systems thinking, design, and futures methods to address complex sustainability challenges (Angheloiu et al., 2017, 2018, 2019), on the literature reviewed in Chapter 2, and the epistemological and methodological groundings of action research as introduced in Sections 3.1 and 3.2. Lastly, they build on a decade of professional experience as urban practitioner and researcher. Table 3 below provides an overview of the relationship between the research sub-questions, the action research cycles, and the research methods deployed. Following this overview, Section 3.3.1 provides a detailed account of the research methods used in each Action Research Cycle (ARC) and their rationale.

Table 2. Research design overview.

Research question	Action Research Cycle and Aim	Research method(s)/approach	Reason
1. What are the knowledge-implementation gaps and how do they occur?	Cycle 1 (2019) – Define the problem situation	<ul style="list-style-type: none"> • Systematic literature review • Semi-structured interviews with mid-career urban resilience professionals (researchers, practitioners, policymakers) • Observation 	To identify the key knowledge-implementation gaps to develop a baseline understanding of the problem situation
2. How might systems approaches help bridge these gaps in the context of an urban resilience capacity building programme?	Cycle 2 (2020-2021) – Intervene in the problem situation	<ul style="list-style-type: none"> • Narrative literature review • Problem-based workshop facilitation • Entry and exit surveys • Participant, process design, facilitation observation 	To develop a framework for taking a systems approach To test the framework as part of an urban resilience capacity building programme
3. How might a transdisciplinary community of practice support the onward learning and knowledge brokering process?		<ul style="list-style-type: none"> • Narrative literature review • Community of practice facilitation • CoP entry survey 	To explore how an intervention in the problem situation might be sustained through social learning approaches such as a community of practice

The research questions and the cycles of action research undertaken between 2019 – 2021 are visualised in the figure below. The larger dotted cycle represents the development of an evaluative approach to understanding how the interventions undertaken in ARC2 have helped improve the problem definition defined in ARCI.

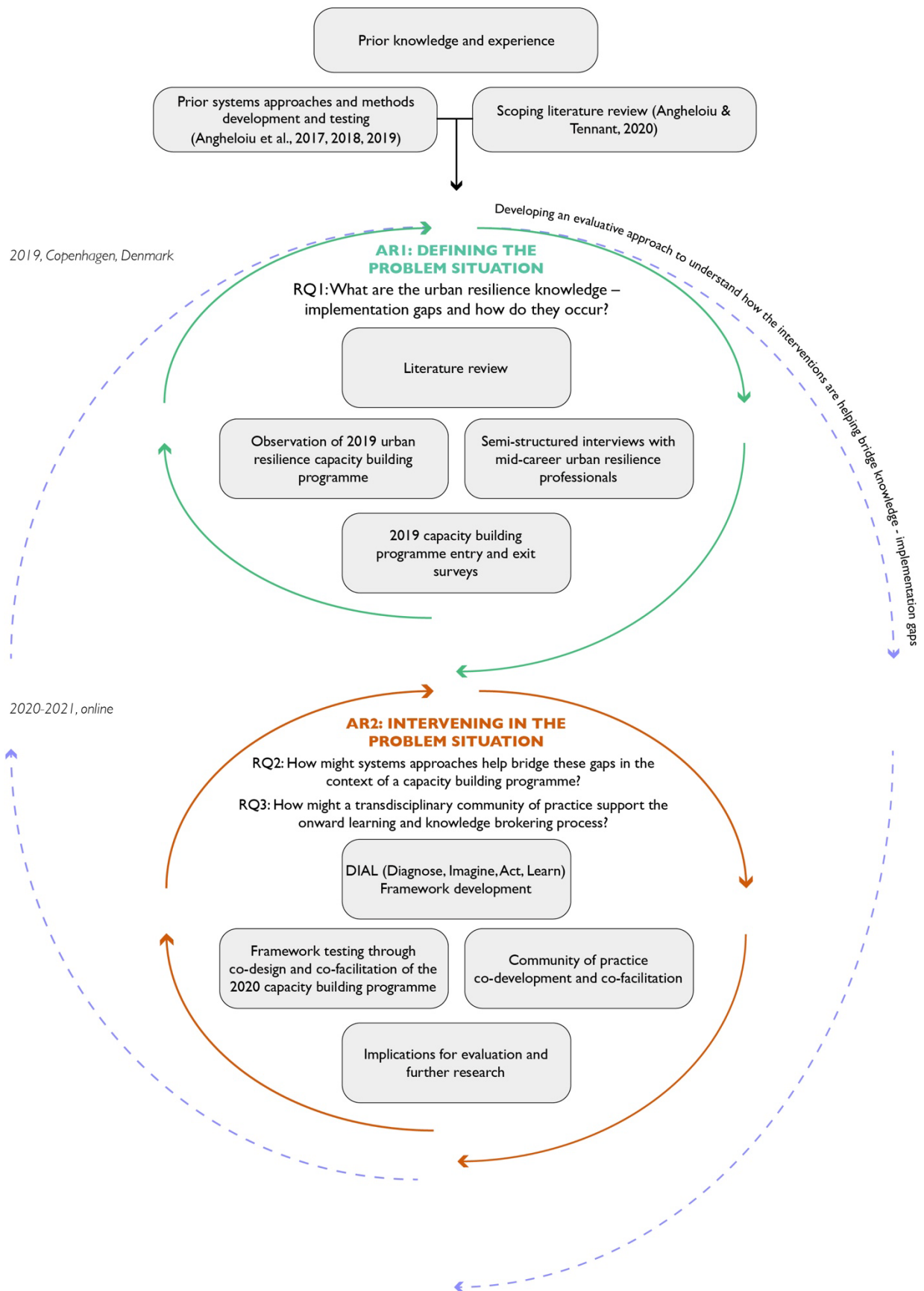


Figure 13. Research questions and action research cycles.

3.3.1 Research methods

This section provides an overview of the key research methods deployed as part of the two action research cycles (ARC). Following this overview, each corresponding chapter (ARCI – Chapter 4 and ARC2 – Chapter 5) provides respective data collection and analysis methods.

ARC I: Defining the problem situation

Systematic literature review

The first research question, corresponding to the first action research cycle, seeks to identify current gaps and better understand how they occur to develop an understanding of the problem situation. Firstly, it does so through undertaking a systematic literature review drawn from a Web of Science search (covering the years 2005-2021) across the terms “urban resilience” and either of the following: “knowledge gap”; “implementation gap”; “knowledge implementation gap”; “operationalisation gap”. The search timeline covers the Hyogo Framework for Action (HFA): Building the Resilience of Nations and Communities to Disasters (2005-2015) and the first phase of the 2015-2030 Sendai Framework for Disaster Risk Reduction. These two key global policy directives have informed the operationalisation of urban resilience to date. The search included title, abstract, and keywords and yielded 47 results; after reading the abstracts, 12 results were excluded as they did not directly explore knowledge-implementation gaps. In total, 35 results were analysed using a content analysis approach (Vaismoradi et al., 2013), with the key findings presented and discussed in Section 2.1.

Primary data collection context

The primary data collection of ARCI was conducted during the “BLOXHUB Summer School on Urban Resilience” (Summer School), a capacity building programme convened by the International Urban Resilience Academy (IURA), part of the University of Southern Denmark. The Summer School brought together 25 multi-disciplinary participants and 30 expert contributors during an eight-day course from 12-19 September 2019 in Copenhagen. The goal of the Summer School was to build the capabilities of mid-career urban resilience professionals from different geographical, disciplinary, and sectoral backgrounds to plan ‘for urban resilience, using Copenhagen’s experiences and challenges’¹³ with a focus on developing capabilities for taking a ‘systems and futures thinking approach’¹⁴ to resilience challenges.

As the 2019 Summer School was the main site of primary data collection in ARCI, the following research methods were used: semi-structured interviews and participant observation. The detailed method design,

¹³ As described on the IURA website:

<https://www.sdu.dk/en/forskning/sducivilengineering/iura/teaching+and+education+activities/bloxhub+summer+school+on+urban+resilience+2019>. Accessed March 2022.

¹⁴ As described on the IURA website:

<https://www.sdu.dk/en/forskning/sducivilengineering/iura/teaching+and+education+activities/bloxhub+summer+school+on+urban+resilience+2019>. Accessed March 2022.

analysis, and discussion of the findings can be found in Chapter 4. The following sections will provide the rationale behind the method selection.

Semi-structured interviews

Interviews can enable the researcher to gain complex, in-depth information from participants (Wengraf, 2001) and help develop an understanding and interpretation of people and their situations (Tierney & Dille, 2002; Warren, 2002). Semi-structured interviews with urban resilience practitioners were deemed as an appropriate complementary method to the literature review to gain a better understanding of what the perceived knowledge-implementation gaps are and how they occur.

Twenty-one semi-structured interviews were undertaken with urban professionals who were either (mid-career) Summer School participants and (senior-level) guest contributors. Semi-structured interviews were deemed as an appropriate method as it allows for a flexible conversation framework and further elaboration where necessary (Bryman, 2011; Rowley et al., 2012). For the purpose of this research question, the number of interviews was deemed appropriate as data saturation (Savin-Baden & Major, 2012) was reached across most of the interview questions asked. The interview questions followed four broad categories: interdisciplinarity, knowledge gaps, implementation gaps, and capacity building. All interviews were recorded and transcribed later.

Participant, process design, and facilitation observation

Observation has been used as a method for qualitative data collection for over a century (Kawulich, 2005). It is widely regarded as fundamental to understanding culture (Adler & Adler, 1994) through a “systematic description of events, behaviours, artefacts in the social setting” (Marshall & Rossman, 2010, p. 79). Observation was deemed an appropriate method to understand the context of how knowledge-implementation gaps occur through observing the interactions between multi-disciplinary and multi-sectoral participants and the interactions between the participants and the guest contributors.

The roles of a researcher in observing can take multiple forms, on a spectrum of overt–covert and active–passive, with different ethical implications. In the context of the AR methodology chosen, I took an active participation (Gold, 1958) role by joining the 2019 Summer School as a participant and observing it. Given the discussions with the IURA organisers to play an active role in designing and co-facilitating the 2020 edition, it was deemed relevant for me to join as an active participant and overt observer during the 2019 edition to have a first-hand experience of the participant user journey. To this end, the observation process included document analysis (guest contributor presentation decks, the documents and briefs shared with the participants by IURA), informal conversations with other participants, as well as direct participation and observation, and introspection and reflection (Denzin, 1978; Patton, 1987).

Detailed observation notes were taken to capture participant-participant and participant-guest contributor dynamics, plenary discussions, and reflections regarding the local challenge set by the City of Copenhagen. Alongside observation notes, daily research journaling was used both as a means of documenting and reflecting (Banks-Wallace, 2008) as part of first-person research/practice as well as a means of data collection for later analysis (Välimäki et al., 2007). This research method has a dual purpose: first, to support the development of a 'rich picture', also known as a situation summary, which usually takes the form of a visual diagram (Checkland, 1981) of how knowledge-implementation gaps occur (ARC1). Second, to inform the design of the 2020 Summer School (ARC2). As such, the analysis of the data is represented both in Chapter 4: Defining the problem situation (corresponding to ARC1) and Chapter 5: Intervening in the problem situation (corresponding to ARC2).

ARC2: Intervening in the problem situation

Narrative literature review

Narrative reviews, also known as 'traditional reviews' (Dijkers, 2009), form the majority of literature reviews published in some fields, especially in contexts where systematic reviews are not feasible (Haddaway et al., 2015). While they have been criticised for potentially presenting a biased view of the literature or not showing sufficient transparency and consistency, they remain a useful approach for rapid and scoping reviews by offering a breadth of coverage and flexibility to navigate interdisciplinary concepts and knowledge (Byrne, 2016).

A narrative literature review approach was used to provide an overview of the background and current state of the role social learning can play in capacity building (Chapter 2, Section 2.2), as well as an overview of the key skills, capabilities, and competencies for taking systems approaches and the tools and methods that can support these (Chapter 2, Section 2.3). A narrative literature review is a more appropriate approach when "wanting to study a broader topic that has been conceptualised differently and studied within diverse disciplines" (Snyder, 2019, p. 334). It was therefore deemed appropriate due to the heterogeneous nature of the explored concepts. The narrative review also sought to build on my previous practice-based experience and knowledge, as well as previous empirical studies I have undertaken in the context of identifying suitable tools and methods for taking systems approaches (Angheloiu et al., 2017, 2018, 2019, 2020).

Primary data collection context

The purpose of the second action research cycle (ARC2) is to intervene in the problem situation defined in the first cycle. The primary data collection context of ARC2 started in the run-up of the 2020 edition of the Summer School (March 2020-July 2020) and continued with the facilitation of the urban resilience community of practice (2020-21).

ARC2 addresses the second (RQ2) and third (RQ3) research questions seeking to explore how two specific interventions can improve the problem situation as defined in ARC1: 1) testing the role of systems approaches as part of a capacity building programme (the 2020 Summer School), and 2) facilitating a transdisciplinary community of practice (CoP) to better understand the role of social learning and knowledge brokering.

The primary ground for RQ2 data collection was the 2020 Summer School, which I co-designed and co-facilitated with IURA staff. Due to the COVID-19 pandemic, the Summer School occurred online rather than in Copenhagen (from the 28th of May to the 26th of June 2020) and brought together 25 practitioners, policymakers, and researchers from 21 countries.

The primary ground for RQ3 data collection was the urban resilience community of practice (CoP). RQ3 starts from the premise that social learning approaches such as CoPs can better equip professionals to value and integrate different types of knowledge back into their professional, sectoral, and disciplinary communities (Collins & Ison, 2009; Fisher & Dodman, 2019). The CoP emerged as a result of the 2019 Summer School, as programme participants expressed the desire for a format to continue the process of peer learning. Between September 2019-May 2020, the CoP was formed of 25 members, with 25 new participants joining the CoP following the 2020 Summer School. The CoP governance and membership criteria were reviewed in January 2021, and the CoP became open to join in March 2021 to any self-identified urban resilience professional. Consequently, membership grew from 50 to 223 members registered on the closed messaging platform Slack and a further 500 'followers' of the public LinkedIn page of the CoP. Although CoP activities continue to date, the primary data collection for this research ended in December 2021.

The following research methods were used as part of ARC2: facilitation and surveys. The detailed design, analysis and discussion are found in Chapter 5. The following sections will provide the rationale behind the method selection.

Facilitation

Facilitation as a research method for AR can fulfil different purposes: communication, reflection, idea generation, knowledge exchange, decision making, or collaboration, while facilitators might act as “guides, orchestra conductors or universal translators — naming key thoughts or feelings, making observations back to the group or drawing out different individuals with a minority opinion or less power” (Heft, 2014, p. 334). The presence of named facilitators in inter- or transdisciplinary contexts can enable groups to explore similarities and differences that emerge in the process of collaboration (Kaner, 2014; Lanier et al., 2018). Unlike other research methods that focus on the aim of data collection, facilitation “prioritises group dynamics, the importance of process, and designing sessions to achieve specific outcomes” (Graef et al., 2021, p. 110). In other disciplines, facilitation has also been found to be one of the key factors

influencing the uptake of evidence in practice (Harvey et al., 2002), for example, in nursing (Kitson et al., 1998). Findings from a literature review of clinical studies show that implementation is most successful when “evidence is ‘scientifically robust’ (‘high evidence’), and the context receptive to change with sympathetic cultures, appropriate monitoring and feedback systems and strong leadership (‘high’ context), and when there is appropriate facilitation of change using the skills of external and internal facilitators (‘high’ facilitation)” (Harvey et al., 2002, p. 578).

Therefore, facilitation was deemed an appropriate research method given the first-person and second-person research/practice dimensions of the ARC2. In nursing, facilitation was also found to support learning from practice and the co-creation of new knowledge through critical reflection, enabling a dialogue between the ‘learner’ (in this case, the practitioner) and a ‘critical companion’ (in this case the facilitator) (Titchen, 1998). Facilitation can also be used as a method to support groups in achieving specific goals, and often, a combination of goals is pursued at the same time, ranging on a spectrum from ‘task-oriented facilitation’ to ‘holistic/whole situation/whole person facilitation’ (Harvey et al., 2002).

Facilitation is an adaptive research method that contains a core synthesis process; the preparatory work of facilitators often includes the selection of processes and tools to meet the needs and objectives of the participants, developing formats to document the workshops or sessions, as well as engaging in their reflective process about the role facilitation and their respective performance and facilitation style (Graef et al., 2021; Heft, 2014; Raelin, 2006). The role agreed upon with the 2020 Summer School organisers included leading the co-design and co-facilitation process of the 2020 edition. My role as a CoP convenor also included co-designing and co-facilitating events and learning sessions. Therefore, naming facilitation as a research method in ARC2 seeks to make this process explicit to analyse my role as a facilitator and better understand the role facilitation can play in bridging knowledge-implementation gaps.

In ARC2, I use facilitation as a method for first-person research/practice (in the specific instances I am facilitating on my own) and a method for second-person research/practice (when I am co-facilitating with others). As part of facilitation in ARC2, the active and overt observation described in ARCI above was maintained with a change in positionality – from participant to facilitator. The facilitation process has two main applications in ARC2: 1) designing and facilitating problem-based workshops (Savin-Baden, 2003) as part of the 2020 Summer School; and 2) designing and facilitating peer learning (Guldberg, 2008) as part of the community of practice. As part of facilitation as a research method, different types of data were collected: workshop agendas and preparatory meeting notes, workshop outputs and notes, as well as detailed observation notes and reflective journaling as mentioned as part of the observation method in ARCI.

Surveys

- a) Entry, reflective, and exit Summer School surveys (2019 and 2020)

The participants in the Summer School were asked to fill in an entry survey before the official start of the 2019 Summer School, a reflective daily study, and an exit survey after the official closing. As the 2019 edition of the Summer School was the first of its kind, the design of the surveys was co-developed with the organisers to inform the formative and summative evaluation of the Summer School as a capacity building format and to inform the design of future editions. In 2019, I was already discussing with the organisers the role I could play in co-designing and co-facilitating the 2020 edition of the Summer School. The entry, reflective, and exit surveys provided key insights that informed the 2020 design process. The surveys were repeated during the 2020 edition to provide a comparative assessment.

The survey questions drew on Critical Incident Analysis (Osterman & Kottkamp, 2004) to enable the participants to reflect on their learning process in the context of the key learning objectives for each day. They featured closed and open-ended questions to allow the participants to provide more complete or comprehensive responses (Holly et al., 2004; Patten, 2016).

b) Community of Practice entry survey

As part of the CoP maturing journey and the decision-making process that resulted in the opening of the CoP to other professionals beyond 2019 and 2020 Summer School participants, an optional entry survey was designed and opened for responses in March 2021 to identify the expectations and needs of the new joiners and to help inform the design and objectives of CoP gatherings. The optional survey had 93 respondents out of 173 new joiners, an overall response rate of 53.7%.

3.3.2 Limitations and delimitations

The present research seeks to explore topics and challenges that are potentially vast in scope – how gaps occur between knowledge and implementation, how systems literacy and capabilities might be increased, how communities of inquiry and practice form, or how we learn as individuals, communities, and organisations in pursuing wider, societal change. For this study, I have narrowed the scope to the goals of developing and testing a methodological framework to enable professionals to take a systems approach to the urban resilience challenges they are addressing in their day-to-day work and seeking to understand how transdisciplinary communities of practice can provide a missing link between individual and organisational learning in the context of resilience knowledge-implementation gaps.

The limitations of this research are three-fold: firstly, the participant criteria and selection for both ARC1 and ARC2 were handled exclusively by the Summer School (IURA) organisers. The organisers sought to maximise the participants' geographical, disciplinary, and sectoral diversity while ensuring the cohorts were gender balanced. The participants were all self-selected 'mid-career' – defined by the IURA organisers as professionals with 5-10 years of professional experience. As the IURA organisers noted explicitly, the reasoning behind this choice was that, in their experience, mid-career professionals tended to be the least supported by further professional development programmes (that usually focus on either

leadership development for senior leaders or early career support and mentoring). Meanwhile, mid-career professionals face increased managerial responsibilities while retaining project delivery responsibilities. Therefore, the study does not represent early career or senior or elite-level perspectives.

Secondly, given that the focus of the participant selection criteria was on 'professionals' (and indeed, action research and social learning draw roots from the focus on professionals), a fundamental limitation of this research is presented by a lack of consideration of how local and traditional knowledge can be rightly valued and integrated as part of transdisciplinary collaboration. There is a proliferation of capacity building programmes and communities of practice aimed at 'professionals', which face the danger of reproducing harmful power asymmetries that uphold historical patterns of marginalisation and exclusion in knowledge production processes.

Lastly, this research was limited by the onset of the Covid-19 pandemic as I was in the planning phase of ARC2 in Feb-Mar 2020. All the engagement, research activities, and data collection were transferred online, and the design of the 2020 Summer School had to be reconsidered to be suitable for an online audience rather than a focused in-person eight-day learning experience. The participants for the 2020 edition joined from 14 different time zones. They struggled at points with family and work commitments and intermittent internet access – all set in the context of widespread lockdown policies being in place during May-June 2020 when the 2020 Summer School took place. The pandemic impacted the research timeline, as I initially intended to undertake three action research cycles: 1) to define the problem situation, 2) to intervene in the problem situation, and 3) to evaluate the intervention. The time limitations of the PhD in the context of delays due to the pandemic have meant that instead of designing and being able to implement a complete evaluation of the interventions, I have instead documented an evaluative approach throughout, in keeping with the ethos of the AR methodology. To this end, Chapter 6 will provide reflections and implications for evaluation in the context of complex problem situations and identify further research required to evaluate the impact of the interventions.

3.3.3 Addressing questions of validity, rigour, and trustworthiness

The validation of an action research methodology is a “property of interpretations and conclusions which people make of information and the theoretical frameworks” (McTaggart, 1997, p. 14). McTaggart points out multiple methods to ensure action research validity, including the triangulation of data collection methods, participant confirmation, creating an audit trail for observations and inferences, and testing the coherence of arguments with the stakeholders involved in the research process. Due to my close connection to the study topic and the ‘insider collaborating with other insiders’ positionality (Anderson & Herr, 2014), I developed a systematic approach to ensuring validity, rigour, and trustworthiness.

Following Lincoln and Guba’s (2005) criteria for qualitative research, by the term ‘validate’ I do not imply testing a hypothesis, but instead “checking out of interpretations with participants and against data as the

research moves along” (Corbin et al., 2008, p. 48). In exploring my construction of validity and understanding of what rigour means for this action research project, I have followed Melrose’s principles:

Ensuring trustworthiness

Ensuring data trustworthiness builds on concepts known in quantitative research paradigms, such as validity, reliability, and generalisability. In action research, these are known as “credibility, transferability, dependability and confirmability, indicating, inter alia, the researcher’s ability to take all the complexities of the context under investigation into account and deal with unexpected patterns” (Beylefeld, 2010, p. 133) building on Guba & Lincoln, 2005; Tesch, 1990). The table below summarises the strategies deployed to ensure data trustworthiness.

Table 3. Strategies and methods to ensure trustworthiness.

Criteria	Strategies and methods to ensure trustworthiness
Credibility	Described the researcher background, biases, qualifications, as well as choice of positionality and ethical implications. Observed participants during the duration of the 2019 and 2020 Summer Schools and discussed emerging patterns with the organisers as part of reflective conversations. Triangulated sources of data (researchers, practitioners, policymakers) and methods (interviews, observation, surveys, journaling). Corroborated findings with research participants.
Transferability	Provided explicit descriptions of participant criteria and recruitment process, as well as detailed research methods. Collected detailed descriptive data, as well as contextual descriptions to facilitate comparison with other contexts.
Dependability	Used more than one method
Confirmability	Practised triangulation and confirmed interpretation with research participants. Recorded my own reflections through journaling and included elements of this as part of first-person research sections to make my positionality explicit and tackle potential biases that led to specific interpretations.

The research timeline accommodated multiple action research cycles in the recognition that

“Sometimes the first cycle is an exploration of the situation (a reconnaissance), the second is an attempt to improve or change (intervention), and the third an evaluation of the intervention. The use of critical reflection in each cycle allows the action (or change or improvement or intervention) to be integrated with research (or building understanding about the process and the practice or evaluating progress or generating theory).” (Melrose, 2001, p. 166)

As addressed in Section 3.3.2, I have undertaken two AR cycles to identify and intervene in a problem situation. While the research timeline did not allow for a standalone third AR cycle due to the COVID-19 pandemic-related delays, I have sought to address this limitation by documenting and analysing an evaluative approach to intervening as evaluation-in-action instead of an evaluation-of-action (Piggot-Irvine & Bartlett, 2008). Conducting this study over a period of time (September 2019-December 2021) provided

me with ample opportunities to discuss this research with peers and mentors, as well as present preliminary findings as part of different conferences and fora, such as a panel presentation at COP25 in December 2019 during the Cities and Local Governments Capacity Building Day, a presentation at the Urban Resilience in a Context of Climate Change in October 2020, a presentation at the Innovate4Cities UN-Habitat conference in October 2021, as well as various internal presentations within my department.

Triangulating the data collection methods to improve the reliability of the data, explore multiple sources and firmly establish patterns and themes

In AR, methodological triangulation is a critical process to increase qualitative rigour (Melrose, 2001), which means collecting data by multiple methods from the same or different sources. In Section 3.3.1, I have detailed the various research methods and the purpose for employing them. For example, to establish what the knowledge-implementation gaps are in urban resilience, in ARCI, I have deployed a systematic literature review (to understand the themes and patterns as presented in peer-reviewed literature), semi-structured interviews with mid-career researchers, practitioners, and policymakers (to understand how professionals perceive the gaps), as well as observation (to understand how these gaps manifest in the broader context of a capacity building programme that the research participants were attending).

As AR aims to improve problem situations, collecting evidence about the different changes and improvements that others perceive is key, especially changes that are perceived to be attributed to the AR intervention. Methodological triangulation aimed to help address the limitation of individual methods to avoid polarised conclusions. Research journaling is a vital practice supporting both ARCs, which allowed me to compare events, insights, and feelings.

Seeking data validation through participant confirmation and agreement with interpretations

In AR processes, the knowledge production process is iterative, incremental, and participatory (Reason & Bradbury, 2013). As knowledge production is the result of a process of co-construction, seeking to understand the reasons for patterns or themes in the data and co-inquiring into what happens in practice and why is an essential part of AR rigour (Melrose, 2001). As AR seeks to improve issues of mutual concern, McTaggart (1994, p. 327) notes that participant confirmation is “often linked with a negotiation about the release and publication of information and interpretation to give expression to moral commitments about the reflexivity of the documentation aspect of the research act in people's lives”. Therefore, seeking participant confirmation is vital to creating agreement and a shared understanding of the issue(s) of mutual concern, how the intervention(s) improved or not the problem situation, and the levels at which knowledge claims are being made.

3.3.4 Ethical considerations

The core tenet of action research – with, not on – implies that research participants are not subjects but co-inquiry partners. As mentioned earlier in the methodology chapter on the implications for knowledge production, this also has implications for ethical considerations in AR processes. The research has been

granted approval by the Science Engineering Technology Research Ethics Committee (SETREC reference I9IC5422). Below I explore some of the critical ethical tensions and how I seek to mitigate these.

One of the key issues in participatory research (as a broader research orientation that includes action research) is navigating issues of consent in the context of emergent situations. Informed consent is given at the beginning of the study and confirmed through signing consent forms stating that participants can withdraw at any time. This means the consent process is ongoing and based on continued negotiation. However, the emergent action research process is primarily participant-led, which means that great care needs to be put into the design of the spaces that people are invited into and in the framing to co-create shared inquiries. This also needs to acknowledge that participants might hold different core values and beliefs, all of which need consideration. As Melrose notes, acknowledging the role values play is a vital part of an ethical approach to action research:

“Far from being value-free, objective, and repeatable or rigorous in a scientific sense, AR is embedded in and built on the values of the participants and on a collection of a multitude of perceptions, which themselves are value-laden. Values impinge on research by guiding the selection of a problem or practice, a plan or method of investigation, a means of analysis and interpretation, and a theory. Values also impinge on personal and group and audience perceptions as to whether theory is important or action all important.” (Melrose, 2001, p. 177)

The following principles underpin my approach to ethics. They are drawn from previous experience with ethical issues in action research processes and from the scholarship of others (Coghlan & Shani, 2005; Eikeland, 2006; Burns, 2007). The role of these principles is to act as guide rails throughout the AR cycles:

- Process as value creation for research participants through co-development of shared inquiry questions (as part of the community of practice facilitation).
- Transparency and accountability to co-inquiry participants throughout the process.
- Active acknowledgement of the epistemic bias towards Western ways of knowing and consideration towards ways to mitigate this in knowledge co-production.
- Active acknowledgement and naming of power dynamics.
- The authenticity of my interpretations, seeking to interpret what participants say truthfully and accurately.
- Commitment to a reflective practice, challenging my assumptions and actively acknowledging and tracking changes in my positionality.

Trust building plays a crucial role in the success of action research processes, as participants require safe spaces to speak freely and honestly on sensitive professional issues. This comes with a duty of care towards the research participants and requires increased transparency and reflexivity about my role(s) and the

overt/covert balance between the multiple identities of a researcher, a learning facilitator, a community builder, a knowledge broker, or even a friend.

3.3.5 Evolution of my role and positionality

The 2019 Summer School was designed, organised, and facilitated by the Southern Denmark University team. I originally joined the programme as a participant-researcher, with the intent to undertake interviews with the Summer School contributors and participants, as well as to observe the group work process and analyse the outputs. This was the first edition of a new, experimental capacity building programme for the organisers. They appreciated the potential for my previous professional expertise to provide a valuable contribution. From the beginning, we discussed how we might collaborate to improve the curriculum, resources, and facilitation of the 2020 Summer School. I, therefore, set out to observe their facilitation and process design and engage in reflective conversations with the organising team, with a view to become involved in the organisation and facilitation of the 2020 Summer School.

My choice of researcher positionality is informed by studies that have explored the insider (whereby the researcher and the practitioner are the same person) / outsider continuum in action research and the different epistemological, methodological, and ethical issues they raise (Anderson & Jones, 2000; Cochran-Smith & Lytle, 1992). From the perspective of traditional research, issues include “objectivity (insider bias), reactivity (changing the setting as one studies and acts within it), and distortion (one’s position of authority distorting the responses of subordinates)” (Anderson & Jones, 2000, p. 444). From the perspective of action research, these issues are reframed. Biases are seen as ‘theories-in-use’ (Argyris, Putman, et al., 1985) to be acknowledged and scrutinised, changes in the setting provide critical data to be considered, while the role of authority becomes one dimension of the power dynamics to be interrogated. Among this continuum, Anderson et al. (1994, p. 27) posit that the dilemma of the insider is opposite to that of the outsider:

“Academics (outsiders) want to understand what it is like to be an insider without ‘going native’ and losing the outsider’s perspective. Practitioners (insiders) already know what it is like to be an insider, but because they are ‘native’ to the setting, they must work to see taken-for-granted aspects of their practice from an outsider’s perspective.”

Drawing on Anderson & Herr (2014) and the positionality spectrum they have developed, I am situating my research design as an insider collaborating with other insiders as the co-inquiry participants are mid-career urban professionals – researchers, practitioners, and policymakers, my positionality as insider contributes to a gap in the knowledge base and seeks to critique and improve practice in the process of doing so. Although the primary focus of my research is positioned as an insider collaborating with other insiders, I am also exploring my research/practice and seeking to follow this inquiry as part of my first-person research. To this end, I use elements of autoethnography to make my positionality explicit; this acts as a form of accountability and contributes to action research validity criteria.

Acknowledging the role of positionality goes beyond naming the stance from which research is undertaken to naming the intersection of social identities – such as class, ethnicity, gender, sexual orientation, age, disability, religion, or political beliefs and seeking to understand how they situate and shape the research process. I am a cis, white, able-bodied, straight, atheist woman and European Union citizen. I am a migrant who grew up in Romania and whose higher education was solely undertaken in the United Kingdom. My forming worldview was influenced by the economic instability of the 1990s and the conflicting family and societal values trapped in the transition between socialism (and a planned economy model) towards neoliberalism (and a free market model).

In the context of urban resilience, acknowledging my positionality helps me situate myself along key axes of difference that shape the current discourse – that of the Global South and Global North (Roy, 2016; Sparke, 2007; Wesely, 2018), as well as an inter-European axis between the East and the West (Boatca, 2006). The intersection of these axes depicts the nuanced and complex relationship between post-colonial and post-socialist studies in the context of Eastern European identities, issues that are only recently starting to be explored (Kołodziejczyk, 2014).

Undoubtedly, the dimensions of my social identity are vastly different to those on the frontlines of climate change who are experiencing high levels of climate vulnerability and the loss of livelihoods, as well as historical marginalisation and colonial oppression. These different layers influence the themes and patterns I see in my research and shape what remains invisible to me. Issues of post-coloniality are of high importance in the context of uneven distribution of climate change impacts, as well as the ‘white gaze’ of development and aid (Pailey, 2020). In seeking to decentre the ‘white gaze’ in my research/practice, I am inquiring into how to untangle the relationship between the given dimensions of my social identity and the dominant epistemic system.

3.4 Reflections: ‘living life as inquiry’

Taking a complexity and systems approach seeks to integrate the inquirer into the inquiry. In my work, I, therefore, start with the assumption that my inquiry is conducted by me, the inquirer, collaboratively with my co-inquirers. All of us are people situated in historical, social, and political contexts, arriving at this inquiry with our values, beliefs, frames of reference, and experiences. Therefore, to undertake this shared inquiry through systemic practices, we must attend to our own self-inquiries and see them as central rather than marginal, liminal, or external to the present inquiry. We also need to acknowledge that our methods and instruments for knowing, doing, and being in the world are also situated – we bring them as inquirers to the inquiry. Seeking to acknowledge this is counter to the attempt to eliminate the role, or even the existence of the inquirer – practice found in many research approaches. So how might this be achieved? We grow in the direction of questions we ask, so setting out these different questions around how I situate myself reminds me of Judy Marshall’s concept of ‘living life as inquiry’:

“By living life as inquiry, I mean a range of beliefs, strategies, and ways of behaving which encourage me to treat little as fixed, finished, clear-cut. Rather I have an image of living continually in process, adjusting, seeing what emerges, and bringing things into question. This involves, for example, attempting to open to continual question what I know, feel, do and want, and finding ways to engage actively in this questioning and process its stages.” (Marshall, 1999, p. 155)

The quote above sums up a sometimes-ineffable quality of action research – the ‘aliveness’ of a process driven by the assumption that we are not fixed entities but are in the process of perpetual becoming. Critical to the ontology of this position is the relational dimension of this process of becoming, which is often difficult to put across in its essence in Western philosophical worldviews or the English language. The Buddhist Zen master Thich Nhat Hanh referred to the concept of ‘interbeing’ in a realisation that ‘to be’ is an act in which we are never by ourselves – we are always interbeing with another, with and within the living world. This is a recurring worldview among Indigenous cultures and languages; for example, Jeanette Armstrong, the traditional knowledge keeper of the Syilx Okanagan Nation, talks about the Okanagan word for ‘ourselves’ as ‘the ones who are dream and land together’ (Mander & Tauli-Corpuz, 2007).

Untangling centuries of polarity and separation between the human and non-human world, between mind and body, between urban and rural is not a straightforward process, nor is the aim of my explorations or the present research to ‘solve’ this; it is my hope that this present inquiry as a bounded experiment in living life as inquiry, can help me be, do, and know towards the healing of our split and splintered worldviews. Returning to Donella Meadows’ wisdom, we can’t control systems, figure them out, fix them, or manipulate them. But through being curious, open to learning, questioning assumptions, and using language with care, we can start getting the ‘beat’ or the rhythm of a system – and slowly, slowly, learn how to even ‘dance’ with the system.

These practices are connected to making my mental models explicit and inviting attention to how I am experiencing my actions, reactions, thoughts, and reflections during the action research process. In this sense, living life as inquiry is the pursuit of ‘lowering the waterline’, a phrase common among systems practitioners that refers to the metaphor of an iceberg – whereby the dominant mass is situated under the waterline and is therefore invisible. Rendering the invisible visible is also a political choice, as I acknowledge how my positionality shapes my research and presents biases, blindspots, and limitations.

*As I’ve been writing this chapter, I’ve kept coming back to a sentence I wrote in a research diary entry from the early days of my PhD journey, as I was trying to reflect on previous action research experiences as a practitioner versus the pursuit of this methodology as part of a PhD thesis: ‘I am the instrument of my inquiry – both the subject and the object of research’. The word thesis comes from the Greek *tithenai*, which means to place or to position – in that sense, this thesis presents my position and stance in the world. This connects to where we perceive the locus of change– whether ‘out there’, ‘in here’, or everywhere in between. I am reminded of the story of Otto Scharmer, the MIT-based action researcher and founder of the Presencing Institute, who was interviewing Bill O’Brien, the late CEO of Hanover Insurance. In response to a question about transformational change in his organisation,*

O'Brien said: "The success of an intervention depends on the interior condition of the intervenor" (Scharmer & Kaufer, 2020, p. 28) When I first encountered this story, I drew parallels to the difficulty of fostering optimal interior conditions for transformation, especially from my previous professional experience – often situated in the context of resource scarcity and asymmetrical power dynamics. Therefore, I set out in this inquiry to explore how I might lead the research process for this thesis as in itself a fractal of the broader outcome that I seek to engender. What might be different when we design processes from a core value of care and abundance – caring for the field of professionals who seek transformative change and creating abundant spaces for learning and development?

3.5 Chapter summary

This chapter has presented the different dimensions of the action research methodology I am deploying in this thesis. In Section 3.1, I have explored the epistemological grounding of an extended constructivism. Following this, I brought in two different methodological lenses to support the research design of the action research cycles: first, second, and third-person research/practice and single-, double-, and triple-loop learning (Section 3.2). I have then provided an overview of the research design and the two cycles of action research that I have undertaken (Section 3.3), including limitations and delimitations of this research and addressing issues of validity, rigour, and trustworthiness in action research, as well as ethical considerations. Lastly; Section 3.4 provided my reflections on the concept of 'living life as inquiry'.

4.0 Defining the problem situation: knowledge-implementation gaps and how they occur

This chapter outlines the first action research cycle (ARCI), undertaken in 2019, corresponding to the first research question (RQ1): What are the knowledge-implementation gaps in urban resilience, and how do they occur? Section 4.1 presents the detailed research design of ARCI and outlines the data collection and analysis process. Section 4.2 presents the findings from ARCI. Section 4.3 discusses the findings in the context of the literature review presented in Chapter 2 and puts forward implications for the second action research cycle, undertaken in 2020-21.

4.1 Action Research Cycle I (2019)

4.1.1 ARCI context: the 2019 Summer School

The primary data collection of ARCI was conducted during the “BLOXHUB Summer School on Urban Resilience” (Summer School), a capacity building programme convened by the International Urban Resilience Academy (IURA), part of the University of Southern Denmark. The Summer School brought together 25 multi-disciplinary participants and 30 expert contributors during an eight-day course from 12-19 September 2019 in Copenhagen. The goal of the Summer School was to build the capabilities of urban resilience professionals from different geographical, disciplinary, and sectoral backgrounds to plan ‘for urban resilience, using Copenhagen’s experiences and challenges’¹⁵ with a focus on developing capabilities for taking a ‘systems and futures thinking approach’¹⁶ to resilience challenges. The key hazards to be considered by the Summer School participants were cloudburst, water scarcity, and heatwaves in the context of the health, energy, and agri-food sectors (Fig. 14).

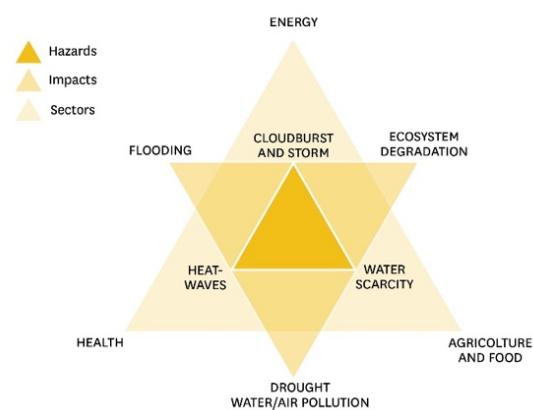


Figure 14. Copenhagen hazards, impacts, and sectors (IURA Summer School, Challenge Brief, 2019).

The 25 participants self-organised into four groups and were tasked with developing an urban resilience vision and implementation plan for a specific neighbourhood in Copenhagen, Sydhavn. The IURA organisers set out the following brief:

¹⁵ As described on the IURA website:

<https://www.sdu.dk/en/forskning/sducivilengineering/iura/teaching+and+education+activities/blohub+summer+school+on+urban+resilience+2019>. Accessed March 2022.

¹⁶ As described on the IURA website:

<https://www.sdu.dk/en/forskning/sducivilengineering/iura/teaching+and+education+activities/blohub+summer+school+on+urban+resilience+2019>. Accessed March 2022.

“The urban resilience challenge in Copenhagen is to address hazards, shocks, and stressors such as air and water pollution, extreme temperatures, and water scarcity, all in the context of increasing pressures for urbanisation, densification, and intensified land use – and to do so through an integrated, systemic approach to climate action.” (IURA Summer School, Challenge Brief, 2019).

As the 2019 Summer School was the main site of primary data collection in ARCI, semi-structured interviews and participant, process, and facilitation observation were used following the rationale set out in Section 3.3.1 covering research methods.

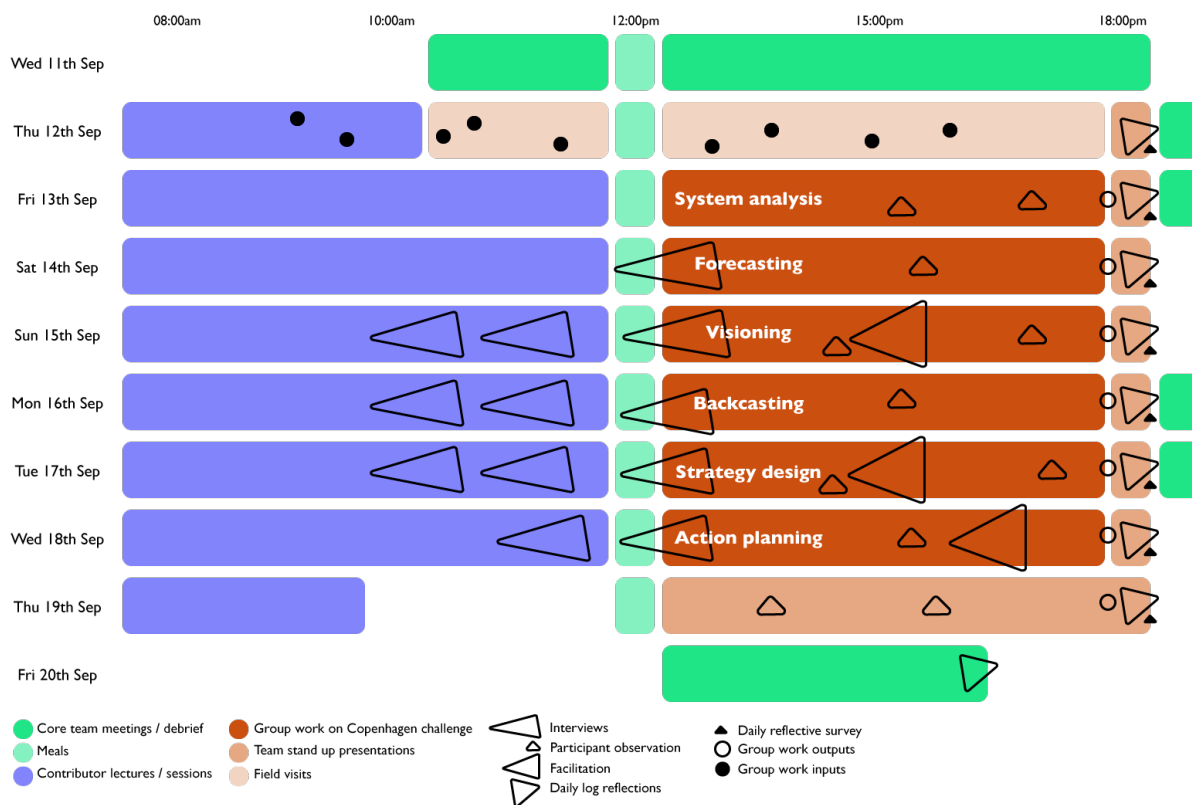


Figure 15. Schedule for the 2019 Summer School and data collection timings.

The schedule for the eight days is visualised in Figure 15 above. Guest contributors were scheduled to deliver lectures and Q&A sessions during the morning, while the afternoons were dedicated to group work. The data collection took place throughout the week; interviews were conducted in the morning or over lunch breaks and lasted between 40-60 minutes; participant observation took place throughout the day, while all participants spent the last 15-20 minutes of each day responding to a reflective survey about the activities that took place that day. At the end of each day, I would also write up my daily log containing a description of the activities, reflections, and onward questions.

4.1.2 Data collection and analysis process

Research participants

The IURA organisers undertook the 2019 Summer School recruitment of participants. As stated on the recruitment website, the following groups were the target for recruitment:

“Scientists and researchers: PhD candidates, post-docs, research fellows, and lecturers from universities and research organisations.

Practitioners: including policymakers from national and subnational governments and public organisations, officers from international and intergovernmental organisations, and staff from private for-profit and non-profit organisations.

Participants with different disciplinary backgrounds are welcome: including engineering, architecture, planning, environmental, economic, and social sciences. English language proficiency is required.”¹⁷

The table below summarises the types of stakeholders interviewed and the research codes.

Table 4. Interviewees’ stakeholder types and codes.

Type of stakeholder	Research code
Academic	4; 5; 17
Intergovernmental organisation (IGO)	6; 8; 9; 11; 16
International non-governmental organization (INGO)	1; 2; 20
Local Government	3; 12; 13
Private sector	7; 15; 18; 19; 21
Think tank	10; 14

¹⁷ As described in the call for participation, available at <https://www.sdu.dk/en/forskning/sducivilengineering/iura/teaching+and+education+activities/blohub+summer+school+on+urban+resilience+2019> (Accessed Mar 2022).

Data analysis process

For the data analysis process of the semi-structured interviews, I have used thematic analysis (Braun & Clarke, 2006; Vaismoradi et al., 2013), with data analysis steps as follows:

- Transcribe recordings using the software Trint, make notes, and capture reflections as I go along.
- Import transcripts in the qualitative analysis software AtlasTi.
- Code the transcripts deductively (based on research questions) as well as inductively (open coding); after coding each transcript, I would write a descriptive memo as well as a reflective memo; the coding process would undergo several iterations to ensure the interpretation was as comprehensive as possible in relation to the primary research question explored.
- Develop a visual code hierarchy using the network visualisation tools provided by the software; this helped map the codes based on their density (how often they show up in the data) and co-occurrence (how often they occur alongside other codes).
- Identify themes (Ryan & Bernard, 2016) and write a short memo for each theme; the themes and dominant associated codes are depicted in Table 5.
- Run two data validation sessions where I shared and discussed preliminary findings with the research participants and reflected on the implications for the following action research cycle.

Table 5 below presents the key emerging themes and the most frequent code groups associated with them, while extracts from the coding process can be found in Appendix I.

Table 5. Themes and associated codes.

Analytic category	Most frequent code groups associated with themes
Definitional gap	Gap_definition; Why resilience; Gap_local knowledge; Gap_intangible; Gap_non-transferable; Gap_normative;
Epistemic gap	Gap_ways of knowing; Gap_interdisciplinarity; Gap_collaboration; Gap_theory-practice; Gap_practice-theory; Gap_whose knowledge;
Multiscalar gap	Change_who drives; Where to intervene; Gap_skills&capacity; Gap_resources; Gap_finance; Gap_localisation;
Methodological gap	Gap_data availability; Gap_tools&methods; Gap_uncertainty methods; Gap_reflection; Gap_incentives; Gap_learn from failure;
Values gap	Change_how it happens; Change_personal role; Resilience for whom; Resilience for when; Drivers_research; Drivers_policy-making; Drivers_practice; Gap_business model; Gap_organisational culture;

The analysis presented in this chapter reports findings based on the themes and codes above. In some parts of the analysis, supporting quotes are presented. Following Corden & Sainsbury (2006), verbatim quotes have been used to provide evidence and explanation. In the first case, they provide transparency into the analysis process, while in the second case, they provide further contextualisation of how the participant positions themselves and some of their underlying assumptions or perceptions.

4.2 Findings

This section will present the key themes related to knowledge-implementation gaps and how they occur. The table below summarises the key findings, implications, and analytic categories.

Table 6. Key emerging themes and analytic categories. The table is based on Bloomberg & Volpe (2015).

Finding Statement	Outcome/Consequence	Analytic Category
Finding 1: Lack of consensus over the meaning of 'urban resilience'	Challenges around the term's intangibility, transferability, and normativity lead to diverging applications.	Category 1 Definitional gap
Finding 2: Complexity of integrating and valuing transdisciplinary evidence-based and practice-based knowledge	Differences in how the process of knowledge creation is perceived and challenges surrounding transdisciplinary and inter-sectoral collaboration lead to a lack of integrative approaches to urban resilience.	Category 2 Epistemic gap
Finding 3: Lack of skills, capabilities, and resources required at different scales to operationalise urban resilience	The lack of skills, capabilities, and resources required at different scales creates friction in the operationalisation of urban resilience and hinders the scaling of implementation.	Category 3 Multiscalar gap
Finding 4: Lack of methods to account for uncertainty and cascading effects	The lack of methods to account for uncertainty and cascading effects leads to data availability challenges and hinders effective learning.	Category 4 Methodological gap
Finding 5: Resilience for whom and for when is a process of negotiation between competing priorities afforded by worldviews and values	Different incentives, time horizons, and success factors lead to different and often competing priorities.	Category 5 Values gap

The following sub-sections will present and discuss the key findings.

4.2.1 Definitional gap: Lack of consensus over the meaning of 'urban resilience' leads to diverging applications

The rapid rise in the use of the term 'urban resilience' by different knowledge communities (researchers, practitioners, policymakers), disciplines (engineering, architecture, urban planning, disaster management, community development), and sectors has led to vastly diverging interpretations of the term.

Intangibility

Participants note that one of the main drivers of the lack of consensus is given by its 'semantic intangibility' (Participant 002) and contextualised application (Participants 009, 015, 019). As the definition requires understanding the place-specific shocks, stressors, and vulnerabilities across social, environmental, and economic dimensions, there is a need for local stakeholders to define for themselves the boundary and scope of urban resilience. Participants note that this leads to 'inconsistent' applications between cities and poses challenges in monitoring and evaluating the impact of resilience interventions, slowing the scaling

and replication process. This assumes that 'consistent' application is seen as the norm, a process by which different resilience interventions can be piloted, tested, and compared in terms of cost-benefit, with those solutions deemed optimal and then scaled through replication. As depicted in Chapter 2, although the use of the 'urban resilience' term has grown considerably over the past decade, it is still relatively new among urban stakeholders. While Participant 009 highlights that mainstreaming a relatively new concept is a slow process, Participant 015 notes that the understanding and definitions of the term vary, which poses further difficulties when it comes to ensuring the desired 'consistency' of application.

"I think the concept of resilience is still for many, many experts and decision makers quite new. And I think it'll take time for it to really sink in and to fully integrate it into city planning."
(Participant 009)

"It is a term that is kind of new, and not so many people understand it. Many people don't agree either with the notion. You have so many different definitions and understandings of resilience; it's going to be difficult to convince that it's necessary." (Participant 015)

Baraikova et al. (2021) highlight the added challenge posed by the language availability of guides and toolkits, which are usually developed in English, while implementation, monitoring, and evaluation are usually undertaken in local languages, with few knowledge products translated back into English. This is especially reflected in the participants' experience of working in small and mid-sized cities, as one notes that talking about urban resilience is akin to 'literally talking in a different language' and coming 'from a different world' (Participant 019). They further point out that applying the definition at a local level beyond the usual array of 'case study' cities that are 'usually well-resourced and politically stable', such as New York, Copenhagen, or London, is slow. This is further backed up by the literature, which evidences that there is currently little evaluation of how knowledge products (such as toolkits and tools) improve urban resilience practice or policy-making (Ernst & Preston, 2020).

While the literature identifies the need to define common lexicons for implementation (Baravikova et al., 2021b), the primary data points to the lack of available support and assistance for small and mid-sized cities compared to that of 'megacities'. This poses challenges for urban resilience practitioners who usually work across urban areas of different sizes (often across multiple regions and countries) and have limited engagement and knowledge of local stakeholders' dynamics. Participant 002 reflects on how distance from 'the field' leads to a lack of in-depth knowledge; they note the personal frustration that arises from working in roles where urban resilience professionals apply their skills to geographies different to the one(s) they have deeper knowledge or lived experience of:

"You need to be close to the field. And that's my personal struggle: what contribution can I give in my position, in my organisation, in my location? The complexity of the subjects and maybe also the intangibility makes it even more difficult to do it from a distance." (Participant 002)

The personal struggle depicted by Participant 002 exemplifies the uneven dynamics between internationally mobile practitioners and the local stakeholders they seek to support 'on the ground', an insight that was not present among the themes that emerged from the literature review undertaken in Chapter 2.

Transferability

Challenges related to the transferability of the term and associated practices are a key contributor to the definitional gap. Interviewees note that urban resilience, as currently practised, relies on politically stable, often democratic regimes, and therefore knowledge transfer is most successful between these contexts. What is deemed a successful resilience implementation programme and the lessons and best practices perceived as transferable are predominantly drawn from cities that benefit from stability, institutional capacity, and resources. Participants 011 and 019 note the challenges related to transferring urban resilience practices beyond these contexts:

“You might have a very nice theory about resilience, but to apply this in the practical reality of that of a democratic chaotic system like in India or a very top-down command economy or a Soviet-style system...theory needs to be open to local circumstances, but it is not addressed because [researchers] don't have money and don't have the time. And you know, you're based at a university, and your funding runs out after two years.” (Participant 011)

“I wouldn't be that worried about the big cities. I think the thing is to focus on the middle-sized and small cities that don't have access to C40 or Rockefeller Foundation. [...] Lucky for New York, Venice, and Buenos Aires, but what about the rest of the world? The city 30km away from these? There are no resources. It's very hard to go to a very small city in Honduras, where the local government probably doesn't know how to pay the salaries of the following day. So, when you talk about urban resilience, literally, you are talking in a different language. That's not the real world.” (Participant 019)

These reflections are mirrored in findings surrounding climate adaptation and resilience funding flows. According to a report by the International Committee of the Red Cross (ICRC), of the 25 countries deemed most vulnerable to climate change, 14 are mired in conflict (ICRC, 2020). The ICRC report depicts the funding challenges these regions face, as funding is often only present in the form of (short-term) humanitarian and aid relief rather than (long-term) climate funding. Tackling climate vulnerability and supporting resilience building in conflict-affected and fragile regions emphasises the need for climate funds and donor agencies to address this 'conflict blindspot'. Returning to urban resilience, this also raises the question as to whether practices and knowledge are being 'transferred' to and between those cities most vulnerable or to and between those cities that happen to have the right enablers (human and institutional capacity, governance, funding) at the right time. Participant 016 echoes this view and notes

the difficulties in translating the meaning of urban resilience across different levels of social, political, and economic stability:

“It’s more difficult for people in developing countries to advance because they keep starting all over again. Whereas here [Denmark] there are many safety nets, whether local governments or charities, which could help you along the way. [...] At 20 centimetres, flooding in Denmark will not create the same impact as 20 centimetres in the Philippines.” (Participant 016)

Participant 005 notes that this challenge concerning stability might arise from different historical legacies between high-income countries benefitting from legacy welfare systems that can uphold the resilience of urban systems, while in many middle- and low-income countries, urban resilience approaches are derived from ‘frugality’ and a ‘make do’ approach. Therefore, the transferability of practices and knowledge needs to account for different governance starting points and worldviews underpinning how resilience is already understood and practised in any given city.

The localisation of the term’s definition must also consider that Eurocentric perspectives, methods, and processes have historically set the standard for what is deemed as ‘best practice’ (Participants 005, 007). This dynamic of knowledge transfer is still prevalent, and participants point out the need to challenge this by enabling South-South learning flows, as well as from the Global South to the Global North, rather than assuming the reverse as the norm.

“How can Africa, Latin America, and Asia form, educate, and inform critically [...] without only copying European models?” (Participant 005)

“To come back to African cities, I believe there is a lot to value. They need to build their models, and we must support them because also we are responsible, the West, for their vulnerability. So, we must support them, but without imposing our way of doing things. And it’s very complicated.” (Participant 007)

Normativity – whose statutory duty?

Participants (003, 005, 011) share a concern that the social dimension of urban resilience is notably lacking from definitional conversations. As the term’s definition focuses on the need to understand vulnerabilities, the social aspect of urban resilience adds another layer of complexity when asking whose vulnerabilities are prioritised in an urban context. Integrating this is connected to the need to explore the implications of a normative (as the process of negotiating trade-offs when asking resilience for whom and for when in the context of limited resources for intervention and competing stakeholder interests) versus non-normative (as a property of urban systems that can be objectively measured) understanding of urban resilience.

The participants share similar views on the moral imperative for climate justice and voice support towards acknowledging the systemic barriers that prevent urban adaptation. Among the participants, academics are strong supporters of the normative dimension of urban resilience; although practitioners and policymakers agree with the moral imperative, they note that the process of prioritisation and decision-making is often outside of the scope of practitioners and civil servants, as it is closely coupled with the political agendas of local and national leaders. This creates a dissonance between their recognition of the normative implications of the term's definition and their sphere of direct influence.

Different attitudes to the role of the state and the role of welfare also impact where the perceived locus of accountability lies. For example, Participant 005 notes that the legacy of attitudes to welfare ranges vastly among high-income countries (such as the US and the Netherlands) and leads to different perceptions over whose role is to ensure critical urban systems are resilient. Participant 005 notes that the US is a high-income outlier in its approach to welfare, although traditional welfare systems have been rolled back in other high-income countries post-2008. Seeing urban resilience as a public good requires rethinking the balance of accountability between local and national governments and the resource flows between them:

“I think a big barrier is national and local governments and the relation between them. In the end, resilience, as is climate change adaptation, is a public service to provide adaptation and safety for people. Resilience, in the end, is a public good.” (Participant 011)

On the other hand, in low- and middle-income countries, participants note that due to a lack of infrastructure, the access to basic needs and the provision of critical services such as utilities often lies with individuals and communities:

“We say that every Nigerian is the local government onto himself because we provide our own power – we all have our diesel generators in our individual houses. We provide our own water – there is no central municipal water system. We all drill boreholes in our houses and put pumps to pull out water.” (Participant 003)

This leads to further development challenges. Cities such as Lagos (referenced by Participant 003 above) already suffer from historical disadvantages and systemic barriers to development. At the same time, they must also adapt to the intensifying impacts of climate change, such as recurring flooding and more intense heat waves or drought. Participant 011 points out that frequent disasters weaken the coping capacity of cities that have historically lacked institutional and financial capacity:

“It's not a service that you can just buy, and everything is fine; it's this kind of whole of systems thinking you need to provide. And that's difficult even if you just look at European cities. If you think of their institutions, capacities, and finances, cities in developing countries just don't have that. And then recurrent disasters make it difficult to develop.” (Participant 011)

Participants 003 and 011 provide contrasting views of what is understood by resilience – on the one hand, individual solutions and make-do, frugal approaches, while on the other, holistic approach that requires the coordination and collaboration between different stakeholders and the resources they can mobilise. While individual approaches might provide short-term, innovative solutions to resilience challenges, they can further exacerbate the underlying stressors. For example, as households drill their boreholes with no or little regulation, this might create additional challenges to monitoring groundwater use and other drought prevention measures and creating potential disincentives for municipal investment in and maintenance of urban infrastructure and service provision.

While the literature depicts how the ownership of urban resilience often straddles different scales and mandates (Bixler et al., 2020a), the interviewees describe how this impacts individuals and communities. In cases where the boundaries of statutory duties are unclear, unassumed, or unenforced, the burden of providing access to services and ensuring that access is maintained in the context of shocks such as floods falls on individuals and communities who act as both service providers, as well as first responders.

4.2.2 Epistemic gap: The complexity of integrating and valuing interdisciplinary evidence-based and practice-based knowledge leads to a lack of integrative approaches

Integrating multiple ways of knowing is a key contributing factor to epistemic challenges. Participants also note that this process needs to expand beyond ‘professionals’ and include participatory processes to integrate local and traditional knowledge. Participants note there is a danger that professionals ‘don’t take this seriously’ (Participant 012) due to finding methods for knowledge co-construction as ‘challenging’ (Participant 005). The tokenistic aspect of participation is also noted, as practices that aim to be participatory often exclude marginalised and migrant communities from engagement (Participant 012).

Overemphasis on theory vs the need for a ‘pragmatic’ approach in practice

Different positions regarding the relationship between theory and practice further accentuate the epistemic gap. Policymakers and practitioners (Participants 011, 015, 016) note a reluctance to change practice based on ‘untested’ or ‘weak’ theory. Theory is viewed as divorced from current practice, difficult to apply in varied urban contexts, and as such, Participant 011 notes the reluctance among practitioners and policymakers to change practice based on theory:

“There is a tendency of theorists to not accept their theory is weak, and there is a reluctance of practitioners to change their practice because of the theory. So, people are just doing what they always do.” (Participant 011)

However, participants note that the reverse is also true – that practice is difficult to theorise. For example, Participant 002 notes the usefulness of case studies to show the relevance of theory in practice; however, they mention that practitioners like them need a pragmatic approach to urban resilience rather than being

interested in the theoretical findings underpinning a case study. They partly attribute this to an ‘action bias’ of practitioners, motivated by pragmatism and the desire to improve practice in tangible ways.

Urban resilience knowledge is predominantly generated by researchers and transferred to practitioners and policymakers. The development and codification of practice-based knowledge pose challenges in the context of dominant iconic cities as case studies, predominantly generated through research on and from the Global North and transferred to the Global South. Although ‘compelling’ stories, they are often outliers, and their case studies can lead practitioners and policymakers from other cities to feel discouraged by the scale of their local challenges and limitations, as Participant 011 notes:

"And then in urban resilience, you have these 15 cities that everybody talks about – Copenhagen, Barcelona and New York. But the reality, the city reality of life on the planet, is not Copenhagen; it's Mumbai, Mombasa and Montevideo." (Participant 011)

The findings highlight prevailing assumptions of unidirectional knowledge transfer at two levels: on the one hand, urban resilience knowledge is predominantly generated by researchers and transferred to practitioners and policymakers; On the other hand, urban resilience knowledge is predominantly generated through research on and from the Global North and transferred to the Global South.

Both findings point to structural biases in knowledge productions systems (Muñoz-Erickson et al., 2021; Nagendra et al., 2018; Sitas et al., 2021) and to a mismatch between where the majority of urban residents live – in Global South cities (UN Population Division, 2018) – and where and by whom knowledge is produced – from and on Global North cities (Sitas et al., 2021; Wang, 2022).

Barriers to knowledge co-production

Balancing the requirements for theory development and testing while recognising the immediate need for outcome improvements on the ground requires building better bridges between researchers, practitioners, and policymakers. As one interviewee notes, this is difficult in the context of operating in response to fundamentally different drivers:

“Scientists need longer time frames to do science, and policymakers will need immediate solutions. Policymaking is concerned with solutions, and science is concerned with understanding problems. So different paradigms rule, making it very difficult for the two to be compatible. Science is about keeping opening questions, and policymaking is about having a very pragmatic and certain approach to problems.” (Participant 014)

Participants share the view that urban resilience challenges require interdisciplinary and intersectoral collaboration due to the systemic and interconnected nature of the difficulties. However, their experience with interdisciplinarity is predominantly negative, and collaboration is perceived as difficult. Participants note that collaboration is a reality check across different dimensions: between researchers from different

disciplines, between researchers and practitioners from the same discipline (for example, engineering or urban planning), between the private and the public sector, and within organisations.

Multiple participants note that trust is a precondition for any collaboration – and that it is difficult to foster trust when there is discomfort and unease in working in interdisciplinary ways, as some disciplines ‘feel superior to others’ (Participant 004). This view is echoed by other participants who noted the need to reject ‘disciplinary supremacy’ (Participant 003) and the ‘disciplinary snobbery’ of natural scientists towards social scientists (Participant 010).

These attitudes to different disciplines start early on, and there is a view that higher education has not evolved to promote the value of interdisciplinarity. Monodisciplinary higher education is seen as the ‘norm’ (Participant 006), while different professional development pathways present outdated views of the role of a profession or discipline. For example, Participant 004 notes that in architecture, the Modernist worldview on the role of the ‘architect as the big puppet master’ is still prevalent, which doesn’t speak to the much-diminished role of the architect in today’s broader processes of urban development. However, some participants noted that there had been positive signs from European funding initiatives that require interdisciplinary and multisectoral collaboration as key eligibility criteria in recent years.

Participants note that the challenges of interdisciplinary collaboration hark back to the post-Enlightenment disciplinary ‘speciation’, which has seen the development of disciplinary-specific language, methods, and norms (Participant 010) and the prevalence of different worldviews that underpin disciplines (Participant 005). Working with, rather than against this path-dependency requires us to ‘find a meeting point while we retain our individual idiosyncrasies from our points, beliefs, and outlooks’ (Participant 003) while also recognising the need to evolve how path-dependency limits disciplinary evolution.

“The road engineer would classically have learned that you aren't allowed to have water on the road, that it should drain as quickly as possible, and there shouldn't be aquaplaning, and there shouldn't be a risk of it freezing. And now this whole climate adaptation agenda comes in, and now we want all the water to go on the road and act as rivers. And that is a fundamental change in how you traditionally design the road. And, of course, you'll meet objection from the classical way of doing it because times have changed.” (Participant 015)

Other participants noted the difficulty of collaborating within their organisations, especially in the context of international organisations that employ various disciplinary specialists across different geographies. This leads to pockets of innovative practice subject to the ‘tensions in the office’, while spaces for bringing different disciplinary and sectoral perspectives together as seen as ‘contentious’ due to diverging views regarding what is perceived as the best course of action or ‘best practice’ and can lead to a lack of internal coherence and alignment in large, multi-disciplinary teams (Participant 007).

While the private sector is seen as having a pivotal role in implementing urban resilience actions, participants note the challenges created by public procurement routes meaning there is a lack of engagement in the co-development of tenders. These conditions are aggravated by a lack of collaboration among local government departments, as well as a lack of collaboration between the public and private sector. This is perceived as limiting how the private sector can meaningfully engage:

“When you're in the private sector, you don't have the opportunity to influence because the tender and the idea is out, and you're bidding on that concept. So, if I should have the opportunity to influence, I need to be involved before the tender stage.” (Participant 015)

However, some participants noted the danger of stereotyping each other's roles and how this hinders important information flows:

“So, 'oh, you government worker, you just want to follow your processes' versus the academic', 'oh, they couldn't possibly understand'. We must reflect on why we have these perceptions. They are creating these barriers to information flows that I think are really important. [...] Othering happens professionally as well, where people don't want to find out a better way of doing something because it demeans them professionally. But it's an ego thing where you don't want to connect because you want it to be your own little policy baby or something.” (Participant 012)

4.2.3 Multiscalar gap: Lack of skills, capabilities and resources required at different scales to operationalise urban resilience

The lack of resources, structures, and processes to translate from the national to the local, coupled with capacity building and funding challenges, contribute to the increasing gap between rhetoric and action at different scales. The resulting gap derives from a lack of skills, capabilities, and resources at different scales, creating friction in the operationalisation of urban resilience and, consequently, hindering the scaling of implementation.

Lack of local resources, structures, and processes

The challenge of localisation has been previously explored from the point of view of contributing to a definitional gap between the knowledge and implementation of urban resilience. This challenge is further aggravated by the asymmetry of resources (human, financial, structural) that stakeholders at the local level have at their disposal to operationalise urban resilience. Participants note a gap between the rhetoric of local governments declaring a climate emergency while not knowing how they might redeploy stretched local budgets to act on these declarations. Pressure on local governments is often added by the expectations of central/national governments for the local levels to provide evidence of laddering action towards the NDCs to aid national reporting processes. This puts a strain on the human capacity at the local level, as participants (007, 019) note that small and midsized lack the resources and capacity to

translate high-level policy frameworks such as the Habitat 3 New Urban Agenda, which Participant 019 describes as ‘redundant’ and divorced from ‘the reality in the field’.

“We are talking a lot of like ‘we need the willingness from governments’, but sometimes it does exist, it really does. In many cities there is, but there is no human capacity.” (Participant 007)

“I was in Quito during the New Urban Agenda, working for the German government; we worked on the preparation for that. One of the tasks was to develop workshops for local governments, to spread the good news about Habitat 3 and the New Urban Agenda. And the funny thing was that from two hundred or so local governments, just three or four had an idea about what Habitat 3 was and what was going on with the New Urban Agenda. And that's the reality in the field. And then the New Urban Agenda has 150 [monitoring] indicators for people to fill. It's more or less redundant.” (Participant 019)

The lack of resources can partly be attributed to a diminishing ability to cope with compounding shocks and aggravating stressors, which puts local stakeholders on a reactive rather than proactive footing. Participants note that while managing crisis after crisis, there is little spare capacity for ‘bid writing to develop bankable projects’ or to ‘make the business case for resilience’ (Participants 007, 002). Although participants agree that problem ownership should lie with local stakeholders, they note that often these are not empowered by stakeholders from other levels (regional, national), which fosters resentment at the local level and creates an us and them dynamic between different scales – local, regional, national.

The devolution of responsibility to the local level can partly be attributed to a sustained campaigning approach by city networks (such as C40, 100RC, ICLEI, UCLG); however, in many cases, this is not followed by a devolved approach to resource distribution, which has left cities with no new resources at their disposal, but with the optical perception of being responsible for resilience implementation.

As Participant 013 reflects, this means that local government comes across as the ‘ghost in the machine’, as residents can’t link visible action (for example, roadworks) and resilience outcomes (for example, roads as flood water management routes) and therefore are unaware of what their local government is doing to keep them safe. This view is echoed by other participants who note that successful urban resilience implementation is preventative and often invisible to residents.

The lack of local resources to translate international policy frameworks and implement preventative action is aggravated by a lack of structures and processes to operationalise resilience. Understanding the vulnerabilities of urban communities and systems is resource intensive and often deprioritised as resources are directed towards crisis response. Even when there is a common framework or process to develop urban resilience strategies, applying it is difficult due to ‘many underlying factors’ (Participant 016), leading to timeline delays and further operationalisation barriers.

Diverging needs for capacity building

A lack of capacity (and, therefore, the need for capacity building) is perceived as a key contributing factor to the scalar gap of urban resilience knowledge and implementation. Participants highlight the need for organisational capacity building across local government departments (Participant 003), the need for capacity building to be linked with exposure to other disciplines and sectors (Participant 006), the need to ensure skills and capacities across a spectrum of technical assistance to process design and management (Participants 002, 008), as well as the need for this process to become self-sustaining through building 'institutional capacity building capacity' (Participant 009).

Participants also note the danger of seeing capacity building as a magic solution to urban resilience issues and point out that current assumptions rest on a dynamic of 'knowledge import to low-income countries' (Participant 011). The friction between scales becomes apparent as participants favour capacity building that is 'demand driven' and 'locally contextualised' (Participant 006) and point to the need for donor agencies to rethink top-down approaches and 'reflexively come into a situation' (Participant 001).

"In some countries, there is a perception: "If it comes from the outside, it's better, then in other countries, not at all." You need to know, typically, if international advice is wanted and asked for or if it is perceived to be neo-colonialism. Because you have two very different responses. People tend not to think about that angle when they do training." (Participant 001)

"The issue of capacity building is key, especially for low-income countries. The key is to be more participatory and demand-driven. So, what I mean by that is not having Westerners or donor agencies saying, "Okay, we come to Ghana, and we teach you about urban resilience. We organise this training for two weeks. We design everything. You bring your staff". For me, this is not good capacity building. First, it should be demand-driven, should be locally contextualised." (Participant 006)

Building the capacity of local stakeholders is a challenging process in the context of increased reliance on external expertise – either through international assistance (for example, technical support) or externalised services (for example, through the advent of service outsourcing to consultancy firms rather than in house officers in local government). The role of local governments has evolved from that of a sole implementor to that of a convenor of many other actors with different roles to play in implementation, which requires new skills and approaches such as facilitation, process design, negotiation, or mediation.

Participants also identify a link between personal attitudes to lifelong learning and perceptions about the continuous need for capacity building as a process of 'learning and improving your day-to-day work' (Participant 002). Daily pressures, such as delivery or finances, mean that individuals deprioritise lifelong learning and reflection. At the same time, time allocation for this rarely figures in project and team budgets.

While the participants agree that capacity building is an urgent priority across the board, views are divided over what kind(s) of capacity building is required as a priority for urban resilience professionals. Priorities range from process management and facilitation (Participant 002, 011), communication and engagement skills (Participant 003), bid writing skills (Participant 007), data collection and analysis skills (Participant 006), climate modelling and understanding uncertainty (Participant 010, 018), reflective capabilities such as understanding bias (Participant 012) and ‘asking the right questions’ (Participant 021), to the ability to diagnose issues and know how to intervene (Participant 015, 018). This broad palette of capabilities is encapsulated by some participants in the acknowledgement that there is a need for urban resilience professionals to be systems thinkers (Participant 010, 011, 014); however, participants agree that this is a lifelong process and the capacity to develop and integrate all the necessary skills cannot be attained in through a singular capacity building learning experience. The wide array of capacity building needs poses challenges to integrated approaches for professional development and institutional strengthening.

Overemphasis on the ‘bankability’ and ‘scalability’ of urban projects

The dynamics of the funding landscape contribute to the resource challenge. While participants working for UN agencies decry a lack of ‘bankable’ projects and a proliferation of ‘pilots that don’t scale’, participants working at a local level point out the lack of flexibility in funding structures and the resource-intensive application processes that deter local stakeholders from trying to access funding. Meanwhile, participants point to recent trends in the ‘projectification of funding’, which have seen research funding increasingly tied to tightly defined funding calls (Participant 007). Participant 021 notes that design for compliance, a lack of urban innovation funding, and rigid reporting structures all add to the funding landscape challenges; they point out that there is a need to mobilise knowledge for scale, but current funding mechanisms do not allow this. As smaller enterprises and small- and mid-sized cities lack the resources to develop bids or engage in lengthy procurement processes, this privileges those with resources – often the larger cities, larger companies, and well-known universities with an already proven track record.

“I think [funding] programs are designed to minimise cheating and corruption. So, you have so many indicators, and you're framing the project so tight because you want to ensure nobody will use the money for something else. So, you won't get any innovation. You will get something that you have already described from the beginning. And it's a challenge if you want to investigate something new or a different approach. Well, how is it supposed to be innovative, cross-sector, and cross-everything if you don't have the resources to experiment?” (Participant 021)

Participants (005, 009, 018, 021) share criticism of market-driven parameters, which have seen urban resilience implementation aligned with private sector drivers such as cost savings and recovery, profitability, or effectiveness. Among the participants, researchers point to the contradiction between the resilience principle of functional redundancy (which requires diverse solutions and approaches that

perform the same function) and the techno-efficient paradigm of market-based solutions, which preclude redundancy. They also point out that framing urban resilience in terms of market logics puts the public sector at a disadvantage, as they carry the burden of having to 'make the business case for resilience'. The disadvantage of the public sector is accentuated by the need to 'de-risk investments' while balancing the lack of methods to account for climate risk, which has started seeing the transfer of liability from the insurance sector to the public sector. However, they argue that the 'moral case' for climate change adaptation should prevail.

The complexity of the funding landscape is further aggravated by the perception of climate adaptation funding as access to aid funding for immediate relief rather than funding for preventative action. Multilateral climate funds and donor agencies have traditionally focused funding efforts towards short-term humanitarian funding and support (especially in contexts affected by conflict) rather than providing finance mechanisms for building long-term climate resilience. This is partly due to the lineage of disaster risk reduction (which traditionally focused on crisis response rather than prevention) in the evolution of the urban resilience field.

4.2.4 Methodological gap: Lack of methods to account for uncertainty and cascading effects

The methodological gap often manifests itself in the lack of consistent and comparable data collection methods, resulting in a data availability mismatch. Underpinning this symptom lies a lack of methods to account for and meaningfully incorporate high uncertainty, as climate adaptation interventions require navigating complexity, tipping points and cascading effects, as well as the future implications of social, political, and economic decisions being made today.

Data collection and availability mismatch

Across the board, participants note different challenges related to data collection and the mismatch between available data and the data required for decision-making. These range from a lack of historical and baseline data (Participant 010), siloed data between natural science data (climate models, weather models, rainfall, water scarcity) and social data (demographics, health, inequality) (Participant 014), consistent data availability at a city scale as well as integrated data (for example data across an entire riverine basin rather than only at the point the river traverses a city) (Participant 013), as well as the mobilisation of existing data sets such as censuses (Participant 017).

The participants see the mismatch in data availability as a missed opportunity to spot vulnerabilities early on and better understand how the unfolding effects of climate change are having the most significant impact. In this context, Participant 010 sees data-led forecasting as a critical route to prioritise action in urban contexts. This could be done by layering different data sets (such as demographics and climate models, for example) to explore the uneven impacts of climate change. However, they note that integrating different types of data and translating data into insights that can be actioned on is not straightforward in the current context.

This integration process is hindered by issues surrounding the lack of data at the ‘scale of decision-making’ (Participant 010). In contrast, the high-resolution downscaling issue is mentioned repeatedly (Participant 010, 013, 014, 017, 019), as the existing climate models are at different scales and resolutions and can’t, therefore, be used in decision-making. Participants raise the issue of translating global climate models to hyper-local climate models that are robust enough for a city to make decisions on, as there are significant uncertainties in climate modelling and ‘big assumptions in the methods’ (Participant 010). They point out that ‘one climate model is not enough’.

Participant 013 raises the issue that ‘patchy data’ leads to a lack of trust from decision-makers. It makes it difficult to integrate with national policy, and therefore a vital link between different decision-making scales is missing. This view is supported by other participants who note that the mobilisation rests on ‘how you integrate the data to make a consistent narrative’ (Participant 014) through a ‘translation of data into value and meaning’ (Participant 017).

A different view is put forward by Participant 015, who sees the lack of data as an opportunity to ‘start from scratch’ and to be ‘strategic’ about what data to collect to inform a diagnosis rather than being overwhelmed by too much (and often poor) data. This requires local stakeholders to think critically about what data to collect and how to start classifying it from the beginning and connect other national data sets and global climate models.

Lack of methods for navigating uncertainty

While data availability is a generally shared pain point among the participants, a lack of methods suitable for navigating adaptation uncertainty while being ‘robust’ underpins this methodological gap. Among the participants, the researchers share the view that future system behaviours are uncertain and therefore communicating implications to decision-makers is not easy. On the other hand, policymakers and practitioners note the difficulty of further communicating this to the public and doing this well in the context of our different identities as voters or consumers (Participant 013, 014). The complexity regarding tipping points and cascading effects, as well as the future impact of present decisions, is pointed out by Participant 014, who notes the need for exposing the assumptions regarding uncertainty that are ‘baked into’ the models that inform decision-making. However, they point out that scientists are reluctant to highlight the high levels of uncertainty as they don’t want to undermine trust in modelling and evidence-based decision-making. Understanding the interdependencies between the types of uncertainty is also connected to issues surrounding interdisciplinary collaboration and integration:

“Cascading effects are a very tricky part because they require a lot of data; you need to work with many assumptions, so you need people to support them. It is not just one person who can do that. You need experts from different fields [...], and we don't know the best discipline to inform those decisions.” (Participant 014)

The lack of methods for navigating uncertainty manifests in a lack of data availability. This highlights the challenging relationship between target setting, intervention development, and risk management. Participant 016 points out that the difference in meaning between ‘safety level’ and ‘optimal desirable level’ in target setting is underpinned by different perceptions of the risk involved and creates additional challenges to ‘finding intervention points in interconnected challenges. However, they note that these challenges stem from ‘our desire to keep measuring things’.

4.2.5 Values gap: Resilience for whom, for when, and for where is a socio-political process of negotiation between priorities afforded by worldviews and values

The previous four gaps – definitional, epistemic, multiscale, and methodological – point to the challenges researchers, practitioners, and policymakers face. How these gaps manifest contributes to our understanding of urban resilience as a socio-political process of negotiating the trade-offs and priorities afforded by different worldviews and values. The final gap identified is a values one, speaking to the sometimes fundamental differences between what we think should be valued, whose resilience should be centred, and which time horizons and success factors we should be working to. Contributing to this gap are issues concerning the different incentives, time horizons, and success factors that different communities are motivated by, the lack of spaces for reflection and learning from failure, and the different organisational cultures and business models that create incentives for competition rather than collaboration.

Different time horizons, incentives, and success factors

Different knowledge communities – researchers, practitioners, and policymakers – are driven by different time horizons, incentives, and success factors. For example, Participant 004 notes that academia is driven by pressures to publish and attract research funding. Individual career progression is linked to the number of publications and recognition within a discipline, discouraging interdisciplinary research and further reinforcing disciplinary silos. Participant 006 echoes these reflections and points to the lack of open access peer-reviewed knowledge for practitioners and policymakers, which means that implementation is not always informed by the best available or latest research. However, they note that the reverse is also true – as research done by practitioners or policymakers is not always made public; they offer the example of engineering consultancies or research undertaken by central government departments, studies that are rarely openly published.

These views are echoed by Participant 016, who also raises the issue of confidential client reports and points out that, in many cases, these terms are set out from the beginning of the procurement process. They also point out a prevailing view of publishing reports as ‘successful’ dissemination. This is connected to a previous theme regarding the capabilities and capacity required to transfer knowledge from one context to another. Beyond publishing reports, Participant 016 notes a need for dissemination to be linked with strategic capacity building so that the target audiences are equipped to take on the insights and

findings. However, they admit that these challenges are also very present within organisations. They give their example of internal challenges regarding knowledge transfer and capacity building within an international organisation with thousands of employees.

As different incentives drive practitioners, researchers, and policymakers, this can contribute to misunderstandings regarding the different roles and contributions that different knowledge communities make:

"One of the things I'm facing right now, for example, in my research local governments ask me: So, what am I going to get out of your research? And my answer is a smile. I am not doing consultancy; I am doing science. I can tell you my results, but I'm not going to give you a policy brief. Or maybe I should; I don't know. Maybe that is a new task to think about. But they have expectations, and sometimes they are very difficult to live up to." (Participant 014)

Trying to navigate the different incentives and drivers at the scale of a project presents a prioritisation challenge:

"And what to prioritise? There is a balance between what the client wants or needs and what we can bring as a perspective to prioritise. But there is a huge difference if you have your objectives and your indicators prioritised based on what the community wants, what the client wants, and what the literature recommends. Projects don't always go as they should according to theory or best practices. Which is also learning in itself." (Participant 016)

Participants 004, 006, and 013 also highlight the challenges of working to different time horizons. Participant 13 gives the example of the day-to-day drivers of projects and interventions in the context of policymakers being driven by the agendas and mandates that emerge from political election cycles, while practitioners tend to have a shorter-term focus that is driven by the funding duration of their projects.

Lack of spaces for reflection and integrating learning from failure

The lack of spaces for reflection is a recurrent pattern across different types of participants (Participants 002, 012, 015, 016, 018). Participants identify the lack of reflection as a critical driver underpinning challenges previously explored, such as interdisciplinary collaboration (Participant 002), transferability (Participant 016) or the lack of structures and processes to integrate resilience at different scales (Participant 012). Participant 021 notes that this is due to a lack of time and allocated resources for reflection (within an organisational department or a project team), as well as a perception that reflective practices are not valued and, therefore not legitimised by senior leaders:

"We need to foster more sharing of failure. We have to learn from mistakes and be willing to share it with others without being judgemental. And then it becomes very important to have this sort of formal influence. It takes a lot of work to change perceptions and norms [...] it requires

just as much effort because it's about sending a signal from the leaders, from the management that you will be rewarded.” (Participant 021)

The need to learn from failure echoes previous themes around scaling challenges, as well as collaboration challenges. Participants noted the need to evolve how we think about monitoring and evaluation to include organisational learning as well as learning that contributes to the development of the urban resilience field:

“Approaches need to be developed in such a way that there is sufficient time for monitoring evaluation and not only about outputs of your program, how many water pumps, but also about, “What have I learned as an organisation? What have I done wrong, as well as what did I do well, and how can I improve that?” (Participant 002)

However, opening up about failure requires a high-trust environment, further eroded by how business models and funding structures incentivise competition rather than collaboration.

Organisational cultures and business models lead to competing methods, tools, and initiatives

While participants share the view that urban resilience challenges require different disciplines and sectors to collaborate (as explored in section 4.2.2), participants point out that current incentives promote competitive rather than collaborative behaviour. Organisational motivations for competition vary from financial gains or organisational ego:

“There are so many different initiatives happening about similar subjects and maybe also overlapping. It seems that a lot of organisations want to make their point, and even when you're supposed to be a partnership working together, there's a lot of competition.” (Participant 002)

“And there is a huge industry as well; I think a lot of companies make a lot of money; international cooperation is incredible business.” (Participant 019)

Participant 020 points out that existing financial incentives for tool development have led to an abundance of tools to explore different aspects of urban resilience. Still, there is a lack of knowledge on how to navigate these tools and their best use cases. These dynamics between different organisations working in urban resilience, their business models, and internal culture can lead to a perception of urban resilience as a zero-sum game, as Participant 019 remarks that in the context of limited resources, ‘the reality is about power’.

4.2.6 Reflections: Writing myself in

I set off on this first action research cycle with hopes that the findings will better inform how I might intervene as a preliminary scoping study to help me orient myself not just around the analysis of the current issues but around the thorny ‘So what?’ and ‘Now what?’ questions. As I went through the literature on knowledge-implementation gaps, I was struck by the formulaic ways in which the very same papers that advocate for an evolution of knowledge production systems end up recommending further

research following the same canons of academic publishing. As a practitioner, my answer to that would be that we don't need more research; we need more action to understand what we know – we need to mobilise the research and knowledge we already have. As a researcher, my answer to that would be that research is a form of intervention or action, it's just that it is seldomly interrogated as such. As a researcher/practitioner, my answer to that would be that changing knowledge systems from within gets closer to the aim of methodologies such as action research, with an orientation towards action but with lucidity about the scope of evolving academic canons.

“Realising there are limits to any account I can give does not offer me license to give no account. Rather I can ponder and test limits.” (Marshall, 1999, p. 156)

Marshall's writing on the role of first-person research shines a light on the necessity to make my assumptions, motivations, and beliefs explicit. As I started interviewing, I was reflecting in my daily log on how the 'research on research' that is called for in the literature is often the treasure trove that colours these seemingly neat analytical categories – eight in the literature, five emerging from the interviews – and start depicting how they collide and influence each other.

I note this in my diary log from Day 2 of the summer school, in which the teamwork focused on forecasting:

“The participants are struggling with uncertainty and with the incomplete data sets that even a municipality such as Copenhagen faces. There's a desire to quench this thirst for uncertainty, and for the best part of an hour, all groups have fallen silent as they are 'looking for the data sets'. The Municipality, who set the brief together with the summer school organisers didn't share any of their data sets, and the participants are keen to land on answers. After the silence, participants look up from their laptops and start acknowledging there's no 'good' or 'useful' data sets. “We should downscale from the census”; “We can extrapolate from hospital admissions during floods or heat waves”; “We can look at insurance claims”. But none of these processes are as straightforward as they sound. As they start realising this and thinking of what to do with the time left that afternoon, a participant remarks that, of course, this is the same in their own city, none of the data sets are complete, and sometimes it's more hassle to scrub them up to make them useful. But they follow up by saying they expected Copenhagen to have all the data.

We hide behind data sets as anchors of reassurance when there's so much uncertainty baked in. Which modes of knowing are being centred this afternoon?

During the following exercise, a brainstorming task to explore different trends and drivers of change, in Group 2, a participant writes down 'increase in climate refugees' as a trend they think is likely to impact Copenhagen. They explain that as Copenhagen is seen globally as a resilience pioneer, it is, therefore, an 'attractive' destination. This might make more people looking to migrate inclined to make their way over. Another participant from the group, who works for an intergovernmental organisation, immediately adds

that a climate refugee is not a recognised status and should not be used. The group quickly deliberates and decides to use the term – as it is ‘only an exercise anyway’.

The conversation moved on, but this short exchange struck me – the practitioner in me wanted to intervene and add that the words we use are essential. There’s no point talking about climate vulnerability as something abstract. Meanwhile, the researcher voice held back and was more intrigued by the reasons underpinning the exchange. What does that say about how people identify or confuse their agency as professionals with the positionality of their institutions? Why did the group deliberation end swiftly – do people behave differently when working in the ‘simulated’ environment of a summer school? And if so, in what ways? Does that mean they give themselves a license to be freer of institutional restrictions or barriers? And if they experience a positive difference in the outcome in a ‘simulated’ environment, would they be more inclined to question those restrictions or barriers when they return to their day-to-day? Also, what are the limitations of gathering different types of urban professionals without seeking to include or represent other voices?”

These were some of the questions emerging as I was trying to capture what was happening around me while trying to take an inquiry approach to how I use my voice(s).

“In this context, what emerges is the complex and challenging position – and therefore positionality – of practitioners who have to both actively participate in the production of knowledge at the interface between science and policy and access and use the growing abundance and plurality of its results.” (Baravikova et al., 2021a, p. 253)

On Day 4, one of the guest contributors representing another intergovernmental organisation gave a presentation on challenges for urban resilience in informal settlements. I note in my log the following exchange:

“Starts with a personal story about the neighbourhood they grew up in as an example of a ‘perfectly resilient’ urban environment – economic stability, amenities, emergency response, access to social infrastructure, culture, good governance, basic services, awareness (weather forecasting, DRR) - but none of these infrastructures was developed for urban resilience, and none of these was created or provided by local government alone - all depend on national legislation, regulation, and financing. Their moral of the story – ‘we need to work with national governments to transform the wider systems and structures’. I feel uncomfortable at their lack of acknowledgement for the privilege that is growing up in a stable, well-funded, democratically-run society versus the informal settlements they now ‘works on’ – I make a note of the ‘on’, perhaps a linguistic slip, but still makes it sound like an inert patient on an operating table. I look around the room and see participants exchange glances. Participant 007 catches my glimpse and rolls their eyes.

The guest contributor starts wrapping up their presentation and concludes: ‘We need to move beyond projects – we need to move to scale and step up, replicate, innovate, be faster, bigger, and smarter in the way we both mitigate and adapt.’ I decide to ask a question in the Q&A and intervene, naming that I’m speaking from a practitioner perspective to ask – ‘How do we know whether we’re scaling the right things? There is such a focus on scaling solutions and so little emphasis on the need to scale the capacity of people to work, think, and deliver at scale’. I share my experience working in an international NGO that spent many strategy sessions trying to move beyond donor-driven projects. However, that proves operationally impossible when there is no finance to support organisational learning or core costs.”

As I reviewed my memos, and realised that I didn’t capture their verbatim answer – instead, I wrote that they *‘fumbled response about the need for capacity building’*. So, what can be learnt from this and the previous exchange in the context of the findings explored in this chapter around knowledge production systems? The two accounts above depict how the dynamics of knowledge production manifest as issues of power and of whose knowledge is centred, as well as providing a glimpse into how attitudes towards uncertainty reinforce a quest for (false) objectivity. This points to a lack of double and triple-loop learning (Argyris & Schon, 1974; Cartwright, 2002) – moving from ‘Are we doing things right?’ (single-loop), to ‘Are we doing the right things?’ (double-loop) and ‘How do we know what is right?’ (triple-loop). As Participant 001 mentions that ‘you need to come reflexively into a situation’, the vignette above depicts how the guest contributor did not demonstrate critical reflexivity despite the seniority of their role and the influence of their organisation in urban resilience. While this could be a one-off instance, it might be implicitly signalling that this behaviour is more widely seen as the norm.

This episode also made me question how I ‘see’ power, especially in such elusive forms, and sense this as a personal learning edge. In hindsight, I could have used my researcher voice to prod the issue of a lack of reflexivity towards their position and challenge the power dynamic that their anecdote presented. Yet, instead, I chose to address the issue of scaling, as I found my practitioner identity responded to what it perceived as a ‘flippant’ call to scale up and step up as if that had not been tried before. This exemplifies the complexities and limitations of inhabiting the researcher/practitioner identities and the need to explicitly capture and critically reflect as a mitigating approach.

4.3 Discussion

This chapter has presented an empirical counterpart to the literature review undertaken in Chapter 2 in defining the problem situation. From the analysis of the literature in Chapter 2, eight key gaps emerged: 1) the term’s definition and applications; 2) knowledge production challenges; 3) ownership over the process of implementation; 4) navigating confidence and uncertainty; 5) everyday resilience; 6) processes to address trade-offs; 7) skills and capacity; 8) social dimensions of resilience.

The findings of the first action research cycle (ARCI) point to five analytical categories: definitional, epistemic, multiscale, methodological, and values gaps between the knowledge and the implementation of urban resilience. Table 7 below depicts the relationship between the themes that emerged from the literature review (Section 2.1.2) and the primary data analysis undertaken in ARCI.

Table 7. Knowledge-implementation gaps identified in the literature review and from the primary data analysis undertaken in ARCI.

Gaps identified from the literature review	Gaps identified from primary data analysis (ARCI)	Analytic Category
The term's definition and applications (Baravikova et al., 2021b; Chelleri & Baravikova, 2021; Handayani et al., 2019)	Lack of consensus over the meaning of 'urban resilience'	Category 1 Definitional gap
Lack of understanding of everyday resilience (Beauchamp et al., 2020b; Satterthwaite et al., 2019b)		
Knowledge production challenges (Beauchamp et al., 2020b; Borie, Pelling, et al., 2019; Coaffee & Clarke, 2015; Ernst & Preston, 2020; Grabowski et al., 2019; Robin et al., 2019; Wamsler et al., 2013; Wang et al., 2018)	Complexity of integrating and valuing interdisciplinary evidence-based and practice-based knowledge	Category 2 Epistemic gap
Ownership over the process of implementation (Baravikova et al., 2021b; Bixler et al., 2020a; Fraser et al., 2020; Graham et al., 2016; Handayani et al., 2019; Melkunaite & Guay, 2016; Pitidis et al., 2018; Therrien et al., 2020; Wamsler et al., 2013; Young et al., 2019; Zaidi & Pelling, 2015)	Lack of skills, capabilities and resources required at different scales to operationalise urban resilience	Category 3 Multiscale gap
Skills and capacity (Doyle et al., 2017; Handayani et al., 2019; Peyroux, 2015)		
Navigating confidence and uncertainty (Beauchamp et al., 2020b; Heinzlef et al., 2020; Wardekker et al., 2020)	Lack of methods to account for uncertainty and cascading effects	Category 4 Methodological gap
Social dimensions of resilience (Fitzgibbons & Mitchell, 2021; Leitner et al., 2018; Pizzo, 2015; Sharifi, 2020)	Resilience for whom and for when is a process of negotiation between competing priorities afforded by worldviews and values	Category 5 Values gap
Processes to address trade-offs (Bush & Doyon, 2019b; Connelly et al., 2020b; Labaka et al., 2019; Sarabi et al., 2019b; Therrien et al., 2020)		

While the knowledge-implementation gaps map across five analytical categories, the findings of the primary data analysis shine a light on how these gaps materialise in the day-to-day experience of urban professionals. The literature calls for further exploration of the knowledge production process at the interface of science-policy-practice (Baravikova et al., 2021a), identifies the process of undertaking research as a site of research in itself (Beauchamp et al., 2020a), recognises the need to create learning infrastructure (hard and soft) (Robin et al., 2019), acknowledges the need to explore how adaptive capacity skills can be built in multi-disciplinary and multi-professional environments (Coaffee & Clarke, 2015). The literature review highlights that knowledge systems have focused on improving existing decision-making processes rather than the nature of decision-making itself (Grabowski et al., 2019). A better understanding

of the role of social learning is portrayed as having the potential to address the challenge of improving the nature decision-making (Zaidi & Pelling, 2015).

However, as the increased concern towards how urban resilience knowledge production systems operate (and the operationalisation barriers they create) is a relatively recent issue, there is a pressing need not only to identify them but to explore how they can be addressed. Identifying how these different dynamics interact depicts the characteristics of a systemic challenge or wicked problem (Rittel & Webber, 1973). The issues span disciplinary and organisational boundaries, are driven by multiple stakeholders with conflicting agendas, and are multiscale, while the effectiveness of interventions can take a long time to establish. Interventions aren't good or bad, but better or worse.

Figure 16 below summarises the key findings presented in this chapter, using the visual metaphor of a bridge that is missing its keystone. On the left-hand side, epistemic and definitional gaps pose challenges with regard to what knowledge is produced, as well as how it is produced. In contrast, on the right-hand side, multiscale and methodological gaps pose challenges regarding what is implemented and how implementation happens. In this context, the values gap is visualised as the flowing river, recognising the different worldviews and values that need to be bridged.

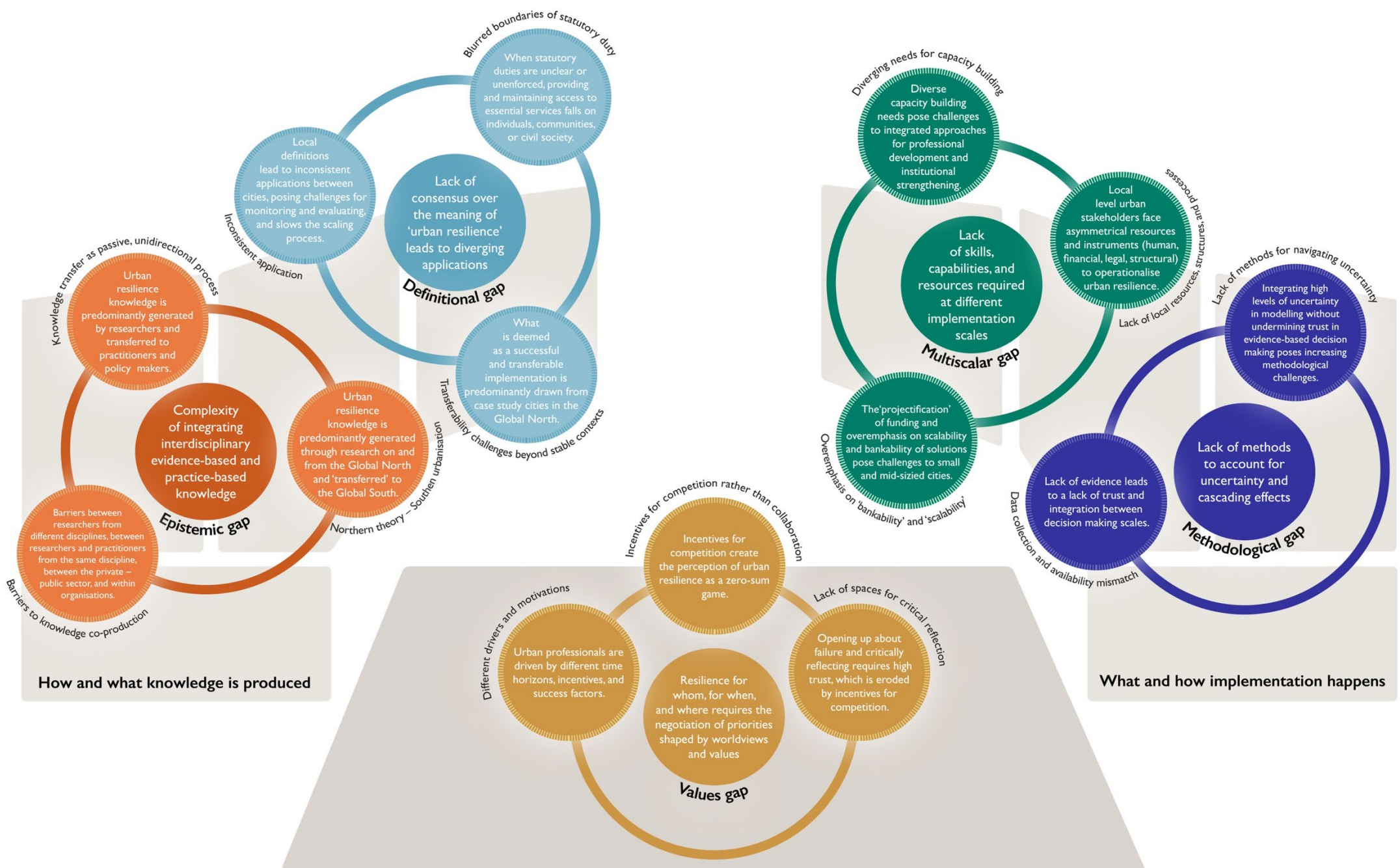


Figure 16. Urban resilience knowledge – implementation gaps.

The findings of the literature review and ARCI highlight the potential of capacity building and social learning in tackling knowledge-implementation gaps. This poses the question: how might we intervene to improve the problem situation, in this case, bridging knowledge-implementation gaps? And how might we evaluate how the intervention improves (or not) the given problem situation?

Skills and competencies regarding systems approaches are highlighted as a potential enablers of transformational change in adaptation and resilience (IPCC, 2022). However, what transdisciplinary learning systems might look like “in practice” and how we might build the capacities and capabilities for systemic approaches at scales that vary from the individual to the organisational and ‘whole-of-society’ is ‘unclear’ in the context of limited empirical evidence or practical examples (IPCC, 2022). In urban resilience, only two such capacity-building programmes explicitly aimed at urban professionals were identified as part of the scoping undertaken in 2018-2019, and only one was open to multi-sectoral urban professionals – the IURA Summer School.

While skills and competencies such as facilitation, process design, negotiation, and critical reflection, are recognised by both the literature and interviewees as desirable outcomes from capacity building experiences, the findings presented in this chapter point to the mismatch between the need to develop skills and competencies associated with procedural knowledge or know-how, and the focus of capacity building efforts on propositional knowledge or know-that.

Moreover, urban resilience capacity building efforts predominantly focus on upskilling individuals as the unit of learning through one-off training programmes. The findings presented in this chapter depict how sustaining the learning process once individuals return to their day-to-day professional context is presented with multiple challenges, such as the lack of time allocation of lifelong learning and reflection, as well as organisational pressures such as finances and a focus on delivery. Meanwhile, as explored in Section 2.3, capacity building programmes do not see the ongoing advancement of organisational learning and institutional capacity building as part of the remit of their training programmes. These predominantly operate a ‘pay to play’ business model, which means that only a few professionals can benefit due to limited organisational budgets and time allocated by employers for professional development.

With these challenges and potential limitations in mind, I set out to explore in my second action research cycle how we might use the context of a capacity building experience (the 2020 edition of the IURA Summer School) and an ensuing community of practice as a means for intervention.

4.4 Chapter summary

This chapter has outlined the first action research cycle (ARCI), undertaken in 2019, corresponding to the first research question: what are the knowledge-implementation gaps in urban resilience, and how do they occur? Section 4.1 presented the detailed research design of ARCI and outlined the data collection

and analysis process. Section 4.2 introduced the findings from ARC1, while Section 4.3 situated the results in the context of the literature review presented in Chapter 2 and put forward implications for the second action research cycle, consequently undertaken in 2020-21.

5.0 Intervening in the problem situation: designing and co-facilitating a capacity building programme and onward community of practice (ARC2)

This chapter outlines the second action research cycle (ARC2) undertaken in 2020-21. Section 5.1 of the chapter presents the context of the second Action Research Cycle (ARC2) and the data collection and analysis process. Section 5.2 presents the findings from the two key interventions undertaken: designing and facilitating the 2020 edition of the International Urban Resilience Academy (IURA) Summer School and co-developing and facilitating the Urban Resilience Community of Practice. Section 5.3 discusses the findings from the two interventions in the context of the knowledge-implementation gaps identified in the previous chapter.

5.1 Action Research Cycle 2 (2020-2021)

5.1.1 ARC2 context: the 2020 Urban Resilience Summer School and the Urban Resilience Community of Practice

The second action research cycle set out to respond to Research Questions 2 and 3 (RQ2, RQ3) as set out in Section 1.3:

- RQ2: How might systems approaches help bridge urban resilience knowledge-implementation gaps in the context of a capacity building programme?
- RQ3: How might a transdisciplinary community of practice support the onward learning and knowledge-brokering process?

The objective of RQ2 is to develop and apply a framework for capacity building that supports professionals in applying systems approaches to urban resilience challenges. The scope of the framework is to support professionals in diagnosing relevant urban resilience challenges, imagining preferable alternatives, developing actions that would enable those alternatives, and developing learning strategies. Through this process, the framework aims to support the development of systemic skills and capabilities from a lower to a higher maturity level (as set out in the literature reviewed in Section 2.3).

The objective of RQ3 is to explore how social learning can support the longer-term learning process beyond a one-off capacity building experience. This builds on the literature reviewed in Section 2.2, which sets out how social learning approaches – and CoPs in particular – can enable transdisciplinary collaboration and create spaces and processes conducive to bridging knowledge-implementation gaps.

In mobilising RQ2 and RQ3, the second action research cycle (ARC2) aims to intervene in the problem situation defined in the first cycle (Chapter 4). ARC2 started with the second edition of the Summer School on Urban Resilience, initiated by the International Urban Resilience Academy (2020). It continued with the facilitation of an emerging urban resilience community of practice (2020-21).

As this chapter analyses two interventions I developed in pursuit of improving a previously identified problem situation (Chapter 4), the findings are presented through the lens of my first-person inquiry into navigating the researcher/practitioner identities and the endeavour to integrate them rather than see them as dualities and provides a prototype for boundary and domain spanning professionals. The first-person inquiry depicts the roles facilitation and brokering play in bridging knowledge-implementation gaps.

This draws on the methodological approach introduced in Chapter 3, following Chandler and Torbert’s distinction between first/second/third-person practice and voice as: “1. the subjective, first-person voice; 2. any given particular set of intersubjective, second-person voices; and 3. the objectivity-seeking third-person voice” (Chandler & Torbert, 2003, p. 140). The use of voice in the following sections has been a purposeful choice as I seek to systematically situate the relationship between the cycles of action research and the levels of research/practice from which knowledge claims emerge.

5.1.2 Data collection and analysis process

The previous section has provided an overview of the second action research cycle and set out the logic behind the two-part intervention of the 2020 Summer School and the initiation and facilitation of an onward community of practice. This section describes the data collection and data analysis process.

Research participants

The recruitment of Summer School participants was undertaken by the IURA organisers, with the 2020 recruitment criteria being identical to the 2019 criteria (previously outlined in Chapter 4). Like the 2019 edition, the 2020 Summer School aimed to attract mid-career urban resilience researchers, practitioners, and policymakers.

Mid-career professionals are a key audience as they are impact multipliers. They are in positions where they can influence programmatic or funding decisions within their teams, organisations, or coalitions while still being involved in delivery work. As such, the potential for indirect impact is increased. The table below summarises the types of stakeholders and the participants codes.

Table 8. 2020 Summer School participants.

Type of stakeholder	Participant code
Academic	24; 26; 27; 28; 34;
Intergovernmental organisation (IGO)	29; 39; 40; 42;
Non-governmental organisation (NGO)	46; 23; 25; 31;32; 38; 41; 43;
Local / Central Government	30; 33; 35; 36; 44; 45;
Private sector	37.

The table below lists the community of practice core governance group, formed of volunteers from the 2019 and 2020 Summer School participants.

Table 9. Community of practice core governance group.

Type of stakeholder	Participant code
Academic	26; 17; 44;
Intergovernmental organisation (IGO)	40; 42;
Non-governmental organisation (NGO)	43;
Local / Central Government	12;
Private sector	19; 7; 22.

Data collection methods

The following research methods were used as part of ARC2: facilitation and surveys. The description and rationale behind the method selection can be found in Section 3.3.1.

Data analysis process

For the data analysis process, I have used thematic analysis (Braun & Clarke, 2006; Vaismoradi et al., 2013). To do so, I used the identified gaps and key themes from ARCI as an analytical framework to explore how the two-part intervention (the Summer School and the ensuing Community of Practice) contributed to addressing the issues identified in ARCI, as well as to identify potential challenges and future opportunities to aid the process of bridging knowledge-implementation gaps.

The data analysis steps were as follows:

- Non-participant observation, taking notes in and after workshops, and documenting my reflections as activities happened.
- Document analysis of the workshop outputs.
- Analysis of participant surveys.
- Memo writing based on the gaps and themes identified in ARCI.
- Develop vignettes based on the steps above for each of the key findings.

The findings section uses vignettes to report and analyse primary data. The use of vignettes in action research spans different applications, from documenting fieldwork data and interview prompts or as a way to facilitate reflection for “the purpose of improving practice” (Spalding, 2004, p. 388). I follow Ely et al.’s definition:

“Vignettes are compact sketches that can introduce characters, foreshadow events and analysis to come, highlight particular findings, or summarise a particular theme or issue in analysis and interpretation. Vignettes are composites that encapsulate what the researcher finds through the fieldwork” (Anzul et al., 2003, p. 70).

5.2 Intervening to bridge knowledge-implementation gaps

This section presents the two interventions I developed to address the gaps identified in Chapter 4. Knowing where there is potential to intervene in a complex problem situation needs to “work with the way the world works, as a complex adaptive, social, physiological, ecological, connected world” (Birney, 2021, p. 751).

This extends to the nature of the knowledge-implementation gaps I identified in ARCI, where the problem landscape results from the dynamic interrelations between actors and the value, knowledge, and resource flows between them. In developing interventions, there is a need to learn and monitor how the given problem landscape is changing through the contribution of our interventions rather than “designing linear, causal theories of change” or seeking to “predict and find knowable solutions and fixes” (Birney, 2021, p. 750).

5.2.1 Intervention I: Urban Resilience Summer School (2020)

Co-designing and facilitating the 2020 Summer School

What aspect from the problem definition as explored in ARCI did the intervention focus on?

ARCI revealed the need to build adequate skills and competencies that equip urban professionals to address complex challenges associated with urban resilience. The review of systemic capabilities presented in Section 2.3 showed the potential presented by the wide array of systems tools and methods (and the different disciplines they draw on) to be used as part of capacity building programmes aimed at urban resilience professionals.

Given my previous practice-based experience, I discussed the potential to collaborate with the International Urban Resilience Academy (IURA) organisers, joining as participant-observer for the inaugural 2019 edition with the aim to improve the process design and curriculum for the 2020 edition

For the 2020 edition of the Summer School, I led the process design and tools and methods selection; alongside one other alumna from the 2019 Summer School, we co-led the facilitation process, while IURA acted as hosts and overall organisers. The detailed design of the summer school, including scheduling, facilitation agendas, problem-based workshop templates, reflection log templates, and extracts from the post-Summer School activity report produced by the IURA organisers, can be found in Appendix 2.

Developing and testing the Diagnose, Imagine, Act and Learn (DIAL) framework

Due to the COVID-19 pandemic, the 2020 Summer School took place online (May – June) and brought together 25 practitioners, policymakers, and academics from 21 countries. Similarly to the 2019 edition, the participants worked in interdisciplinary, multi-sectoral groups.

Baseline from the 2019 participant surveys

The participants' exit survey from the 2019 edition and reflective conversations with the IURA organisers set out the scope for improvement of the 2020 edition. In response to this and in line with the research objectives set out in the previous section, I developed and tested a framework for taking systems approaches.

The IURA organisers collected the 2019 participant feedback through an anonymous exit survey. Participants highlighted challenges regarding the lack of guidance through the different days and themes of the Summer School. They proposed improvements such as organising the different tools and methods introduced under a broader capability or learning outcome for the different days.

“If the 'process' was the main learning outcome of the group work, then I'd suggest connecting the specific tools/processes, e.g., stakeholder role play, backcasting, or systems analysis. Group dynamics were difficult and maybe could have been limited if clarity was given about what exactly was to be achieved.” (Participant feedback, 2019 Exit Survey)

“I feel like I've got a lot more content knowledge out of the Summer School, but not necessarily any new processes or tools.” (Participant feedback, 2019 Exit Survey)

“I would suggest more clarity on the process and more detail on how it relates to the content. Additionally, a more detailed explanation of how all the steps relate to each other such as forecasting, scenario planning, and strategy from the outset, would improve the applied-experiential learning part of the Summer School to provide the crutches participants may need to truly contribute, depending on their level of understanding, perspectives, and ability to voice their thoughts.” (Participant feedback, 2019 Exit Survey)

The feedback from the participant feedback set out the improvement needs that the DIAL framework sought to address in relation to the learning outcomes of supporting participants on a journey from a lower to a higher maturity of systemic capabilities.

Developing the DIAL framework

In agreement with the IURA organisers, I developed the DIAL framework to act as an overarching guide rail for the participants and expert contributors. The framework development used the Diverge/Converge model as its basis. The Diverge/Converge model was developed by the linguist Bela Banathy (1996, 2013) in his exploration of the different phases of design processes. More recently, the model has been popularised by the British Design Council under the name the Double Diamond (British Design Council, 2005).

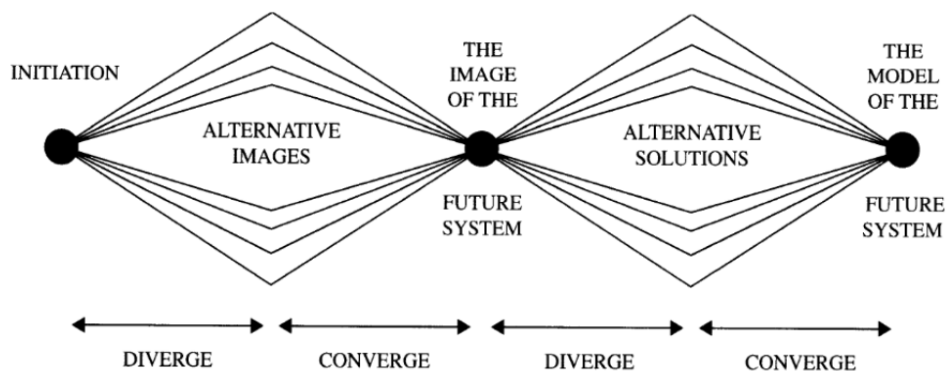


Figure 17. "The dynamics of divergence and convergence" (Banathy, 1996, p. 336).

The Diverge/Converge model helped shape the focus of the different phases of the capacity building programme, provided a scaffold to inform the learning outcomes for the different sessions, and informed the choice of the tools and methods that the participants were introduced to. In addressing the feedback above, the use of the Diverge/Converge model also intended to help the participants to navigate emerging team dynamics, especially in an online context, by providing clarity about the expected participant experience through each of the phases.

Building on the literature review of systemic capabilities and the tools, methods, and approaches to support their development in Section 2.3, the framework was structured into four phases and capability areas: Diagnose, Imagine, Act, and Learn. Diagnose and Imagine formed the overarching focus of Weeks 1 and 2, while Act and Learn formed the focus of Weeks 3 and 4. The figure below depicts the different phases and the outputs the participants worked towards.

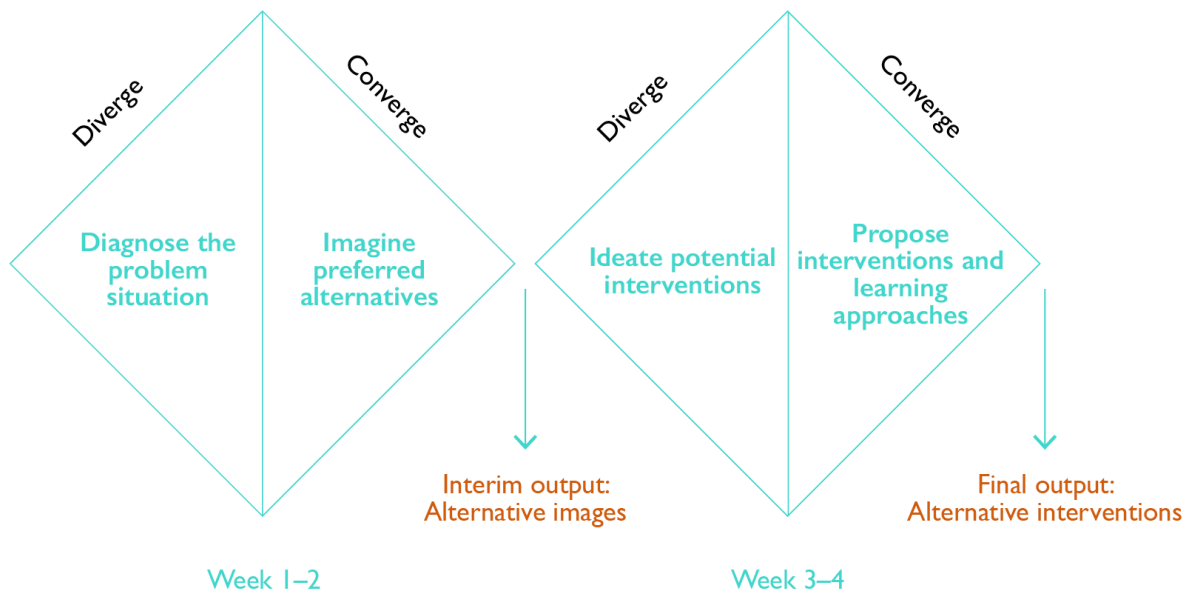


Figure 18. DIAL process framework, building on Banathy (1996) and the British Design Council (2005).

Finding 1: The introduction of the DIAL framework led to an overall improvement of the Summer School capacity building programme

The comparison of the 2019 and 2020 participant exit surveys (presented in the table below) demonstrates an overall improvement between the 2019 and 2020 editions of the Summer School. The exit survey asked explicit questions as to whether participants have learned more about systems, futures, strategy development and learning approaches corresponding to the different objectives and capabilities contained in the DIAL framework. While for the first two categories, systems and futures, an overall improvement is seen between the 2019 and 2020 responses, only 40% of the 2020 respondents agree they learned more about strategy development and MEL. The introduction of the Act and Learn phases was new compared to the 2019 process, so there is no comparative data from the previous year.

Table 10. Improvement based on the 2019 and 2020 exit surveys.

	2019 Exit survey (19 respondents out of 25 participants)	2020 Exit survey (20 respondents out of 25 participants)
Were the learning objectives clearly defined?	28% agree 56% somewhat agree	74% agree 26% somewhat agree
Were the learning objectives in line with your expectations?	60% agree 28% somewhat agree	74% agree 21% somewhat agree
Learned more about systems approaches?	52% agree 28% somewhat agree	95% agree 5% somewhat agree
Learned more about strategy development methods, including elements of monitoring, learning and evaluation?	n/a	40% agree 50% somewhat agree
Learned more about futures methods (such as trends, signals of change, scenarios)?	40% agree 28% agree	89% agree 11% somewhat agree
Learned from both lecturers and other participants?	88% agree 8% somewhat agree	95% agree 5% somewhat agree
The Summer School enhanced my perception of transdisciplinary collaboration in a positive way	67% agree 10% somewhat agree	88% agree 6% somewhat agree
Group dynamics helped the learning process	50% agree 20% somewhat agree	88% agree 6% somewhat agree
I felt differences across disciplines or professions	70% agree 30% somewhat agree	61% agree 39% somewhat agree
Such differences, if any, positively contributed to my learning	80% agree 10% somewhat agree	94% agree 6% somewhat agree
I am satisfied with the outcome	55% agree 30% somewhat agree	72% agree 28% somewhat agree
I received useful, constructive feedback	60% agree 15% somewhat agree	82% agree 12% somewhat agree

The participants shared their narrative reflections and part of the exit survey. Their entries depict the surprise of realising the possibility of converging after a process of diverging and suggest they had not expected this to be possible. This could be based on previous experiences where different disciplinary or sectoral perspectives were not integrated in a way that led to productive convergence:

“I was most surprised that it was possible to converge after diverging. The magic happens when we find space for different perspectives.” (Participant Exit Survey, 2020)

The exit survey depicts significant improvement in how the participants perceived the learning objectives – from 28% agreement in 2019 to 74% agreement in 2020 and with 74% agreement in 2020 that the learning objectives were in line with their expectations of the Summer School. To achieve the stated goals under each of the phases, it was essential to develop guiding questions and exercises that drew from different fields (such as design, futures studies, and systems thinking), however without overwhelming the participants with multi-step tools or methods that could easily form the focus of a standalone training or learning experience.

I undertook this translation and simplification process to provide the participants with a ‘taster menu’ approach to support them in identifying the tools, methods, skills, and capabilities they would like to develop further after the Summer School. The reported improvement points to the effectiveness, as 95% of the participants reported that they learned more about systems approaches (52% in 2019), and 89% reported learning more about futures methods (40% in 2019).

“The tools and guiding questions helped us to explore the root issues and organise our thoughts and ideas.” (Participant Exit Survey, 2020)

“Discussing the concept of Leverage Points was a real eye-opener to understand how most interventions only focus on a small number of levers. I will use this model to reflect in future projects and go beyond the usual parameter-level interventions.” (Participant Exit Survey, 2020)

In the 2020 edition, 88% of the participants agreed that the Summer School helped them positively perceive transdisciplinary collaboration, compared to 67% in the 2019 edition. The participants also reported a decrease in the perception of differences between disciplines or professions, with 61% (2020) compared to 70% (2019) agreeing to the statement ‘I felt differences across disciplines or professions’. This improvement points to the potential of systems approaches to provide a scaffold for valuing different disciplinary and sectoral ways of knowing:

“I was completely new to systems approaches, and the Summer School has encouraged me to understand the complexities within and outside my subject. It has also helped me connect my discipline to other disciplines and reinforced the need for multi-sectoral collaborative efforts.” (Participant Exit Survey, 2020)

As part of the narrative feedback, participants note that the process of reflection help them interrogate their learning processes and styles. This depicts how participants might start to engage in double-loop learning and how a positive experience posits the promise of reinforcing a more regular practice of critical reflection:

“The Summer School allowed me to seriously reflect on my learning process and made me realise how over the years, as a practitioner, I missed the academic person in me. I am now trying to take out time to invest in learning, especially given the COVID-19 lockdown.” (Participant Exit Survey, 2020)

The reflection above points to an assumption the participant makes about which persona is associated with learning and reflection processes – in this case, the ‘academic’ rather than the ‘practitioner’. The quote depicts the challenges to overcoming entrenched assumptions that associate reflective practices solely with academic pursuits.

Finding 2: Developing systemic capabilities from a low maturity to a high maturity requires more than a one-off capacity building experience

The analysis of the participants' observation depicts that the tools and guiding questions used in the first two phases (Diagnose and Imagine) were better received than the second two (Act and Learn). The observation records were matched by the results of the participant exit survey (Table 11 above), which show that while 95% agree they learned more about systems approaches (in the Diagnose phase) and that 89% agree they learned more about futures approaches (in the Imagine phase), only 40% agree they learned more about approaches for strategy development and monitoring, learning, and evaluation (in the Act and Learn phases). This could be due to the relative novelty and the multi-step process required in applying tools such as Theory of Change, or Key Performance Questions.

In my reflective memos, I note this might also be due to the situated nature of strategy development and intervention design. This might be more difficult to enact in a problem-based learning environment in which the participants cannot represent or postulate instead of the myriad of different ‘real world’ stakeholder perspectives that would be involved in developing an urban resilience strategy.

A further challenge might be presented by the geographical diversity of the participants (as the participants in any one group had different nationalities) in the context of the challenge brief set out by the IURA organisers, which asked the groups to choose one urban context for the duration of the programme. This meant group participants had to decide which city or urban context to focus on. However, only one participant from the group would have had professional and/or lived experience of the selected city. This challenge regarding developing contextual interventions and strategies as part of a problem-based learning (PBL) environment with heterogenous participants reinforces the need to be ‘close to the field’ raised by Participant 002 as part of ARCI.

This challenge is documented in the literature on problem-based learning, as a meta-analysis of PBL notes that while ‘ill-structured problems’ are presented as unresolved to enable the learners to generate multiple problem-solution pairs (Barrow et al., 2002), that “possible solutions will generally marginalise one or

more stakeholders because of complex interrelationships and numerous concerns (Walker & Leary, 2009, p. 17).

The observation notes of group and participants dynamics flag that 'in one group, the participants had become frustrated in the second half of the process (Act and Learn) as they felt that the intervention design had become a forced exercise'; the group in question would have rather spent longer focusing on the first two phases (Diagnose and Imagine). The participant observation findings point to an assumption held by the participants that there are tools, methods, and even different types of algorithms or software (such as the system mapping platform Kumu, which the participants used) that can be applied to systems and that through this application of tools the *right* systemic interventions will reveal themselves. This insight was further supported by the participant exit survey, where 11 of the 19 respondents wrote down 'Kumu' in response to the open text question 'What was the most useful method or tool you've experienced in the Summer School?'

"The system thinking approach, with the use of interfaces such as Miro and Kumu, has been most useful. Kumu made possible the process of interlinking the different aspects of a system and help us to understand the problem and the possible solutions." (Participant Exit Survey, 2020).

I made this challenge explicit as part of the group's written feedback after the third week (Act and Learn). In there, I wrote that

"On their own, tools cannot tell you where to intervene, in the same way that the map of a landscape cannot tell you where you need to go next in your journey." (Extract from written feedback to groups, 2020)

Proposing interventions in a complex system is an active, values-laden process informed by who the intervenors are and what they seek to achieve. However, the participants' answers to the exit survey depict the challenges regarding assessing the learning taking place and the ability to ascertain whether single-, double-, or triple-loop learning is taking place¹⁸.

The advertised learning outcomes posit that the course equips participants with the skills needed for taking systems approaches to tackle urban shocks and stressors in the context of a problem-based learning environment conducive to transdisciplinary collaboration¹⁹. However, the course did not make explicit any learning outcomes regarding double- and triple-loop learning, although they were previously identified

¹⁸ It is noted that terms such as method, tool, and approach can be potentially misleading given the cohort's multicultural and multi-lingual nature. However, there is insufficient evidence from the data collected to link this finding to the linguistic challenges posed by the dominance of English in training and capacity building programmes.

¹⁹ As advertised on the IURA website, <https://www.sdu.dk/en/forskning/sducivilengineering/iura/teaching-and-education-activities/bloxhub-summer-school-on-urban-resilience-2020>. Accessed March 2022.

in Chapters 2 and 3 as key systemic capabilities and therefore pre-conditions to being able to take a systems approach.

This illustrates the challenge posed by seeking to teach the *how* of transformative change (Leichenko et al., 2021), as professionals do not necessarily join a capacity building programme with the intent to examine their practices, beliefs, assumptions, values or worldview. This tension is very much present in the literature on urban intervention design (Angheloiu & Tennant, 2020), as well as beyond the realm of urban systems:

“The process of analysing systems to inform strategic decision-making can often be overwhelming for practitioners as it requires both an understanding of the theories and ideas in systems and complexity, as well as skills in pattern spotting and critical reflection from this perspective. [...] This paradigm of working in systems is not the dominant one in management, organisations, and how we do strategy. Therefore, there is a deep need to cultivate systemic mindsets and the practices of change-makers to have an effect on changing systems.” (Birney, 2021, p. 763)

While the systemic nature of resilience challenges and the transdisciplinary nature of their potential interventions and solutions requires the development of systemic capabilities and skills, the findings from the 2020 Summer School demonstrate that the process of capacity building needs to extend beyond a one-off learning experience. Deepening the skills and competencies required to evolve from a low capability maturity (systemic sensibility) towards a high capability maturity (systemic literacy and capability cf. Arnold & Wade, 2017) is a longer-term process that cannot be fully addressed within the scope and limitations of a four-week training programme. Over three decades ago, Peter Senge coined ‘personal mastery’ as the key to understanding the process of individual learning (Senge, 1990), positing that

“People with a high level of personal mastery live in a continual learning mode. They never ‘arrive’. Sometimes, language, such as the term ‘personal mastery’ creates a misleading sense of definiteness, of black and white. But personal mastery is not something you possess. It is a process. It is a lifelong discipline. People with a high level of personal mastery are acutely aware of their ignorance, incompetence, and growth areas.” (Senge, 1990, p. 142)

Senge articulates the personal mastery of individuals as a precondition to organisational learning. In contrast, the body of knowledge on social learning has brought forward evidence of the role communities of practice play in enabling learning organisations. Through developing and testing the DIAL framework, I propose an evolution of the understanding of ‘mastery’ beyond the individual and the organisational to the interstitial level of the transdisciplinary learning system. This boundary seeks to recognise that, in fact, no individual, let alone a single organisation, can achieve high levels of mastery across all skills and competencies. Instead, the development of mastery posits that these different skills and competencies should be held by different stakeholders who form a broader learning system. Therefore, learning systems

must go beyond the boundary of specific projects or organisations and encompass multi-level processes for diagnosing, imagining, acting, and learning. This shift in scales and focus is required by the systemic nature of resilience challenges and the transdisciplinary nature of their potential interventions and solutions.

The development and testing of the DIAL framework has met its primary objectives in that it provided a flexible heuristic for process design and has led to an overall reported improvement compared to the previous edition of the Summer School. However, there is a need to better understand the enablers and barriers over longer time horizons. Therefore, the second intervention, as part of ARC2, sought to explore how the learning process might be sustained through an ensuing community of practice. This emerges as a critical area of inquiry to further examine in ARC2.

5.2.2 Intervention 2: Urban Resilience Community of Practice (2020-2021)

What aspect of the problem definition explored in ARCI did the intervention focus on?

As identified in ARCI, knowledge–implementation gaps result from the lack of skills, capabilities and resources required at different scales to operationalise urban resilience. In addressing this gap, both the literature and the findings of ARCI point to the potential of capacity building and highlight the need for social learning approaches to help embed learning and reflection once the capacity building event has ended.

“So, we need the capacity to talk to all the professionals, the capacity to create communities of practice, to do interdisciplinary work.” (Participant 014)

This second intervention, as part of ARC2, sought to explore how a transdisciplinary community of practice (CoP) might be fostered, its potential to sustain the process of learning, as well as the opportunities, challenges, and limitations of CoPs in addressing knowledge–implementation gaps.

The emergence of the Urban Resilience Community of Practice

The Urban Resilience Community of Practice (URCoP) was developed as an experiment led by alumni of the International Urban Resilience Academy (IURA) capacity building programme hosted by Southern Denmark University (SDU). In a reflective conversation, the IURA organisers admitted that sustaining learning efforts over time (such as through a CoP) would be a valued contribution to the capacity building process and a broader contribution to the urban resilience field.

However, they noted that their business model does not accommodate the human capacity required to sustain the process of community building and ongoing peer learning. Through a series of online conversations, after the 2019 Summer School ended, a subset of alums volunteered to co-develop the initial set of aims and assumptions about the CoP, visualised below.

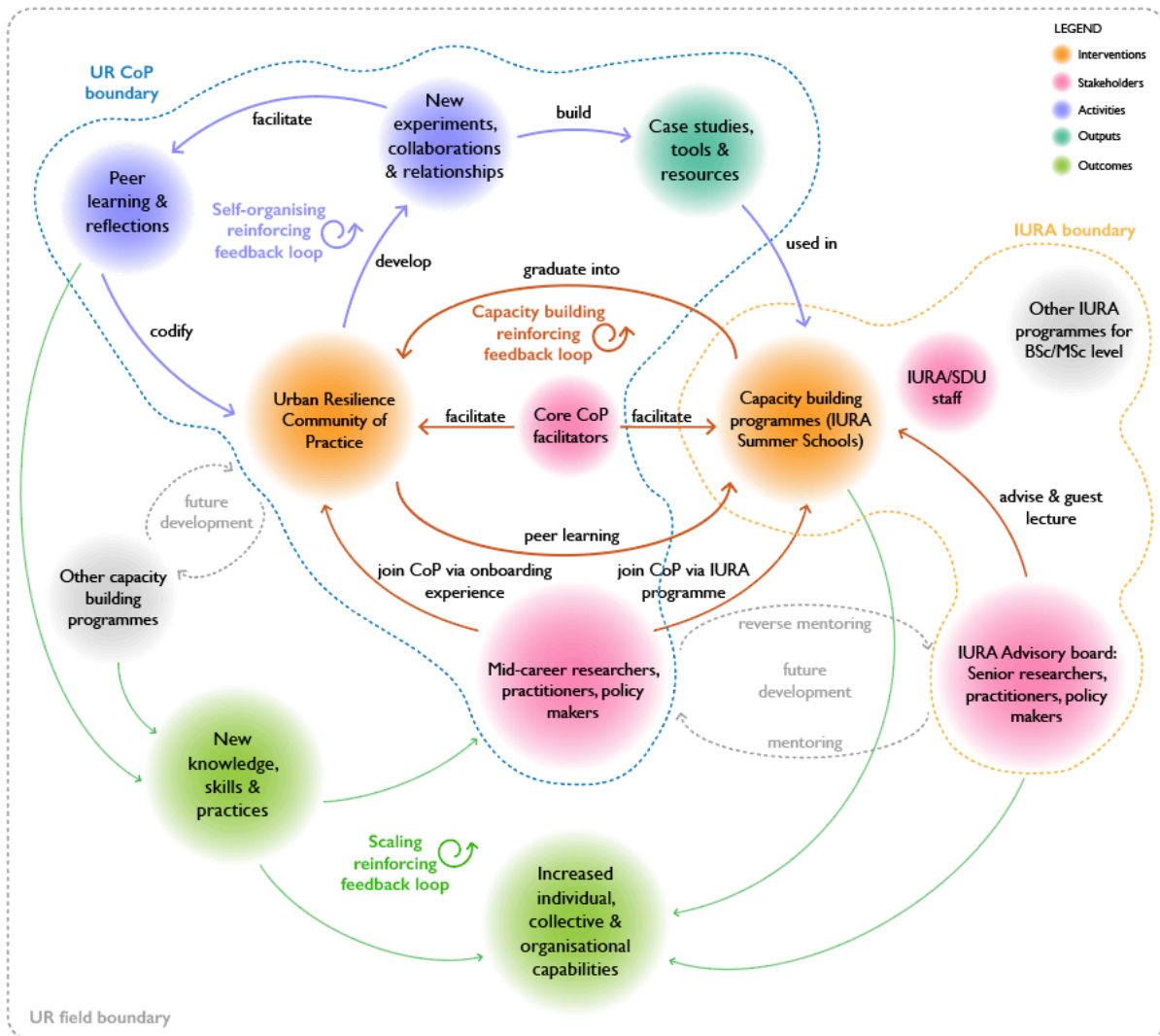


Figure 19. Developing a shared Theory of Change: exploring the value flows between IURA, the Urban Resilience CoP, and the wider urban resilience field, as well as three desired feedback loops: capacity building, self-organising, and scaling.

Figure 19 above presents the starting assumptions about the different value flows between IURA, the Urban Resilience CoP, and the wider urban resilience field. Through this participatory mapping process, three key assumptions about desired feedback loops emerged:

- Firstly, the capacity building loop depicts the assumed relationship between future IURA capacity building programmes and the CoP, whereby programme participants graduate into the CoP. At the same time, CoP members join the capacity building programmes for specific peer learning and networking sessions. This flow assumes that future programmes could be demand-driven, responding to the learning needs of CoP members and servicing them through more ad-hoc and one-off training experiences to accompany the ongoing learning as part of CoP activities.
- Secondly, the self-organising feedback loop assumes that new transdisciplinary collaborations, experiments, and relationships would emerge due to CoP participation. These could occur through facilitated sessions and the development of knowledge products such as case studies,

tools, or other resources (which in turn could be used as learning materials for capacity building programmes).

- Thirdly, the scaling feedback loop assumes that newly developed knowledge, skills, and practices would be integrated into members' day-to-day roles and contribute to an overall increase in individual, collective, and organisational capabilities.

These three desired feedback loops and their corresponding assumptions map across to the three components of communities of practice: the domain of interest, its pursuit by a community (and the “relational space that leads to trust building — oftentimes through interactions that span the personal and the professional” (Lave & Wenger, 1991, p. 29) and the shared practice (such as tools, experiences, stories) as the outcome of sustained interaction.

Governance

From the beginning, this CoP set out to be an informal, self-organising volunteer-led space. In its incipient phase (2019), the CoP was primarily formed of IURA programme alums. As the depth of relationships and the level of collaborative activity increased during 2020, in early 2021, the CoP became open to any urban resilience professionals. Consequently, membership grew by 70%. The core governance group decided to create an externally facing website, a LinkedIn page, and a quarterly newsletter to serve alongside the closed communications platform Slack.

Collaborative experiments

During 2019 – 2021, CoP members came together regularly to share different perspectives on urban resilience and to reflect on how global events manifested locally, especially given the emergence of COVID-19. The core volunteer group decided to facilitate three types of activities in support of the overall objective of sustaining the process of capacity building through peer learning and knowledge codification:

- The Urban Resilience Dialogues podcast sees each episode explore a resilience keyword through interviewing other members of the CoP. The podcast format seeks to create a process for urban resilience professionals to codify practice-based knowledge. It is produced by me and one other CoP member (Participant 007). Ten episodes were developed during 2020-21, exploring the following keywords: Memory, Feminism, Vulnerability, Experiment, Tools, Anticipation, Collaboration, Water, Learning, and New Cities.
- The ‘Spotlight on...’ series of events gives the floor to one-three members to share work in progress, receive feedback, or put forward a problem case. This format seeks to create a structured process for peer learning.
- The ‘SerendipiTEA’ is a short regular networking slot, usually organised as an informal event during large-scale events such as the annual Conference of Parties (COP) or urban resilience-specific conferences or formal events. This format seeks to create more spontaneous connections

between members and increase the density of ‘weak ties’, based on evidence from social learning literature that they can support individual learning, support problem-solving processes, as well as foster new collaborations and knowledge co-production (Amin & Roberts, 2008; Bettiol & Sedita, 2011; Ryberg & Larsen, 2008; Teigland & McLure-Wasko, 2000).

Beyond these types of events, members are invited to self-organise. Collaborations to date include co-authoring publications and book chapters (such as Dutton et al., 2020), forming action learning sets to join other capacity building programmes or MOOCs, and smaller inquiry groups (for example, a resilience storytelling inquiry group).

Finding 1: Informal communities of practice can enable transdisciplinary collaboration

This section provides evidence on how an informal community of practice can enable transdisciplinary collaboration and knowledge co-production by creating spaces for the negotiation of meaning, the translation of knowledge, and the development of a shared understanding among heterogeneous members.

The agreed agenda aimed to discuss and agree on critical aims and activities for the year. However, the onset of the COVID-19 pandemic saw the session dedicated instead to collective stocktaking and sensemaking. The vignette below presents the account of the first community of practice gathering (March 2020) based on a collaborative notetaking document. The vignette depicts the relationship between two active processes that take place in CoPs: participation and reification. While participation refers to the “mutual ability to negotiate meaning and a source of social identity” (Wenger, 1999, p. 56), reification consists of the process of “giving form to our experience by producing objects” (Wenger, 1999, p. 58), which covers a wide range of activities such as codifying, naming, making, designing different artefacts that ‘congeal’ the meaning negotiated through participation. During the session, the participants identified the podcast format as presenting the potential for knowledge codification.

Vignette 1: A manifestation of the participation – reification cycle, March 2020

It’s late March 2020, and different parts of the world have closed their borders and economies as the number of COVID-19 cases has risen steeply across geographies. Eleven faces appear on a Zoom screen. I ask a couple of questions to get us going – *how are you doing right now? What are you noticing around you? What might be relevant for our exploration and practice of urban resilience?*

We take turns to share. Participant 012 is trying to change jobs and potentially leave local government since finishing the 2019 Summer School – they found it challenging to apply what they learnt as part of the programme, as their manager is resisting new approaches and does not see urban resilience as linked to urban planning (the focus of their department). Participant 019 and their resilience start-up consider this crisis an opportunity. They’ve rapidly developed a COVID-19 module as part of their data analysis platform to help municipalities combine data sets in real-time.

Participant 007 decided to deepen their systems skills after the Summer School. They're taking another online course with three other alums and CoP members. They've been reflecting on their work as a service designer and how their career path might contribute to systemic approaches for urban resilience going forward. They've seen a rapid increase in urban resilience online events but are frustrated that many stories are not being told; it's always the big cities and the successful responses.

Participant 020 is decrying the current lack of funding their organisation is struggling with. They've been fundraising for a global urban resilience programme, but now this has been paused. They admit their organisation is guilty of creating more webinars and online case studies that perhaps reinforce Participant 007's frustration. Still, they are facing fundraising pressures and need to promote their work. They share a hope that closed spaces like this one can help find solutions to this dilemma.

I see heads nodding, and our conversation continues – what can we do to support each other and support our work? What might we do together this year? We start thematising the key points we want to share with the other members of the community who couldn't make the call and make a list of potential experiments to explore in 2020. We take notes in a collaborative document to revisit our questions in our next gathering. The following paragraphs present the key questions and themes from the write-up:

- ***How might this crisis be an opportunity to unlock a different trajectory?*** We're seeing the concept of 'bouncing forward' gain traction in the media coverage of the pandemic – the idea that the response to a shock or a stressor should avoid 'bouncing back' to a potentially unsustainable footing and that responses should take normative stances that improve wellbeing and equity outcomes. This is well understood in our field of resilience, but we note that we could learn from the simpler messaging that is currently gaining traction ('We won't get back to normal because the normal we had was the problem'²⁰).
- ***How can we make the trade-offs between choices explicit?*** The role of technology in enabling surveillance could have long-lasting effects as we're getting used to more invasive oversight over our lives. We miss wandering through the city, as now it feels like a dystopian novel – do you have a legitimate reason to go out? How do we help people make different choices about who should lead us in these times? Whose resilience is being supported? What happens when we centre the resilience of the economy versus that of the workers? We take a moment to think back to the notion of system boundaries – the purpose of the resilience system pans out so differently if we put workers at the centre rather than 'the economy'. Will this further deepen existing inequalities? Who has the means to stay at home?

²⁰ For a detailed narrative analysis of the different messages and memes that appeared during the first months of the COVID-19 pandemic, please see de Saint Laurent et al. (2021).

- **How can we fill the storytelling gap we notice?** Many Asian and African countries have already dealt with epidemics, and anecdotally, for now, we see they are responding in more nimble, agile ways. We need to learn from the resilience responses that Southern cities have already cultivated and ensure that we do not ‘default’ to the usual suspects of Global North cities in our works.
- **How can this space in the community of practice support our personal and collective resilience?** Our work is centred around uncertainty, mostly telling others they need to be more comfortable with it; now we get to experience this first-hand. Does this mean we should be better equipped? Do we feel like the boy who cried wolf – apart from the fact that our wolves are real, bear the names of planetary thresholds, and this is only the beginning of what it’s bound to be an uncertain decade ahead?

The storytelling gap captures our imagination of what we can do together next. Participant 007 proposes a podcast, and conversation converges around this as an actionable next step we can develop a collaboration around. A date is in the diary to discuss how to make this happen. As we close, Participant 040 remarks:

“Writing our memos from these sessions is like writing a collective diary entry from the eye of the storm.” (Participant 040)

Creating ‘collective diary entries from the eye of the storm’ depicts how a CoP engages in a shared practice of meaning-making: through participation, the act of taking part in a shared pursuit, and through reification, the act of codifying or giving form to experience through artefacts (Wenger, 1999). Following Wenger, three characteristics of negotiating meaning in practice emerge.

Firstly, “participation and reification can be seamlessly interwoven” (Wenger, 1999, p. 84), as CoP sessions (such as learning gatherings or podcast recording sessions) both encompass collaborative inquiry, where members come together for shared exploratory conversations, as well as sensemaking, where members codify these conversations in the form of knowledge products (internal memos, blogs, journal articles, or podcast episodes). Vignette 1 above depicts how what could have been a social catch-up quickly developed into an exercise in sensemaking and codification as the group decided to create an artefact to share reflections more widely.

In Vignette 1 above, the discussion moves between different levels of depth: it starts by reflecting on current events (the onset of the COVID-19 pandemic) and how we are being personally affected, it moves on to discussing underlying patterns and structures (how urban resilience stakeholders, including ourselves and our employers, are responding to the pandemic), and continues with a discussion about the values and beliefs that underpin action (the resilience narratives that we see emerge, the societal debates

between human and economic cost of lockdowns, the ethical dimensions of the trade-offs that are being discussed). The conversation then returns its focus to the realm of action and ends with a discussion about tangible interventions and collaboration that might be possible among CoP members (a podcast). This act of reifying helps create feedback loops between different levels of learning: between the realm of acting in the world and the realm of learning through reflecting on the assumptions, mental models, and structures that underpin actions.

Secondly, shared experiences can create “mutual accountability without ever being reified, discussed, or stated as an enterprise” (Wenger, 1999, p. 84). As Participant 012 notes below, prioritising participation in this informal CoP over other engagements creates shared accountability for learning.

“The moral support and space for learning I'm getting from the CoP is so much needed because I don't have it with my colleagues, I don't have it on a day-to-day basis.” (Participant 012)

As the CoP evolved, 15-20% of members have been consistently highly engaged, even as membership grew. Building accountability for learning and critical reflection in informal spaces can be particularly helpful when organisational or managerial drivers don't enable this, as is the case of Participants 012 and 007 above. Their respective managers were not supportive of their participation in the CoP, nor were they interested in acting on the improvements proposed by the participants following their experiences at the Summer School. Since then, they have both moved on to new positions.

Thirdly, “shared histories of engagement can become resources for negotiating meaning without the constant need to ‘compare notes’” (Wenger, 1999, p. 84). Through the repeated process of ‘showing up’, mutual accountability is created as the CoP builds a shared history of engagement, both intangible (stories, anecdotes, or confidential insights people shared, memorable moments from sessions) and tangible (blogs, podcasts, a CoP website, internal messaging platform using Slack, etc.).

Shared histories of engagement help build trust in the quality, rigour, and confidentiality of the CoP, trust which can, in turn, be extended between CoP members who have not interacted before. This can shortcut trust-building processes and help speed up transdisciplinary collaboration among CoP members. For example, through meeting other resilience professionals through the CoP, Participant 040 invited several other members as panellists at an event hosted by their organisation during World Water Day 2021. Participants 007 and 012 have co-authored multiple peer-reviewed articles and book chapters even though neither is based at an academic institution (Participant 007 is a practitioner, while Participant 012 works in local government).

As part of the 2020 end-of-year reflections process, we discussed the value the CoP brings to us as resilience professionals and what we perceive the unique contribution of the CoP to be. Participants point out the space's ‘judgement-free’ nature, the lack of competition or pitching, the passion they witness among other members, and a sense of belonging.

“It’s a judgement-free place to connect across disciplines and sectors. I really enjoy the global aspect and connecting to the work they’re doing. I think the CoP has a rare energy and general passion amongst participants, making it a worthwhile space to be involved in.” (Participant 012, December 2021)

“It’s an open community, and the uniqueness is brought by the willingness to act based on personal intention rather than outside or organisational requirements.” (Participant 042, December 2021)

“The global footprint, the diversity of views [...] and a space of belonging with like-minded people.” (Participant 022, December 2021)

“I get new perspectives - the possibility to tap into a collective, sincere, passionate brain and soul that offers insight and motivation. And it doesn’t feel like another thing I need to do, contrary; it provides enough space to come as I am when I can.” (Participant 17, December 2021)

The quotes above depict how such ‘shared histories of engagement’ create a sense of belonging, of being accepted and welcomed, and the value added from this process. They also raise questions about gaps in organisational learning as well as formal project-based multi-stakeholder collaborations or formal communities of practice that one or more organisational stakeholders host. As this research depicts how informal communities of practice can contribute to catalysing transdisciplinary collaboration, it becomes apparent that they can provide a missing link between the levels of individual learning, organisational learning, and multi-stakeholder project-based collaboration. This also demonstrates the need to integrate social learning as a part of longer-term approaches to capacity building and institutional strengthening processes.

The vignette provides evidence of the value added by an increasing density of ‘weak ties’, relatively small-scale interactions and collaborations as part of the informal CoP. However, outstanding questions emerge regarding potential trade-offs between the quality of rather intimate learning spaces versus the initial assumptions about scaling. As the initial aims were to scale the CoP through partnering with different capacity building programmes and scale transdisciplinary collaboration to include funded project-based collaboration among CoP members, this poses questions regarding the potential future pathways for the URCoP and to what extent members are content with the status quo (an informal, facilitated space for learning and collaboration) compared to the initial assumptions developed as the emerging core governance group in early 2020.

Finding 2: Considerations of power are critical to the success of transdisciplinary communities of practice

At the heart of the participation–reification dynamic of communities of practice lies collaboration. In their exploration of collaboration as a governance form, Stout and Keast depict how the value add of collaboration results from the explicit removal of command and control approaches as well as the self-

interested behaviour of actors, which they argue both result in “asymmetrical power dynamics” (Stout & Keast, 2012, p. 20).

Understanding the collaborative dynamics within the community of practice requires considering how power is held and exercised (Crosby & Bryson, 2005). The exploration of power typologies (Gaventa, 2006; Gaventa & Cornwall, 2008; Gaventa, 2019) identifies the following forms: *power-over* as the exertion of control or influence over others; *power-to* as agency and the ability to act according to one’s desire; *power-with* as solidarity and egalitarian mutuality; and *power-within* as the sense of self-efficacy and self-belief in one’s ability to act. Huxham and Vangen (2004) argue that different power typologies can be used to analyse collaboration.

The invitation to join the CoP, either as an alumnus of an IURA Summer School or as an urban resilience professional applying for join, aims to foster *power-with*, which in turn helps build the *power-to* take part, learn, and collaborate with others, as well contributing to *power-within* through confidence building and peer encouragement. This effort is mirrored by our community values, co-developed in the early stages of the CoP formation. One of them states that ‘we put collaboration first – no logos, no egos’²¹ and forms one of the fundamental principles the CoP is based on.

Vignette 2 below presents two interactions – a phone call and an email – with senior figures in urban resilience, which depict how the experience of power-over can stymie the knowledge claims that arise from informal communities of practice.

Vignette 2: Experiencing power-over

April 2021

I see a WhatsApp call coming in – unusual, as I don’t tend to receive unscheduled calls from M. It so happens that I was already on a Zoom call with two others from the core governance group, Participants 012 and 022, as we were working through the plans for the external CoP launch. We spend about 10 minutes trying to see if M. wants to join the Zoom call, but they eschew by saying they’d prefer to talk via WhatsApp. I put them on speaker, but due to microphone feedback, the other two core group members can’t make themselves easily heard.

M. is calling about the launch of the CoP, for which we had previously asked for promotional support through their organisational website and social media channels. They just got around to seeing our

²¹ The co-created values of the CoP are: “We trust each other. We care for one another. We help each other think outside the box. We support the evolution of the urban resilience field. We’re here to support personal and collective development. We are ready to challenge our own beliefs and gain new perspectives. We put collaboration first – no logos, no egos.” As depicted on <https://www.urbanresiliencedialogues.com/about> (Accessed October 2021).

proposed materials and sounds uncomfortable about our proposed name, Urban Resilience Dialogues Community, building on the name of our existing podcast.

'It can look...[long pause]...too much like you are launching a new brand or an organisation.'

'But M., we agreed that to be taken seriously by the wider field we need an online presence, a calling card. We already have the podcast, and the website domain is available. Naming it the Urban Resilience Community of Practice sounds too long and generic', I add.

The conversation continues for a while and we arrive at a compromise – we'll call it the Urban Resilience Community of Practice, but they accept the web domain name to be urbanresiliencedialogues.com.

We bring the WhatsApp call to an end, and I look at Participants 012 and 022 – what did just happen!?

June 2021

"Hi Corina,

I've joined your CoP; I'm happy you are creating a new one.

I'm wondering whether it could make sense to talk between us or with who is responsible of the development of your programs.

We are already a big network for urban resilience, and it is cool you are creating a new mixed CoP of researchers/practitioners on urban resilience, but if you are inviting our members to join your new network without writing to us about it, to establish cooperation mechanisms, rather than compete, it could seem inappropriate.

I'm just out of our monthly meeting, and more than one member asked me about your CoP." (Email correspondence, June 2021)

The vignette depicts how power imbalances manifest regarding legitimacy, recognition, and the control of agendas or territories beyond the boundary of a community of practice. While from within the URCoP seeks to enable *power-with*, *power-to*, and *power-within* among its members, its informal status becomes a potential hindrance when it comes to asserting legitimacy outside of the boundaries of the CoP.

Both the call and the email happened within a relatively short period, at a key moment for the CoP, as we were preparing to move from an invisible to a visible online presence and seek to increase membership numbers. They both came from senior figures recognised as significant gatekeepers in the urban resilience field. The first one had initially been supportive of our efforts and had previously offered to lend their institutional support to promote the activities of our informal CoP. The second was unaware of the existence of the CoP until we advertised the CoP and the podcast on an email list. While we had never

been in contact before, the informal tone of their email further denotes a display of *power-over* as they assumed that my power rank was inferior to theirs.

Without organisational buy-in, the validity of participation can be diminished. It can therefore mean that members deprioritise participation in CoP activities, especially in the context of daily pressures and other organisational drivers. This can lead to growing gaps between the most and the least active members, as the shared histories developed among active members can lead those less active to feel like they cannot 'catch up'. Equally, fostering collaborative relationships between professionals employed by organisations that often compete within the urban resilience field can pose challenges to trust building.

These different dynamics are mirrored in the research literature on governance, as “collaborative relationships work more easily when there are no major disparities of power” (Huxham & Vangen, 2004, p. 248). While the literature on social learning and communities of practice acknowledges the role of mutuality in shaping member identities and helping them negotiate the process of meaning-making, explicit interrogations of power are a relatively recent issue, as Wenger-Trayner includes the political dimension of the landscapes of practice only as recent as 2014 (Wenger-Trayner, 2014). For example, earlier writing claimed that “communities of practice that bridge institutional boundaries are often critical to getting things done in the context of – and sometimes despite– bureaucratic rigidities” (Wenger, 1999, p. 119). While this is possible and indeed something the CoP has demonstrated, the power blindness of past social learning literature raises critical concerns that need to be adequately interrogated as communities of practice continue to proliferate in cross-organisational and transdisciplinary contexts.

Finding 3: Facilitation plays a key role in transdisciplinary bridging

In ARC2, I used facilitation as a method for first-person research/practice (in the specific instances I am facilitating on my own) and a method for second-person research/practice (when I am co-facilitating with others). The facilitation process has two main applications in ARC2: 1) designing and facilitating problem-based workshops (Savin-Baden, 2003) as part of the 2020 Summer School; and 2) designing and facilitating peer learning (Guldberg, 2008) as part of the community of practice.

The agreed role with the 2020 Summer School organisers included leading the co-facilitation process of the 2020 edition, while my role as a CoP convenor also included co-facilitating events and learning sessions. Therefore, naming facilitation as a key focus area of ARC2 seeks to make this process explicit in order to analyse and understand the role facilitation can play in bridging knowledge-implementation gaps. As key connectors, translators, and community gatekeepers, the role of facilitators is far from neutral (Dillard, 2013; Harvey et al., 2002). Facilitation as a mode of knowledge brokering requires critical reflection, as well as a continuous interrogation of the forms of power that are being enabled, as facilitators might act as “guides, orchestra conductors or universal translators — naming key thoughts or feelings, making observations back to the group or drawing out different individuals with a minority opinion or less power” (Heft, 2014, p. 334).

The members of our growing CoP faced difficult situations across the different geographies they were based in due to COVID-19, professional and personal challenges, and the effects of the different waves of cases increase and ensuing lockdowns. The pressures of the external environment also meant that while the value the CoP was bringing to its members was recognised, there was also a growing sense of responsibility within the core governance group.

“We have an informal community, and when life becomes smaller physically [during the various COVID-19 lockdowns], being able to access this is something quite special, and I wouldn’t play down the energy that it takes to maintain it because it does need a champion to facilitate that and is quite a naked experience. And you must have no shame to say, let’s be friends on the Internet. That is quite a huge thing to do.” (Participant 40)

The quote above depicts how one of the core governance members framed the dilemma posed by the growth of our CoP during 2020-21. What started as an informal, small-scale reflection space was, by the beginning of 2020, evolved into a more extensive, even looser network of individuals joining with the expectation of a facilitated programme of events and workshops. Balancing the desire to ensure the CoP experience was deemed worthwhile by the newcomers also meant increased pressure on the old-timers who formed the core governance group. Ensuring newcomers could propose and drive activities (display power-to), rather than only joining as participants in predetermined activities, has proved one of the more challenging dynamics.

While over time, there has been a diversification in the core governance group and newcomers have stepped in to propose, help organise, and co-facilitate activities, this process has always happened with the support of an ‘old timer’ (alumni of the 2019 or the 2020 Summer Schools). The core CoP governance group (which counted 15 members at the end of 2021) was still only formed of ‘old timers’, despite repeated invitations through the newsletter and the closed communications space on Slack for newer members to join the core group.

Facilitation is a mode of intervening and requires critical reflection not to become a covert display of power-over; for example, facilitators have key influence over the extent to which pursuits within the CoP might be legitimate or not, or for example, by setting agendas and designing processes they influence the overall learning outcomes and activities. In my facilitation practice, my stance could uphold or challenge the power dynamics explored above. Different facilitator roles (Fig. 22) emerged during ARC2:

- Knowledge broker: navigating between disciplines and knowledge systems to help translate and align different epistemic perspectives.
- Environment creator: designing a climate that is conducive to learning and critical reflection and supports different interaction modes.

- Process designer: bringing together different methods, tools, and approaches according to the learning objectives and group dynamics.
- Quiet convenor: building one-to-one relationships and trust to ensure the desired outcomes for community building.
- Pollinator: connecting members who might otherwise not be connected.
- Mirror: reflecting back patterns and perspectives to help CoP participants reflect critically on their experience.
- Thermostat: sense the ‘temperature’ of CoP participants, energy and collaboration levels and adjust activities accordingly.
- Norm authoriser: depict desired behaviours or actions through their behaviour and actions.

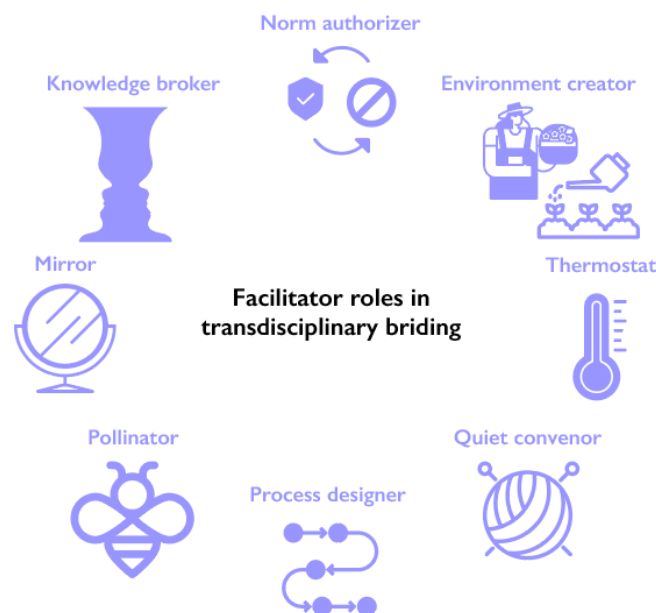


Figure 20. Facilitator roles in transdisciplinary bridging.

Navigating these different roles involves a process of translation, coordination, and alignment between different needs, wishes, and perspectives that other members of the core governance group might have, as well as wider CoP members. Below, Participant 017 reflects on my role as a facilitator as part of a one-to-one conversation:

“I think facilitation needs a certain kind of personality to make it work. Like in your case, you are somebody who gets energy from collaboration. You are an extrovert. You like interacting. And I imagine that if it was not you but somebody who is more introverted or a more conventional academic, I’m not sure the community would have sustained itself.” (Participant 017)

Wenger (1999, p.109) highlights that the process of CoP facilitation requires “enough legitimacy to influence the development of a practice, mobilise attention, and address conflicting interests”. As Participant 017 depicts their assumptions and perceptions about my role as facilitator, they equate good

facilitation with a personality trait rather than as a set of honed skills. While it is true that I ‘get energy from collaboration’, as I enjoy meeting new people and their stories, I do not consider myself an extrovert. I require significant prep before facilitating and adequate downtime after facilitating²². The quote also points to an assumption about how a ‘conventional academic’ might facilitate and the implied assumption that they would not make good or successful facilitators in a CoP.

In its dictionary form, being a facilitator means ‘to make an action or process easy or easier’. However, when facilitation succeeds in making difficult things easier, its value and contributions remain underestimated as the bridging process remains invisible. A further reflection emerges as to whether double- or triple-loop learning, processes that entail stepping outside comfort zones to interrogate deeper assumptions and beliefs, can ever be made more accessible.

Returning to the literature review presented in Section 2.1 and the investigations undertaken in ARCI and presented in Section 4.2.2, the findings depict the challenges of seeking to bridge an epistemic gap that stems from the complexity of integrating and valuing different types of knowledge and ways of knowing. The section above aimed to tackle the lack of evidence on the role of process-oriented interventions such as facilitation in the context of urban challenges (Angheloiu & Tennant, 2020) and contribute to the evidence base of other disciplines with more established action research traditions (such as nursing). As the need to interrogate the range of technical, practical, and emancipatory support that facilitation brings in change processes (Harvey et al., 2002; Jackson et al., 1999; McCormack & Garbett, 2001; Titchen, 1998), facilitation plays a key role in the attempt to expand the unit of learning from the individual to a transdisciplinary audience and emerging community of practice.

5.2.1 Reflections: Inhabiting the transdisciplinary chameleon

Crown shyness is a phenomenon where the crowns of fully stocked trees do not touch each other, forming a canopy with channel-like gaps. The immediate thought that came to mind is that this is what a learning community feels like — growing together, leaning on one another in the wind while forming a microclimate of new patterns and flows that wouldn’t have existed otherwise. However, oftentimes our societal obsession with the individual tree ‘crowns’ as the visible pinnacle of maturity and success ignores the role of the nourishing soil and mycelium within that makes the crowns possible, to begin with.

I found this analogy helpful in processing my experiences designing and facilitating the 2020 urban resilience Summer School and co-facilitating the ensuing community of practice. I cannot help but wonder whether this is the missing piece in the pursuit of unlocking transdisciplinary collaboration towards systemic change – the need to shift from individual to ecosystem learning and, therefore, the need to focus both on the ‘crowns’ as well as the ‘soil’.

²² My personal rule of thumb for prep time vs facilitation time is 2:1, however the ratio can be much higher depending on the objectives of the session and the sensitivity of the topics that are being explored. The same ratio applies to post-facilitation reflection and downtime.

Even so, the ‘crowns’ and ‘soil’ are only some of the visible and tangible parts of a learning system, so how might we be able to account for the invisible processes, such as knowledge translation or the years of practice-based experience that contribute to becoming a skilled facilitator, or the care, time, and emotional labour invested in the process of relationship and community building?

Drawing on the experience of this action research journey, this is where I believe there is merit in naming the role of a ‘transdisciplinary chameleon’. From the outset, my journey has been a transdisciplinary adventure. While studying architecture, a constant message was repeated by our studio tutors and lecturers alike: architects don’t work in silos but depend on a wide array of interdisciplinary skills and, vitally, on transdisciplinary collaboration. Working in practice, I got used to understanding the different needs of engineers, urban designers, landscape architects, and interior designers alongside the needs of our clients. It was, therefore, a surprise to me to realise that this experience was counter to the norm. It was a bigger surprise when challenges related to transdisciplinarity emerged as a key finding from the first action research cycle.

Having secured my PhD from a funding body containing the word ‘interdisciplinary’ in its title, I was lured into thinking that this journey would be smooth and that people would have realised by now both the need and the value of inter- and transdisciplinarity. And I wasn’t entirely wrong – there is more openness to different research approaches, yet navigating the waters of transdisciplinarity is fraught with challenges. For example, journals require affiliation to one main disciplinary canon. Examiners ask, ‘Which disciplinary community do you want to belong to?’. Over time, I have learnt that instead of the answer being ‘to all the disciplinary communities I’ve listed above’, my role is to fulfil the part of the translator, the shapeshifter, even if it bears the risk of never entirely belonging to one single disciplinary community.

Inhabiting the transdisciplinary chameleon means being comfortable with occupying the liminal spaces between disciplines and sectors and using this vantage point to spot commonalities between approaches and purposes, as well as potential for translation and brokering. It means using the ability to spot patterns to understand different approaches to the same challenge in a similar way to sitting in different translation booths at any one point. There are inherent challenges – languages might get mixed up, the meaning might be partially lost, or the whole process might last longer than the other parties’ patience.

I can see how the transdisciplinary chameleon manifests itself as I re-read the chapter above. I can see how knitting and remixing methods from different fields can aid a specific learning outcome and lead to tangible improvements in how we understand and intervene in complex situations. However, I can also hear the voice of doubt – is the evidence and justification enough?

5.3 Discussion

The purpose of the second action research cycle (ARC2), documented in this chapter, was to intervene in the problem situation defined in the first cycle (Chapter 4). The chapter described, analysed, and

discussed two interventions: the design and facilitation of the 2020 Urban Resilience Summer School and the emergence and facilitation of the ensuing Urban Resilience Community of Practice (2020-21).

The two interventions present a body of research into how urban resilience knowledge-implementation gaps might be addressed and their limitations and challenges. The findings provide evidence of the enabling conditions for capacity building and social learning: trust, facilitation, knowledge translation and brokering. The findings also provide evidence of how capacity building and social learning challenges manifest in pervasive ways: developing from a low maturity to a high maturity of systemic capabilities requires more than a one-off capacity building experience; social learning approaches remain undervalued at managerial and organisational levels; the power-over of senior knowledge gatekeepers undermines the knowledge claims that can arise from social learning in the context of an informal CoP.

Chapter 4 identified five key gaps: definitional (a lack of consensus over the meaning of urban resilience), epistemic (complexity of integrating and valuing interdisciplinary evidence-based and practice-based knowledge), multiscale (a lack of skills, capabilities, and resources required at different scales to operationalise urban resilience), methodological (a lack of methods to account for systemic risk, uncertainty, and cascading effects), and lastly, a values gap (resilience for whom, for when, and for where is a process of negotiation between competing priorities afforded by worldviews and beliefs).

Chapter 5 depicted the attempt to bridge these gaps through two interventions. The development and testing of the DIAL framework in the context of the 2020 Urban Resilience Summer School sought to explore how the gaps might be bridged in a problem-based learning environment. The study pointed to an overall reported improvement compared to the 2019 edition. However, further research is needed to explore the applicability of the DIAL framework beyond the context of problem-based learning.

The second intervention, the development and co-facilitation of the URCoP, depicted how informal communities of practice often operate in the liminal spaces between organisational boundaries, project, or coalition boundaries, professional identities, and community belonging. While, to date, there are few examples of informal resilience CoPs that have an external presence, it is essential to identify and learn from them for two reasons. Firstly, the different forms of power that unfold can have wide-ranging impacts and shape the quality of learning.

Secondly, because understanding the relationship between weak and strong interpersonal ties and how they correspond to the core of an informal CoP and its peripheries can shine a light on the enabling conditions that make transdisciplinary bridging possible. In the URCoP, a high density of weak ties creates a shared sense of accountability. It is a critical asset that enables an informal CoP to develop a wide variety of knowledge products and activities despite having no funding or institutional status or backing.

Figure 21 below reintroduces the visual summary of the knowledge-implementation gaps identified in ARC1 (Chapter 4) and situates the two interventions undertaken in ARC2 (Chapter 5), putting forward capacity building and social learning as ‘keystone’ processes in the process of bridging.

The interventions can be read as two nested levels:

- This research process set out to diagnose a problem situation and develop commensurate interventions to address it. The diagnosis of knowledge-implementation gaps, presented in Chapter 4, guided the nature of the intervention design, presented in Chapter 5, alongside the findings from the 2020 Urban Resilience Summer School and the URCoP.
- The first intervention (the Summer School) sought to support urban resilience professionals (researchers, practitioners, policymakers) to diagnose a problem situation of their choice and develop commensurate interventions to address it. They did so guided by the DIAL framework, which supported them in diagnosing the situation, imagining preferred alternatives, developing ideas and strategies for intervention, and proposing learning approaches. Reflective conversations aimed to support the professionals to reflect on what they are taking away from the problem-based learning environment and explore how they might integrate this learning into their day-to-day roles.

As Reynolds and Holwell note, “a skilled practitioner is someone who continually keeps alive the tension between practice and theory” (Reynolds & Holwell, 2010, p. 298). They further explain this as the “interplay between the problem situation, methodology, and practitioner-community in developing a systems approach to intervention” (Reynolds & Holwell, 2010, p. 298). As part of this process, I deployed first-person and second-person action research/practice (Reason & Bradbury, 2013) to support the knowledge claims arising from different levels:

- Through first-person (I) action research/practice, I sought to foster an inquiring approach to my life. In the research presented in this chapter, the first-person research/practice demonstrates both an ‘upstream’ orientation through seeking to clarify my intentions, ethics, and positionality as the inquirer. It also has a ‘downstream’ orientation as I seek to critically reflect on my behaviour and the gaps between espoused and enacted values and theories.
- Through second-person (us) action research/practice, I sought to inquire ‘face-to-face’ with others into issues of mutual concern, as the research participants were co-subjects – participating in the action that was being researched.
- The third-person (we) action research/practice sees the codification and dissemination of evidence and narratives through the present thesis. Third-person research/practice enables action research to go ‘beyond the single case’ through situating and discussing the evidence and narratives in relation to broader academic and practice discourses. It reflects on the inquiry process and presents it to a broader audience, such as you, the reader, or through presentations or conferences.

Figure 22 below depicts how I used first- and second-person action research to inform a systemic intervention approach.

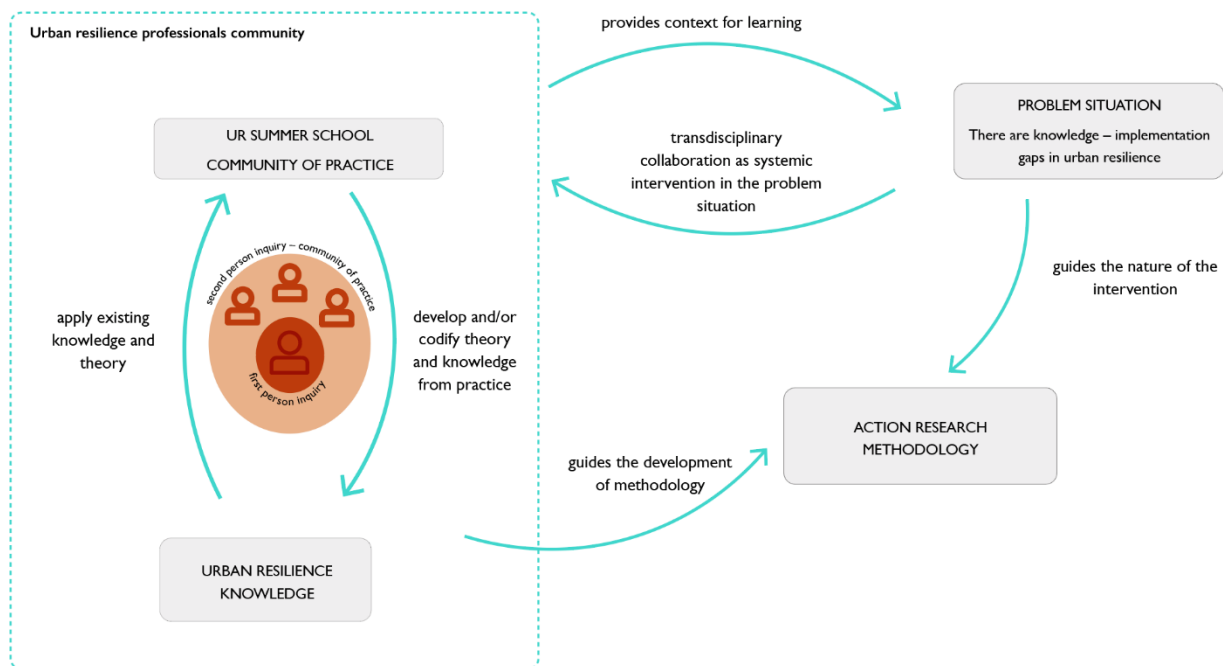


Figure 22. Mobilising first- and second-person action research as a systemic approach to intervening, building on Reynolds and Holwell (2010).

The process of theory building has been an exercise in navigating transdisciplinarity in the context of complexity through identifying, testing, and connecting threads across disciplines and within disciplinary branches – systems thinking, systems dynamics, design thinking, design futures, foresight, futures studies, organisational development, social learning, action research. As Montuori wrote

“The implications of complexity and transdisciplinarity go far beyond a set of tools for academic inquiry. They call for a reflection on who we are, how we make sense of the world, and how we might find ways to embody different ways of being, thinking, relating, and acting in the world.” (Montuori, 2013a, p. 184)

The systemic nature of resilience challenges and the transdisciplinary nature of their potential solutions requires the development of systemic capabilities and skills so as to embody the different ways of being and acting referenced above. Chapter 5 provided evidence on how learning systems as “systems capable of bringing about their continuing transformation” (Schön, 1973, p. 28) might be cultivated and how learning emerges from the interstitial level between the individual and the institutional ones – at the level of a community of practice. However, no individual, let alone a single organisation, can achieve high levels of mastery across all skills and competencies. Instead, the development of mastery posits that these different skills and competencies should be ‘held’ by different stakeholders as part of a learning system that spans the different levels and scales of the transdisciplinary interventions.

5.4 Chapter summary

This chapter has outlined the second action research cycle (ARC2, undertaken in 2020-21), which sought to develop specific interventions to address the problem situation as set out in the previous chapter. Section 5.1 of the chapter presented the context of the second Action Research Cycle (ARC2) and the data collection and analysis process. Section 5.2 presented the findings from the two critical interventions undertaken: designing and facilitating the 2020 edition of the IURA Summer School and co-developing and facilitating the Urban Resilience Community of Practice. Section 5.3 discussed the findings arising from the two interventions.

6.0 Concluding discussion

This chapter summarises the findings and conclusions of this research and outlines future research directions. Section 6.1 discusses the implications for evaluating interventions in complex problem situations; Section 6.2 summarises the key findings regarding the roles of social learning and capacity building. In contrast, Section 6.3 summarises the key findings and recommendations for urban resilience. Each of the three sections outlines the limitations of this research and identifies future research based on the study presented here. Lastly, Section 6.4 offers concluding reflections.

6.1 Evaluating interventions in complex problem situations

This research focuses on defining (Chapter 4) and intervening (Chapter 5) in a problem situation. This concluding section discusses the merit of two approaches for evaluating interventions in complex problem situations: evaluation in-action and of-action.

6.1.1 Evaluating processes and outcomes: evaluation *in*-action and of-action

Understanding what works and what does not is critical to tackling urban resilience knowledge-implementation gaps and avoiding maladaptation (Eriksen et al., 2021), as evidence suggests that the difference between incremental and transformational adaptation processes is enabled by the development of capacities, knowledge, and skills at individual and institutional scales, processes that underpin the course correction of strategies, agendas, and policies through monitoring, evaluation, and learning (MEL) (IPCC, 2022).

However, despite growing support for transdisciplinary collaboration as a set of approaches seeking to diagnose and intervene in complex problem situations and develop actionable knowledge, evidence of impact remains limited and difficult to gauge (Plummer et al., 2022). Determining whether progress has been achieved against an initial situational assessment requires understanding the performance improvement (through means and processes) and assessing outcomes (the contribution towards or the causal attribution of impact).

In the context of action research, a distinction is made between these two applications of evaluation: *of*-action and *in*-action, as “the former checks the worthiness of action research as an enterprise, whereas the latter portrays the techniques used to assess specific projects within that enterprise” (Piggot-Irvine & Bartlett, 2008, p. 9). Building on Chen’s (1996) four types of evaluation in action research, the Table below depicts the different kinds of evaluation concerning the research presented in this thesis.

Table 11. Types of evaluation used in this thesis, building on Chen's four types of evaluation in action research (1996).

Purpose Stage	<i>Improvement</i>	<i>Assessment</i>
<i>Process</i>	<u>Process–improvement evaluation</u> Evaluation <i>in-action</i> : undertaken as part of ARC1 (Chapter 4) and ARC2 (Chapter 5)	<u>Process–assessment evaluation</u> Evaluation <i>of-action</i> : identified as future research outside the scope of the present study
<i>Outcome</i>	<u>Outcome–improvement evaluation</u> Evaluation <i>in-action</i> : undertaken as part of ARC1 (Chapter 4) and ARC2 (Chapter 5)	<u>Outcome–assessment evaluation</u> Evaluation <i>of-action</i> : identified as future research outside the scope of the present study

Evaluation in-action portrays the different methods and approaches that can be used to support learning and improvement during and in between action research cycles. In the case of this study, different methods (as described in Section 3.3.1) were deployed to inform process and outcome improvements during and between the two cycles of action research (ARC1 and ARC2).

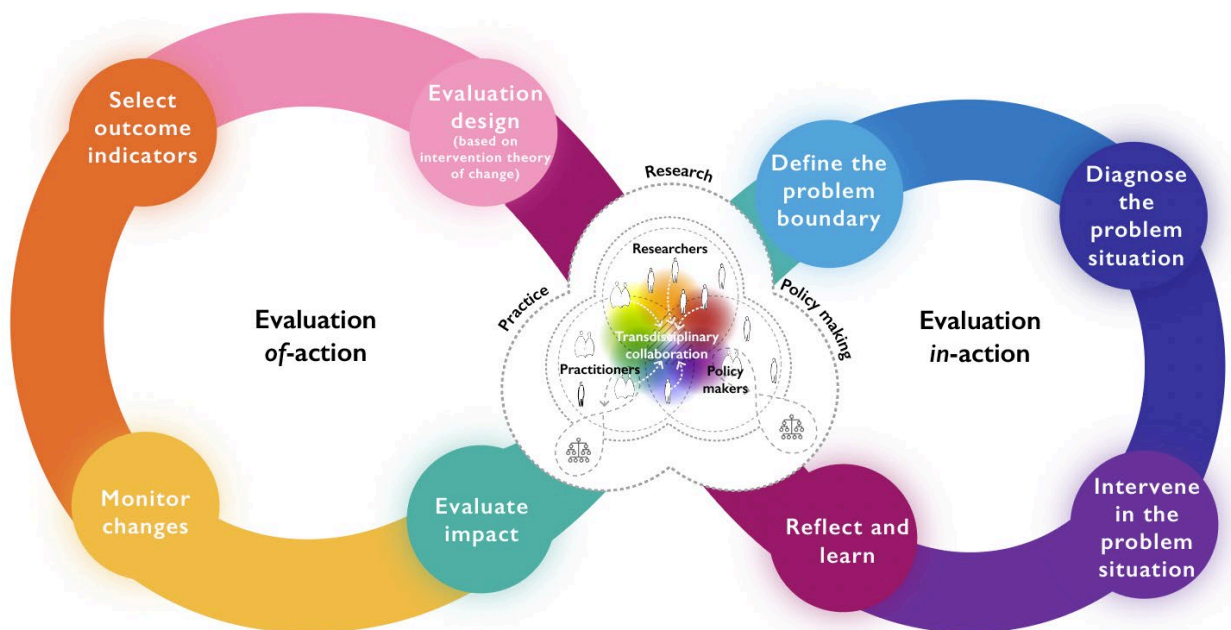


Figure 23. Evaluation in- and of-action in transdisciplinary collaboration.

The relationship between the two types of evaluation is depicted in Figure 23 above and put forward as a proposed guide for evaluating the process and outcomes of transdisciplinary collaboration. As demonstrated in the present study, defining the problem boundary (Chapter 2) and undertaking a diagnosis of the problem situation (Chapter 4) can inform interventions in the problem situation (Chapter 5), process supported by critical learning and reflection ('Reflections' sections part of Chapters 4 and 5). An evaluation of action would need to consider the intervention's theory of change (as set out in Chapter 5, Fig. 19), followed by selecting relevant outcome indicators, monitoring those indicators, and evaluating impact. The larger loop of evaluation of-action would then feed back to inform the further definition or

refinement of the problem boundary, thus initiating another loop of action research. This process follows the principle or guide-based evaluation (Patton, 2010, 2017) as it does not seek to prescribe specific concepts or variables that would indicate evaluation frameworks within the disciplinary efforts (Nilsen, 2015).

Due to the onset of Covid-19 and delays to the overall research timeline, an evaluation of-action has fallen out of the scope of the present study. The following section will discuss the temporal dimensions in evaluating whether knowledge–implementation gaps have been reduced, followed by future research directions regarding the evaluation of-action and identify implications for evaluating transdisciplinary collaboration.

6.1.2 Temporal dimensions in evaluating whether knowledge–implementation gaps have been reduced

As discussed in the previous section, as part of the present research only evaluation in-action has been possible (as illustrated in the right-hand side of Fig. 23 above). There are two reasons for this: firstly, because of the temporal dimension of intervening in resilience challenges (as summarised above); secondly, because of the temporal dimension of establishing the impact of social learning and communities of practice.

Due considerations of the temporal dimension are a noted weakness of communities of practice (Smith et al., 2017). Difficulties include choosing relevant criteria for evaluation and establishing what is seen as ‘success’ or ‘practice improvement’ in the context of a CoP, collecting and analysing relevant evidence, interpreting the evidence (including resisting the dominant paradigm of counterfactuals in impact assessment and the pursuit of determining causation, which is challenging in the context of a complexity paradigm), and ensuring that the different stakeholders involved in the pursuit of practice agreement agree with the overall assessment and the onward steps and recommendations that arise from the evaluation.

Smith et al. (2017) note that of the 41 CoPs assessed, few studies went further than focusing on the best-known elements of CoP development – joint enterprise, mutual engagement, and shared repertoire. The present research sought to expand from this focus in choosing to explore the role facilitation plays in knowledge brokering within a CoP, as well as the role of power in hindering or enabling the legitimacy of knowledge claims arising from a CoP and their wider knowledge and practice domain (in this case urban resilience). However, the temporal limitation of this research given by the duration of the PhD research does not allow for a fuller view as to whether the interventions undertaken in ARC2 have met their original aim – that of bridging knowledge–implementation gaps in urban resilience.

The importance of working with and for different time horizons and paces of change surfaced as a recurring theme throughout the research. The peer reviewed scoping study (Angheloiu & Tennant, 2020) points to the importance of building both short-term responsive capacities and longer-term transformational ones, while being aware of the feedback loops being set in place which might strengthen

the former but weaken the latter (Coaffee et al., 2018; DeVerteuil & Golubchikov, 2016; Gorissen et al., 2018; Masnavi et al., 2019; Mendizabal et al., 2018; Rogov & Rozenblat, 2018; Sanchez et al., 2018). The tendency to discount the future further adds to tensions surrounding the temporal focus of change initiatives (Sanchez et al., 2018) meaning that concepts which should be aligned on outcomes (such as resilience and sustainability) implement contradictory, or even competing measures (Zhang & Li, 2018).

The research undertaken in ARCI and ARC2 has uncovered the dynamics leading to the issues above. Different knowledge communities of researchers, practitioners, and policymakers are driven by different time horizons, incentives, and success factors. Academia is driven by pressures to publish and attract research funding, which discourage interdisciplinary research and reinforce disciplinary silos. Open access to peer-reviewed knowledge for practitioners and policymakers is lacking, which means that implementation is not always informed by the latest research. Confidential client reports also contribute to challenges in knowledge transfer and capacity development. These differences in incentives and drivers can lead to misunderstandings and challenges in prioritising project objectives. Day-to-day drivers of projects and interventions are driven by the agendas and mandates that emerge from political election cycles, while researchers and practitioners focus on time horizons determined by the duration of their funding.

The challenges of determining whether transformative change, or triple-loop learning, has taken place are exemplified by evaluation challenges between in-action and of-action. Returning to the concept of loop learning introduced in Chapter 3, integrating both evaluation in-action and of-action provides the opportunity to draw on single- and double-loop learning depending on the scope and nature of the problem situation. As Argyris notes, single-loop learning occurs “whenever an error is detected and corrected without questioning or altering the underlying values of the system”. In contrast, double-loop learning occurs “when mismatches are corrected by first examining and altering the governing variables and then the actions” (Argyris, 1999, p. 68).

As such, single-loop learning is posited to take place as part of evaluation in-action, as course-correcting actions emerge to improve the given intervention without necessarily questioning the nature of the intervention itself. Double-loop learning is posited to occur as part of the process of evaluation of-action through gaining an understanding of the ways the given interventions are altering (or not) the factors and drivers that contribute to the initial problem situation.

Incorporating process and outcome improvements and assessments in transdisciplinary collaboration is vital to understanding what works, when, and why (Plummer et al., 2022). Building on the different types of evaluation and single- and double-loop learning, future research is required to further investigate whether and how they can contribute to the ‘transformative’ aims of triple-loop learning (Exter & Ashby, 2021; Porzecanski et al., 2022).

The dual application of evaluation bears implications for how such studies are designed and undertaken, as the process and outcome both play a critical role in shifting governance and decision-making from ‘what worked?’ to ‘what will work?’ (Beauchamp et al., 2022). In the context of complex problem situations, the following concepts are identified as relevant to the evaluation of-action:

- Feedback loops: through creating links between the outcomes of an intervention and the improvement of strategies and decision-making going forward).
- Trade-offs: the compromises between desirable but incompatible factors that are not attainable simultaneously within the existing situational parameters).
- Synergies: the potential for increased effectiveness from coupling different interventions within the same implementation process).
- Unintended consequences: unanticipated effects that arise from an intervention (Beauchamp et al., 2022).

This presents an evolution from traditional understandings that portray evaluation as providing “decision-makers with information about the effectiveness of some program, product or procedure” (Caldwell & Spinks, 1988, p. 142). In the context of implementation, evaluation practices are often used to judge the merit and worth of a programme through defensible criteria, as the evaluator seeks to assess goal attainment, outcomes, and types of impact (Fitzpatrick et al., 2011). For example, frameworks such as the OECD DAC Evaluation Criteria of relevance, coherence, effectiveness, efficiency, impact, and sustainability are widely used in evaluating international development interventions (OECD, 2021).

Traditional impact evaluation is concerned with establishing the “causal effects that result from an intervention” (Plummer et al., 2022, p.956), usually involving a counterfactual assessment that considers what happened because of the intervention and what would have happened in its absence (Ferraro & Hanauer, 2014). However, evaluating the impacts of interventions in the context of complex problem situations is presented with multiple challenges, such as incomplete information, lack of a clear problem definition, diverging or conflicting stakeholder agendas, multi-causality, and interconnectedness, (Rittel & Webber, 1973) as well as the challenge of understanding and evaluating self-organisation, emergence, and cross-scale effects (Connick & Innes, 2003; Plummer et al., 2017).

As transdisciplinary collaboration is experiencing considerable growth in peer-reviewed studies (Brandt et al., 2013), future research directions should investigate how to reconcile the approaches above – complexity-informed and traditional intervention evaluation to ascertain if progress towards resilience is being made through transdisciplinary collaboration (building on Blackstock et al., 2007; Buizer et al., 2015; Wiek et al., 2012).

6.2 Summary of findings on the roles of capacity building and social learning

6.2.1 Beyond capacity building, towards learning systems: the potential and limitations of systems approaches and social learning

This research set out to develop and apply a framework for training urban professionals in systems approaches and to explore how social learning can support the longer-term learning process beyond a one-off capacity building experience. The scope of these was informed and further defined through the literature review contained in Chapter 2.

The review found that urban resilience implementation is hindered by a lack of skills and capacity across individual, community, and institutional scales, as professionals are seen to lack experience working in transdisciplinary work environments (Doyle et al., 2017). At the institutional level, there is a lack of capacity for implementation, which results from a lack of access to information, limited resources, and unclear institutional mechanisms for decision-making (Handayani et al., 2019).

The literature identifies the need for further research to investigate how adaptive capacity skills can be built in multi-disciplinary and multi-professional environments (Coaffee & Clarke, 2015), as well as a better understanding of the role social learning and self-organisation in improving individual as well as institutional capacities in urban resilience (Zaidi & Pelling, 2015).

Complementing the literature review (Chapter 2), the first action research cycle (ARC1) sought to understand how urban resilience researchers, practitioners, and policymakers experience urban resilience knowledge-implementation gaps and how they believe these occur (Chapter 4). From these investigations, three key themes emerge:

- 1) Capacity for who?
- 2) Capacity for what?
- 3) From capacity building to learning systems.

In response to the three themes, the second action research cycle (ARC2) charts two interventions undertaken to test how capacity building could be improved and integrated with social learning approaches: the design and facilitation of the 2020 edition of the International Urban Resilience (IURA) Summer School and co-developing and facilitating the Urban Resilience Community of Practice during 2020-2021 (Chapter 5). The key challenges, findings, limitations, and future research for each theme are summarised below.

Capacity for who?

Key challenges identified in the literature review and interviews (ARCI)

Across the literature review and ARCI, urban resilience capacity building efforts rest on prevailing assumptions of unidirectional knowledge transfer at two levels:

1. Urban resilience knowledge is predominantly generated by researchers and transferred to practitioners and policymakers; and
2. Urban resilience knowledge is predominantly generated through research on and from the Global North and transferred to the Global South.

Both findings point to structural biases in knowledge productions systems (Muñoz-Erickson et al., 2021; Nagendra et al., 2018; Sitas et al., 2021) and to a mismatch between where the majority of urban residents live – in Global South cities (UN Population Division, 2018) – and where and by whom knowledge about urban resilience is produced – from and on Global North cities (Sitas et al., 2021; Wang, 2022).

Key findings from interventions (ARC2)

1. Enabling South-South and South-North knowledge translation and brokering is an active process that requires considerations of equity and inclusivity as core parts of both capacity building curriculum and logistics. For the 2019 edition based in Copenhagen, the curriculum was designed around the problem case of proposing resilience actions for a local neighbourhood. Global South participants were offered partial or complete fee waivers, though they still had to cover travel expenses and accommodation and undergo lengthy visa processes. This presented a key limitation to the need for more demand-driven and localised capacity building. The 2020 edition was facilitated online due to Covid-19 restrictions, which provided the scope for participants to decide on an urban problem case of their choice. (Section 5.2.1)
2. Informal communities of practice can enable transdisciplinary collaboration and knowledge co-production. They operate in the liminal spaces between organisational boundaries, project, or coalition boundaries, professional identities, and community belonging. In the case of the urban resilience community of practice (URCoP), peer learning supported practitioners in codifying their knowledge. It enabled transdisciplinary collaboration, resulting in co-developed knowledge products (for example, the Urban Resilience Dialogues podcast and blog series or book chapters such as Dutton et al., 2020). Facilitation and trust building were key enablers of knowledge translation and brokering. However, imbalances manifest regarding recognition and the control of agendas or territories beyond the boundary of the URCoP, as its informal status becomes a potential hindrance when it comes to asserting legitimacy. (Section 5.2.2)

Limitations and future research

1. Firstly, the participants were all self-selected ‘mid-career’ – defined by the IURA organisers as professionals with 5-10 years of professional experience. The reasoning behind this choice is that mid-career professionals tend to be the least supported by further professional development programmes (that usually focus on either leadership development or executive coaching for senior leaders or on early career support graduate programmes and mentoring). Meanwhile, mid-career

professionals face increased managerial responsibilities while retaining project delivery responsibilities. Therefore, the study does not represent early career or senior or elite-level perspectives. Future research should explore how the challenges manifest at different seniority levels and seek to create integrated interventions across the entire lifecycle of professional development – from early career to senior leadership (Harvey et al., 2022; Kucharska & Rebelo, 2022; Masenya, 2022).

2. Secondly, regarding equity and inclusivity considerations as part of capacity building curriculum and logistics, both tested routes (in-person in Copenhagen, online) present advantages and drawbacks. A key limitation of the capacity building curriculum is presented by the lineage of the methods, tools, and approaches derived from predominantly Northern epistemologies. This reflects the disciplinary roots of the fields that informed the process design (systems thinking, design thinking, futures studies) and the positionality of the organising and design team. Future research must explore, develop, and test tools, methods, and approaches stemming from Southern epistemologies. Further research and iteration of capacity building programmes and communities of practice should explore how funding flows and institutional partnerships can be developed to enable South-South and South-North learning partnerships (Dannecker, 2022; Kim & Lee, 2022; Woldegiyorgis et al., 2022).
3. Lastly, given that the focus of the participant selection criteria was on ‘professionals’ (and indeed, action research and social learning draw roots from the focus on professionals), a key limitation of this research is presented by a lack of consideration of how local and traditional knowledge can be rightly valued and integrated. There is a proliferation of capacity building programmes and communities of practice aimed at ‘professionals’, which face the danger of reproducing harmful power asymmetries that uphold historical patterns of marginalisation and exclusion in knowledge production processes. Future research must explore how to rightly integrate traditional and local knowledge and its keepers into capacity building and social learning processes. Research is needed to understand what skills, competencies, and capacities they need, as well as how to broker spaces for shared inquiry and knowledge co-generation (Avilés Irahola et al., 2022; Druker-Ibáñez & Cáceres-Jensen, 2022; Karrasch et al., 2022).

Capacity for what?

Key challenges identified in the literature review and interviews (ARCI)

1. Capacity building efforts focus predominantly on propositional knowledge, or *know-that*, and rarely integrate procedural knowledge or *know-how*. In the instances where procedural knowledge features as part of learning objectives, the focus is predominantly on areas such as project management, accessing and managing finance, communications, or reporting rather than on skills and competencies such as facilitation, process design, negotiation, or critical reflection.

However, the literature and interviewees recognise them as desirable outcomes from capacity building experiences.

2. While skills and competencies regarding systems approaches are highlighted as a potential enabler of transformational change in adaptation and resilience (IPCC, 2022), only one such capacity building programme open to any urban professionals was identified as part of the scoping undertaken in 2018-2019 – the IURA Summer School.

Key findings from interventions (ARC2)

1. As the capacity building programme was designed around a problem-based environment, learners were found to have developed skills associated with systemic capabilities Diagnose (diagnosing urban resilience challenges) and Imagine (imagining alternative pathways). At the same time, less evidence pointed to developing skills associated with Act and Learn (proposing interventions and developing monitoring, learning, and evaluation approaches) (Section 5.2.1).
2. Developing systemic capabilities from a low maturity to a high maturity of skills requires more than a one-off capacity building experience. As participants in such training programmes return to their day-to-day work environment, they face considerable barriers to applying new approaches and continuing to develop their skills. These include a lack of managerial support, a lack of formal recognition of their new abilities, and structural barriers presented by the parameters of existing work programmes and organisational strategies. The participants who return to their work duties with proposals for change or improvement are seen as ‘disruptors’ rather than ‘intrapreneurs’, as the pull of organisational culture outweighs the push of the individual pursuits (Section 5.2.1).
3. Building accountability for learning and critical reflection through trust building and belonging in informal spaces such as communities of practice can be particularly helpful when organisational or managerial drivers do not enable this. The regular learning and reflection rhythm of the URCoP was highly valuable to the most active participants, who highlighted the importance of trusted reflection spaces outside of one’s organisation. However, there is a danger that such spaces reinforce the ‘refugees in sanctuaries’ narrative (Norton et al., 2022), and further research is required to explore how transdisciplinary CoPs can better support members to challenge the status quo of their organisations (Section 5.2.2).

Limitations and future research

1. The first finding points to potential limitations of problem-based learning environments with heterogenous sets of participants as urban resilience requires localised interventions. Further iterations and testing of different formats are needed to establish the optimum balance between learning objectives, format, duration, the scope of the problem-based brief, curriculum design, and participation criteria. For example, the potential limitation regarding heterogeneous sets of participants could be further tested through a version of the programme in which two-three

participants from a place-based multi-stakeholder collaboration join as a tandem or triad (the participation criteria could focus on different sectors, for example, one researcher, one local government representative, and one practitioner who already collaborate as part of an urban resilience project to join as a triad), or delivering the programme for an entire place-based implementation team and their local partners.

2. The limitations of the second and third findings are given by the duration of the research, the sample size of CoP participants, as well as practical challenges of following the learning trajectories and decision-making of individuals as the URCoP grew in numbers. The in-depth participant observation as part of the URCoP focused on the core governance group (10-15 CoP members between 2020-2021), a limited sample size considering the membership grew from 25 to over 200 professionals during the research period). Further research is needed to better understand the evolving motivations and professional trajectories of the members who volunteer as part of the core governance group (Wang et al., 2021). For example, the findings indicate that members volunteer because the active involvement in the URCoP satisfies needs (such as agency, belonging, solidarity) that are not met as part of their day-to-day professional environment, and only secondly because it helps members to solve problems, improve their practice, or codify knowledge. However, as the URCoP matures and grows in numbers and as members change roles or organisations, further research should seek to understand how these motivations evolve and their implications for the CoP governance and event programming, as well as for the effectiveness of activities undertaken.

From capacity building to learning systems

Key challenges identified in the literature review and interviews (ARCI)

1. Urban resilience capacity building efforts predominantly focus on upskilling individuals as the learning unit through one-off training programmes centred around problem-based learning pedagogy. Sustaining the learning process once individuals return to their day-to-day professional context and how it can advance organisational learning and institutional capacity building presents a notable gap in training programmes. These predominantly operate a 'pay to play' business model, which means that only a few professionals can benefit due to limited organisational budgets and time allocated by employers for professional development.
2. What transdisciplinary learning systems might look like "in practice" and how we might build the capacities and capabilities for systemic approaches at scales that vary from the individual to the organisational and 'whole-of-society' is 'unclear' in the context of limited empirical evidence or practical examples (IPCC, 2022).

Key findings from interventions (ARC2)

1. The systemic nature of resilience challenges and the transdisciplinary nature of their potential interventions and solutions requires the development of systemic capabilities and skills. However, no individual, let alone a single organisation, can achieve high levels of mastery across all skills and competencies. Instead, the development of mastery posits that different stakeholders should hold these different skills and competencies as part of a learning system that spans the different levels and scales of the transdisciplinary interventions. (Section 5.2.1)
2. Transdisciplinary communities of practice can provide a missing learning link between the individual and institutional scales. This research provides evidence of the need to integrate social learning as a core part of capacity building and institutional strengthening processes. As adaptation and resilience capacity building and learning have been historically underfunded (Revi et al., 2014), despite increasing evidence of the high benefit-cost ratio (Global Centre on Adaptation, 2021), this research identifies how different learning scales – from the individual to the organisational – might be ‘stitched’ together through transdisciplinary communities of practice (Section 5.2.2).
3. Facilitation plays a key role in expanding the unit of learning from the individual to a transdisciplinary audience and emerging community of practice. As key connectors, translators, and community builders, the role of facilitators is far from neutral. It requires critical reflection and a continuous interrogation of the forms of power enabled in the learning system. However, unlike traditional understandings of facilitation as a way of simplifying or making things more accessible, the types of facilitation in transdisciplinary bridging require stepping outside comfort zones to interrogate deeper assumptions and beliefs. Different facilitation roles emerge from this context: knowledge broker, environment creator, process designer, quiet convenor, pollinator, mirror, thermostat, and norm authoriser (Section 5.2.2).
4. Enabling the shift from the individual as the unit of learning to a transdisciplinary community as the unit poses implications for assessing the quality and depth of learning. This presents significant challenges for both the evaluation *in-action* and *of-action*, as their design needs to consider the second-order effects of learning. Indicators such as the number of new collaborations and knowledge co-production processes and products emerge from the learning community need to be considered in relation to tracking ripple effects – for example: Are there improvements or changes in the work environments (organisational policies or norms, projects, programmes) of the individuals who are part of the learning community? What enablers contribute to the improvements, and what role (if any) does the transdisciplinary learning community play? What ongoing challenges emerge, and how might the learning community address them? What feedback loops, synergies, trade-offs, or unintended consequences emerge? Given the complexity of these questions and the need for sufficient time horizons for interventions to enable structural and systemic change, significant challenges remain with regard to the assessment of triple-loop learning (Section 6.1).

Limitations and future research

1. This research has focused on mid-career urban resilience professionals in the context of a capacity building programme and an ensuing volunteer-run, informal community of practice. Two key limitations arise from this boundary. Firstly, the limited evidence of second-order effects of learning (changes in work environments – projects, programmes, organisational policies or norms) could reflect limits to the decisional power of mid-career employees. Further research over longer time horizons and across different scales (individual – CoP – organisational) is required to better understand how triple-loop learning might be enabled (Exter & Ashby, 2021). Secondly, as members of the URCoP participate as individuals and volunteers, there is no mandate or permission from their employer to participate. While this research has shed light on how informal transdisciplinary CoPs can emerge, grow, and mature, a key limitation is that this trajectory does not represent institutionally hosted CoPs that often require organisational and not just individual affiliation. Further research is needed to understand the similarities, differences, and potential synergies between governance models and CoP participation criteria (Angheloiu et al., forthcoming).

6.2.2 Developing systemic capabilities – a theory in progress

The present research has developed and tested the DIAL framework to support professionals in taking systems approaches to urban resilience challenges through building skills across three capability areas:

- 1) Diagnosing dynamics within a system of interest.
- 2) Imagining alternative pathways.
- 3) Acting and learning to continuously improve interventions.

Figure 24 below presents the updated DIAL (Diagnose, Imagine, Act & Learn) framework of skills and competencies for systems approaches based on the findings from the development and testing undertaken in ARC1 and ARC2 (Sections 5.2.1 and 5.2.2).

The iterated framework depicts the grey area of low maturity at the centre as a visual metaphor for the starting position. A 'novice' learner might be unable to distinguish between the different skills and competencies and their associated tools, methods, or approaches. Instead, they would feel lost in a grey fog. Over time, the different skills and competency areas become easier to distinguish as different hues as the learner sharpens their practice and gains confidence in deploying different tools, methods, or approaches in different contexts.

As the learner advances their skills, the notion of systemic mastery (Senge, 2006) manifests through the epistemic humility of realising the gaps and limits of their knowing (Walker & Martinez-Vargas, 2020) and developing critical reflexivity in understanding how the mastery of systemic capabilities might be distributed and cultivates across an entire learning system, rather than seen as a solely individual pursuit.

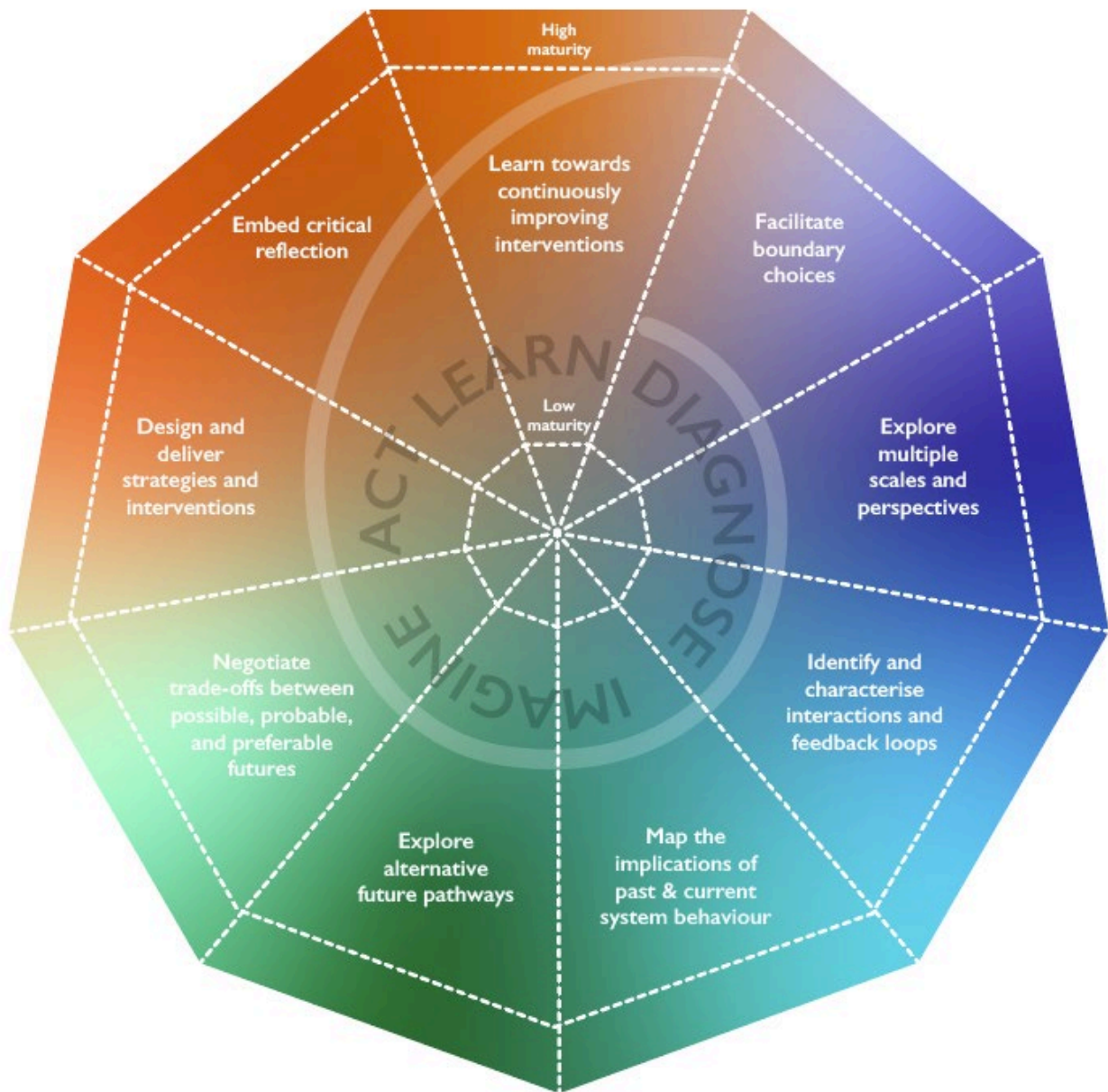


Figure 24. The DIAL framework: skills and capabilities for systems approaches.

The updated DIAL framework accompanies the findings presented in this section about the role of capacity building and social learning in complexity and transdisciplinarity. While it does not offer a step-by-step process, a recipe, or a guidebook, it seeks to set out a map of a territory of systemic capabilities that could be nurtured across different scales (individual, CoP, organisational and beyond), as indicated by the testing and development undertaken in this research.

6.3 Summary of findings on urban resilience

6.3.1 Shifting global context of resilience: evolution during the period of this research

Over the four years of research (2018-2022), the world has changed dramatically. The onset and ongoing waves of the COVID-19 pandemic, alongside new wars as well as protracted conflict, rapid biodiversity decline, and an increase in the frequency and intensity of extreme weather events, are all creating compounding crises that are increasing the exposure of people, communities, assets, and systems to hazards and risk previously unrecorded (UNDRR, 2021).

As the frequency and intensity of shocks and crises have been increasing, the adaptation and resilience agenda has been gaining prominence in global policy fora, as well as in the discourse of political leaders. Before COP26 (which took place in 2021 after a year of postponement due to the onset of Covid-19), adaptation was only featured on the formal agenda under the technical reporting work of the Adaptation Committee (UNFCCC, n.d.). During COP26, adaptation and resilience rose on the agenda, featuring highly in both the formal negotiations, as well as in the campaign demands of non-state actors, with adaptation finance widely seen as a key priority (Angheloiu & Bickersteth, 2021), as the provision for low and middle-income countries is insufficient given worsening climate impacts.

Launched during COP26, the UNEP 2021 Adaptation Gap Report (AGR) (UNEP, 2021) provides evidence that adaptation finance needs are five to ten times greater than current finance flows and that the gap has been widening since the previous 2020 AGR due to an increase in adaptation costs and needs, while funding flows have remained stable or decreased. Indebtedness, which has only increased during the COVID-19 pandemic, presents an additional challenge, which has seen states and negotiation blocks as well as non-state actors expressing the need for grant-based rather than loan-based adaptation finance.

The 2021 AGR also found that adaptation and resilience considerations are increasingly embedded in policy processes, with around 79% of countries adopting at least one national-level adaptation planning instrument (UNEP, 2021). Beyond the formal climate negotiations that have restarted following the 2020 hiatus, the role of non-state actors in enabling resilience (such as the private sector, investors and financial actors, civil society, academia, cities and regions) has come increasingly into focus (Angheloiu & Bickersteth, 2021). This has partly been facilitated by the launch of the Race to Resilience (UNFCCC, 2021), a global campaign launched by the UNFCCC in 2021 to accompany the previously launched Race to Zero, which focused on mitigation. The Race to Resilience aims to “catalyse action by non-state actors that builds the resilience of 4 billion people” (UNFCCC, 2021) by focusing on urban, rural, and coastal areas.

Alongside the mainstreaming of the adaptation and resilience agenda, Loss and Damage, the term that refers to the impacts of climate change that we cannot adapt to, has emerged as a key focus of the COP26 negotiations. The term had been recognised since the 2015 Paris Agreement as the ‘third pillar’ of climate

policy and international cooperation alongside adaptation and mitigation (UNFCCC, 2015); however, no standalone funding mechanism has been agreed to.

Feeding into the evidence-gathering, advocacy, negotiation, and mainstreaming processes in the build-up between COP milestones, another significant event for the global resilience agenda took place in 2021 – the Innovate4Cities conference, organised by the Global Covenant of Mayors, UN-Habitat, and the IPCC. The Innovate4Cities event built on the 2018 Edmonton Cities and Climate Change Science Conference and the resulting Global Research and Action Agenda (GRAA) on Cities and Climate Change Science (Prieur-Richard et al., 2018), which informed the original premise and scoping of this research.

The Innovate4Cities 2021 Conference focused on charting progress since the 2018 GRAA and set out critical gaps through a ‘stocktake of progress’ in evidence-based knowledge products to inform the preparation of the 7th assessment cycle’s Special Report on Climate Change and Cities (Walsh et al., 2022).

The proceedings identify the following areas that are relevant to the pursuit of bridging knowledge-implementation gaps: 1) a ‘change in mindset’ towards ensuring implementation processes are ‘people centred’, ‘systems informed’, and that instead of focusing on the current status of cities, new ‘visions of the future’ are developed; 2) ‘tools and processes’ for closing the implementation gaps, namely ‘participation, partnership, finance, capacity building, and research’ (Walsh et al., 2022).

The Innovate4Cities presented a key milestone on the road to developing a Summary for Urban Policymakers (SUP), which was consequently launched in November 2022 at COP27. The summary series includes a report on *What the Latest Science on Impacts, Adaptation and Vulnerability means for Cities and Urban Areas*, distilled from the Sixth Assessment Report of the IPCC Working Group II (IPCC, 2022). It highlights that

“Peer-reviewed monitoring and evaluation of government-led urban adaptation is largely missing, even if it is captured and updated by global city networks or related NGOs. Important gaps in instrumental knowledge include: event loss and damage data; city-relevant climate data; and data on adaptation experiments within and between governments, as well as including civil society and the private sector. There are also key gaps in inclusive knowledge, or who’s asking and who’s answering. Finally, key knowledge gaps remain concerning the systems transitions themselves, such as: understanding urban decision-making support systems including the functioning of multi-level governance; monitoring and evaluation of adaptation projects, programmes, and spontaneous actions; and opportunities for peer-to-peer learning from local to international exchanges.” (Adelekan et al., 2022, p. 14)

The findings quoted above corroborate three of the five gaps identified and discussed in Chapter 4: the epistemic gap (“inclusive knowledge”; “gaps in instrumental knowledge”), the methodological gap (“peer-reviewed monitoring and evaluation”), and the multiscale gap (“understanding multi-level governance”;

“peer-to-peer learning from local to international”). The findings resulting from this research provide evidence towards two additional gaps: a definitional gap (a lack of consensus over the meaning of urban resilience) and a values gap (resilience for whom, for when, and for where is a process of negotiation between competing priorities afforded by worldviews and beliefs).

6.3.1 Summary of key findings and recommendations

This research explored the role of systems approaches in bridging urban resilience knowledge-implementation gaps through an action research methodology. It built on previous scoping work (Angheloiu & Tennant, 2020) and a decade of professional experience as urban practitioner and researcher. The objectives of this thesis were to investigate the gaps between knowledge and implementation in urban resilience and to test how building the capabilities of urban professionals to think and act systemically might bridge the gaps identified.

The thesis consists of two main parts: defining the problem situation and intervening to improve it. The first part contains the review of academic literature (Chapter 2) and the design of an empirical study (Chapter 4) to investigate current urban resilience knowledge-implementation gaps, how they occur, and how they might be bridged. The second part charts two interventions to improve the problem situation (Chapter 5). The first consisted of designing and facilitating a capacity building programme in collaboration with the International Urban Resilience Academy (2020). The second was formed by initiating and facilitating a community of practice (2020-21). Both interventions were aimed at mid-career urban resilience researchers, practitioners, and policymakers.

The summary of findings from this research is presented in two tables as follows:

- Table 12 situates the key findings from this research in the context of the landmark reports introduced in the previous section: from the 2018 GRRAA and the 2021 Innovate4Cities proceedings.
- Table 13 summarises the urban resilience knowledge-implementation gaps identified through the literature review and complemented by the primary research undertaken in ARCI, the key findings resulting from the interventions conducted in ARC2 that sought to address these gaps, as well as resulting implications and onward recommendations.

Table 12. An overview of 2018 GRRAA findings, 2021 Innovate4Cities findings, and findings from this research regarding the role of systems approaches in enabling transformative urban change towards adaptation and resilience.

Global Research and Action Agenda, Cities and Climate Change Science Conference, 2018 (Prieur-Richard et al., 2018, p. 3)	Innovate4Cities Identified Gaps, 2021 (Walsh et al., 2022, p. 29)	Key findings arising from this research
“Knowledge is needed on how to use a holistic approach to capture and weave together or integrate diverse	“Research is needed to better understand how to effectively design urban climate goals and actions that	Transdisciplinary collaboration and knowledge co-production between South-South and South-North is an

forms of knowledge and data from a wide range of sources and perspectives.”	take on a systems approach by incorporating the multiple, locally specific climate and societal problems and pressures and the perspectives of different actors in cities.”	active process that requires considerations of equity and inclusivity as core parts of both capacity building curriculum and logistics. (Section 5.2.1) Communities of practice can enable transdisciplinary collaboration and knowledge co-production in the context of urban resilience. (Section 5.2.2)
“Systems knowledge is needed on important interactions, interdependencies, and resource flows between natural, built and social systems, and between urban areas and the rural hinterlands.”	“Further information is needed on how city systems and systems of cities operate at different scales from the neighbourhood scale to metropolitan regions and how this impacts regional and national scale decision-making and the implementation of climate change mitigation, adaptation and resilience solutions.”	Advancing systems knowledge requires the development of systemic capabilities from a low maturity to a high maturity and across different scales – individual, institutional, as well as the interstitial scale of transdisciplinary communities of practice. (Section 5.2.1)
“Advancements in action-oriented research are needed, focusing on multiple impacts, assessing how uncertainty can be reduced, providing options for transformative climate action plans, and highlighting co-benefits for achieving the SDGs and other global agendas, within the context of rapid urbanisation.”	“Further work is needed to bring together different ways of thinking which currently contribute to how cities are built and shaped such as ecological placemaking, design and participatory planning to build new creative approaches and ways to think and plan a city system which increase resilience to climate change while also providing important co-benefits particularly for marginalized and vulnerable groups.”	Transdisciplinary communities of practice can provide a missing learning link between the individual and institutional scales. This research demonstrates the need to integrate social learning as a core part of capacity building and institutional strengthening processes, as well as the need to consider the different forms of power that are exercised in the process. (Section 5.2.2) Facilitation plays a key role in transdisciplinary bridging through expanding the unit of learning from the individual to the learning system (in this case the transdisciplinary community of practice). (Section 5.2.2) Enabling the shift from the individual as the unit of learning to a transdisciplinary community as the unit poses implications for how the assessment of quality and depth of learning might be undertaken. (Section 6.1.1)

The table above depicts the relationship between the 2018 GRRAA, the 2021 Innovate4Cities proceedings, and the findings arising from this research. Firstly, in response to the GRAA-identified gap on a holistic approach to capture and integrate diverse forms of knowledge, and the gap consequently identified by Innovate4Cities on incorporating the multiple perspectives of different actors in cities, this research has demonstrated how communities of practice can enable transdisciplinary collaboration and knowledge co-production in the context of urban resilience (Section 5.2.2). It has also shown how transdisciplinary collaboration and knowledge co-production between South-South and South-North is an active process that requires considerations of equity and inclusivity as core parts of both capacity building curriculum and logistics (Section 5.2.1).

Secondly, in response to the GRAA-identified gap regarding the need for systems knowledge and the Innovate4Cities-identified gap on how urban systems interact with regional and national scale resilience decision-making and implementation, the findings from this research demonstrate that advancing systems knowledge requires the development of systemic capabilities from a low maturity to a high maturity and across different scales – individual, institutional, as well as the interstitial scale of transdisciplinary communities of practice (Section 5.2.1). This finding has important implications for how ‘systems knowledge’ is developed and how urban stakeholders are supported to develop capabilities for systems-informed interventions.

Lastly, in response to the GRAA identified gap regarding the need to advance action-oriented research and the Innovate4Cities identified gap on the need to bring together different ways of thinking which currently contribute to how cities are built and shaped, the findings from this research demonstrate how transdisciplinary communities of practice can provide a missing learning link between the individual and institutional scales (Section 5.2.2). The findings indicate that facilitation plays a key role in transdisciplinary bridging (Section 5.2.2) and pose implications for assessing the quality and depth of learning. (Section 6.1.1). Taken together, these findings pose implications for how institutional strengthening takes place, as this research demonstrates the need to integrate social learning and capacity building as a core part of these processes.

The table below situates the key findings introduced above in the context of knowledge-implementation gaps identified through the literature review (Section 2.1.2) and complemented by the primary research undertaken in ARCI (Chapter 4).

Table 13. Summary of key findings and recommendations.

Gap	Key findings from ARCI	Outcome/Consequence	Key findings from ARC2	Recommendations
Definitional gap	Lack of consensus over the meaning of 'urban resilience' (Section 4.2.1)	Challenges around the term's intangibility, transferability, and normativity lead to diverging applications.	Informal communities of practice can enable transdisciplinary collaboration and knowledge co-production. This process can create spaces for the negotiation of meaning, the translation of knowledge, and the development of a shared understanding between different stakeholders (practitioners, researchers, policymakers). (Section 5.2.2)	Diversify the urban resilience knowledge base through learning networks (such as communities of practice) and knowledge codification specifically aimed at practitioners, researchers, and policymakers in small- and mid-sized Global South cities. Embed social learning approaches as a core part of urban resilience projects and programmes.
Epistemic gap	Complexity of integrating and valuing transdisciplinary evidence-based and practice-based knowledge (Section 4.2.2)	Differences in how the process of knowledge creation is perceived and challenges surrounding transdisciplinary and inter-sectoral collaboration lead to a lack of integrative approaches to urban resilience.	Transdisciplinary communities of practice can provide a missing learning link between the individual and institutional scales. This research demonstrates the need to integrate social learning as a core part of capacity building and institutional strengthening processes, as well as the need to consider the different forms of power that are exercised in the process. (Section 5.2.2)	Create additional incentives for practitioners and policymakers to codify practice-based knowledge, for example through linking knowledge codification to professional development targets and project and programme funding. Include active considerations and interrogations of the forms of power exercised in the process of capacity building and institutional strengthening.
Multiscalar gap	Lack of skills, capabilities, and resources required at different scales to operationalise urban resilience (Section 4.2.3)	The lack of skills, capabilities, and resources required at different scales creates friction in the operationalisation of urban resilience and hinders the scaling of implementation.	The systemic nature of resilience challenges and the transdisciplinary nature of their potential interventions and solutions requires the development of systemic capabilities and skills. (Section 5.2.1) Enabling South-South and South-North knowledge translation and brokering is an active process that requires considerations of equity and inclusivity as core parts of both capacity building curriculum and logistics. (Section 5.2.1)	The development of systemic skills and capabilities needs to be held by different stakeholders as part of a learning system that spans the different levels and scales of the transdisciplinary interventions. Develop demand driven, localised capacity building learning experiences that encompass ongoing social learning through transdisciplinary communities of practice. Consider issues of access and funding as core to ensuring equity and inclusivity.
Methodological gap	Lack of methods to account for uncertainty and cascading effects (Section 4.2.4)	The lack of methods to account for uncertainty and cascading effects leads to data availability challenges and hinders effective learning.	Enabling the shift from the individual as the unit of learning to a transdisciplinary community as the unit poses implications for how the assessment of quality and depth of learning might be undertaken. (Section 6.1.1)	Embed evaluation in-action and of-action as part of intervention design through single loop learning (considering first order effects such as outputs and immediate outcomes) and double loop learning (considering second order effects of learning through intermediate outcomes such as feedback loops, synergies, trade-offs, unintended consequences). Revisit the evaluation of- and in-action over longer time horizons to establish whether triple loop learning can be evidenced.
Values gap	Resilience for whom and for when is a process of negotiation between competing priorities afforded by worldviews and values (Section 4.2.5)	Different incentives, time horizons, and success factors lead to different and often competing priorities.	Facilitation plays a key role in navigating different values and worldviews and in building trust, factors that enable transdisciplinary collaboration. It is not a neutral process and requires critical reflection and the continuous interrogation of the forms of power that are being enabled. (Section 5.2.2)	Successful facilitation of transdisciplinary collaboration requires explicit attention to forms of power and the different facilitative roles required at different times or in different contexts. This requires investment in building skills and capabilities for facilitation, as well as creating clear mandates for facilitators of transdisciplinary collaboration.

Regarding the definitional gap, the findings provide evidence of how informal communities of practice create spaces for the negotiation of meaning, the translation of knowledge, and the development of a shared understanding between different stakeholders (practitioners, researchers, and policymakers) (Section 5.2.2). This finding has important implications and highlights the need to diversify the urban resilience knowledge base through learning networks (such as communities of practice) and knowledge codification aimed explicitly at practitioners, researchers, and policymakers in small- and mid-sized Global South cities.

Regarding the epistemic gap, the findings demonstrate how transdisciplinary communities of practice can provide a missing learning link between the individual and institutional scales (Section 5.2.2). The recommendations that emerge from this finding highlight the need to create additional incentives for practitioners and policymakers to codify practice-based knowledge, for example, through linking knowledge codification to professional development targets and project and programme funding, as well as the need to integrate social learning as a core part of capacity building and institutional strengthening processes.

Regarding the multiscale gap, the findings depict the necessary link between the systemic nature of resilience challenges and the development of systemic capabilities and skills that is required as a precondition to developing systems-informed interventions (Section 5.2.1). Additionally, the findings also demonstrate how enabling South-South and South-North knowledge translation and brokering is an active process that requires considerations of equity and inclusivity as core parts of both capacity building curriculum and logistics (Section 5.2.1). The recommendations highlight the need for systemic skills and capabilities to be developed and held by different stakeholders as part of a multiscale learning system centred around transdisciplinary interventions. The implications arising from the findings point to the need to develop demand-driven, localised capacity building learning experiences that encompass ongoing social learning through transdisciplinary communities of practice, which explicitly consider issues of access and funding as core to ensuring equity and inclusivity.

Regarding the methodological gap, the findings demonstrate how enabling the shift from the individual as the unit of learning to a transdisciplinary community as the unit poses implications for how the assessment of quality and depth of learning might be undertaken (Section 6.1.1). Going forward, evaluation in-action and of-action should be integrated as part of intervention design through single-loop learning (considering first-order effects such as outputs and immediate outcomes) and double-loop learning (considering second-order effects of learning through intermediate outcomes such as feedback loops, synergies, trade-offs, unintended consequences). The findings also point to the need to revisit the evaluation of- and in-action over longer time horizons to establish whether triple-loop learning can be evidenced.

Regarding the values gap, the findings provide evidence of the role facilitation plays in navigating different values and worldviews and in building trust, factors that enable transdisciplinary collaboration. It is not a

neutral process and requires critical reflection and the continuous interrogation of the forms of power that are being enabled (Section 5.2.2). The findings indicate that the facilitation of transdisciplinary collaboration should integrate explicit attention to forms of power and the different facilitative roles required at different times or in different contexts. This requires investment in building skills and capabilities for facilitation and creating clear mandates and explicit roles for facilitators of transdisciplinary collaboration.

6.4 Concluding reflections: On bridging and bridge builders

6.4.1 Living the questions

“Be patient toward all that is unsolved in your heart and try to love the questions themselves, like locked rooms and like books that are now written in a very foreign tongue. Do not now seek the answers, which cannot be given you because you would not be able to live them. And the point is, to live everything. Live the questions now.” (Rilke, 1929, p. 34)

Rilke’s quote above perfectly summarises how I feel as I reach the end of this PhD journey. Four years ago, I started with a set of inquiry questions about the challenges regarding bridging the gaps between what we know and what we do in the specific context of urban resilience. Through exploring these questions, new inquiries have continued to emerge: Can knowledge-implementation gaps ever be bridged? Are they a ‘root’ problem, or are they in themselves just a symptom of deeper underlying binaries? What other conceptual weaknesses are embedded in the framing of knowledge-implementation gaps? What are the implications for the ways of being and doing raised by this research?

The introductory chapter started by framing how I arrived at the issue of urban resilience. In this concluding section, I would like to reflect on where the implications of this research might now leave me and what I might have done differently with the benefit of this hindsight. In Section 1.5, I highlighted the need to develop counter-narratives to a dominant view of resilience as control through overcoming uncertainty. Here I put forward three overarching narratives about how we understand resilience as embracing uncertainty.

These are resilience as negotiating trade-offs, resilience as a common good, and resilience as living with change. Firstly, understanding resilience as negotiating trade-offs means focusing on processes as much as on outcomes when advocating, devising, or implementing interventions. It also means emphasising the asymmetrical resources and power dynamics that lead to the uneven distribution of winners and losers in any given change process. In a discourse dominated by understanding resilience as a (passive) characteristic or property, I found that reframing resilience as an (active) process of negotiation between trade-offs helps expand what is possible — from whose lives and livelihoods we protect to whose recoveries we collectively subsidise.

Secondly, seeing resilience as a common good requires rethinking the balance of accountability between the different actors and the resource, power, and governance flows between them. It also entitles us, as citizens, to demand our right to resilience. Lastly, understanding resilience as living with change highlights the need to integrate epistemic humility as a way of navigating rather than overcoming uncertainty. It puts forward listening instead of fixing; holding space for inquiries instead of seeking certainty; bearing witness instead of solutionism; and seeking collective mastery instead of individual heroism.

While the previous sections of this concluding chapter have summarised specific future research directions, the umbrella under which they are housed consists of the following inquiry: How might I/we mobilise these three counter-narratives of resilience (as negotiating trade-offs, as a common good, as living change) going forward? Returning to the discourse analysis that used Meadow's Leverage Points (1977) as analytical framework (Angheloiu & Tennant, 2020), the research highlighted the need to identify 'deeper' leverage points (such as mental models, beliefs, and worldviews) that could provide alternatives to the goal of the system as currently enacted. Shifting from a narrative of 'resilience as control' towards resilience as 'negotiating trade-offs, common good, living change' emerges as a critical future inquiry.

6.4.2 Reflecting on the research questions

This PhD research generated insights towards closing the gaps between urban resilience knowledge and its implementation. Through an action-oriented research approach I sought to address the following research questions (RQ):

RQ1: What are the urban resilience knowledge-implementation gaps, and how do they occur?

A literature synthesis of urban resilience knowledge-implementation gaps identified through the literature review (Section 2.1.2) was complemented by the primary research undertaken in ARC1 (Chapter 4). Five key gaps were identified: definitional (a lack of consensus over the meaning of urban resilience), epistemic (complexity of integrating and valuing interdisciplinary evidence-based and practice-based knowledge), multiscalar (a lack of skills, capabilities, and resources required at different scales to operationalise urban resilience), methodological (a lack of methods to account for systemic risk, uncertainty, and cascading effects), and lastly, a values gap (resilience for whom, for when, and for where is a process of negotiation between competing priorities afforded by worldviews and beliefs).

RQ2: How might systems approaches help bridge these gaps in the context of a capacity building programme?

The research (ARC2, Chapter 5) was drawn in the context of a capacity development program designed to develop systemic capabilities in mid-career urban resilience professionals. The program focused on problem-based learning and aimed to develop skills in diagnosing urban resilience challenges and imagining alternative pathways. The findings highlight the challenges learners face in applying new approaches and continuing to develop their skills when they return to their day-to-day work environment. These

challenges include a lack of managerial support and formal recognition of their new abilities, as well as structural barriers presented by existing work programs and organizational strategies. Participants who return with proposals for change or improvement may be seen as disruptors rather than intrapreneurs. The findings point to the need for capacity development interventions to not be considered as one-off learning experiences, but instead to provide demand-driven and tailored support to urban resilience professionals. For example, such programmes could be designed for and with multi-stakeholder urban resilience project and programme teams and could see a parallel knowledge brokering process between different place-based teams.

RQ3: How might a transdisciplinary community of practice support the onward learning and knowledge-brokering process?

The research (ARC2, Chapter 5) suggests that building accountability for learning and critical reflection through trust building and belonging in informal spaces such as communities of practice can be particularly helpful in supporting onward learning and knowledge brokering. The regular learning and reflection rhythm of the URCoP was highly valuable to active participants, who highlighted the importance of trusted reflection spaces outside of their organisations. However, further research is needed to explore how transdisciplinary CoPs can better support members to challenge the status quo of their organisations.

While the URCoP has been successful in providing a supporting environment for the learners, there is insufficient evidence to demonstrate any contributions towards transformative change, or triple-loop learning that would see changes in organisational practices, structures, norms, or in legal, fiscal, or other structural dimensions. This is due to the temporal dimension of bridging knowledge–implementation gaps (as Section 6.1.2 notes, transformative change is a slow, often multi-generational process), and to the contested, political process of establishing how different types of knowledge are created, valued, integrated, applied, and evolved.

The emergence of action research and social learning fields took place in a backdrop of increased acknowledgement of the inadequacy of the scientific method in contexts of complexity. As the scientific method treats problems as independent of the people and the socio-political processes involved in solving them, the fields of action research and social learning put forward a human-centred approach to the process of knowledge creation and brokering.

In contexts such as urban resilience, it is important to note that both paradigms are needed. Rather than rejecting positivist science altogether, an extended constructivist approach (such as the one that underpins the action-oriented methodology of this thesis) should be seen as a critical companion to positivist science, in helping inquire into the social and political dimensions of knowledge creation and brokering. How we might navigate and integrate the two paradigms (rather than seeing them as polarising either/or choices)

remains an outstanding meta-research question in the context of ‘post-truth’ or ‘post-normal’ societies that undermine the role and validity of science altogether.

In this thesis, I have embarked on a journey of identifying the key questions that need to be asked, rather than solely seeking answers. As practitioners and researchers, we are concerned with better understanding how change happens and how our inquiries might lead to improved (if not transformational) societal outcomes. Finding the ‘right’ question to ask is a key part of this process –if we don’t have the right problem framing, how might we know that our answers are the right ones, and more importantly, how might we know whether our questions are addressing root causes rather than symptoms?

I arrived at the questions above through an iterative process. When I was first writing the PhD application back in late 2016, the question I thought I was asking was: *How might design futures methods enable place-based systemic change?* Very few understood what it meant (myself included), but it served a ‘good for now’ purpose, a placeholder question mark with fuzzy boundaries. From that initial research question, I tested the first phrase — design futures methods — by designing and facilitating a series of immersive workshops with young people to explore how they imagine the future and what might that tell us in the pursuit of deeper, systemic change.

The findings and methods were consequently published as peer-reviewed articles rather than forming part of the finished thesis, but from this iteration of question formulation I learnt that the focus of my inquiry was not design futures and that my main audience and disciplinary field was not design studies. These were important pivots, as they depict the messy and non-linear ways in which we develop new insights and knowledge through the process of formulating questions and seeing where their guiding handrail takes us as inquirers. I didn’t find the solution to my question through these experiments; what I did find, was an evolved ‘good for now’ question that guided me through my next iteration.

In the second iteration, the focus of my question tipped towards the urban forms that are already experimenting with ‘place-based systemic change’. I was then asking: *What are the enabling conditions for urban transformations towards resilient and sustainable futures?* This iteration helped me narrow my literature review to a more bounded scope: urban resilience, urban sustainability, urban transitions, and urban transformations. This exploration was also published as a peer-reviewed article rather than forming part of the finished thesis, as it helped me get much closer to the scoping of the final research questions. Through this process, I narrowed the scope of my thesis to urban resilience, while the exploration of ‘enabling conditions’ as framed in this second iteration of the research question led me to identifying knowledge-implementation gaps as the key barrier (and therefore, as the key potential enabler) of urban transformations towards resilient and sustainable futures.

Shaping, iterating, and pursuing questions is core to the process of knowledge generation, however the process of revisiting and re-evaluating my research questions has been more akin to the story of Goldilocks – testing alternatives in pursuit of a fit that is not too big, not too small, but ‘just about right’.

6.4.3 Knowing what I know now, what would I have done differently?

As action research is underpinned by principles of emergence, iteration, and continuous learning, I could argue that the answer to this question could be ‘not much’ – as I have followed the insights that emerged, iterated, and corrected the course along the way. However, in taking a step back from this process, I wonder whether the development of counter-narratives could have been a more explicit thread running throughout the process rather than just as part of my first-person inquiry. I also wonder whether focusing more on narrative building and, therefore, narrative analysis would have provided additional insights into the limitations and potential of triple-loop learning and the connections to the transformative capacities for resilience.

I have sought to integrate research/practice by making the first-person inquiry an explicit thread of this thesis in the attempt to ‘lower the waterline’ and make the process of critical reflection, usually invisible in academic research, visible. I am left with a parting reflection on the need to embrace duality (both/and), all the while challenging dualism (either/or) and the false divides between research/practice, knowing/doing, science/action, knowledge/implementation that might consequently emerge (Knight et al., 2019).

Following this line of inquiry might also point to the conceptual weakness of the ‘gaps to be bridged’ as a deficit-based lens and the potential to reconceptualise ‘knowledge-implementation gaps’ through an asset-based lens as productive and interactive spaces (Toomey et al., 2017), which might be a framing better suited for the negotiation of resilience trade-offs mentioned above. As this research demonstrated that knowledge-implementation gaps are not linear but instead represent challenges to bi-directional flows of learning and bridging, knowing what I now know, I wonder whether the reconceptualisation from ‘gaps’ to ‘spaces’ would have provided a conceptual framework in better keeping with knowledge as a “process of relating that involves negotiation of meaning among partners” (Roux et al., 2006, p. 11).

6.4.4 Where does this leave me?

The starting impetus for this research stemmed from the challenges I encountered and the opportunities I envisioned during a decade of experience as urban practitioner and researcher. As such, this research has been rooted in the pursuit of improving the conditions for urban professionals and seeking to amplify our impact through cultivating a connecting tissue for practitioners, researchers, and policymakers to engage in collaborative action inquiries, knowledge co-production, and critical reflection.

The metaphor of ‘bridge building’, approach fundamental to transdisciplinary inquiry, seeks to “replace disciplinary confinement and piecemeal approaches during the planning and construction of built

environments” (Lawrence, 2020, p. 5). It conjures the attempts to address gaps between knowledge and implementation that this research has focused on. This thesis has sought to test what the process of bridge building might look like in the context of urban resilience, as well as understand what is needed of the bridge builders.

The contributions to knowledge detailed in this thesis are methodological and theoretical. This thesis has developed and tested a methodological framework to Diagnose, Imagine, Act and Learn (DIAL) that enables professionals to apply systems approaches to the urban resilience challenges they are addressing in their day-to-day work. This thesis has developed theory regarding the skills, capabilities, and competencies required for individuals, communities of practice, and organisations to deepen their systemic practice from a low maturity towards a higher one.

This thesis has advanced the current understanding of knowledge-implementation gaps and the contexts within which they occur. It has advanced the application of action research in the transdisciplinary context of resilience. My first-person inquiry into navigating the researcher/practitioner identities and the endeavour to integrate them rather than see them as dualities provides a prototype for boundary and domain-spanning professionals and shines a light on the roles facilitation and knowledge-brokering play in bridge building. A first-person inquiry thread has been purposefully included in the attempt to recognise that there is no bridge building without interrogating the motivations, values, social identities, and worldviews of the bridge builders:

“What we can learn is the art of shifting our viewpoint, circulating among points of view, and the expansion of the context in which initial oppositions are located. It is the art of the traveller who, with his own motion lays down a path in walking, or the decipherer of hints who immerses herself in the context and interrogates what she encounters to decide what point of view is most pertinent in that particular moment of her history.” (Montuori, 2013, p. 223)

The opening gambit of this thesis stated that Minerva’s owl always flies at dusk – that wisdom emerges in hindsight. Through undertaking the body research presented here, it is my hope that I have drawn attention to the potential offered by weaving different tools, methods, and approaches as ways of being and doing in pursuit of enabling systemic change. While the owl of wisdom flies at dusk, this research highlights the opportunity to cultivate spaces for deepening our collective wisdom through transformative learning and to mobilise our newly developed insights to tackle our most intractable societal challenges.

After all, there is a dawn after every dusk.

7.0 Bibliography

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8.0 Appendices

Appendix I: ARCI annexes

Interview guide

Background/introduction

- Thank you for agreeing to be interviewed today.
- The interview should take 45-60mins.
- Your answers will be kept securely on OneDrive, and all interviews will be anonymised.
- If you agree, I will take notes and would like to record this interview.
- I'd like you to respond to all questions from the perspective of your experience (the city you live in or work in) rather than in general.
- Please feel free to ask questions or say anything you think is important but haven't been asked about.
- Any questions before we start?

1. Conceptualisation (general)

Purpose of the section: Ease the interviewee in and gather their current understanding of and relation to urban resilience.

Tell me about yourself – what is your work and connection to urban resilience?

What is your understanding of urban resilience [from your experience] [i.e. in the city you come from or work in]?

- What is part of it, and what is not?
- What are current barriers and opportunities for urban resilience [in the city you live or work in] and/or [in the city or country you come from]?

2. Knowledge gaps

Purpose of this section: Investigate the perceived knowledge gaps.

In your experience, what do you think the critical knowledge gaps in urban resilience are? (for example – data availability, finance, legislation, technology, policy, governance, power dynamics, capacity building, the capacity of local institutions, co-benefits, formal – informal institutional gaps, human capacity, application gap between policy - innovation)

- Can you give an example of how these knowledge gaps manifest in your work?

How do you think change happens in urban resilience [in your experience]?

- Who are the key stakeholders you see being involved in the change process?
- How do you see the current state of involvement of informal actors/institutions? (*provide additional details such that informal actors/institutions include non-governmental actors/institutions, including NGOs, private companies, entrepreneurs, and individual citizens).

What role do you believe you play in shaping change in urban resilience?

- Do you identify as an “agent of change”? If so, why?

What enablers/barriers can you identify to fill knowledge gaps?

- At which stage in the process – knowledge production/co-production or transfer – do these enablers/barriers occur?
- Who are the blockers or enablers?

3. Operationalisation – bridging theory and practice

Purpose of this section: Investigate the perceived gaps in the operationalisation of knowledge and explore potential enabling conditions to bridge the theory–practice gaps.

There seems to be a gap between the theory (knowledge) about urban resilience and implementation (policy/practice) in urban resilience.

- If you agree with this statement, why do you think so?
- If not, why?
- What are the root causes for this gap (or disconnect)?

What are, in your experience, the enabling conditions required to bridge the gaps between theory and implementation?

The summer school has three types of professionals: practitioners, policy-makers and researchers. Depending on which you identify with most:

- What value do you see in integrating different types of knowledge (from the other two) in your work?
- Are there any opportunities/barriers to bridging knowledge gaps? In which ways can urban resilience knowledge be made actionable?
- In which way can transdisciplinarity bridge these gaps?

4. Capacity building

Purpose of this section: Investigate the perceived capacity building needs.

Which are the primary needs in terms of capacity building for urban resilience? (for example, human capacity, financial capacity, technology access and awareness, etc.)

- In your organisation
- In your experience
- More widely in the field of urban resilience

What are the opportunities and barriers for building capacities and/or skills development?

5. Life-long learning and transdisciplinarity

Do you have experience of learning beyond formal education systems and/or inter-disciplinary learning as part of your professional life?

Do you work in an interdisciplinary and/or cross-sectoral context? What is your experience with interdisciplinarity / cross-sectoral work in the context of urban resilience?

Participant surveys

Entry survey (only undertaken in 2020)

- Expectations about the summer school | What three key things do you hope to get from the summer school?
- What are you most excited about?

- What are you worried about? What do you think could be most challenging?
- What one hopeful thing have you noticed/seen around in your city since COVID-19?
- What one worrying/challenging thing have you noticed/seen around in your city since COVID-19?
- Working with complexity | Do you have any previous experience or knowledge of systems thinking, futures/foresight or other process design methods to help navigate complexity? If yes, can you tell us a bit about it?
- What metaphor best describes the way you work? A family / A clock / An army / A rainforest / Other
- Can you give an example of how this manifests in your work?
- Complete the sentence: To me, urban resilience means...
- Complete the sentence: My main field/discipline is...
- Complete the sentence: My key skills and competencies are...

Exit survey (repeated in 2019 and 2020)

Category of work/profession?

- Government / public sector
- Non-governmental / NGO / Non-profit
- Academia
- Private Sector
- International organisation

Please rate the following statements: agree / somewhat agree / neutral / somewhat disagree / disagree.

- I have learnt from the context of Copenhagen.
- I have learnt from the site visits.
- The site visits were relevant to my work.
- I have learnt from urban resilience practices in other cities.
- I have learnt more about the latest research on urban resilience.
- I have learnt more about relevant international policies and efforts (SDGs, Paris Agreement, New Urban Agenda, and Sendai Framework for Disaster Risk Reduction).
- I have learnt more about technological/technical solutions for urban resilience.
- Learning objectives were clearly defined.
- Learning objectives were in line with my expectations.
- I have learnt more about systems thinking approaches to urban resilience.
- I have learnt more about futures/foresight approaches to urban resilience.
- I have learnt more about strategy development and action planning for urban resilience.

- I have learnt from the expert contributors.
- I have learnt from exchanges with peer learners.
- I have learnt more about the theoretical background of key challenges to urban resilience.
- The Summer School contributed to my lifelong learning experience.
- The Summer School met my overall expectations.
- I have shared my knowledge and experience with others.
- I have contributed actively to the group work.
- I have experienced transdisciplinary collaboration as part of the group work in a positive way.
- The group challenge was relevant to my work/professional activity.
- The group challenge instructions were clear.
- The group challenge contributed to my learning.
- The group challenge helped me take away lessons to apply back into my work/professional activity.
- As group members, we worked smoothly together.
- I felt some differences across disciplines or professions.
- Such differences, if any, positively contributed to my learning.
- I contributed to facilitating peer learning.
- I am satisfied with the outcome of our group work.
- I received helpful, constructive feedback from the facilitators.
- The schedule was easy to follow.
- The pace of the Summer School was just right.
- The level of depth was in line with my expectations.

What has been the most challenging aspect of the Summer School?

What has surprised you the most?

What were the most valuable methods or lectures you've experienced this week? What new tools do you now have in your toolbox?

What skills or capabilities do you need to expand/deepen further after this experience?

If you were to take one thing that you learned during the Summer School and apply it to your practice when you return to your city/workplace, what would that be? (if you can, please explain why)

What advice would you give another group seeking to address the group challenge as part of a next Summer School?

Any other suggestions to improve the challenge?

In what way did the Summer School enhance your life-long learning experiences? Please describe.

Any other suggestions to improve the content of the Summer School?

Any other suggestions to improve the experience of the Summer School?

Sample coding and memo development

The screenshots below depict the coding process of a sample interview (Participant 007, 2019) as analysed in the software Atlas.TI.

Interviewer [00:05:04] Tell me about yourself, how did you end up working in urban resilience?

007 [00:05:22] I think when I started and when I chose geography, it's because I started studying the favelas in the township of South Africa. I had this geography course, that was very interesting and that's how I started to understand, how this spatial way, how we are making our cities is a political statement of our society. So that's how I started to get involved, but also through law, because I always felt like that was very much linked. And then I specialized in my master's degree in development studies and focused on urban areas, because that's where the tensions are more more visible and I would say also violent. And because I worked in Brazil, I learned Portuguese and and then I've been called for a project in Mozambique. They were setting up a technical centre for urban resilience, climate change adaptation and disaster risk management. And that's when I entered the subject. And what was interesting there, that [00:07:09] they were building this centre between several countries speaking different languages. Madagascar, speaking French. Malawi, speaking English and Mozambique, speaking Portuguese. But these people are facing very similar hazards. And sometimes what happens in a country can influence another one, like Mozambique, has been affected by floods happening in Zambia, where they opened the dam and it flooded in Mozambique. But it was not raining in Mozambique. Just to give you a clear picture of this interactions. So that's when I started to understand, everything is linked and if we want to improve the condition in our cities, it's a governance approach to [59.5s] tackle this challenge of urbanization, sustainability, climate change that we are talking about. So that's a bit how I started to get into this subject. And then I've been developing tools, very practical ways of working with municipalities to improve their resilience - the City Resilience Action Planning tool. It's not online, it's UNHabitat who developed that. So I've been working with many, many municipalities and communities and always having this participatory approach. For the Climate Adaptation Plans and some examples of resilience plans and other examples need to be owned by the municipality. I'm gonna say small scale actions, but [00:09:32] when I was working in all these municipalities, I was facing a huge challenge - financing and getting to scale for implementation of all these actions, [19.4s] you know, like there is like many governments. [00:09:54] And this morning we were talking a lot of like "we need the willingness from governments", but sometimes it does exist, it really does. I'm not saying all the time, but in many cities there is, but there is no human capacity. [17.8s] But you can work with them on that, you know. And data and all that, this is something you can help. [00:10:22] But there is something that when I was working at U.N. Habitat, I was constantly failing to build bankable projects that may not need international donors to chip in. Because for a municipality that is not capital city, but even for capital cities, for secondary cities, there are just huge challenge in Africa, especially. You know, it's a huge challenge to access funds, they don't have the human capacity to write projects. I've been participating in writing adaptation fund project and it took us three years, you need huge capacities. It was a regional project, so it was a big project, but it took us a long time. And you're going to manage to get funds for some important infrastructure to strengthen resilience, but UN Habitat, UNEP, UNDP, so my question was how do you go to scale? [83.2s] You know, I have no answer yet to that, but that's what I'm working on. So I got this proposal to join the private sector. And when I discussed with them this opportunity, I also explained my interest in the challenge of urbanization in Africa. And we have a lot of room to find different models and change the dynamic and maybe take some shortcuts. We don't have to replicate the same models to build cities like that we did in the West, let's say. And I learned a lot working with African cities and communities especially in including stakeholders, which is I find in France where I'm based, can be more challenging. Because when you work at the scale of a neighbourhood in an African city, they are very well organized and they can have power to take action that is very quick. Then in our "organized society", this rapid action community driven, it may be much more complicated. So my personal objective is in these two ways. [00:13:29] First is, can

Perception of I...ation: difficult

7:5 We had this morning like a pr...

- Cities are whe...visible/violent
- Citymaking is political
- INTERDISCIPLINARITY**
- multidisciplinary
- Personal journey to UR
- Social sustain...y link w justice
- Spatial justice
- Stressor_Lack of equity
- Stressor_Violence

7:5 they were building...

- Interconnected challenges
- Lack of geogr...l collaboration
- Role of collaboration
- Unintended consequences

7:7 So tha...

- Interconnected challenges
- Opportunity f...ce approaches
- Personal journey to UR
- Role of governance

7:8 And then I'v...

- Capacity build...l stakeholders
- Capacity build...e participatory
- Capacity building_Tools
- Need for UR ag...municipalities
- Who owns the problem**

7:9 I'm gonna say small scale actions, but [00:09:32]w...

- Barrier to acc...e fundable bids
- Barrier to acc...econdary cities
- Capacity build...for bid writing
- KNOWLEDGE GAPS**
- Knowledge ga...business case
- Knowledge ga...capacity in LIC
- Knowledge ga...plementation
- Knowledge ga...kable projects
- THEORY-PRACTICE GAPS**
- Willing municipalities

7:10 So I got this proposal to join...

- Community driven rapid action
- Facilitating stakeholders
- How change h...r engagement
- Need to go be...Eurocentrism
- Opportunity f...m urbanisation
- Personal journey to UR

7: Capacity build...ods to context

more complicated. So my personal objective is in these two ways. [00:13:29] First is, can we bring some of these good practices from from what I've learned, working with African cities and communities, can they influence the way we built our cities in a more resilient way? Because I think in many ways, African cities are already very resilient. I mean, they are self organized because the local government can be so low, you know. And so I think there is a lot to learn from that. And at the same time, is there some way of maybe the knowhow of a big construction company like Vinci, where my consultancy firm belongs, is there a way they can also we can use this knowhow, but in a different way? [72.2s] I'm thinking, in Africa, maybe let's not have the same approach like when we build in France or in the U.S. So I would like to work on that, on how we fast track, because that's where all the investments for infrastructure have to be made. Everything has to be built. So I think it's a huge opportunity, but it's also very risky. I mean that the decisions that we are making right now will have a huge impact on the life of a lot of city dwellers.

Interviewer [00:15:35] I guess you've been already hinting, but just to kind of spell it out briefly. What is your take on what urban resilience means to you beyond the buzzwords?

007 [00:15:54] My take is - it's the colearning to become stronger. That's what I experience. For me personally and the stakeholders I've been working with. I think it's about building bridges to escape, making stronger bridges by colearning and cooperating.

Interviewer [00:16:42] So the next section is trying to delve a bit deeper into to where these gaps are coming from - knowledge gaps, theory, actions policy gap. So, in your experience, what do you think are the key knowledge gaps?

007 [00:17:37] I don't even know where to start, but I think there are huge knowledge gaps, about the concept of resilience and all the doors that it opens. But I think it can be easily tackled if I know resilience is a complex concept, but I think it will bring interest. It's a very different way of approaching say, city management, even if it's not just that. [00:18:17] And I think the knowledge gap is about knowing that there is a different way to go. [9.1s] You know, it may be very theoretical, but it feels, as we were talking this morning, that capitalism is the only way for managing a city. There is the mayor that decides, elected or not, and then you have sectoral departments that are deciding their own things and the knowledge gap is in these cross sectorial aspects, and what is the opportunity that working in an interdisciplinary manner would bring? I think actually the knowledge is there, of course, there is a lot of capacity building to do. [00:19:21] When we are talking about developed cities, I think that this is where the gap is - what are the process to work together in a more cross-sectoral way? The idea's great, but how do we actually interact and work out what it means in practice? [24.1s]

Interviewer [00:19:46] And you're hinting at my next question, which is how do think change happens in urban resilience?

007 [00:20:13] I think it happens when you have leaders, it doesn't have to be very high position leaders, I'm not talking about the mayor. I think change happen when you have a group of leaders or leadership in a group of people coming together, willing to push a process, and in the case of urban resilience one person is not enough, you need to bring with you like a lot of stakeholders. And where I think that change is very hard still to do, is to engage with a stakeholder which is very critical, which is the private sector. Not meaning that they don't want to engage, but meaning that we still have to break silos between the public and the private sector. And I think that's when change will happen. But for now, I think we're not there yet. Not everywhere. I mean, there is a lot happening, but we need to break more silos. But for this, you need to convince people and change their rules. And that's what's complicated. How do you change the rules? I don't know yet, but I'm working on it.

Interviewer [00:22:04] And a follow up question from that is what role do you believe you play in shaping change?

7:11 So my personal objective...	Capacity build...ods to context	n...
	Impact potenti...is happening	
	Knowledge tra...ing companies	
	MEANING OF UR	
	Meaning of U...ontext specific	
	Meaning of U...lf-organisation	
	Opportunity f...rn urbanisation	
	Perceptions of...ledge transfer	7:12 So I wou...
	PERSONAL ROLE IN CHANGE	
	Role of private sector	Fast track
		Future impact...sent decisions
		Opportunity f...is getting built
		Potential for in...delivering UR
7:13 My take...	MEANING OF UR	
	Meaning of U...come stronger	
7:14 I don't e...	KNOWLEDGE GAPS	
	Knowledge ga...to other terms	
	Knowledge ga...meaning of UR	
	Meaning of U...Not understood	7:15 And I think...
		Capitalism ha...urbanism/cities
		INTERDISCIPLINARITY
		KNOWLEDGE GAPS
		Knowledge ga...ond capitalism
		Knowledge ga...on in local gov
		Role of multisi...al collaboration
7:16 I think a...	CAPACITY BUILDING	
	Capacity build...ral experience	
	T-P gaps_knowledge is there	
	T-P gaps_nee...mplementation	
	T-P gaps_No...ss to implement	
	T-P gaps_opp...l collaboration	
	THEORY-PRACTICE GAPS	
7:17 I think it...	HOW CHANGE HAPPENS	
	How change h...ns_leadership	
	How change h...r_engagement	
	One person is not enough	7:18 And where I think...
		Barrier to implementation
		How change h...ange the rules
		How change h...private sector
		Role of private sector
		T-P gaps_Nee...ctural change
		T-P gaps_No...ss to implement
		T-P gaps_Pub...te sector silos

Interviewer [00:22:04] And a follow up question from that is what role do you believe you play in shaping change?

007 [00:22:27] First, as I said, [00:22:31] **for us to build different models, we need to empower different stakeholders to believe in the way they do things.** [14.7s] To come back to African cities, I believe there is a lot of things to value there, and that's what I try to participate by educating and talking about these whenever I can. I try to highlight the fact that there there are good practices that we may not see yet or we may not value yet that can allow us to take some shortcuts in the urbanization of African cities. Still, I insist, because I think where it's where the challenge will be very big. And I think we need to build a different. They need to build their own models and we have to support them because also we are responsible, the West, for their vulnerability. So we have to support them. But without imposing our way of doing things. And it's very complicated. So one of the things I do is advocate and talk about what I've seen or what I've experienced during my five years in Africa. And I'm still very linked to it. And I'm trying to build projects on the African continent. So I think this is one of the things, advocate to say let different stakeholders or different municipalities build their own model and we are there to support. But let's try a different solution. There's not one way, so this is one of the things I'm trying to do. The other thing is trying to advocate in the private sector, as I was saying, I think it is a big component of resilience. Cities are operated and built by private sector companies and working with the U.N. during many years, I felt that we were engaging with them in an ineffective way. So what I'm doing right now is trying to understand from the inside how it works so I can then try to come up with solutions to include them. So I'm advocating for this on a daily basis. But they are moved by different rules that we need to take into account and that comes back to this breaking silos objective. And this is where, I try to keep very good relationship with UNHabitat and my colleagues, who I still consider my colleagues, it's really an institution that I really respect. And I have my personal project that I would like to develop, a resilience lab where big companies could lead the discussion because they won't be interested in very small scale projects, that in some cities are very new. But there can be also capacity building there to start building small scale bankable projects that could help to strengthen resilience. And also because I think the socioeconomic part of this system is very important in the process of urban resilience. And I think that's where I'm trying to act now to scale up urban resilience.

Interviewer [00:27:26] Do you feel that you identify as a **changemaker** or as an agent of change?

007 [00:27:34] I hope so. I do. Not everything I do is not perfect, but I'm really engaged every day to make a step closer to changing things, to changing mentalities, to open the discussion, to have like a different vision of cities in different countries and to bring perspectives and at the same time, advocating at work for them to understand how resilience is actually an approach creates opportunities, it's an opportunity to shape things and bring quality of life for everyone.

Interviewer [00:28:58] So my next question is around: "There seems to be a gap between the theory of knowledge about UR and the implementation, the policy, the practice side." Do you agree with this statement? Yes / No. And either way, why? You've already been hinting at it in terms of the academic way of doing things and the practice way of doing things, but how do you feel about this statement?

007 [00:29:41] I think there is a gap. Urban resilience is such a complex and broad concept. A lot of cities, governments are starting or trying to have a different approach, but they don't even know they're doing resilience. I think the gap is that it's a term that in between practitioners, we own it, we understand it. And in this way, we can try to implement it. And [00:30:31] **I think the big problem is that there's no one process. And we will never have one process for resilience. So, I mean, starting from that, there is always a gap between theory and practice.** [14.7s] There is no common process. But I think where we need to work on is for people to understand the approach of what we are trying to achieve with urban resilience and and owning the concept. I think there are too many actors that are not owning the theory.

7:20 First, as I said [00:22:31]...	Accountability...bility_the West	7:21... Condition for...r empowerment
	Capacity build...ods to context	Need to go be...Eurocentrism
	Need for context knowledge	
	Need to go be...Eurocentrism	
	Perceptions of...ledge transfer	
	PERSONAL ROLE IN CHANGE	
	Personal role i...nge_advocate	
	Personal role i...uth to GNorth	
7:21 So one of t...	PERSONAL ROLE IN CHANGE	
	Personal role i...nge_advocate	
	Personal role i..._build bridges	
	Personal role i...o their context	
	Personal role i...uth to GNorth	7:22 The other thing is trying...
		Barrier to cha...sector drivers
		How change h...s_from within
		PERSONAL ROLE IN CHANGE
		Personal role i...nge_advocate
		Role of private sector
		T-P gaps_Pub...te sector silos
		UN isn't enga...private sector
7:23 And I have my...	Capacity build...kable projects	
	Capacity build...for bid writing	
	Meaning of U...oeconomic part	
	Opportunity f..._resilience labs	
	PERSONAL ROLE IN CHANGE	
	T-P gaps_opp...l collaboration	
	T-P gaps_Pub...te sector silos	
7:24 I hope so, I...	Change maker...f change: yes	
	HOW CHANGE HAPPENS	
	How change h...s_from within	
	PERSONAL ROLE IN CHANGE	
	Personal role i...e_intrapreneur	
	Personal role i...the discussion	
	Personal role i...oter of change	
7:25 I think t...	Knowledge ga...to other terms	
	Knowledge ga...meaning of UR	
	Meaning of UR_complex	
	T-P gaps_Pra...n the concept	7:26 I think the...
		Knowledge ga...meaning of UR
		Meaning of UR_always plural
		Meaning of U...ontext specific
		T-P gaps_Act...own the theory
		T-P gaps_No...ss to implement

Interviewer [00:31:26] And what would that look like - owning the theory?

007 [00:31:36] I think, for example, in the psychological aspect of resilience, most people understand the concept and many people are using it. I think it just takes time. What we are doing and each of us in our circle of work, broadcasting and advocating about this approach, this holistic way of strengthening the capacity of a city to recover from a shock or stress. I think it's a process for people to understand that maybe this is the way to go. Opening doors, breaking silos. And I said, that's what we need to do it.

Interviewer [00:33:09] So the last section is about capacity building and about skills. So the question is what do you think are the main needs in terms of capacity building for UR? And that could be in your organization or elsewhere in the field.

007 [00:33:30] Huge need to scale up, right? For example, in my company, nobody understands urban resilience. I mean, I'm being a bit harsh. And there's a lot of confusion with environment. They're just using a word for another. But the problem is that they misuse a lot, the content and resilience means. But now there is a perspective group and it's a worldwide company. It's very big. And at this level of perspective, they really understand that this is where we need to go. As someone said, it's not a performance, but it's a competence. So we need to acquire this competence. And so to do that, we need to understand what we mean and build capacity in the company to do that. And it's huge. I mean, and there are some people that will be much more complicated to access and to shape or capacitate. Everyone working on operations, on construction sites, that would be very complicated. So we are trying to look at ways - building very short online training that could be broadcast to the entire company, co-workers who so they could just understand what we mean. Also there is many things that the company knows and has knowhow that can help build more resilient cities, but they don't even know it is a resilient approach. So right now, what you're working on it's just like changing the way they look at their daily work. And it's also good because it's bringing value in a field that is theoretically very much participating in making the climate more unstable and creating emissions. But there we have the opportunity to say, "look, guys, you can also participate in fixing or mitigating the problem". So we need to do that. But first of all, we need to explain what it is. So we do very short films for awareness raising, but it doesn't have to go very deep. We don't need 12 days of training for people to understand what is. How to work on it, you need more, but to understand that you're participating, we need a simple way to reach as many people as possible and encourage their curiosity. I mean, I'm talking from the point of view of the private company with hundreds of thousands of employees. Huge. And it's gonna be hard to have money to train all these people, but I think just starting with very short content. And then I think people would be curious.

Interviewer [00:38:20] And I have a mirror question, one last question, which is what skills and capacity building needs do you have?

007 [00:38:53] How I see resilience as a process, you're never completely resilient, right? Because there is always like some new hazards or the social context, the economical context changes and then you have to remodel your strategy, it's a continuous process. And it's a bit the same for this scaling, I think it has to be a continuous process of learning. This kind of 10 days training, when you stop doing what you're doing on a daily basis and stop and discuss with other practitioners to see where you are and where you want to go. So I think that should happened regularly. It doesn't have to be on the same model. It can be in conferences, even if it has its limits. But these kinds of events, gathering together different practitioner and academia. For example, I joined an engineering construction company and I'm not an engineer. So you can only imagine, the amount of things that I have to absorb every day just to maintain the conversation flowing. So you to constantly level up your competency.

7:27 I think, for...
Hollistic approach
Role of UR Co...t and advocate
T-P gaps_Act...own the theory
T-P gaps_Pra...n the concept
T-P gaps_Pub...te sector silos
THEORY-PRACTICE GAPS

7:28 Hug...
Barrier to UR...se of the term
Basic capacity building
CAPACITY BUILDING
Capacity building_what is UR
Meaning of UR_confusing
Need to scale...pacity building

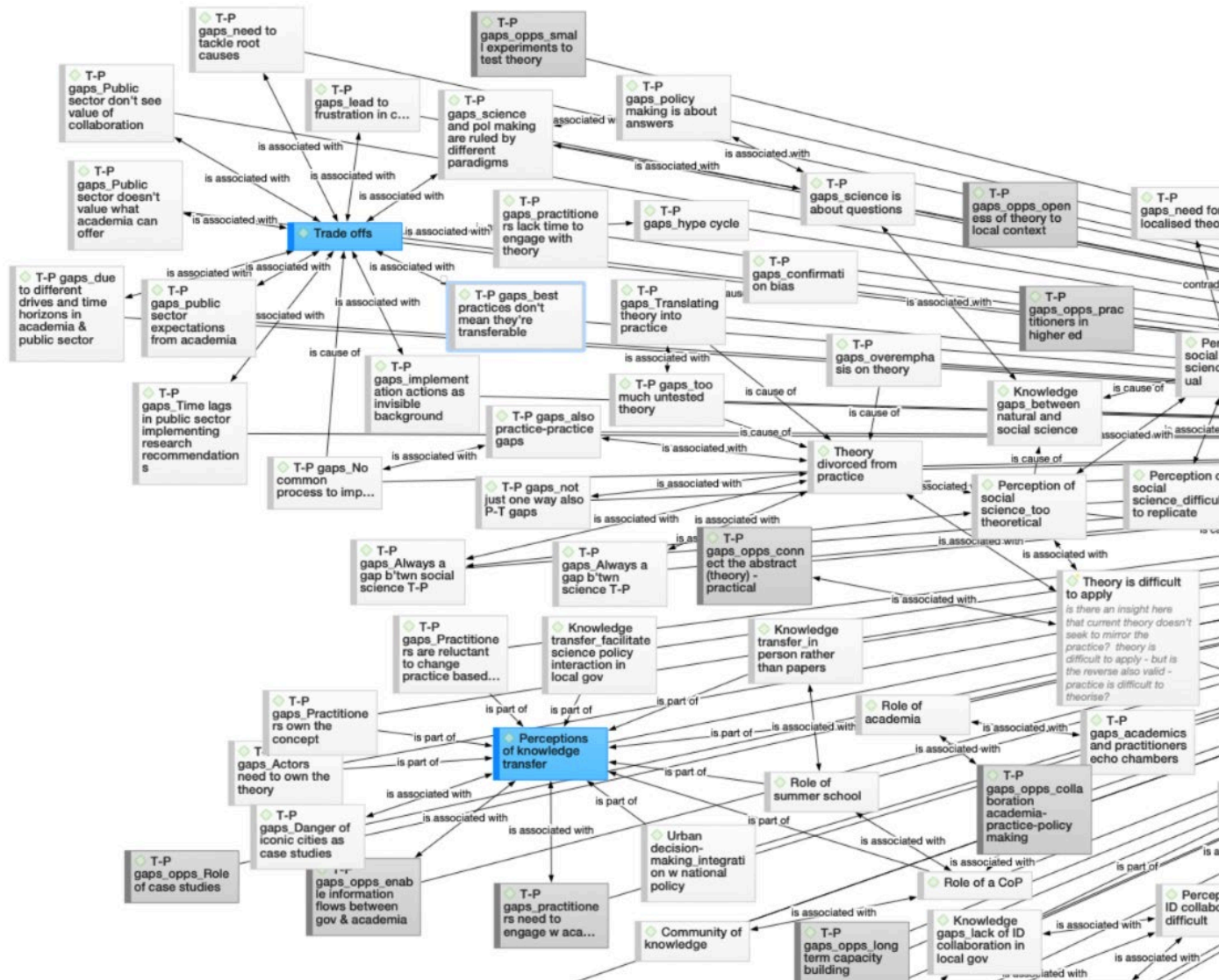
7:30 So we are trying to look at ways - building very...
Basic capacity building
CAPACITY BUILDING
Capacity build...ssible content
Capacity build...rage curiosity
Capacity build...rdable formats
Capacity build...ruction sector
Capacity building_what is UR

7:29 But now there is a...

Basic capacity building
Capacity build...r competence
Capacity build...truction chain
Need to scale...pacity building

7:31 How I see resilience as a proce...
CAPACITY BUILDING
Capacity build...erdisciplinarity
Capacity build...inous learning
Capacity building_skills for LL
INTERDISCIPLINARITY
LIFELONG LEARNING
Lifelong learning_Reflection
Need for reflection
Need to bridg...OPs and COKn
Personal capacity building
Practice based knowledge

The following screenshots depict the development of code forests for the interview theme (based on the interview guide above) using the network visualisation tools in Atlas.Ti. Sample screenshots from the map regarding the theme on knowledge-implementation gaps are included below.



The following screenshots depict the memo development process, taking notes iteratively as part of the interview analysis. Memos were developed based on the different themes contained in the interview guide. The screenshots below depict part of the memo on knowledge-implementation gaps.

RQ: Knowledge implementation gaps - how they occur

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1 **001**
 2 Most significant knowledge gaps - structures and processes in how to operationalise resilience. There is a need to understand where vulnerabilities can come from and what that means for how you operate as an organisation. 'Thinking outside the box' is important and transdisciplinarity can play a role in this.
 3 These structures and processes, or 'the how', trickier because they require resources that aren't always there in your typical city, so there's a need to use existing processes for example town halls or open evenings.
 4 The broader resilience of communities is not well understood - the social dimension of UR is lacking
 5 If knowledge gaps are closed through codesign and participatory processes it's important to show the feedback loop and demonstrate the outcome of participation so people don't start disengaging (if they see nothing changes even if they participate).
 6 Context knowledge is very important when looking at knowledge transfer through training between different geographies with different histories. Sometimes this can be perceived as 'neocolonial' and teams 'going in need to be aware of this risk and dynamics. Need for outsider reflexivity - 'reflexively coming in to a situation where you are not necessarily local'.
 7 Pre-feasibility and feasibility studies can help test / pilot whether solutions can be transferred and can help test assumptions between different geographies.

8 **002**
 9 UR needs different disciplines to collaborate as well as different sectors but there are strong drivers that contribute to knowledge gaps and TP gaps. These are: different organisational motivations (politics, hype, finance), organisational ego (wanting their logo on tools or outputs lead to an abundance of tools and initiatives that create confusion), distance from the field when developing knowledge so then it's divorced from the realities on the ground.
 10
 11 Knowledge gaps: lack of navigational aides or toolkits to know which tools and methods are to be used when - there is need for capacity building to close these gaps
 12 Knowledge gap: how to make the business case if you're an NGO or local government; how to build bankable projects;
 13 T-P gaps: theory is divorced from practice and is difficult to apply. Is there an insight here that current theory doesn't seek to mirror the practice?
 14 Theory is difficult to apply - but is the reverse also valid - practice is difficult to theorise?
 15 002 notes the usefulness of case studies to show the relevance of theory in practice, but notes that from people on the ground there is a need for a pragmatic approach to UK -> to make lives better
 16 T-P gaps occur due to a lack of reflection and lack of knowing how to bring together different sectors and disciplines - so at the end of the day people go back to their own disciplinary communities rather than pursue integrated development
 17
 18 Enabling conditions to close T-P gaps: monitoring and evaluations, organisational learning, reflection, communication, process management and process facilitation - these are all areas that need capacity building

19 **003**
 20 Key knowledge gaps mentions extensively with examples - lack of historical/baseline data as well as reliability of data
 21 Need for context knowledge in applying lessons in UR from other geographies and need to understand specific local contexts

22 **004**
 23 There's gaps between rhetoric and action - gives the example of local gov's and cities declaring climate crisis/emergency but not knowing what the implications are for policy and action and therefore not doing anything. 'no one knows what it means' (nb. climate crisis). This has added yet another dimension to the resource requests of local budgets to local gov needs to make implementation compromises and trade-offs rather than fund additional actions/projects.
 24
 25 Knowledge gaps - siloed data especially in natural science data (climate models, weather models, rainfall, water scarcity etc) and social data (demographics, health, inequality etc) means that an opportunity is lost to spot vulnerabilities - ie. where is climate change going to impact people most? Sees data led forecasting as important in prioritising action in urban contexts.
 26
 27 Priorities are also very different in diff economic contexts - developed countries have the privilege and capacity to think and plan long terms, while in LDCs the focus is on survival at both individual (feeding your kids) and institutional levels - this means LDCs pay a double cost - as the focus on survival means they don't have the bandwidth and capacity to think and plan for the long term which makes them even more vulnerable - feedback loop - this also affects the perception of risk as people in LDCs discount the future in favour of present moment survival.
 28
 29 Academia -> practice
 30 Highlight theory-practice gaps in how different knowledge communities value and measure success - in academia it's papers and publishing. Sees the need for academia to change - publishing beyond disciplinary communities/sectors could help bridge this gap. Sees examples such as the summer school useful formats in bridging these gaps.
 31
 32
 33

Memo
 RQ: Knowledge implementation gaps - how they occur

Linked Codes

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39 **005**
 40 Knowledge gaps - how we manage and govern the built environment higher ed is specialised and disciplines are differentiated but that's
 41 not how the real world functions so people aren't prepared for practice
 42 Need to connect disciplines and for practitioners to be interdisciplinary
 43 Need to acknowledge design is political and integrate it with environ and econ and social dimensions - but modernist worldviews still
 44 dominate
 45 Highlights the need to ask the right questions and says even then there are no 'easy answers to connect academia and practice'
 46 Knowledge gaps - capitalism has homogenised cities so when we say 'we' who is that? Need to go beyond eurocentric models and
 47 approaches and centre indigenous practices and knowledge and be aware of socio-economic privileges
 48 Need for structural change to do so - but theorists are unhappy because implementation means compromise. Solutions mean
 49 compromise - so theory as pure is difficult to implement - a revolution might be the answer, but what kind?
 50 **006**
 51 Identifies knowledge gaps as key in low income countries (LIC) - human capacity and institutional capacity
 52 Knowledge gaps - data availability, as well as methods for evaluating and operationalising UR
 53 Identifies T-P gaps in both resilience in general and in UR in particular
 54 T-P gaps due to: Lack of clarity of who should implement, Differences in application of UR meaning (the terms is seems as 'vague'), Due
 55 to communication barriers ("you really need to break it down to practical, really practical aspects.")
 56 Opps to close T-P gaps: making it practical, building coconstruction of knowledge into research funding calls and dissemination plans as
 57 well as the wider shift to interdisciplinarity highlighted as part of talking about LL
 58 Mentions the role mainstream media needs to play in helping disseminate issues around resilience and urban change and what citizens
 59 can do; opps - changing how we manage and evaluate success in academia and creating codependent success factors (for example
 60 judging funding applications by their dissemination plans);
 61 Gives the example of Horizon 2020 as positive for this shift towards interdisciplinarity and dissemination of knowledge
 62 Barriers to closing T-P gaps: different drivers in academia, the publishing regime, the lack of open access knowledge even if sometimes
 63 it's taxpayer funded, the fact that research is demand driven and data is siloed, the pressure to publish within own disciplinary
 64 communities
 65 **007**
 66 Perceives ID collaboration as difficult even within their own organisation which leads to gaps.
 67 A geographical perspective, gives the example of interconnected UR challenges in different neighbouring countries, yet due to a lack of
 68 communication there's uncoordinated action with unintended consequences (opening the dam in Zambia leads to flooding in
 69 Mozambique even if it wasn't even raining in M).
 70 Sees the need for problem ownership lying with municipalities yet highlights the many knowledge and capacity gaps they face especially
 71 in secondary cities (ie. not a capital) - lack of skills/knowledge for bid writing and capacity to develop bankable projects, how to make the
 72 business case for UR, human capacity in LIC, how to scale implementation.
 73 Highlights that in many municipalities there is a lot of willingness but not enough capacity.
 74 Knowledge gaps - highlights the lack of basic understanding of what UR is due to the term's complexity, the meaning is not well
 75 understood. Municipalities don't understand the meaning of UR
 76 Mentions that people assume 'capitalism is the only way of managing a city' and there's a lack of awareness of other possible models for
 77 city management.
 78 Knowledge gaps are also aggravated by a lack of collaboration between local gov departments and between public and private sector -
 79 a lot of siloed work and sees the roles of multisectoral collaboration in bridging this.
 80 T-P gaps - mentions the topical knowledge 'is there' but there are no processes to implement multisectoral collaboration; mentions the
 81 need for capacity building for implementation and sees multisectoral collaboration as an opportunity. Need for structural change to break
 82 public - private siloes and sees from personal experience that public sector and UN departments don't engage private sector effectively,
 83 despite the fact that implementation of UR always involves private sector companies.
 84 To close T-P gaps actors need to own the theory and understand the differences in application of UR meaning. There is no common
 85 process for implementing UR because it's a context specific concept.
 86 Need to go beyond Western / Eurocentric perspectives about UR and seek to do knowledge transfer the other way around too - learning
 87 from non-western examples and best practice for example from many African cities implementing resilience.

RQ: Knowledge implementation gaps - how they occur

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76 **008**
 77 **Mentions** the need to integrate different ways of knowing - from communities to engineers and therefore there's a need for UR language to be simple and easy to understand. Says the knowledge is there, we don't know how to integrate it across disciplines. However mentions there's confusion about what the term means and the term is misused - there's a need to translate high level information from international and national policies and bring that down to the geographical level and make it relevant to those stakeholders.

78
 79 Mentions the challenge around the lack of common processes for resilience and that it's not a quick process, it needs constant attention and investment and resources are always limited.

80
 81 **Technical** assistance from other countries can help span T-P gaps.

82
 83 **009**
 84 Organisational remit - provide CB on building bankable projects
 85 As UNFCCC funding mechanism - portfolio approach to UR -> **projectification** of funding
 86 Sees multiple entry points to tackle both mitigation and adaptation through projects and links it to better livelihood outcomes - green growth

87
 88 Implementation barriers: private sector drivers and need for UR business model to work for private sector;

89
 90 Identifies different ways in which UR can be framed for private sector to bridge this gap:
 91 - Framing why resilience_Cost of inaction
 92 - Framing why resilience_Improve livelihoods
 93 - Framing why resilience_Mitigate climate risk
 94 - Framing why resilience_Private sector_Cost savings and recovery
 95 - Framing why resilience_Private sector_Profitability
 96 - **Opp** for private sector engagement_cost effectiveness

97
 98 However these drivers are different between large companies and SMEs as large companies are motivated by seeking competitive advantage & sector leadership while also being more visible and therefore having to be accountable to their consumers/stakeholders. For SMEs this is a "luxury".

99
 100 Knowledge gaps
 101 - lack of knowledge how to write bankable projects
 102 - how to **derisk** investments (from the **poV** of public sector)
 103 - difficult to identify and design adaptation projects

104
 105 Barrier to scale: lack of replication of pilots, lack of sustainable financial mechanisms, too many pilots
 106 Barrier to change: lack of accounting for climate risk in insurance sector, **shorterminism** of both public and private sectors

107
 108 Opportunity for UR - provide incentives to participate to close gaps
 109 Need for aspiration/imagination to demand change

110
 111 T-P gaps - identifies market failure as key barrier to theory implementation; translating theory into practice is difficult; perceives academics as having the "luxury" to "think things from a bigger picture" which is lacking in practice; idealised version of academia; while sees the public and private sectors primarily driven by financial pragmatism; identifies lack of education to set aspirations and lack of knowledge to use technical solutions in practice (implement solutions)

112
 113 Closing T-P gaps - either through incentives to change or through structural change

114
 115 **010**
 116 Knowledge gaps:
 117 - between informal and formal educational systems
 118 - between natural and social science (link with post-Enlightenment disciplinary speciation and how this is leading to knowledge gaps)
 119 - also a gap in how we perceive cities - we should think of cities as "a living organism" - nod to complex systems and system dynamics
 120 - about where risks and vulnerabilities exist - especially in layering different data sets (demographics and climate models for example) - to look at uneven impacts of climate change and help prioritise action
 121 - population dynamics & impacts - how are the socio-economic changes affecting demand, aspirations and behaviour change
 122 - lacking systemic knowledge - making sense of different types of data and information for ID knowledge production
 123 - data at the scale of decision-making - climate models are at different scales/resolutions so they're not helpful for decision makers
 124 - data availability

RQ: Knowledge implementation gaps - how they occur

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135 **011**
 136 Knowledge gaps
 137 - Mentions that all the known gaps are important - data, infrastructure, finance, legislation etc - but the key area that is underresearched
 138 is the interplay and feedback loops between them. Uses the metaphor that there's a need to "align the stars" - need to go beyond usual
 139 suspects to look at interplay
 140 - mentions finance, governance and institutional capacity as three key areas where the interplay is important and there's big knowledge
 141 gaps - for this needs to be a process and there's also the need to understand path dependence and historical impacts

142 Knowledge gaps_opps_
 143 - adaptive priorities - keep adapting priorities as the realities change
 144 - create continuity processes beyond political cycles
 145 - create process for interplay
 146 - for this there's a need to move beyond initiatives (think they mean projects or the flashy pilots they mention elsewhere?)

147 Conditions to bridge
 148 - go beyond buzzword of UR
 149 - go beyond flashy projects and embrace the reality (similar to Dan Hill's Dark Matter concept?)

150 T-P gaps
 151 Identifies two key dynamics:
 152 - Theorists don't accept their theory is weak
 153 - Practitioners are reluctant to change practice based on theory
 154 So as a consequence people keep doing what they usually do

155 This is partly due to academic drivers (projectification of funding, duration of projects, physical distance from areas being researched etc)

156 Examples:
 157 - dominance of iconic cities as case studies (Copenhagen, New York) when most cities aren't like those so limits to transferability of
 158 insights generated
 159 - reality check of urban governance differences (as example above)
 160 - need for localised theory
 161 - need to apply theory to practical reality
 162 - hype cycle - UR became a buzzword, now everyone thinks they're resilient because they have an action plan
 163 - overemphasis on the importance of theory vs the value of practice based knowledge

164 "And then in urban resilience, you have these 15 cities that everybody talks about - Copenhagen, Barcelona and New York, great cities
 165 and I admire them and I like to travel to them with my family. But the reality, the city reality of life on planet is not Copenhagen, it's
 166 Mumbai, Mombasa and Montevideo. So these theories on cities are a very localized thing."

167 **Opps**
 168 - small experiments to test theory
 169 - openness of theory to local context
 170 - connect local actors, especially academics and practitioners and policy makers to build connections between them that will survive
 171 once the UN mission is over - rather than international research partners who then pack up and go
 172 - create feedback loops academia-practice-policy making - mentions that these exist among combination of two but not of all 3 together
 173 - new ways of working
 174 - long term capacity building through building connections at a local level

175 Positive example:
 176 - bringing academics, policy makers and practitioners together in the IPCC Cities Conference

177 **012**
 178 Discomfort of ID working leads to knowledge gaps - highlights this in itself as a gap - how to work in ID ways
 179 Need to accommodate new ways of knowing but people aren't comfortable

180 Barriers to co-construction of knowledge
 181 Barrier to change_top down without participation/inclusivity
 182 Involvement of local people is tacked on rather than embedded
 183 Collaboration with academics is a one off
 184 Lack of diversity leads to blindspots - both sectoral (pol makers, practitioners, academics) and gender, ethnicity etc

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 RQ: Knowledge implementation gaps
 - how they occur

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221 **013**
 222
 223 Opportunities:
 224 Role of summer school in bringing ID people together to understand the needs of stakeholders in UR
 225 Connect planners and cartographers - so planners betwe understand the data and can help the planning process
 226
 227
 228 Barrier to UR
 229 - local gov not open to new terminologies
 230 - public sector 9-4 mentality
 231 - relationship between national & local gov - translating national strategies and learning from local action (feedback loops) - embedding a mindset of resilience in this process
 232
 233 Knowledge gaps
 234 - local gov as ghost in the machine
 235 - local gov comes across as opaque - residents can't link what they see (works on the road) with action on resilience (new hedges for biodiversity and water retention) - so therefore don't know what local gov is doing to keep them safe
 236 - lack of communication to residents
 237 - implementation actions as invisible background - some people perhaps want this though so how to balance the right amount of communicating action?
 238 - how to communicate what's been done
 239 - involve residents in solution generation - so they're not just at receiving end
 240 - data availability in the right format and at the right scale and consistent across the whole country so rural areas don't get left behind
 241 - data-decision-making link in national policy - data at different scales and patches of uncertainty means its hard to link this to national strategy and inform it - also link with high resolution downscaling
 242 - role of communication between departments, disciplines, levels is key but there's big gaps in knowing how to communicate
 243
 244 **014**
 245 Brings up T-P gaps early on in the interview when looking at interdisciplinarity collaboration and science - policy making
 246 T-P gaps_lead to frustration in collaboration
 247
 248 Knowledge gaps:
 249 - lack of understanding uncertainty in climate modelling
 250 - we need to plan in accordance to what the climate system will be like in the future, but we don't know that due to complexity, tipping points and cascading effects - Future impact of present decisions - we need to name the assumptions we're making in models and that inform decision-making but scientists are reluctant to name these as uncertainty in models is very high
 251 - future system behaviour is uncertain
 252 - climate system is part of a socioeconomic system
 253 - cost-benefit analysis of decision-making - gives the example of infrastructural decisions that are very expensive and might not be effective in the future
 254 - interplay between data, infrastructure, finance, legislation
 255 - uncertainty level in climate modelling
 256 - historical data is not enough
 257 - there are trade offs in prioritising action
 258 - information regarding uncertainty and risk is not easy to communicate to different audiences (from scientists to decision makers, from decision makers to the public etc)
 259 - understand cascading effects
 260 - what's the best discipline to integrate it all - how do we bring a systemic perspective
 261 - current wave of global conservatism reduces participation in decision making and we as scientists and policy makers don't know how to deal with that
 262 - between natural and social science
 263 - perceptions of social science as contextual, difficult to replicate
 264
 265 Decision-making is seen as a political process rather than science/evidence based
 266
 267
 268 Need for ID to understand assumptions in cascading effects
 269 Need for systemic knowledge
 270 Need to translate jargon to convince others
 271 Need for translation of data & tech into value & meaning

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299 **015**
 300
 301 People are experts in their own context but there's a dynamic of Insider-outsider knowledge - sometimes people value outsider
 knowledge more
 302 Organisational role as UN agency is to empower local knowledge to be values
 303
 304 T-P gaps_opps
 305 - connect local actors
 306 - value insider/local knowledge
 307 - build on UN role to empower people in the decision-making chain
 308 - enable information flows between gov & academia
 309 - private sector engagement - although there's a need to be mindful of private sector drivers (profitability) so it's a win win situation
 310 - connect municipalities through national policy
 311 - Cities have a bigger platform nowadays - so national level policy is in a way an enabler rather than crucial
 312 - connect the abstract (theory) - practical
 313
 314 T-P gaps
 315 - assumption it needs to be perfect before scaling
 316 - Danger of iconic cities as case studies
 317 - need for adaptive scaling process
 318 - need for capacity building for implementation
 319 - overemphasis on theory means there's not enough focus on implementation - need for adaptive learning so we learn by doing
 320 - need to learn by doing in implementation
 321 - need to apply theory to practical reality
 322 - Interdisciplinarity is seen as condition to close T-P gaps
 323 - experiments to test theory
 324 - theory needs to touch ground
 325 - too much untested theory
 326
 327 Challenges
 328 - lack of learning from the past and from crisis
 329 - good DRR is invisible so people don't make the connection between preventative action and results
 330 - implementation actions as invisible background
 331
 332 Knowledge gaps:
 333 - scaling implementation - need for scale even if it's an imperfect model
 334 - data availability
 335 - having no data is an insight in its own right
 336 - no historical/baseline data in many places
 337 - what data to collect for diagnosis - more importantly
 338 - opportunity of starting from scratch with data collection is to be strategic about what data to collect for diagnosis rather than be
 overwhelmed by too much data
 339 - data-decision-making link in national policy
 340 - gap between NDCs and local level implementation
 341
 342 **016**
 343 Lots of links with memo notes on [interdisciplinarity](#)
 344
 345 T-P gaps
 346 - balance ideal process with reality on the ground
 347 - best practices don't mean they're transferable
 348 - even if there's a common framework/ process to develop your UR strategy, it's different from context ot context "because there's so
 many underlying factors"
 349 - need for localised theory - need to apply theory to practical reality of the cities you're working in
 350 - role of case studies - to develop best practices but can sometimes be too generalised so that they can be compareable (gives the
 example of European projects case studies) even though they're not fully comparable
 351 - measuring coping capacity - link with the meaning of UR in developed/developing countries and the normative/non-normative attitude
 to UR given the impacts are different and the ability to cope is different
 352 - "challenges to these concepts come from our desire to keep measuring things" - positivist worldview / quantitative desire to measure
 and compare everything
 353 - difference in meaning between "safety level" and "optimal desirable level" in target setting - perception of risk is different

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 Corina Angheloiu

Comment

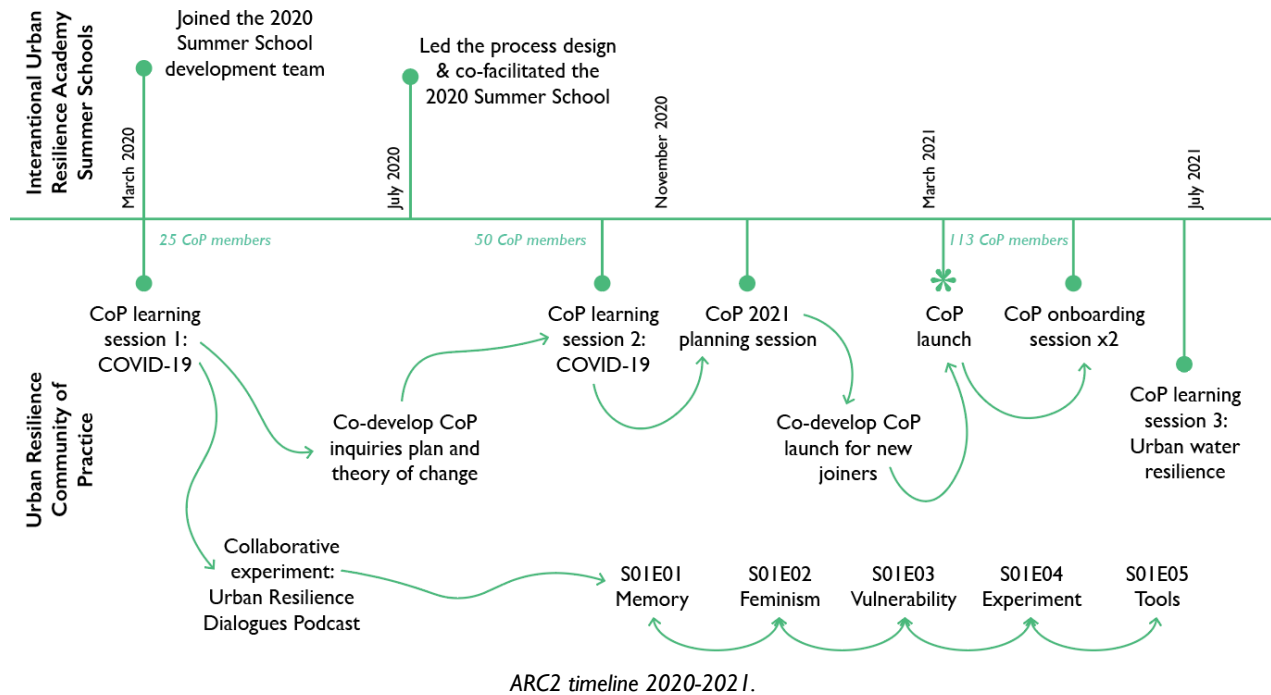
Code notes from interviews:

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Appendix 2: ARC2 annexes

Designing the 2020 Urban Resilience Summer School

ARC2 started with the second edition of the Summer School on Urban Resilience initiated by the International Urban Resilience Academy (2020) and continued with the facilitation of an emerging urban resilience community of practice (2020-21). The figure below depicts the ARC2 timeline.



The challenge brief was designed by Prof. Nicola Tollin from SDU and asked participants to:

- “Analyse the impact of COVID-19 on an urban system of your choice and how this affects broader urban resilience (city of your group’s choice).
- Explore how short and long-term COVID-19 responses contribute to or hinder urban resilience.
- Envision medium- and long-term scenarios about the urban context of your choice.
- Identify lessons learned from the pandemic that can be of use for addressing other shocks and stressors.
- Provide recommendations for how to enhance urban resilience.” (IURA Summer School, Challenge Brief, 2020)

The participants were split into five groups optimised to ensure compatible time zones (so they could meet outside programme contact hours) and to ensure a diverse mix of disciplinary backgrounds and professional types (researchers, practitioners, and policymakers).

The online collaborative platform Miro was selected to aid the online format of the Summer School. A set of templates to support the teams in exploring the DIAL phases was introduced each week. The

weekly schedule was split between applied sessions (workshops I designed and co-facilitated based on the process design framework above) and general lectures (also open to the public), followed by closed Q&A sessions for Summer School participants. The table below presents an overview of the weekly schedule and session objectives and the key concepts to which the participants were introduced.

2020 Summer School schedule, session objectives, and key concepts introduced.

		Session objectives	Key concepts
Onboarding	Thursday	Set expectations Get to know one another Start building trust Reflect on learning expectations Provide tools for learning how to learn	Community of practice Triple-loop learning
Diagnose Week 1	Monday	Set the context: complexity, uncertainty, and wicked problems Explore what is a system Define system boundaries and your complex problem	Wicked problems System boundary / Boundary choice System of interest System goal/purpose
	Thursday	Participants to share their chosen problem definition and system boundaries Share the initial system mapping Reflect on boundary choices	
Imagine Week 2	Monday	Explore possible futures Discuss and decide on preferable futures Apply tools to envision future pathways	Signal of change Trend Preferable, possible, probable futures Axis of Uncertainty
	Thursday	Participants to share their system diagnosis considering the diagnosis and envisioning tools Discuss the normative aspect of resilience and how it relates to 'preferable' futures	
Act Week 3	Monday	Participants to share progress from diagnosis to proposed intervention Discuss similarities and differences in approaches Reflect on the process	Leverage Points Theory of change
	Thursday	Identify key dynamic areas for interventions Develop a theory of change	
Learn Week 4	Monday	Identify key learning questions to support evaluation design Discuss the challenges of evaluating change over time in complex systems	Triple-loop learning
	Thursday	Participants to present back their group work Peer feedback and discussion	
Graduation	Friday	Get a sense of closure Reflect on learnings during the summer school Identify remaining or new learning questions Graduate into the community of practice	Community of practice

Following the 2020 editions of the Summer School, the facilitation of the urban resilience community of practice consisted of regular peer-learning workshops, as well as the co-development of a collaborative experiment, the Urban Resilience Dialogues podcast, which ended its first season in July 2021. With that, ARC2 also came to an end.

Reflective logs template

- What happened? A chronological log of events
- What are my observations of the events? What did I perceive to happen?
- What patterns or themes stand out?
- What am I feeling?
- What surprised me? About myself? About others?
- Anything to do (actions), think about (reflections), or ask more questions?

Facilitation agendas

	ONBOARDING	DIAGNOSE		ENVISION		INTERVENE		INTERVENE		FINAL SESSION
		WEEK 1		WEEK 2		WEEK 3		WEEK 4		
13:00-15:30 CET	Thu 28th May	Mon 1st June	Thu 4th Jun	Mon 8th Jun	Mon 8th Jun	Mon 15th Jun	Thu 19th Jun	Mon 22nd Jun	Thu 25th Jun	Fri 26th Jun
Learning objectives	-set expectations -create the container for a new community to grow -start building trust -get to know one another -provide tools for learning how to learn	- set the context: complexity, uncertainty and wicked problems - what is a system - defining system boundaries - applying tools to define your complex problem	-share the problem definition you'll be working with for the next weeks -share the initial system mapping -reflect on boundary choices -share progress on your diagnosis	- explore possible futures - discuss and decide on preferable futures - apply tools to envision future pathways	- share your updated system diagnosis in light of the envisioning tools - reflect on possible vs preferable futures - discuss the normative aspect of resilience and how it relates to 'preferable' futures - get feedback on interim output	- understand city-systems interdependencies through cascades of failure - understand and identify failure mechanisms in interdependent systems	- identify key 'failure mechanisms' across in your key system - design impactful programmes to enhance the protective, provision and connective capacity of infrastructure	- identify key dynamic areas for interventions - develop a theory of change - bring together weekly outputs/work together into one strategy - identify key learning questions / KPOs (part of approaches to M&E)	- share back your whole change narrative - from diagnosis to proposed intervention - discuss similarities and differences in approaches - reflect on the process	- get a sense of closure - reflect on learnings during the summer school - identify new learning edges - the things we now know we don't know - create a sense of an enlarging community - we're now part of something bigger than the sum of our parts
ROLES	Thu 28th May	Mon 1st June	Thu 4th Jun	Mon 8th Jun	Mon 8th Jun	Mon 15th Jun	Thu 19th Jun	Mon 22nd Jun	Thu 25th Jun	Fri 26th Jun
Host	Kasia, Nicola	Corina	Corina	Kirsten	Kirsten	Monica	Monica	Monica	Monica	Corina
Co-host	Corina, Monica	Monica	Monica	Corina/Monica	Corina/Monica	Corina	Corina	Corina/Kasia	Corina/Kasia	Monica/Kasia
Harvester	Marcia	host/cohost to cover	host/cohost to cover	host/cohost to cover	host/cohost to cover	host/cohost to cover	host/cohost to cover	host/cohost to cover	host/cohost to cover	
Tech lead	Margherita/Kasia	Margherita								
Chat monitor	Vittore	host/cohost to cover	host/cohost to cover	host/cohost to cover	host/cohost to cover	host/cohost to cover	host/cohost to cover	host/cohost to cover	host/cohost to cover	
Guest contributor	x	x	x	x	x	Arup & tRS	Arup & tRS			
Guest alumni	x	x	Jenna tbc?		Mrudhula	x	x	x		Lookman/Danilo tbc
Breakout facilitators	GR 1 Nicola GR 2 Kasia GR 3 Corina GR 4 Marcia GR 5 Vittore	GR 1 Kasia GR 2 Corina GR 3 Nicola GR 4 Vittore GR 5 Monica	GR A Kasia GR B Corina GR C Nicola GR D GR E Monica	GR 1 Corina GR 2 Nicola GR 3 Monica GR 4 Kirsten GR 5 Kasia	GR A GR B GR C GR D GR E	GR 1 Marcia GR 2 Monica GR 3 Kasia GR 4 Nicola GR 5 Corina	GR A GR B GR C GR D GR E	GR 1 GR 2 GR 3 GR 4 GR 5	GR A GR B GR C GR D GR E	
SESSION OVERVIEW										
Feel of the session	Opening	Diverge	Converge	Diverge	Converge	Diverge	Converge	Diverge	Converge	Closing
Key concepts	Community of practice		Wicked problems Complexity Systemic approaches Ability to cope		Signal of change Trend Horizon scanning Scenario planning		Systems interdependencies Cascades of failure		Leverage Points Theory of change	
Frameworks/tools			Snappy systems Multiple Cause Diagrams Stakeholder mapping Trend wheels/Forcefield Analysis		Four futures & scenario archetypes Futures cone Trend wheels Personas		tbc		Leverage Points Theory of change Key Performance Questions (KPOs)	
Key tasks for the week	Read learning to learn document and set your learning intentions and questions for this journey	- Articulate your problem definition and system boundaries through Snappy Systems - Map system dynamics through Multiple Cause Diagrams - Map your stakeholders and decide on viewpoint(s)		Keep refining your system maps and diagnosis - added layer of envisioning methods and start converging towards your preferable vision	Share preliminary output - your system diagnosis + envisioning board and short narrative	Start pivoting from diagnosis and envisioning to developing ways to intervene - through applying the Arup/TRS methods	Share your emerging strategy	Bring it all together - work towards your final output that encompasses your change narrative, diagnosis, preferable visions and strategy for intervening		
Link to deck			Link							
Link to Miro board			Link							

Onboarding session detailed agenda

Logistics		Aims		
Date	28th May	Objectives	<ul style="list-style-type: none"> - set expectations - create the container for a new community to grow - start building trust - get to know one another - provide tools for learning how to learn 	
Time	2hr30; 13:00-15:30pm CET	Feel of the session	fast paced, high energy, build up excitement	
Zoom link	https://spddan-kuni.zoom.us/j/670503109223pwd=emhZe85b1dFUHN6anpUMzEwOURpdz09	Roles	Harvester - Marcia Tech - Margherita Chat monitor - Vittore	
Deck	Link to deck			
Miro	Link to Miro			
Agenda				
Time		Description	Who/roles	Materials
5mins	13.00-13.05	Technical buffer time	Marcia/Margherita	
5mins	13.05-13.10	Welcome: quick overview of the need for urban resilience and the vision behind this This is an experiment - trying to bridge practice - policy - research Not just a one off - we're building communities of practice and this is reflected in the way the second summer school is designed and facilitated by former alumni	Nicola	no slides
30mins	13.10-13.40	Check in - getting to know each other Introduce why we do check-ins - arrive in the meeting, focus on what we want out of it and bring our whole self What is your name & where are you? How are you today? What one hope do you have for this journey?	Corina	Marcia to capture hopes in Miro Onboarding no slides
15mins	13.40-13.55	Orientation - what we'll be up to during the next weeks Who we are What to expect Ground rules What we expect of you Housekeeping (tech, platforms, timings - introduce zoom functions ie. go slower) What we heard from the survey (top line key themes)	Kasia	Short intro deck
5mins	13.55-14.00	Break - quick comfort break		
10mins	14.00-14.10	Overview of the next 5 weeks - learning objectives - share the overview flow and types of sessions (diamond)	Nicola/Kasia/ Corina/Monica	Short intro deck
10mins	14.10-14.20	Challenge: Urban resilience in light of COVID19 as a systemic challenge, setting the expectations and learning objectives	Nicola	Short intro deck
15mins	14.20-14.35	Q&A - clarifications questions about the timeline/challenge or any other general questions	Corina to moderate q&a	Vittore to monitor if any questions are shared in the chat and bring them up in plenary
15mins	14.35-14.50	Group activity 1 - getting to know each other better You'll be split into random groups and you've got 5 minutes to take a piece of paper and draw your urban resilience journey that brought you here today. Then take turns to share with others in your group (2-3mins each)	Corina	Margherita to assign breakout groups
		Introduce the next activity before break	Room facilitators: Marcia, Monica, Kasia, Vittore, Corina, Nicola	
5mins	14.50-14.55	Break - quick comfort break and we'll come back into your work groups	Corina to move between the	Marcia/Margherita to assign people to breakout rooms meanwhile

Diagnosis detailed agenda

Logistics

Date	1st June
Time	2hr30; 13:00-15:30pm CET
Link to deck	

Aims

Objectives	-set the context: complexity, uncertainty and wicked problems -what is a system -defining system boundaries -applying tools to define your complex problem
Feel of the session	divergent, exploratory

Agenda

Time	Description	Who/roles	Materials
5mins	Technical buffer time - start w the welcome	Monica	
10mins	<p>Welcome to the week</p> <p>Happy Monday, welcome to a new week This week, our theme is diagnosis Today we're focusing on...</p> <p>Before we start, quick check in through the chat box: 1) How are you doing today? 2) What one thing/insight stayed with you from last week? -> any reflections on learning styles? 3) Have you activated your accounts?</p> <p>Facilitator to summarise key patterns from the check in verbally</p>	Monica	
30mins	Introduce the process design phase and deep dive into the tool(s) they're exploring this week	Corina	
10mins	Q&A/discussion/clarifications		
5mins	Break		
15mins	Walk participants through the group task for the week and the deliverable they need to work towards this week	Corina	Post on slack pdf file too
40mins	<p>Breakout rooms</p> <p>Teams to start discussing what system they want to explore over the next 4 weeks - perhaps a challenge they are already working on or perhaps something different.</p> <p>Teams to also discuss how they are going to work for the rest of the week - individually then come together as group/split in pairs/work together etc.</p>	<p>Breakout room facilitators: Corina, Monica, Nicola, Kasia</p> <p>Facilitator to keep time, keep an eye out for team dynamics, but teams should do their own harvesting - more of a background role.</p>	Margherita to make Corina co-host so she can jump rooms
5mins	Break		
25mins	<p>Report back in plenary</p> <p>1) Where you got to with defining your system 2) How you're going to work together this week</p> <p>Any further clarification questions - ask on the slack channel</p>	Monica to facilitate/Corina as backup 5mins per team - 2min share back, 3min feedback - Corina & Monica & Nicola	
5mins	<p>Coming up next this week - summary slide</p> <p>Include info on coaching slots</p>		

*drop in slots can be offered on Weds for different timezones so that groups can check in with someone about their work (max 20-30mins slots/group)

Logistics		Aims		
Date	4th June	Objectives	<ul style="list-style-type: none"> - share the problem definition you'll be working with for the next weeks - share the initial system mapping - reflect on boundary choices - share progress on your diagnosis 	
Time	2hr30; 13:00-15:30pm CET	Feel of the session	reflective, converging, mapping insights from the week	
Agenda				
Time	Description	Who/roles	Materials/notes	
5mins	Welcome and introduce structure of the session	Corina		
10mins	NBS	Nicola		
15mins	Guest alumni perspective - reflections on urban resilience x COVID19 from an alumni's geography + short q&a	Jenna		
1hr15	Group sharing progress from this week	All	Assuming 5 groups x 5-7 mins each presentation Feedback from facilitators/peers 5-7 mins -> 15min per group = 1hr15	
5mins	Summary feedback - key themes/insights across the 5 groups	Corina		
5mins	Break			
40mins	<p>Reflective conversation:</p> <p>Any reflections on the week - what inspired you? What surprised you? Any reflections on the theme of leadership - what does this mean to you in the context of urban resilience?</p> <p>1-2-4-all method Take a moment to reflect - add any post it on Miro Split into random pairs and discuss (10mins) Pair with another group and discuss (10mins) - Monica, Corina, Nicola, Kasia, Margherita, Kirsten, Jenna to record the conversations in the groups of 4 Come back - share insights in plenary (20mins)</p>	All	Reflective q's set up in Miro - facilitators to actively take notes & record the sessions they are in	<p>Additional questions to consider:</p> <p>On a scale from 1 to 10 how committed were you this week to your learning? Is there anything holding you back? What will you do different next week to maximize your presence and contribution to the big and small groups?</p>
15mins	<p>Wrap up & what's coming up next week</p> <p>Check-out - share one word/question on your mind now - either in writing or verbally (quickly)</p>	Corina		

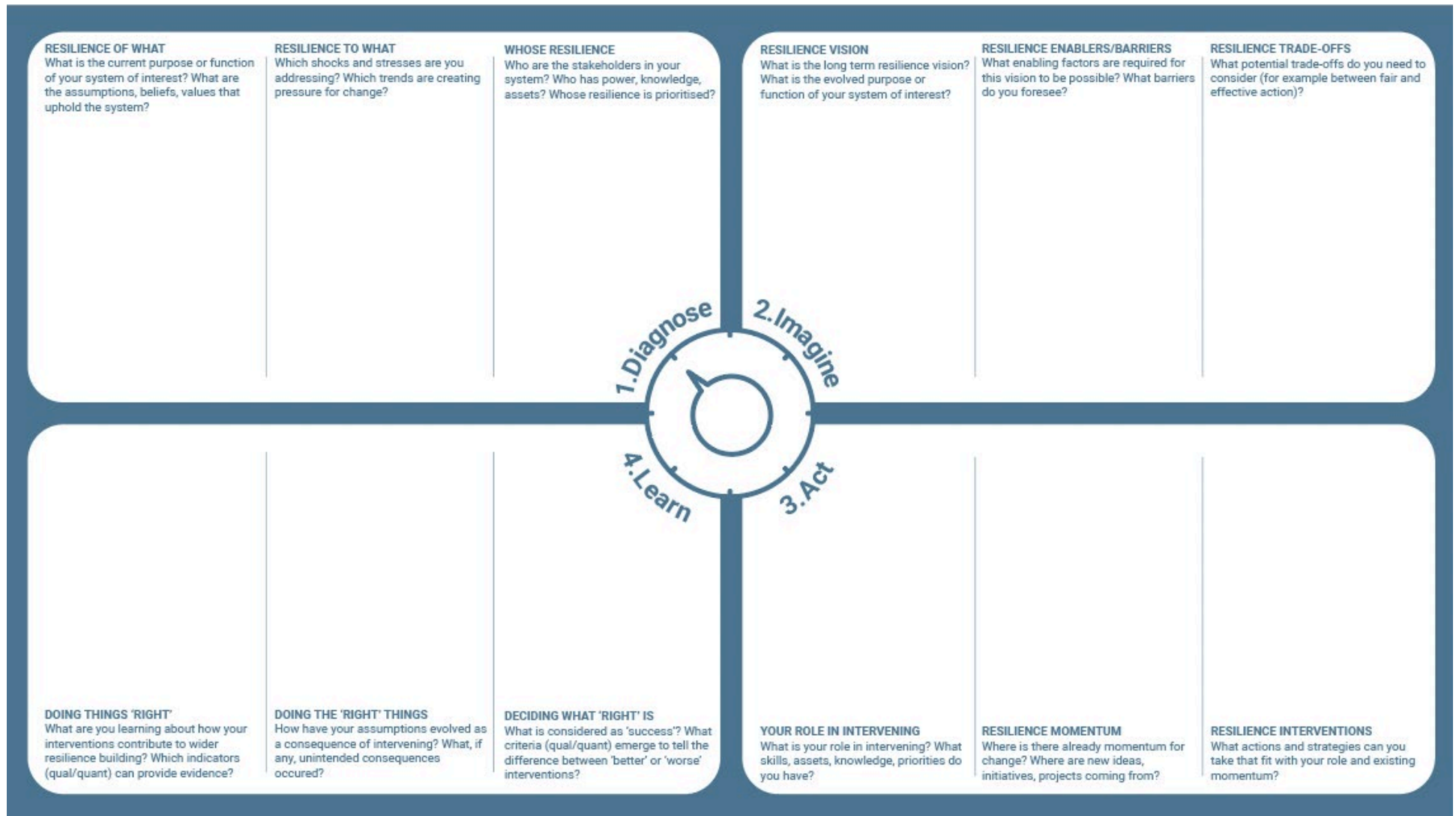
Envision detailed agenda			
Logistics		Aims	
Date	8th June	Objectives	- explore possible futures - discuss and decide on preferable futures - apply tools to envision future pathways
Time	2hr30; 13:00-15:30pm CET	Feel of the session	divergent, exploratory
Agenda			
Time	Description	Who/roles	Materials
5mins	Technical buffer time - start w the welcome	Corina	
10mins	<p>Welcome to the week</p> <p>Happy Monday, welcome to a new week This week, our theme is envisioning and today we're focusing on alternative, preferable futures of the systems you're exploring</p> <p>Before we start, quick check in through the chat box: 1) How are you doing today? 2) What one intention are you bringing to this week?</p> <p>Facilitator to summarise key patterns from the check in verbally</p>	Corina	
30mins	Introduce the process design phase and deep dive into the tool(s) they're exploring this week	Kirsten	
10mins	Q&A/discussion/clarifications	Kirsten	
5mins	Break		
15mins	Walk participants through the group task for the week and the deliverable they need to work towards this week	Corina	
40mins	<p>Breakout rooms</p> <p>Teams to start exploring the envisioning tools and discuss how they will work this week towards the interim output.</p>	<p>Breakout room facilitators: Corina, Monica, Nicola, Kasja, Kirsten</p> <p>Facilitators to keep time, keep an eye out for team dynamics, but teams should do their own harvesting - more of a background role.</p>	Margherita to make Kirsten/Corina co-host so she can jump rooms
5mins	Break		
25mins	<p>Report back in plenary</p> <p>1) Where you got to with developing a vision for your system 2) How you're going to work together this week</p>	Kirsten facilitate/Corina as backup	5 mins per team - 2 min share back, 3 min feedback
5mins	<p>Coming up next this week - summary slide incl. interim output</p> <p>Include info on coaching slots</p>	Corina	
*drop in slots can be offered on Weds for different timezones so that groups can check in with someone about their work (max 20-30mins slots/group)			

Logistics		Aims	
Date	11th June	Objectives	- share your updated system diagnosis in light of the envisioning tools - reflect on possible vs preferable futures - discuss the normative aspect of resilience and how it relates to 'preferable' futures - get feedback on interim output
Time	2hr30; 13:00-15:30pm CET	Feel of the session	
Agenda			
Time	Description	Who/roles	Materials/notes
5mins	Welcome and introduce structure of the session	Corina	
15mins	Guest alumni perspective - reflections on urban resilience x COVID19 from an alumni's geography + short q&a	Mrudhula	
1hr15	Group sharing progress from this week	All	Assuming 5 groups x 5 mins each presentation Feedback from facilitators/peers 10 mins -> 15min per group = 1hr15
5mins	Summary feedback - key themes/insights across the 5 groups	Facilitators	
5mins	Break - intro next session before		
20mins	Reflective conversation: Take a moment to reflect - add any post its on Miro Split into random pairs and discuss (10mins) Group 2 pairs and discuss (10mins) Plenary - themes/reflections	All	Reflective q's set up in Miro - all to take notes in there https://miro.com/app/board/o9J_kr37DKY/
15mins	Wrap up & what's coming up next week Check-out - share one word that summarises how you feel now - either in writing or verbally (quickly)	Corina	

Intervene & learn detailed agenda			
Logistics		Aims	
Date	22nd June	Objectives	reflect on week 3 bring all the concepts together - as a systemic approach to strategy ensure everyone knows what they're doing for the final days
Time	2hr30; 13:00-15:30pm CET	Feel of the session	divergent, exploratory
Agenda			
Time	Description	Who/roles	Materials
5mins	Technical buffer time- start w the welcome	Monica	
40mins	<p>Welcome to the week</p> <p>Happy Monday, welcome to our final week together This week, our theme is intervening and learning about how systems change over time.</p> <p>Before we start, quick check in through the chat box: 1) How are you doing today? 2) What one intention are you bringing to this final week?</p> <p>thank you all for your willingness to dive into discovering yet another tool last week, and working so diligently to advance your understanding of the systems you look to improve. special thanks to BEgona, carolina and Shailendra for their gifts last week, for sharing their knowledge and wisdom. I have a deep sense of gratitude that we are able to create this space of sharing, and growth. Reflecting on week 3: https://miro.com/app/board/o91_kr37DKY=/ we'll follow the 1-2-4-all method individual - in a pair - in a group - in plenary</p>	Monica	<p>Miro prompts for reflections - week 3 Marcia to support with pairing in breakout rooms</p> <p>Timings: 7mins - instructions 3mins - individual reflection 5mins - reflect in a pair 10mins - in a group of 4 10mins - themes in plenary total - 35mins</p>
40mins		Corina/Monica/Nicola	
10mins	Q&A/discussion/clarifications	all	
5mins	Break		
40mins	Breakout rooms - in your groups	Breakout room facilitators to help groups prioritise	
10mins	<p>Work planning for the week - what do you now need to do to wrap it up?</p> <p>Coming up next this week - reminder of schedule and outputs</p>		

Final graduation				
Logistics		Aims		
Date	26th June	Objectives		
Time	2hr30; 13:00-15:30pm CET	Feel of the session	celebratory, fun	
Agenda				
Time		Description	Who/roles	Materials
2mins	13:00 - 13:10	Welcomenote to participants & external guests who's in the room (please say hello in the chat, your name, role and affiliation with the summerschool) formal welcome	Monica & Corina to open together Nicola overall IURA philosophy and aim & introduce the challenge	welcom chat prompts- share in the chat your name, role and affiliation with the summerschool Nicola to hand over to Monica
8 min	13:03:00 -13:10	Format of session (Monica) Our journey together (Monica)	Monica & nicola	slides summarizing the summer school intention, how it all happened through the lens of weekly reflection boards, touching on process, methods, learnings, vision for scaling
45mins	13:10 - 13:55	Introduce the challenge as bridge to next section (Nicola) The highest point of the program - describe in 2 sentences the challenge brief to allow guests to follow Final team presentations introduce each group member (name country)	Corina introduce the groups Group 1 Group 2 Group 3 Group 4 Group 5	7mins/group, no feedback; in chronological order 1 - Carolina (Brazil), Eleanor (UK), Napi (Cameroon), Johanna (Colombia), Thomas (Ghana) 2 - Begona (Spain), Filippo (Italy), Avinash (India), Lea (Germany), Irina (Russia & France) 3 - Indu (India), Rik (Netherlands), Lisa (Austria), Maggie (Malawi), Umberto (Italy) 4 - Dewi (Indonesia), Eva (China), Nir (Nepal), Simon (Bangladesh), Tasfin (Bangladesh) 5 - Ayu (Indonesia), Ermin (Philippines), Shailendra (India), Jawed (Pakistan)
10mins	13:55 - 14:05	Wrap up reflections, comments from external guests who are present Thanking the guests for honoring us with their presence and communicate that we are transitioning to the private part of the session with a 5 min break	Monica	Keep this as a buffer if the teams overrun Audience to provide any input if desired
5mins	14:00 - 14:05	Break - external guests leave		
45mins	14:05 - 14:50	Graduation ceremony Each participant will be called out (spotlights in zoom), receive appreciations and congratulations (1 min X 24) 30 min Staff will receive appreciations (1 X 6) 6 min Nicola to mention Vittore and Jangoong mention that Official certificates will be in the mail with a copy of your appreciation board Welcome the graduates into community	Monica and Corina to read appreciations and congratulate participants in the order from the list Nicola - staff appreciations YES Monica - Corina's appreciations Corina - Monica's appreciations Monica and Corina - Nicola's appreciations	- Read appreciations and congratulate participants in the order from the list - Marcia to support with zoom spotlight synchronized with the reading of appreciations
5 min	14:50-14:55	Awards for group work	All	each staff to add the title of their grup award and present it (1 min each) Group 2 - the most innovative approach to parenting and educational activities during lockdown - ie. keeping kids busy while the parents join a summer school
3 min	14:55 - 14:58	Read notes for participants from external guests who could not attend	Kasia	summarise if too many
6 min	14:58 - 15:04	Participants shared thoughts- 3 mini speeches		participants voices: have 3 participants share in 2 min slots their thoughts, appreciating the summer school, self organized will ask in Slack
15 min	15:17 - 15:30	What next Workshop style to engage graduates into co-creating the community of practice, deciding forms of communication, frequency of interactions, topics, etc	Corina	using last year's minimum viable community exercise as starting point https://docs.google.com/presentation/d/14xnEm-6-Wwt2Z5TKiCn8FbR0_FY72-6IDrBGD14sM/edit?usp=sharing survey type questions - Miro board (Corina)
5mins		family picture wrap-up expect an email on Monday logistics, certificates, accounts, deliverables, files, surveys check out a keyword, hope, dream....		

Problem-based workshop template



Extract from the activity report developed by the IURA organisers after the 2020 Summer School.

The full report can be found at <https://www.sdu.dk/en/forskning/sducivilengineering/iura/training>. Link accessed October 2022.

BLOXHUB Summer School on Urban Resilience

May/June 2020



SDU 

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Copenhagen, 2020

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Foreword

BLOXHUB Summer School on Urban Resilience 2020 was a second edition and was organized responding to the Cities-IPCC call for fostering dialogue between practitioners, policy makers and researchers; to develop and promote peer-to-peer learning across regions, sectors and disciplines to support climate actions.

Following the challenge imposed by the COVID-19 pandemic and relative constraints in our personal and professional lives, it was not possible to realize the BLOXHUB Summer School on-site as originally planned. At the same time, the relevance and the importance of this training course, as an opportunity to exchange experiences, discussing challenges and solutions among participants was indeed timely, relevant and needed; as COVID-19 exposed

the vulnerability of cities and human settlements worldwide. Thereby the training was adapted to the current circumstances to hold it on-line and addressing specifically the urban resilience challenges posed by the pandemic.

The summer School brought 25 policy makers, researchers and practitioners from 18 countries and 4 continents, during on-line learning process spread across 5 weeks from 28 May till 26 of June 2020. The summer school aimed at providing the participants with the latest knowledge on urban resilience research, practice and policies and to co-develop their competencies by working on problem-based challenge, responding to the challenge of analysing and understanding the current pandemic crises. Ultimately, participants identified lessons learned on

how to make cities resilient in face of multiple and diverse crisis, including climate change.

I would like to congratulate the alumni of the BLOXHUB Summer School 2020 for an impressive outcome and to complement them on their wholeheartedly effort, collaborative skills, openness throughout the entire process, during the on-line time spend together. I would like to thank sincerely our partner organizations, the members of Expert's Committee and the organizing committee for their dedication, support and work that made possible the organization of the summer school in challenging times. I look forward to continued collaboration towards 2020 and onwards!

Nicola Tollin

2. Summer school's goal

The BLOXHUB Summer School on Urban Resilience 2020 brought together researchers, practitioners and policymakers from 28st May to 26th June 2020. The summer school provided the participants with the latest knowledge on urban resilience research, practice and policies through lectures of lead experts; and aimed to co-develop their skills and knowledge by working in small groups for responding to the challenge of analysing and understanding the current pandemic crises and to define lessons learn and recommendations that can make cities more resilient in face of multiple and diverse crises, including climate change.

The summer school goal was to bring together multi-disciplinary knowledge and perspectives, from science and practice, on the different global and local challenges faced by cities, and to provide a process design methodology and the necessary skills to developed informed policies, strategies, plans and solutions for urban resilience, that can be later used in the specific context of work of the participants.

The work in groups was organized through a process design methodology guiding the participants in addressing the challenge.

Learning objectives



KNOWLEDGE The basis of urban resilience science, and the development of resilience research in different disciplinary contexts;

International policies (Sustainable Development Goals, Paris Agreement, New Urban Agenda and Sendai Framework for Disaster Risk Reduction);

National policies regarding climate adaptation and mitigation, including urban content of Nationally Determined Contributions and urban aspects of National Adaptations Plan and Policies;

Urban resilience practices with specific case studies from cities worldwide, including strategic plans, action plans, and technological solutions



COMPETENCIES Process design methodology for urban resilience;

System thinking for the analysis of urban shock and stresses;

Different future scenarios methods: forecasting, visioning and backcasting

CROSS-SECTORIAL & THEMATIC ISSUES

Multilevel governance, Finance, Generation of co-benefits, Appropriate technology, Participatory processes and stakeholder involvements, Planning and design

#1 WEBINAR

Facing global crisis at time of pandemic: research, practice and policy perspectives

28 May 2020, 09:30 – 11:30 CET

This first webinar set the scene for the webinar series URBAN RESILIENCE: facing global crisis at the time of pandemic, with a lively discussion intended to provide a broad overview on urban resilience, and the capacity of cities to address causes and effects of mayor global challenges, specifically learning from the current global pandemic crises. The panellists discussed different perspectives and experiences from the point of view of practice, policymaking and research.

The discussion illustrated a reality snapshot at the ground level, efforts, gaps, and opportunities to increase the ability of urban systems, to respond systemically and dynamically to present and future shock and stresses related to the major global challenges.

Citing directly one of our panellists: ‘building resilient cities [must happen] not tomorrow, but now. It’s not easy. Globally, humanity is enduring one of the most difficult moments in decades. The experience is particularly bewildering for younger generations, who have never encountered challenge of this magnitude before’ (Esteban Leon, UN Habitat, Urban resilience Hub).

Alexandros Makarigakis
Programme Specialist and IHP Deputy Secretary
Intergovernmental Hydrological Programme,
United Nations Educational, Scientific and
Cultural Organization UNESCO



Esteban Leon
Head of the City Resilience Global Programme
United Nations Human Settlements Program
UN-Habitat



Nicola Tollin
Professor wsr in Urban Resilience
IURA Coordinator
SDU Civil and Architectural Engineering
University of Southern Denmark

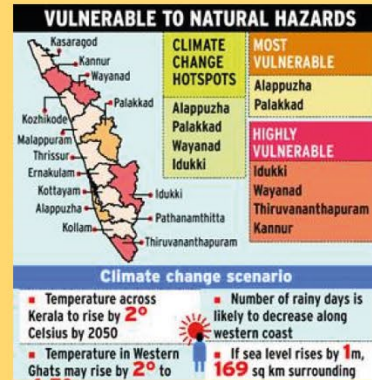


Corina Angheloiu
PhD candidate , Imperial College London
Senior Design Strategist, Forum for the Future
Moderator



Alumni sessions

ENVIRONMENTAL UNCERTAINTY



'LEARNING IN CRISIS' DURING THE COVID-19, A 'GLOBAL SOUTH' CASE STUDY, KERALA, INDIA

Mrudhula Koshy
PHD Research Fellow
Norwegian University of Science and Technology (NTNU)

Urban resilience

- SOCIAL**
- Livelihood
 - Sociocultural values

- PHYSICAL**
- Access to basic services
 - Spatial segregation
 - Density



- INSTITUTIONAL**
- Political instability
 - Lack of planning

- ECONOMIC**
- Informal economy
 - Income disparity

- ENVIRONMENTAL**
- Lack of green spaces
 - Pollution

CASE STUDY: SÃO PAULO, BRAZIL

Danilo Cançado
Junior Program Officer Green Infrastructure
Global Center on Adaptation
The Netherlands



COVID-19 RESPONSE MECHANISMS IN THE CITY OF LAGOS, NIGERIA

www.arcticil.org

Lookman Oshodi

Commonwealth professional fellow
 Project Director, Arctic Infrastructure
 Team lead, Abeokuta Urban Intervention,
 FCN/UK Global Prosperity Fund

COVID-19 IN CALGARY, CANADA

Jenna Dutton

Research Coordinator, Urban Policy Platform,
 School of Public Policy, University of Calgary

Local



- #SupportLocalYYC
- Freshroutes/ Leftovers YYC- 27,000 lbs of food redistributed
- Breweries – making hand sanitizer
- “Porchraits” – by donation, expanded across country
- Local scavenger hunts – window art and painted rocks



Peer to peer learning sessions

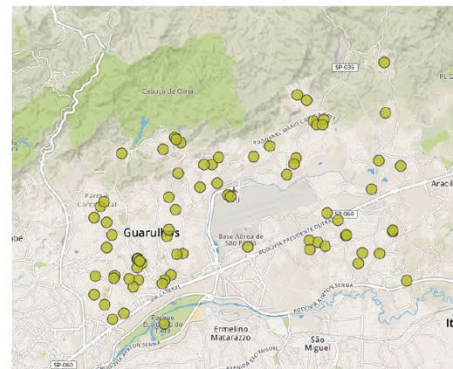
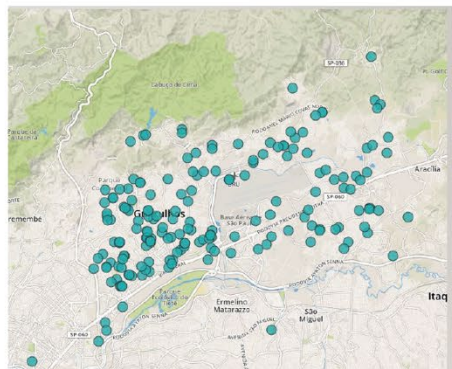


CLIMATE CHANGE, VULNERABILITY AND RISK UN-HABITAT

Begoña Peiro Salvador
Urban Resilience Advisor, Ministry of Housing and Community Development (Fiji), in partnership with UN-Habitat

Challenges	Mitigation
Inconsistent data quality- not easily verifiable	<ul style="list-style-type: none"> - Data collection process documented and field/partners are consistently trained - Use of Data Quality Assurance guideline Proper use of IPTTs/ the same format (programme and MEL) - Use of data collection through technology (Total reach; activity indicators)
Analysis is shallow and sectors would like more depth	<ul style="list-style-type: none"> - Each sector to identify key areas of analysis (information that they CANNOT live without) - Programmes to provide technical interpretation in initial reports e.g. Baseline, analysis documentation
Because you aren't getting what you think you need from MEL some sectors would like to have their own sector specific MEL staff	<ul style="list-style-type: none"> - Before we can make this kind of decision we need to understand what type of information you need which you aren't getting. Can the MEL team's priorities be reorganised to meet your needs.
Communications between MEL and programmes is challenging	Programmes and MEL to agree effective communication methods and when to collaborate
MEL team involved too late in the design and planning of projects thus are unable to be proactive in providing support- key activities are ad hoc when they could be planned in advance	<p>A MEL activity calendar will be updated regularly and TAs should check this during project design.</p> <p>MEL should be involved before logframe design to explore opportunities for integrated MEL activities and capitalise on learning from previous projects.</p>
MIS is a useful tool however, certain functionalities are not user friendly and therefore limits programme use	<ul style="list-style-type: none"> - Teams to propose improvements to the system to encourage use - Information to be shared summarising the key findings every month

New proposals for fresh food markets and urban gardens to fight food insecurity



MONITORING EVALUATION & LEARNING (MEL) PRACTICES

Nir Prasad Dahal

Monitoring Evaluation and Learning (MEL)

Delegate

American Red Cross, Philippines



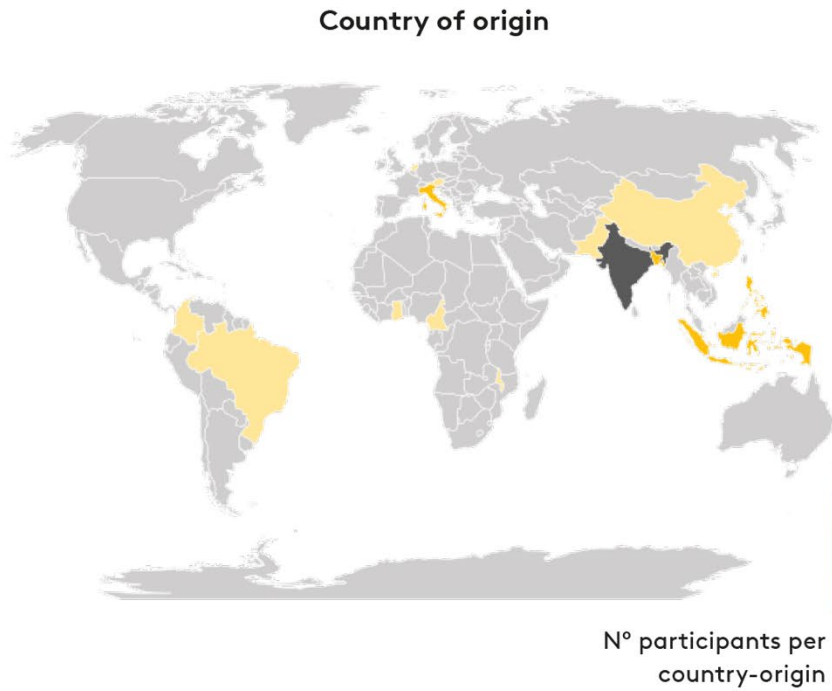
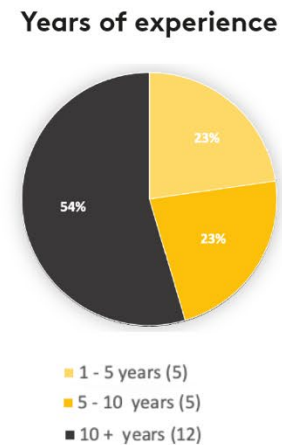
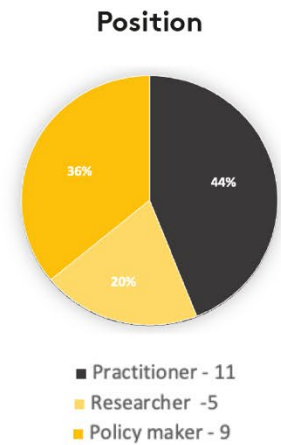
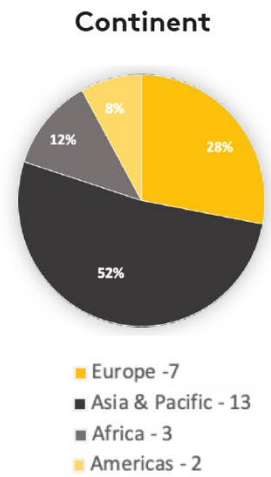
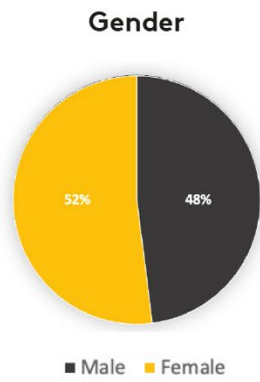
PARTICIPATORY GEOGRAPHIC INFORMATION SYSTEMS (PGIS) FOR WATER-ENERGY-FOOD (WEF) NEXUS TOWARDS A SUSTAINABLE URBAN PLANNING

Carolina Carvalho

Researcher

Institute of energy and environment,

São Paulo University



6. Challenge

The systemic understanding of how the pandemic affected these dimensions and their interrelations is still to be understood, this including both negative (stop of the economic activities) and positive feedback loops (reduction of pollution and GHG emissions).

The challenge is to:

- Analyse and understand how the pandemic affected our cities
- Analyse understand strength and weakness of the cities in facing the pandemic
- Foresee future challenges for the cities, both slow and rapid on-setting
- Foresee how the cities can dynamically adapt to future multiple crises
- Transfer lessons learned from the pandemic to increase urban resilience in relation to other global crisis
- Make recommendations to increase urban resilience, through strategies and action, considering knowledge gaps in policy, practice and research.

The purpose is to better understand how the pandemic crises affected the cities and how resilient were the cities in responding in the short and long term to this crises, as well as to understand in a future looking perspective how to enhance the resilience of cities facing diverse and multiple crises, especially climate change, based on the experience of this first global urban crisis.

Analyse vulnerabilities and impact of COVID-19 on cities, and how this affected urban resilience.

Understand how resilient cities are in the short and long terms response, including positive and negative aspects.

Envision medium- and long-term scenarios, about urban resilience of cities facing single and multiple crises.

Identify lessons learned from the pandemic that can be of use for addressing other crises, specifically climate change

Provide recommendations how to enhance urban resilience and how to facilitate urban resilience transition.

#5 Group Wash resiliency of families in Asia's slum areas amidst the pandemic

Group:

No nation was ready when Covid 19 disrupted the world we know. Rich and poor countries and communities were both affected by the Pandemic. However, the poor were affected the most because of their higher vulnerability and lower capacity to recover from the disaster.

The team analyzed the urban slum system in the global south amidst the pandemic and other disasters. Anchoring their objective with the vision of the New Urban Agenda and SDGs 6 and 11, they focused on slum communities' access to water, sanitation and hygiene (WASH).

Today, by the most conservative estimates, about 900 million people live in slums. But most experts agree that including different types of informal settlements, the number goes up to 1.6 billion – which represents 1/4 of the world's urban population. By 2030, it's estimated that 1 in 4 people on the planet will live in a slum or other informal settlement.

The team studied one of Asia's largest slums - Dharavi Slum in India. The slum has a population of around 1 million inhabitants occupying an estimated area of only 2.1 square kilometers. Its population density is approximately 277,136 people per square km which is almost 30 times of New York City, one of the most populated cities in the world.

WASH is already a complex and life-threatening issues in Dharavi slum even before the pandemic arrives. Dharavi has severe problems with public health. Water access derives from public standpipes stationed throughout the slum. Additionally, with the limited lavatories they have, they are extremely filthy and broken down to the point of being unsafe. Mahim Creek is a local river that is widely used by local residents for urination and defecation causing the spread of contagious diseases. The open sewers in the city drain to the creek causing a spike in water pollutants, septic conditions and foul odors. Due to the air pollutants, terrible diseases such as lung cancer, tuberculosis, and asthma are common among residents.

On April 2020, Covid 19 positive cases rose in the city and the slum became its focal point. The city administration planned an intervention strategy employing community participation and partnership to contain the virus in the Dharavi slum. The community practiced the four T's (Tracing, Tracking, Testing and Treating) in addressing the virus. The positive cases subsequently decreased in the city.

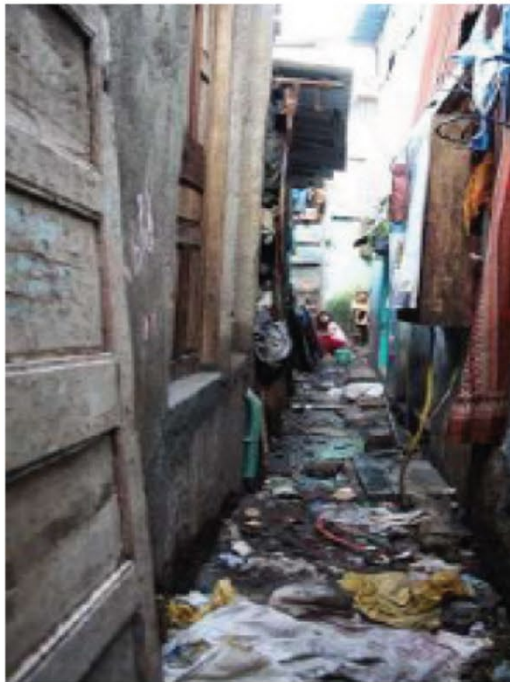
WATER

Two-thirds of households in the slum purchase water.



SANITATION & HYGIENE

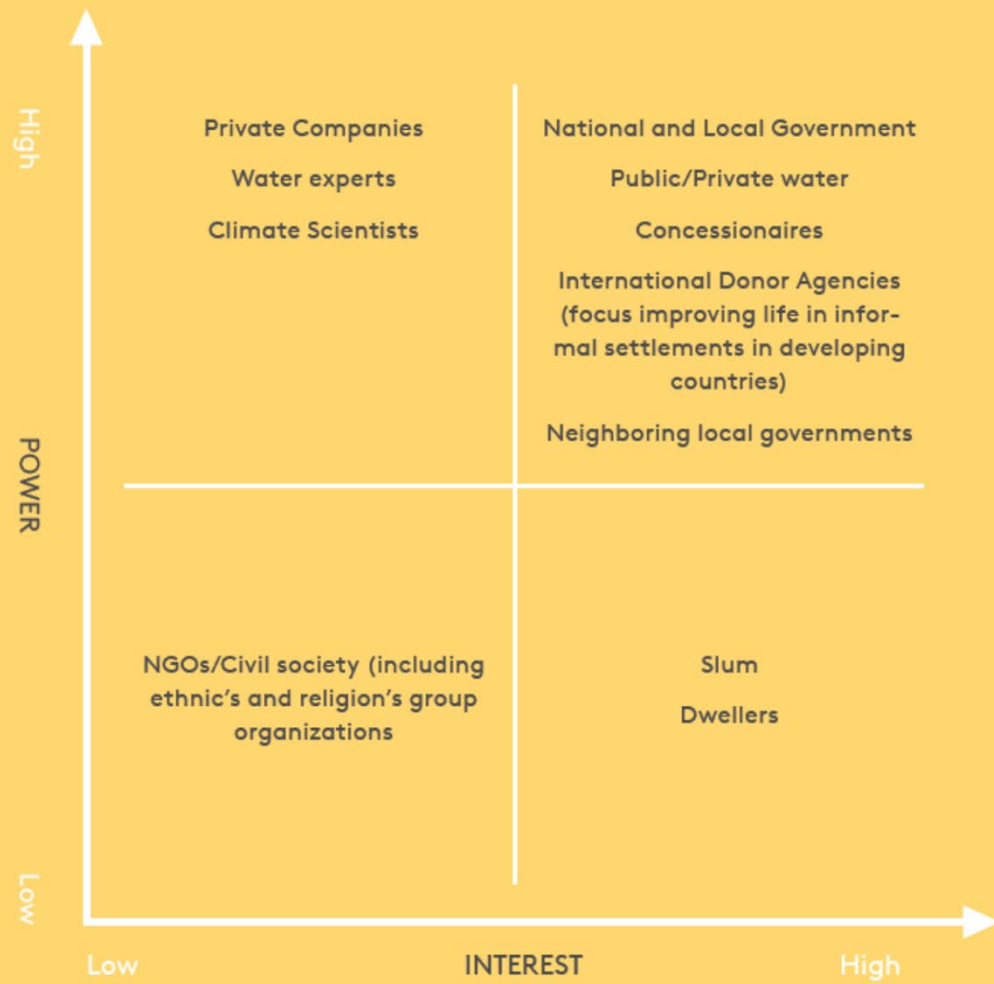
About 80% of the residents use community toilets.



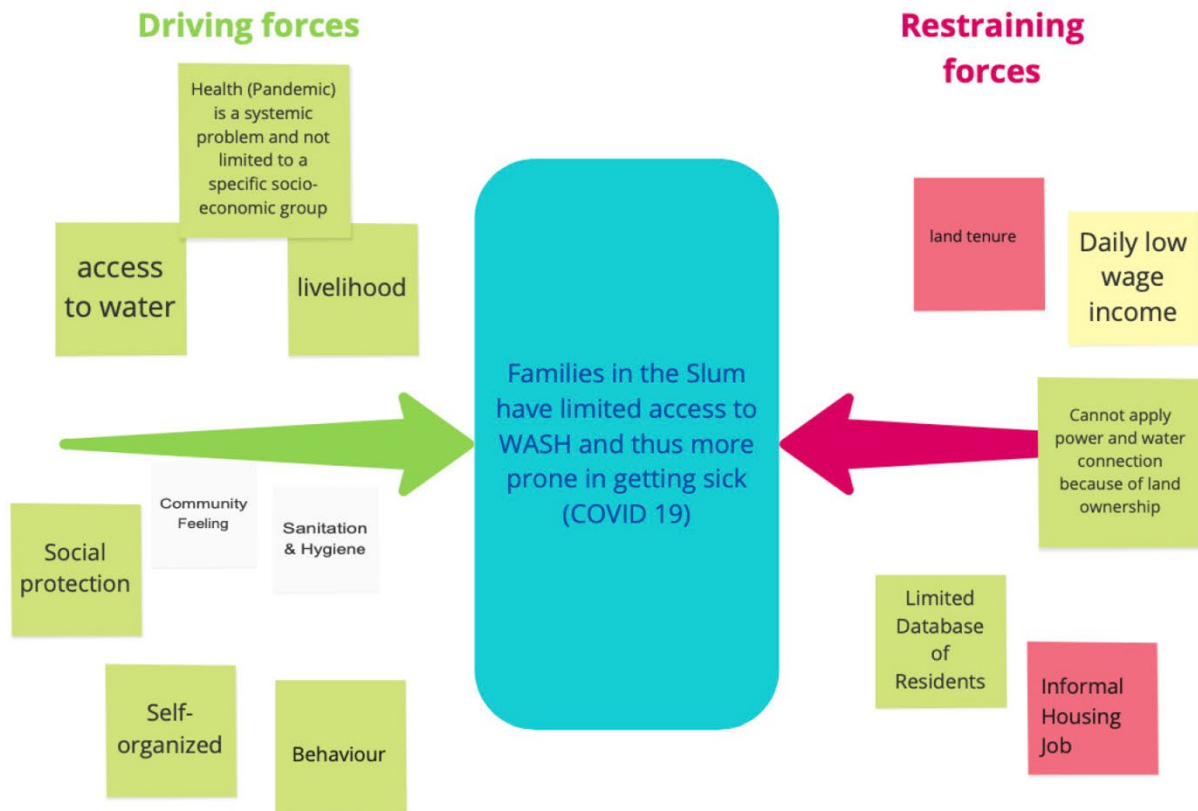
COVID-19

In fight against COVID-19, it grapples with water, sanitation and Hygiene.





DIAGNOSE
Stakeholder analysis - Power and Interest



Role of the City Planner	Projects / Activities	Outputs
<ul style="list-style-type: none"> Promote people participation in development planning 	<ul style="list-style-type: none"> Organize the Community (if not yet organized) Put all stakeholders on one table Conduct Strategic Planning Workshops with all Major Stakeholders Facilitate MOA Draft Document 	<ul style="list-style-type: none"> Approved 1-3 Year Strategic Plan <ul style="list-style-type: none"> Conduct of Information Education Campaign on Good Hygiene Practices (Community , school levels) List of activities, tasking (Government, NGOs, Private Sector, Local Community), key result areas, monitoring Ownership / Commitment of Stakeholders Signed MOA Among Local Stakeholders
<ul style="list-style-type: none"> Provide technical advice to the local council 	<ul style="list-style-type: none"> Provide a draft document and advice the Mayor and City Council about the need to pass a local law on WASH 	<ul style="list-style-type: none"> Enacted Resolution Ordinance Declaring Access to Water and Toilet as a Basic Human Right Enacted Resolution Requesting the Private Water Concessionaire to provide affordable water supply to slum areas
<ul style="list-style-type: none"> conduct training programs necessary to evolve plans and programs for implementation 	<ul style="list-style-type: none"> Coordinate with Stakeholders in providing the following trainings: <ul style="list-style-type: none"> Training of youth as peer educator and health educators Household and neighbor demonstration sessions on Covid-WASH nexus/integration Community engagement in WASH activities 	<ul style="list-style-type: none"> Developed Local WASH Advocates / Champions Developed Local Information Education Campaign (IEC) Materials Empowered Communities
<ul style="list-style-type: none"> formulate and recommend fiscal plans and policies Monitor and evaluate the implementation of programs, projects, and activities 	<ul style="list-style-type: none"> Advise the elected officials to include in the city budget the WASH projects in the Slum Area Monitor the implementation of the project Develop and send proposals to the national government or international agencies if the local budget is not available for the WASH projects 	<ul style="list-style-type: none"> Constructed Government funded facility <ul style="list-style-type: none"> sanitation resources- hand washing spaces – water storage tank Community toilets/latrines Distributed safety kit –hygiene kits Construction and repair of water and sanitation facilities in Slum Sent Project Proposals to Funding Agencies

Community of practice joining survey

- Your name
- Your category of work – please tick all options that apply
 - Government/Public sector
 - Non-governmental/NGO/Non-profit
 - Academia
 - Private sector
 - International organisation
 - Other (please describe)
- Your citizenship
 - Europe
 - North America
 - Latin America and the Caribbean (LAC)
 - Africa
 - Asia-Pacific
- Your place of work
 - Europe
 - North America
 - Latin America and the Caribbean (LAC)
 - Africa
 - Asia-Pacific
- Organisation(s)
- Role(s)
- Email

- My work related to urban resilience entails...
- Where did you hear about this community of practice?
- The biggest challenge I face in my work...
- What would you like to get out of this community of practice?
- How would you like to contribute? Please tick all options that apply.
 - I'd like to volunteer as part of the core governance group
 - I'd like to share examples from my work, host peer learning sessions
 - I'd like to set up and run a thematic group
 - I'd like to set up and run a geographic group
 - I want to codify insights and write blogs, journal articles, or other artefacts.
 - I'd like to be a guest on the podcast
 - I'd like to take part in a peer learning group
 - I can't commit to a very active role, but I'd like to participate in events and contribute where I can
- What timezone/scheduling slot can you commit to joining sessions/events?

CoP activities and reflection survey

- Your category of work – please tick all options that apply
 - Government/Public sector
 - Non-governmental/NGO/Non-profit
 - Academia
 - Private sector
 - International organisation
 - Other (please describe)
- When did you join this community of practice?

- 2019
 - 2020
 - 2021
- Have you met or connected with people through this CoP that you would not have otherwise met?
 - Yes
 - No
 - Other
- If yes, how did you connect?
 - Through Slack
 - Through the WhatsApp group
 - Through the LinkedIn page
 - Through participating in an online community event (podcast, workshop)
 - Through participating in an in-person community event (COP, other conferences)
- How many new connections have you made through this community?
 - None
 - 1-5
 - 5-10
 - 10-15
 - 15+
- Have you collaborated with any other community members?
 - Yes
 - No
 - Other
- If yes, what did you collaborate on? If outputs are publicly available, please share a link.

- If not, what type of collaboration would be worthwhile for you?
- In your view, what does this community offer that you might not have elsewhere?
- Were you able to participate in or initiate community activities as much as you originally intended when you joined?
 - Yes
 - No
 - Other
- How many monthly hours did you spend participating in or initiating community activities?
- What is the main barrier to participating in or initiating activities if not?
- Thinking of the reason or need that made you join this community, do you feel it has been met? If yes/no, why?
- On a scale of 1-5, how connected do you feel to other urban resilience professionals? (1=not at all connected; 5=very connected).
- What regular activities would you like to see happen in this community of practice?
 - Peer learning/coaching
 - Training/capacity building
 - In-person gatherings
 - Online gatherings
 - Book/reading club
 - Case clinics
 - 'Consultants pool' – getting together with other community members to respond to tenders / provide consultancy.
- What skills, competencies, and topics are you interested in building?
- What activities would you like to offer? What support do you need to make them happen?
- What timezone/scheduling slot can you commit to joining community sessions?
- Peer learning – would you like to...
 - Be paired with a buddy for a year
 - Be part of a peer learning group of three

- Other
- Any other feedback or ideas?