Chapter 1
Future Cities and Their Transitions Ahead

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Abstract Change is needed in how cities are designed, built, and managed to meet the grand challenges of the twenty-first century. In this book, we invited authors to report on their visions for cities, using a missions-oriented perspective on transformative innovations that support more liveable, sustainable, resilient, inclusive, and just futures. The resulting chapters have proposed a set of distinctive missions, providing what we think can provide the primary focus for future urban research and sustainability efforts. However, the chapters provide a mosaic rather than a single unified vision. To weave them together, this introductory chapter provides a conceptual framework for connecting and operationalising the mission-oriented approach for urban development research as a nexus of imaginaries, missions, pathways, and transformative urban innovations. This allows for orienting and bringing together contributions that represent a forward-looking collection for missions to guide and inform future city-making. In this chapter, we identify the pathways, game changers, and positive tipping points that can reshape future cities. This requires conceiving and activating multiple mission-scale programmes of intervention capable of step-change urban transitions.

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1.1 Introduction to This Book

This book is based on the premise that transformative change is needed in how cities are designed, built, and managed if United Nations Sustainable Development Goals are to be realised by the mid-twentieth century (Newton and Bai 2008; Seto et al. 2012; Crane et al. 2021; de Sa et al. 2022; Rockström et al. 2023). Furthermore, to craft and navigate towards the types of cities that we need, it is necessary to move beyond traditional scientific forecasting efforts and engage with our imagination, and to tap into multiple knowledges and values so as to direct our minds to how the future of our cities should be: what our future cities could look like, and whose visions and imaginaries they will take up, enable, and propagate. So far, most urban research literature does not fully embrace futures-oriented perspectives, as it generally sits outside of most disciplines, and it is often used in more applied or transdisciplinary research projects.

In this book, we have asked the authors of chapters to draw on their breadth of experiences and research to outline how future cities could be imagined, designed, and built within a missions-oriented approach to address some of this century's grand challenges. By doing so, this book provides a comprehensive set of visions and urban imaginaries, offering a set of blueprints for problem-solving.

Given that most authors and editors of this book come from Australia, we need to caution that the word 'missions' refers to the objective-oriented and innovation-centric framework of mission-oriented innovation proposed by Mazzucato (2018) and should be neither conflated nor associated with the colonising meanings and history of the word. The choice of mission-oriented innovation and the idea of missions as a frame to guide and organise the ideas and proposals is our attempt to provide a new lens to orient our collective imagination for future cities.

In this chapter, we also identify the drivers as well as transformative propositions across existing and emerging urban imaginaries, such as human-healthy cities; nature-based cities, technology-driven cities; resilient cities; and just cities. We do this by reviewing prominent and emerging scientific literature to enrich our conceptual lens further and position the contributed chapters across the spectrum of future-focused urban imaginaries.

Box 1.1 Glossary
Grand challenges: Situations that create the need for transformative change. Examples include global climate change, biodiversity loss or pollution.

Imaginaries: Visions for how urban areas need to develop and transform. This represents the end goal and typically has explicit normative judgements and justice implications.

Pathways: Sequences of actions implemented progressively, typically based on cross-sectoral responses to achieve a goal (such as a response to a grand challenge).

Solutions: The actions, such as implementation of technology, that will help address a problem or a grand challenge.

Mission areas: The combination of imaginaries, pathways, and solutions in response to identified grand challenges.

Cities are where sustainability tensions manifest, places where solutions are tested, evidence collected at a local scale, and at the same time, side effects and unintended consequences of interventions are revealed, opening the discourse to new debates and contestations. There is no solution applied to or emerging from cities that is uncontested, showing the dynamism as well as the immediacy of responses that urban environments can provide. This further supports the statement from Newton and Bai's (2008, p. 4) pioneering work that 'the challenge of achieving sustainable development in the 21st century will be won or lost in the world's urban areas'. As spaces and places of opportunity and tension, cities are often seen as locations for emerging or accelerating transformations. Recent examples include the electrification of cities (Griffith 2022a, b), the growing number of sharing and circular economy initiatives (Winslow and Coenen 2023), the declaration of climate emergency by cities (Howarth et al. 2021; Harvey-Scholes et al. 2023; Greenfield et al. 2022), and the mainstreaming of climate adaptation agendas, including greening the urban environment (Adams et al. 2023a, b); replacing grey infrastructure investments with nature-based solutions, including water sensitive urban design (Coutts et al. 2013) and low-impact urban solutions (Sharma et al. 2018); and hosting debates and agendas for just transition measures (Hughes and Hoffmann 2020). Progressing across all those challenges, city governments and urban planners, particularly, must consider multiple and often misaligned urban objectives, dealing with trade-offs and tensions that urban interventions need to navigate to facilitate the achievement of broader goals of sustainability, justice, liveability, and climate resilience (Frantzeskaki et al. 2021).

One way to source or co-create solutions for future cities is through future-oriented visions or urban imaginaries stimulated by questions such as: Why is it important to look into the future, and why are future-oriented narratives and images important to urban planners, practitioners, citizens, and all involved actors in cities? Imagining urban futures is a practice and process that goes hand in hand with the way we deal with urban complexity and progress our understanding of urban development trajectories. One important reason for this is that much of the uncertainty and complexity in cities is associated with human choices and actions; the uncertainty can be significantly reduced when shaped by collective visions. Imagination is a fundamental process of conceptualising, envisioning, anticipating, and executing visions and pathways that can help us project desired futures (Cork et al. 2023; Dunn 2018; Keith et al. 2023). Imagination leads to imaginaries that can be used for many different purposes, including.

- Seeds for a better future—providing a common goal for diverse stakeholders
- Boundary objects that allow us to identify where to intervene to transform a city
- Points of discussion and analysis to help us rethink how we make decisions about cities in a more systems-oriented, anticipatory, and adaptive manner

It is within this imagining of urban futures with a focus on innovation that these futures are defined and taken forward through mission-oriented approaches that include major intervention programmes. Mission-oriented approaches and policies represent the solutions driving innovation to address the 'grand challenges' that are complex, interconnected, and systemic, such as climate change and socio-economic inequalities (Mazzucato 2018).

When we do this, we also need to acknowledge both the diversity in society and our cultural and ideological biases. Only with more inclusive methods for thinking about and crafting more positive outcomes can we move towards such a future. There is a need to embed this type of futures-thinking and the missions-oriented research paradigm into societal futures thinking capability and governance systems. However, this is currently far from mainstream practice. This book attempts to break new ground in this space and offer innovative ways to address our grand challenges.

1.2 Imagination, Change, and Transformation

In recent times, humans have become the primary drivers of the planet's environmental systems to the extent that the current era in Earth's history has been termed the Anthropocene (Steffen et al. 2007). This has profound implications for how we as humans think about the future, and there is a need to move from being passive observers to acknowledging our role more actively in shaping the future. Whilst it is tempting to become fatalistic and pessimistic in viewing the future, considering our current trajectory, we need to acknowledge that, just as humans have shaped the past, we can also shape the future, and we have the agency to turn our trajectory towards more positive outcomes. Moglia et al. (2018) have highlighted six grand challenges that cities must deal with:

1. *Failure of planning for rapid urbanisation*, which is still occurring in many, if not most, cities around the world. This tends to lead to inadequate provision of services, congestion, inequality, crime, loss of agricultural lands, and ecosystem damage.
2. *Climate change* and its associated heat waves and natural disasters. This is connected with damage to infrastructure, loss of lives, and water and food shortages, as well as refugee flows and international instability.
3. *Economic boom-bust cycles*, which are associated with periods of rapid economic growth followed by rapid economic contraction. This leads to unemployment, household stress, accentuation of societal problems, and infrastructure deficits.

4. *Natural disasters*, such as storms, bushfires, cyclones, and flooding. These occur naturally but are being exacerbated by climate change. This leads to infrastructure damage, loss of life, and damage to the economy.
5. *Technology-based disruptions* associated with the unintended consequence of technological change such as automation and AI, potentially leading to issues like deskilling, disruptions to social and family structures, pressure on social services, unemployment, increased inequality, and stranded infrastructure.
6. *Failure of governance*, for example, through polarised political systems, and reduced trust in democratic government. This tends to reduce the capacity to protect social good and institutions, thus leading to increased inequality, lower social participation, environmental degradation, reduced productivity, and reduced attractiveness of the city.

In addition to these six specifically urban challenges, we can also add the urgent issue of biodiversity loss, as a critical challenge for staying within a safe operating space for the planet:

7. *Biodiversity loss*, as the planet increasingly loses its biosphere integrity that supports all known life. Whilst ecosystems in cities are smaller relative to other surface areas, recent research shows that urban areas are hotspots for biodiversity and need to be reimagined as linking spots or corridors to peri-urban and rural biotopes and ecosystems. Biodiversity loss is thus a challenge that also has an urban character, especially due to the dual role of cities (Simkin et al. 2022) as generators of consumption and pollution (Seto et al. 2012; Güneralp et al. 2013), as well as the potential of urban areas to contribute positively to biodiversity and liveability.

Since Moglia's identification of grand challenges, we have also been reminded of ever-present challenges such as the risk of *pandemics*, *war*, and *global conflict*. Importantly, we note that cities are responsible for much of the pressure on planetary support systems, through their material consumption, pollution of air, land, and water, and especially their greenhouse gas emissions. With the planet now in unsafe territory in relation to planetary boundaries (Richardson et al. 2023), safeguarding Earth's life support systems urgently requires a reduction in the damaging effect of cities and their populations on the environment.

1.2.1 Our Theory of Change

In this book, we do not address all these challenges. The primary focus is on climate change, but extends to biodiversity loss, technology-based disruption, failure of governance, and the capacity of planning to handle future threats and opportunities. We propose that such challenges can only be addressed by large-scale mission-oriented innovation, and urban imaginaries that focus on aspirational futures depicting what could be and should be. Urban imaginaries provide a common vision and goal that can become the focus of innovative, long-term, mission-oriented intervention programmes (Fig. 1.1).

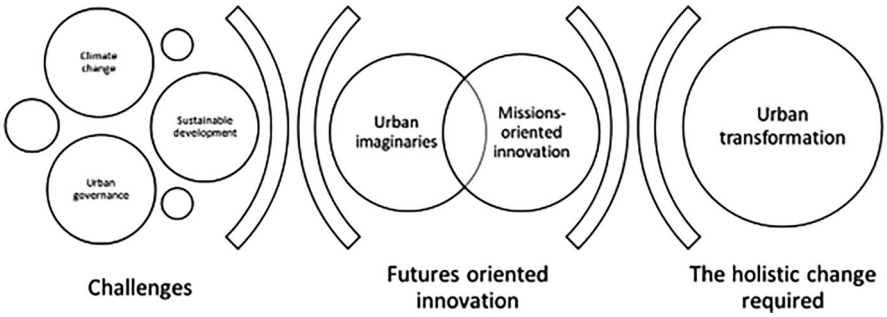

Fig. 1.1 The process of urban transformation to address urban challenges at the nexus of urban imaginaries and mission-oriented innovation

1.2.2 Urban Imaginaries of the Twenty-First Century

Achieving transformative change that addresses grand societal challenges is complex. To change intentionally, there must be both a recognition of the need for change and the imagination of a desired future. Imagination is therefore central to change processes.

> ***Box 1.2a Examples of Urban Imaginaries Focused on Process***
> Smart City. Resilient City. Industrial City. Digital City. Global City. Neo-Liberal City. Regenerative City. Tactical Urbanism. Circular City. Cultural City. Inclusive City. Intelligent Urbanism. New Urbanism. Post Urbanism. Contested City.

Unsurprisingly, therefore, visioning and developing urban imaginaries is critical to the process of city-making. McPhearson et al. (2017, p. 6) remind us that 'positive visioning is a critical component to co-creating opportunities and generating realistic pathways for transformation toward sustainability. Research and practice are beginning to create positive visions, develop future scenarios, generate pathways, create plans, and initiate implementation projects for improving urban sustainability, resilience, and human livelihoods in cities'.

We note that while positive visioning is critical for place-making and enabling sustainability transitions, it also needs to be critically examined to ensure that an urban imaginary does not result in unintended consequences; for example, it is not reproducing inequalities or introducing narratives of unsustainable growth, or favouring the elites and certain cultural ideals that are underscored by wealth accumulation at the cost of marginalised groups and the environment (Bonakdar and Audirac 2021).

Box 1.2b Examples of Urban Imaginaries Focused on Urban Form and Transport
Garden City. Polycentric City. Compact City. Vertical City. Megacity. Megacity Region. Walking City. Happy City. Green City. Low-Carbon City. Transit City. Auto-City. Linear City. Edge City. Satellite City. Chrono-Urbanism. 30-Minute City. 15-Minute Neighbourhood.

In response to this need, 'Imaginaries' have emerged to stretch the boundaries of thinking across multiple disciplines and research areas. They are typically the result of a creative process involving often-speculative visions of some future state. Many are utopian, targeting new ideas and concepts that are conceived as transformative, involving some form of positive transition. Some are in response to grand challenges that need to be tackled to avoid or minimise negative (including catastrophic or dystopian) outcomes (Mazzucato 2018, 2020).

Box 1.2c Examples of Urban Imaginaries Focused on Outcomes
Green City. Healthy City. Low-Carbon City. Sustainable City. Competitive City. Productive City. Just City. Equitable City. Water-Sensitive City. Gentrified City. Liveable City. Safe City. Nature-Based City. Resilient City. Zero-Waste City.

Labelling of imaginaries varies, depending on whether the focus is on envisioning some 'end state' (e.g. smart city, garden city, etc.) or describing key drivers of change (e.g. globalisation, digitalisation, significant population upheaval, etc.). At a higher level, imaginaries can be clustered as social imaginaries (Taylor 2002), socio-technical imaginaries (Jasanoff et al. 2007), spatial imaginaries (Watkins 2015), and climate imaginaries (Nerlich and Morris 2015). Urban imaginaries can also be added to this list (Meissner and Lindner 2018, and earlier, Peter Hall's Cities of Tomorrow, whose 13 chapter titles are all replete with imaginaries). A compendium would be needed to capture all urban imaginaries that have emerged over the decades, so a representative collection is listed in Boxes 1.2a–1.2c. In this book, imaginaries will focus primarily on the topic of achieving/targeting 'sustainable urbanism' as a key goal of twenty-first-century city-making (here, sustainable urbanism is the effort to achieve the comprehensive set of sustainable development goals in cities).

1.2.3 Mission-Oriented Innovation

To move from imagination to action, Mazzucato (2018) outlined an approach that can collaboratively activate the key pillars of society, with governments in a leading role, but also applying the innovative capacity of industry and academia, to address big societal challenges. This is based on defining clear goals that can be collectively targeted, and that are based on a key set of principles that

- Are bold and inspirational with wide societal relevance
- Provide a clear direction by being targeted, measurable, and time bound
- Are linked with ambitious but realistic research and innovation activities
- Involve cross-disciplinary, cross-sectoral, and cross-actor innovation
- Operate across multiple scales
- Involve multiple, joined-up, bottom-up, and top-down solutions

This approach by Mazzucato has gathered traction, providing a guiding frame for EU and OECD innovation policy and frameworks (Mazzucato 2019; OECD 2022), as well as guiding the thinking of many universities globally (Broström et al. 2021).

1.3 Five Foci for Mission-Scale Urban Interventions

In this section, we identify several mission-critical areas for urban intervention. The goal: achieving critical sustainability outcomes, as represented by the UN SDGs and the UN's New Urban Agenda acting as a critical lever and implementation mechanism for the SDGs (United Nations 2017, 2020). They represent a nexus of missions, pathways, and transformative urban innovations. The goal of achieving sustainability outcomes, such as attending to issues of equality, health, well-being, and accessibility to services and infrastructure, and improving resilience, climate adaptation, and provision of ecosystem services and benefits, reflects the needs and aspirations that seek alternative futures.

1.3.1 Resilient Cities

The resilient cities imaginary describes a vision in which planning for, delivering, and maintaining infrastructure that is usually long-lived and expensive is done in a way that meets the rapidly changing priorities or needs of communities and economic activities in the future, in a world of shocks and stresses. An important assumption in resilience thinking, which originated in the study of social-ecological systems (Walker et al. 2004), is that systems like cities and the natural environment are dynamic, and constantly changing in interaction with each other; this realisation is moving resilience thinking away from a static or reductionist view of the world. Whilst there is no inherent value in the term resilience by itself, as it simply refers to the capacity to not change in response to stresses and shocks, urban resilience relates to a city's capacity to maintain key functions and thus meet the needs of its inhabitants as well as nature. In this context, this imaginary addresses the trifecta of the social, economic, and ecological domains.

Common critiques of the resilient city agenda argue that it is inadequate in dealing with power and politics, promotes the status quo, and aligns itself with the neoliberal politics field (Meerow and Newell 2019). In this book, we share this

concern, and we argue that the resilient city imaginary needs to be radical and transformative, based on a paradigm shift of governance and decision-making (Chaps. 2 and 3), as well as radical and disruptive innovation (Chap. 4). Specifically, the resilient city imaginary needs to encompass notions of the just and nature-based city and needs to not simply reinforce poor outcomes for the natural environment, nor spatial or other types of inequalities for people, but rather build resilience for and with people and nature.

We note, then, that the resilient city imaginary (as a city that stays the same on some key aspect, regardless of shocks and stresses) relies on the social construction of what is considered a desirable city, and therefore it is important to consider who decides what a desirable urban system is, whose resilience is being prioritised, and where the boundaries of the city are (Meerow and Newell 2019). A good example to highlight this tension is the frequent debate about the role of private cars in cities. Although most cities have been built to support the widespread use of private cars, many argue for the extensive social and ecological benefits of reduced car use (Nieuwenhuijsen 2020; Nieuwenhuijsen and Khreis 2016). This creates a common dilemma, where decision-makers and the community tend to propagate a legacy urban form 'built for the car' whilst simultaneously recognising that reduced car use would benefit nearly everyone. Chapter 2 notes in particular the important role of allowing the community to be part of the process of socially constructing the goal of this imaginary inclusively and, in a way, open to systemic transformation. Chapter 3 notes the importance of a paradigm shift in governance based on intergenerational equity and resilience to climate change. Chapter 4 highlights the importance of radical and transformative innovation to address climate change threats, but specific innovations are currently meeting some resistance in governance regimes.

Resilience, as earlier noted, is a systems concept. While the resilience of systems, therefore, does not respect arbitrary administrative boundaries, interactions between scales need to be considered. On this note, Chap. 3 discusses the importance of considering such interactions when ensuring the resilience of water systems at precinct, city, and regional scales.

The focus of resilient cities is sometimes on general resilience, which is the capacity of social-ecological systems to adapt or transform in response to unfamiliar or unknown shocks (Carpenter et al. 2012), and sometimes on specific resilience, which is the capacity of social-ecological systems to adapt to specific shocks or threats. In this book, Chap. 2 focuses more on general resilience by addressing governance and decision-making capacity. Chapter 3 focuses on more specific threats to water systems, and Chap. 4 focuses on more specific climate change-related threats.

As outlined in Chap. 2, achieving resilient cities is more about the capacity and competencies for governing, adapting, and changing than it is about adopting any specific solution. The chapter argues that this involves building the capacity for a different decision-making process, which includes a better understanding of systems and anticipating challenges before they emerge, as well as incorporating more preventive strategies that help reduce risks in a more holistic sense. Expanding on this issue in relation to climate change, Chap. 4 stresses the importance of moving beyond simply coping with weather extremes and calls for more radical and disruptive innovation that speeds up the rate of change to rapidly reduce greenhouse gas

emissions, and that better mitigates the negative impacts of climate change in a more proactive way.

In summary, the key to cities' resilience lies in the people and organisations having capacity, competencies, and governance for systemic interventions based on adaptive learning and collaborative decision-making. In terms of the solutions, they tend to relate to the challenges at hand, and in Chaps. 2–4, the following solutions are noted:

- Building with materials that reduce heat in the urban landscape
- Production and use of green energy, to reduce greenhouse gas emissions
- Nature-based solutions, like urban forests, for a range of benefits to people, biodiversity, and urban ecosystems
- Smart city technologies that promote more rapid and effective governance.
- Water-sensitive technologies such as water reuse, stormwater harvesting, and stormwater management, enhanced through green roofs or constructed wetlands
- Reduced private car use and the introduction of more public and active transport
- Provision of more affordable housing
- Sustainable urban re-development approaches like greening the greyfields (Newton et al. 2022; Chap. 7).

1.3.2 Low Carbon and Circular Cities

We currently inhabit a carbon- and resource-constrained world where population, consumption, and urbanisation are all on growth trajectories. In this context, the twenty-first-century goal of sustainable urban development urgently requires twin interlinked transitions to

- Renewable energy (from a long-established fossil fuel-based system where significant path dependencies exist) on a scale capable of halting and reversing rates of greenhouse gas emission and global warming, which is now reaching historic levels and heading higher (Copernicus Institute 2024)
- A circular economy, based on closed-loop systems linked to recycling, remanufacturing, reuse, repair, and sharing, which stand in stark contrast to currently dominant linear systems involving raw material extraction, manufacturing and distribution, consumption, and disposal (Kara et al. 2022; European Parliamentary Research Service 2024)

The chapters in this section of this book address these two grand challenges.

Decarbonisation of the built environment is the focus of Chap. 5. It draws heavily on an increasing body of research undertaken over the past half-century, and more recently by Australia's CRC for Low Carbon Living (Newton et al. 2019) and the United Nations Environment Programme (UNEP 2023a, b). The latter proposes a three-pillar pathway for creating clean, resource-efficient, green cities. Regarding resource efficiency improvement, there is prioritisation of measures to achieve a

circular economy based on 3R (reduce, reuse, and recycle) principles, promoting lifecycle analysis of material and energy use and adoption of smart technologies. Suggestions about sustainable consumption and production, payment for pollution and waste, and accountability mechanisms represent solutions for making cities cleaner. Innovation in land-use planning, mobility management, and socio-economic equity improvement are challenges to be overcome, however, in realising the green growth opportunities that will underpin green cities and a green economy transition (see Newton and Newman 2015).

Chapter 6 focuses on the circular economy and its early stages of development in the state of Victoria, Australia. Circular economy concepts and their implementation are currently in their infancy in contemporary industrial and post-industrial societies (see McDonough 2008 for one of the early pioneering imaginaries), in contrast with agrarian and earlier industrial societies when circular economies were strong. This was before the Great Acceleration in manufacturing production associated with automation, global supply chains, and massive growth in a consumer society. Based on a survey targeting a wide range of businesses, the chapter found that there was no consistent or systemic understanding of the concept of the circular economy; rather, the narrative was narrower and revolved around waste management and recycling. Transition to a circular economy would require a systematic shift by industry and government involving a clear policy directive, financial outlays, advances in technical know-how, education, awareness, engagement, and collaboration across traditionally isolated sectors.

1.3.3 Nature-Based Regenerative Cities

At their most basic, cities are the habitats humans have created for themselves, but these habitats (like all habitats) are part of nature. Whilst in the modern post-industrial era there has been a tendency to consider cities as something different from nature, this view is now becoming less dominant. New imaginaries focus on regenerating ecosystems, waterways, and forests within cities, with the recognition that this provides benefits not just for nature but also for humans. The framework of ecosystem services may be simplistic in viewing nature as offering services to humans, but it highlights that ecosystems are of vital importance for life on our planet, and especially for humans, including for well-being, health, recreation, protection, and bolstering the earth's life support systems.

Along this line, the Green or Eco City is one of the oldest urban imaginaries to emerge, starting with ideals such as the garden city and affiliate imaginaries such as biophilic cities, in Beatley's coined term (Reeve et al. 2015; Kellert 2016; Lee and Kim 2021). Recent conceptualisations of the Green City envision nature, green spaces, and/or green infrastructure as essential components of the urban fabric. Biophilic cities, for example, focus on incorporating natural elements in urban design to improve inhabitants' sensory experiences and contact with nature to improve health and well-being, foster care and respect for nature, and foster

resilience and adaptability, particularly in the face of climate change (Beatley and Newman 2013).

More recently, conceptualisations such as nature-based urbanism argue for designing with and for nature in cities to be integrated with processes and actions that seek justice for all species (Pineda-Pinto and Frantzeskaki 2023). Similarly, a regenerative urban imaginary seeks to go beyond sustainability and recognises the interconnections and interdependencies within and across urban boundaries. It seeks to minimise consumption, extraction, and impacts on ecosystems and the life that depends on them (Thomson and Newman 2018). Instead, it allows and supports the recovery of ecosystems to absorb, produce, and enhance the regenerative capacity of all interconnected systems. Three chapters in this book dive into the ideas behind the ideals of eco, green, nature-based, and regenerative cities to envision urban imaginaries with a mission to transform our current systems and transition to just and nature-positive futures.

For example, Chap. 8 positions integrating Indigenous knowledge as fundamental for planning nature-based cities. By proposing four pathways (thinking, organising, acting, and knowing), this chapter charts interlinked and interrelated priorities to effectively integrate nature in cities. Chapter 9 draws on the Three Horizons approach to put forward a paradigm shift to regenerative futures—one that seeks multispecies justice. In this chapter, planning and legal systems are reimagined through three horizons to achieve a future that recognises the rights of nature and plans for eco-commons through multispecies practices. Chapter 7 presents the efforts behind the model of greyfield-precinct regeneration. This model addresses the mission-scale challenge of regenerating the established, ageing, and occupied low-density greyfield suburbs of cities by re-developing at medium density with a careful integration of infrastructure retrofits with additional greenspace and services. At its core, this new model brings us an example currently being implemented in a Melbourne municipality that actively seeks to increase and enhance urban nature and provide greater access to local services by actively planning and implementing regenerative land-use and transport redevelopment at a precinct scale. A scale that is representative of master-planned greenfield and brownfield urban development rather than fragmented, piecemeal lot-by-lot redevelopment.

The three chapters in this section not only bring forward just transitions as a key element of building nature-based and regenerative futures, but also connect and transcend urban imaginaries of sustainable, resilient, circular, and healthy low-carbon cities.

1.3.4 Smart and Sustainable Cities

Cities are perhaps one of the most ingenious technologies that humans have invented, and this ‘city technology’ is still evolving. Viewing the city as a technology, or as home to technology, is a key theme in many urban imaginaries. The technology focus is important, because as humans are rapidly changing the planet that

we live on and cities continue to adapt to the huge populations that few could have imagined at the beginning of the twentieth century, many believe that technology will help solve our current (and future) dilemmas.

According to this techno-optimist vision, new technologies—involving, for example, new materials, medical science, information technology, and artificial intelligence (AI)—are expected to solve many environmental, social, and economic problems. In the technologically driven Smart City vision (Chaps. 10 and 11), it is expected that technology will

- Monitor and optimise infrastructure performance, using smart sensors and AI
- Facilitate reduced and more efficient resource use
- Improve the breadth and speed of engagement among urban planners and managers and the public, creating more effective urban governance
- Optimise the transport of people and goods to reduce congestion and minimise costs and greenhouse emissions

This move towards a Smart City vision is part of the next wave of innovation. Several long waves of technological innovation have had a profound influence on industrial and urban development over time (Rodrigue 2020). Advances in transport technology have been associated with some of the most significant changes in urban form and fabric: from walking city to transit city (rail) to auto city and, most recently, the mega-city region, underpinned by high-speed rail, freeways, and broadband communications (Newton et al. 2024).

These significant reconfigurations of urban space and structure are explained by Marchetti's anthropological constant (Marchetti 1994), based on observations that time budgets for travel between home and place of work averaged an hour for a return journey and have remained so since the pre-industrial era. What changed was the mode and speed of travel, permitting the spread of built environments into the surrounding countryside and creating low-density suburban sprawl. This urban principle has been shaken by a surge in telecommuting by information workers, who now constitute the largest share of the modern industrial workforce, supplanting more 'hands-on' workers in agriculture, manufacturing, personal services, and retailing. Triggered by COVID but supported by advances in broadband communications technology and the Internet, telepresence has substituted for physical presence in most information economy-oriented workplaces, especially those in central business districts. This has been accompanied by significant population shifts to suburban and regional housing markets in search of greater living and working space. The planning and building sectors and related government agencies were unprepared for this shock. Indeed, the physical landscape of the urban agglomeration economy going forward is less clear, based as it is on the information economy—the principal outworking of the fifth wave of technological innovation, which is centred on digital networks, software, and new media.

Globally, cities are now experiencing the beginnings of the sixth long wave of innovation, where key drivers include renewable and distributed energy; a circular economy that includes water and sewage recycling and reuse and domestic, construction, and industrial waste recycling; electro-mobility; and increased

automation, robotics, and AI. All are central to an urban sustainability transition, especially when combined with advances in digital information and communication technologies that can accelerate the needed change. This is critical as the window of opportunity for transition without significant economic and social dislocation is closing. Urban collaborations that can be both local and global in scope and operation and based on advanced digital infrastructure platforms (integrating IT, high-speed communications, data, and analytics) are illustrated in Chap. 10. The first of such innovation and creativity hubs, networked on digital platforms capable of linking geographically distributed groups of urban researchers and practitioners in real time, are now operating as prototypes and will become central to better facilitating the innovation that is core to the types of urban development projects envisioned in this book. New systems of governance are required to drive these new directions and rates of change, but the new infrastructure platforms are supportive of this evolutionary pathway.

1.3.5 Healthy Cities

What is it about cities that affect human health so profoundly? Since the beginning of the industrial era, human settlements have been faced with a series of health risks directly or indirectly associated with the type of built environment in which populations live and work. McMichael (2008) and Giles-Corti et al. (2016) have mapped these risks as infectious diseases (linked to poor sanitation and housing and lack of appropriate sewerage and water infrastructures); respiratory diseases (associated with air pollution from industry and transport); road trauma; obesity and associated non-communicable diseases (linked to lifestyle and the sedentary nature of urban living, working, and travelling); climate change-related health burdens (associated with increased temperatures and vector-borne diseases); and growing mental health and psychiatric disorders. While there has been significant progress in health outcomes over the past century, a range of urban-related health problems remain on the rise; for example, rates of diabetes and obesity are growing rapidly, while morbidity and mortality due to air pollution and increasing urban heat are challenges of growing concern. Importantly, many of the accelerating contemporary health problems are associated with the way that cities are built. Therefore, it is unsurprising that the World Health Organization is promoting an agenda of 'Healthy Cities'. The goal of healthy cities is also embedded in the United Nations Sustainable Development Goal 11.

The connections between urban planning, design, and public health are complex, being mediated by societal-scale political, economic, and social processes central to the development and management of built environments. Although it is less clear how these factors are causally related, the cost of not acting now on accumulated research evidence will be far greater in the future. Identifying built environment features associated with health outcomes can inform developments of future city

planning policies: 'designing-out' negative features and 'designing-in' good features that can promote health.

As built environments are socially produced, they represent modifiable determinants of urban health. The challenge is where best to intervene in the urban system to deliver more sustainable outcomes involving human health. This requires visions of key transformative interventions. The following two proposed city planning imaginaries and pathways are not new, but have growing evidence-based support for their efficacy from a health perspective:

- Make built environments more walkable and bikeable, with better public transport links connecting where people live with where they work, as well as better access to shops, services, and recreational places for undertaking more localised regular activities. This approach, the focus of Chap. 12, requires planning for more polycentric urban forms at the city level. Here there is a significant challenge for transport and land-use planning to be better integrated with twenty-first-century 'urban villages' concepts and designs (the 20-minute neighbourhood). Chapter 10 focuses on this municipal and neighbourhood scale, where there is a call for regenerative urban planning, requiring infrastructure retrofitting, redesign of neighbourhood road networks, urban greening, and increased mixed-use and medium-density residential redevelopment.
- Integrate nature-based services into urban design at all scales, ranging from lot to neighbourhood to city/catchment. These types of services are known to provide a range of health benefits to communities, including heat reduction, the opportunity to engage in physical activity, and well-being and mental health benefits. Therefore, the elimination of ecological inequalities needs to assume equal status to that of social inequality, especially in a future where urban heat is a leading economic and health threat. This introduces another hitherto intractable challenge: integrating strategic urban water planning with urban land-use and transport planning, a blue-green urban transition (a focus of Chap. 3).

1.4 Systemic Issues

In the mission-scale urban interventions that we have outlined in this book, the focus has primarily been on achieving better human and environmental outcomes, mostly in a focused way, but sometimes also in a more holistic way (e.g. in the Resilient and Smart City imaginaries). With this diversity of imaginaries there is both tension and contention between them, as well as within and between different parts of affected communities. Therefore, here we also note that these tensions and contentions need to be governed. Consequently, here we first introduce another imaginary, the Just City, to note the importance of governing such tensions. Second, we provide discussion on the synergies and trade-offs between the diverse imaginaries. Do we need to choose which imaginary to prioritise? Or do we need to develop

more comprehensive imaginaries that encompass a range of interventions? Or are we in fact enriched by the diversity of efforts and imaginaries?

1.4.1 Just Cities

Without consideration of justice, sustainability becomes impossible to achieve; thus, the notion of just transitions has become a key tenet of sustainability agendas (Bennett et al. 2019). Therefore, it is not surprising that notions of justice have been part of our urban imaginaries since cities and settlements began to take shape. Responding to calls for just processes, with attributes of democratic inclusivity, fairness, and equity, is key in attending to the vulnerabilities of marginalised populations, and the central prospect of 'the right to the city' has underlined this urban vision. Notions of justice in cities form a key part of urban resilience planning (Meerow et al. 2019), green city agendas (Cousins 2021), and healthy city planning (Corburn 2013). Justice forms part of each of these frameworks not only because it is normatively 'the right thing to do', but also because it makes decision-making more robust, provides a more integrative foundation of knowledge, reduces urban vulnerability and risks, and improves economic productivity. Importantly, growing social inequality represents both key pressure points and unintended consequences in cities, whilst at the same time being a key driver for societal transformation (Moglia et al. 2018).

Furthermore, with a backdrop of progressive agendas gathering strength in the last few decades, it is unsurprising that there has been a rapid growth of urban justice concerns. These are mainly driven by scholars and activists fighting for the recognition of diversity, inclusion, and equity in the way we envision change, create laws and regulations, and approach planning and design, and in the ways, we give shape to our urban environments. Nancy Fraser's (1998) approach, which is based on socio-economic redistribution, cultural recognition, and participatory equality as three tenets of justice, has provided a framework for activism, research, and counter-discourses, creating a diverse and pluralistic understanding of justice. Imaginaries like the *Just City* (Fainstein 2010) help us understand that principles of equity, democracy, and diversity can be aligned or conflict with each other, and that under the current neoliberal capitalist regime, policy reform for justice is possible, but requires political mobilisation. Harvey (2008), through the popularisation of his *Right to the City* ideal, instead argues that achieving urban justice will only be marginal under the capitalist system, and thus there is a need for social revolution. Very inspiringly, Harvey (2008, p. 23) asserts:

> The right to the city is far more than the individual liberty to access urban resources: it is a right to change ourselves by changing the city. It is, moreover, a common rather than an individual right since this transformation inevitably depends upon the exercise of a collective power to reshape the processes of urbanization. The freedom to make and remake our cities and ourselves is, I want to argue, one of the most precious yet most neglected of our human rights.

These stimulating frameworks and ideas have generated new ways of conceptualising, enacting, and questioning plural understandings of justice. Climate justice, environmental justice, ecological justice, and multispecies justice are some of the emerging themes. These new understandings highlight that inequalities, suffering, and invisibilities not only are represented through narrow socio-economic lenses, but also relate more broadly to our most pressing global challenges, such as climate change, biodiversity loss, worldwide social-ecological migration and displacement, and global pandemics.

These pluralities of justice apply to urban environments, and in many cases are born or are more pressing in these geographies. For instance, the environmental justice movement grew in numbers and strength in the USA as a movement against both toxic waste and environmental racism—that is, how issues of environmental pollution tend to fall on communities of colour, lower-income classes, and other minorities (Schlosberg 2007). Whilst these injustices are still present worldwide, environmental pollution is just another impact with which marginalised groups and communities are burdened. Climate change impacts will also increasingly affect these groups—cities with extreme heat, flooding, and other climatic events will experience the most damage and loss, particularly in those communities with fewer resources and capabilities to cope with them. More recent understandings of justice position urban environments as key places for imagining a just city for people, nature, and the planet. Ecological or multispecies justice argues for the recognition, fair treatment, and provisioning of habitat for all human and non-human species to flourish and exist in a state that allows for health and well-being outcomes for all (Celermajer et al. 2021; Pineda-Pinto et al. 2022).

All the chapters in this book bring to light issues of justice either as critical to achieving just outcomes for city-making processes or as a fundamental aspect for shifting existing narratives and paradigms. Planning for and shaping fairer, more accessible, and well-balanced urban environments have a strong connection to several sustainable development goals, including equity, biodiversity conservation, building resilience through climate change adaptation, and providing everyone with health and well-being through social, technological, and environmental improvements. Thus, most urban imaginaries intersect with one another. A resilient city is one that prepares for and can cope with current and future shocks. A just city seeks redistribution, multispecies recognition and participation, and the flourishing of all life through self-expression and self-determination on a shared common planet.

1.4.2 Trade-Offs and/or Synergies

This book has presented imaginaries of sustainable cities ranging from those associated with resilient cities to low-carbon circular cities, green and regenerative cities, those related to healthy cities, and everything in between. That said, somewhat unintentionally, nearly all chapters have addressed the different ways that cities need to adapt to climate change, and in some ways, this has become a common

theme. There is also a strong overlap in the solutions and goals, with some solutions appearing across nearly all the imaginaries, such as nature-based solutions (incorporating urban forests, waterways, and urban parks). There have also been some themes that most, if not all, imaginaries have touched on. For example, the issue of equity and fairness is a common theme, as is the issue of human health. To some extent, this is unsurprising, given that most imaginaries have dealt with attempts to improve environmental outcomes, as they are recognised as an essential aspect of health and well-being.

Inherent in this, although it can sometimes be a false dichotomy, is a trade-off between human needs and the needs of other species and ecosystems. When this trade-off is present, human needs and environmental needs need to be balanced, which has infrequently been the case up to the present—and the results of this imbalance are now clear. Indeed, the Foresight, Research and Innovation team of ARUP, a large multinational consulting firm providing a range of services for the built environment, developed four plausible scenarios (ARUP 2023) that explore this trade-off and the delicate balance that needs to be found. Their scenarios highlight this powerfully, showing that the only viable path forward is to find this balance.

We also note that whilst balance is necessary, trade-offs are sometimes inevitable, and therefore occasionally the needs of some will have to be sacrificed. However, the needs that are sacrificed should be at first non-essential needs; in other words, we should strive to attend to the needs of as many as possible (human and nonhuman)—specifically, those needs that help us and other life forms lead a healthy, fulfilled, and good life, not the needs that enable destruction, consumption, and displacement. This is the basis of the new goal set out in Doughnut Economics (Raworth 2017): to stay within the safe and just space for humanity as defined through an ecological ceiling (nine dimensions) and a social foundation (12 dimensions), which is also closely aligned with the notion of missions-oriented innovation.

Along a similar vein, we note that the missions-oriented approach tends to require strong focus from governments and the community. This means that, at least in the short to medium term, there is limited bandwidth to achieve all the imaginaries that we have presented unless addressed collaboratively and holistically. There simply isn't sufficient funding and human capital to allow all the missions to be addressed simultaneously, and therefore there is a need to better engage and find a more unifying mission process that brings all the visions outlined in this book into a single coherent whole or sequenced according to some agreed level of importance. The emergent theme of climate adaptation and mitigation is a strong contender for a mission that brings together all the imaginaries in the book. That said, we also note that diversity and plurality of imaginations (here in terms of urban imaginaries) and the diversity of those involved in creating them is what will help us achieve the joint mission of resilient, healthy, just, and regenerative urban futures. Such tensions have been explored by Sharp et al. (2024), who note that the different framings at the same time enable pathways and collaborations, whilst at the same time obscuring other possibilities. Similarly, they note that a diversity in visions generates 'productive exchange between disconnected discourses and sheds light on possible

blind spots' (Sharp et al. 2024, p. 13). This creative tension between the diversity of contributions and the need for coherence and prioritisation needs to be nurtured and carefully navigated.

Finally, another common theme is the recognition that to achieve the imaginaries presented, there needs to be the creation of a different type of governance and decision-making system—one that harnesses the increasingly powerful and ubiquitous digital platforms available for data collection, analysis, visualisation, communication, and engagement.

1.5 A Mission for Achieving Sustainable Development Goals in Cities

The big question addressed through the imaginaries in this book is: how can we adapt our cities, and by extension our societies, to meet the needs of the future? Eleven bold and ambitious urban imaginaries have been presented that stretch our imagination for what is possible whilst drawing on the latest available science. While they provide a diversity and mosaic of interdisciplinary solutions, ideas, and paradigm shifts, they also provide a window into what the future of cities may look like, albeit here framed in the context of Australian cities and perspectives. Dealing with the grand challenges that have been presented is not optional, but a necessity, so it is advisable that policymakers in government, industry, and the broader community take notice.

A major challenge that this book highlights is the need to rethink existing ways of organising and governing our cities, and many of the chapters propose or identify experimental actions. As Mazzucato (2018) also notes, progressing with missions requires the advancement of both basic research and innovations, as well as novel ways of combining existing innovations with each other (pp. 66, 74). From the sustainability-transitions literature, in the same vein, it is proposed that transformative change requires disruptive and conforming innovations that challenge the status quo in ways of thinking, organising, doing, and knowing (Frantzeskaki and Bush 2021; Loorbach et al. 2017). In Table 1.1, we list, by chapter, proposed experimental pathways that can advance a transformative agenda for future cities. Citing Mazzucato (2020, p. 105), 'Today's missions need to be nested on top of resilient systems and social and physical infrastructure'. As the contributions to this book note (again, Table 1.1), the needed transformations for creating future sustainable urban systems target ways of organising, knowing, and doing. The proposed experimentations and interconnected innovations are mostly in the areas of governance, planning, and knowledge. This is one of our concluding messages for planning, governing, and managing future cities: embrace new ways of thinking; develop new integrative, system-oriented, and transformative ways of organising and doing (linking tactical to strategic planning); and reform where we source our knowledge for future-oriented planning.

Table 1.1 Proposed transformative shifts and experimentations from this book's contributions to achieve a transformative mission for future cities in Australia

Chapter	Proposed shifts and experimentations	
2	Shift to an adaptive and anticipatory mode of urban governance that takes a systems-thinking approach that recognises uncertainties and opportunities Shift to solution-oriented thinking through an adaptive, integrative, and resilience-oriented urban-planning paradigm	Governance experimentation – Transforming ways of organising – Transforming ways of thinking.
3	Shift to a multi-scale urban water governance paradigm that embeds resilience and water-sensitive approaches	Governance experimentation – Transforming ways of organising and doing
4	Shift to understanding and designing climate innovations by also considering the temporal effects and scales in the context of climate change	Knowledge experimentation – Transforming ways of knowing and doing
5	Shift to interconnected systems thinking for transforming urban infrastructures towards low-carbon or net-zero	Infrastructure experimentation – Transforming ways of doing
6	Shift to a whole system thinking approach to chart innovations for circular economies in cities focusing on policy, practice, and infrastructures	Policy experimentation – Transforming ways of organising and doing
7	Shift to future-oriented planning by bringing evidence across sectors and objectives for greening greyfield precincts	Planning experimentation – Transforming ways of doing
8	Shift to strengthening people, nature, and place relations in cities by aligning planning, knowledge streams, and inclusive governance	Governance experimentation – Transforming ways of organising
9	Shift to new approaches for understanding, experiencing, and knowing nature in cities through a multispecies lens	Knowledge experimentation – Transforming ways of knowing and doing
10	Shift to collaborative governance for knowledge and innovation systems to be in synergy towards urban transformations	Governance experimentation – Transforming ways of organising and doing
11	Shift to policy innovation thinking and formulating for enabling and sustaining experimentation	Policy experimentation – Transforming ways of organising and doing
12	Shift to polycentric urban planning to enable active living as a cross-cutting way for urban planning (form, place-making, and people–place connections)	Planning experimentation – Transforming ways of doing

Finally, across all the urban imaginaries in this book, there is a call for rethinking the current paradigm and culture of urban planning and development; nested within the broader call for new systems of city governance. While we have often escaped

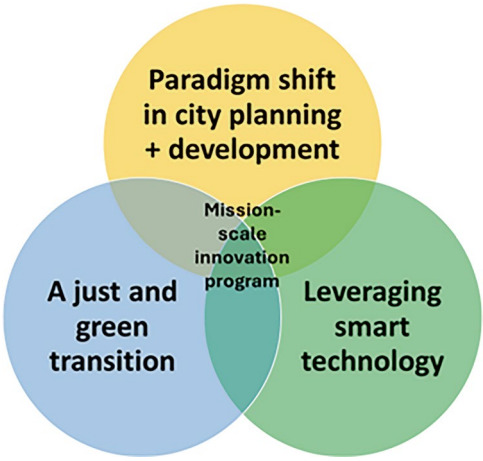

Fig. 1.2 Key arenas of applied research and innovation capable of mission-critical transitions for twenty-first-century cities

with poor practices in the past, from a social good perspective, the now-mounting problems and concerns demand a new paradigm—a new *kind* of city paradigm.

New paradigms, such as the New Urban Agenda, have been proposed, although it is alarming that there has been very little progress (United Nations 2020). Achieving this type of ambitious change, as already noted, requires a complete rethink about 'how we do cities'. What could our cities look like if we chose to comprehensively address current challenges? This book is not able to fully formulate what a future city should look like, but it outlines key pieces of the puzzle. Putting that puzzle together, and developing the final pieces of the puzzle, we argue, requires mission-oriented innovations.

1.5.1 Three Urban Innovation Arenas for Focusing Our Efforts

Taking a helicopter view on the challenge of future city-making suggests that there are three principal arenas where applied research and innovation need to be focused as illustrated by contributions to this book. They are sketched in Fig. 1.2. Each of the research arenas has been explored in this book.

Arena 1. Leveraging Smart Technology The first urban innovation arena involves taking advantage of the multiple technological advances occurring in what Batty (2018) has termed the fifth long wave of global innovation in information technology and digitalisation—the *digital transition*. Central to this transition is high-speed broadband communications delivering telepresence, the Internet and its IoT including synchronous collaboration platforms, an increasing array of sensing systems both ground-and-satellite-based contributing to big data and associated AI systems, and digital infrastructure platforms enabling interoperability of data and analytics

and assembling a more rapid evidence base for urban decision-making. This new technology has the potential to overcome a key problem in urban governance, that is, the difficulty in observing, monitoring, and evaluating the impacts of interventions (the city is large, complex, and dynamic). This has the potential to make urban planning and governance evidence-based in a way it has rarely been in the past. Several chapters illustrate application of important new digital pathways (Chaps. 3, 5, 7, 10, 12).

Arena 2. A Just and Green Transition

The second arena involves engagement with the sixth long wave of global innovation associated with delivering sustainable development (Hargroves and Smith 2005)—a just and *green transition* focused on sustainable urban development that is low-carbon, resilient, nature-based, and healthy (Chaps. 2–11). This transition is multi-sectoral (buildings, transport, utilities, manufacturing, domestic) and multi-scale (household-precinct-city-region) and operates on green economy principles, for example, circular economy, regenerative development—an even greater challenge for applied research than sustainable development (Girardet 2015; Newton et al. 2022).

The challenge before us (as outlined in Chap. 10) is exploring the potential for increased integration and an accelerated convergence between fields of research associated with digitalisation and sustainable urban development. The challenges are formidable but need to be articulated as a focus for a mission-oriented response. OECD (2023) is the first global organisation to begin pursuing this goal. Convergence research has been identified as a fundamental underlying principle of scientific progress that assembles and integrates all relevant capabilities to answer contemporary grand challenges (Bainbridge and Roco 2016). It is a critical arena for applied research central to a much-needed accelerated transition to smart and sustainable urban development.

Arena 3. Paradigm Shift in City Planning and Development

The third innovation arena involves *transforming city governance and institutions* to enable smart sustainable cities. As outlined in Chap. 2, the engine that drives changes in the city is governance and decision-making. As also outlined throughout the chapters in this book, these decisions include how to accommodate growth in population through urban development, policy, and planning decisions in relation to transport systems, decisions about how to source energy for the city, how to create more affordable and accessible housing systems, or how to support nature in cities. It is recognised that to support cities that are more likely to achieve all sustainable development goals, there is a need to change the decision-making paradigm that supports city governance and urban development. A key focus in the paradigm needs to be how to support 'the commons' (i.e. shared community resources, culture, and institutions) and social good, in a planning and decision context that is commonly dominated by financial and development priorities.

To change the city, therefore, there is a need to reform city governance and associated institutions. To achieve the visions outlined in each of the chapters, as per

Table 1.1, a range of such reforms have been proposed, specifically ways of learning and knowing (as discussed in Chap. 2 on resilient cities, as well as described in Chap. 11 on experimentation), as well as changing the values and institutional rules that provide a basis and context for decision-making. Given the high levels of socio-technical complexity, and need to adapt to local contexts, experimentation is warranted as a guide for all types of reforms, including governance, knowledge, infrastructure, policy, and planning experimentation.

But how do governance and institutional reform happen? The answer to this is still an open question as the science and understanding of how reform happens is still evolving. A key emerging concept in relation to this question is the notion of 'mainstreaming'. As argued by Adams et al. (2024), mainstreaming is a process-oriented way of thinking and should be 'considered a strategy for doing sustainability transitions', involving the purposeful and cumulative actions of multiple actors. It needs to consider involving actors in a diverse set of roles, as well as the institutional spaces as they evolve, and their various mechanisms. Urban innovation research and development should have a capacity for mainstreaming. A key mechanism in mainstreaming is the process of experimentation which has been explored in Chap. 11. Chapter 10 further explores the role of digital innovations in the governance of cities, and to support mainstreaming.

1.5.2 An Innovation System to Support an Urban Transformation Mission

This book has provided critical inputs to help guide an urban transformation mission for the twenty-first century that both acknowledges the critical challenges that humanity is facing with the urgent environmental and ecological crisis, as well as the opportunities and risks presented by new technology. Most of the grand urban challenges and pressures faced by cities and their residents in advanced post-industrial Western societies are global in nature and are common to those identified in Australia. Notwithstanding, all chapters in this book are largely based on the Australian context, so the question arises, how well is the Australian innovation and governance system positioned to support a mission-scale *response* to the identified key challenges?

Until the release of a draft National Urban Policy in May 2024 (Australian Government 2024), there had been a gap of 13 years since its predecessor had been introduced (Department of Infrastructure and Transport 2011), A lack of continuity in national leadership in urban policy and settlement planning and development has characterised the last half century in Australia. Labor governments have launched several mission-scale urban programmes over this period, The decentralisation programme of the Whitlam Labor Government (1972–1975) targeted specific regional cities for Growth Centre investment (Bolleter et al. 2021), as well as provisioning sewerage for the outer suburbs of the larger cities and reinvesting in public housing

construction. This administration was short-lived and the Liberal Government that succeeded it for the next decade, in common with most conservative governments in Australia, abrogated leadership in this space by pointing to the constitutional role of state governments in relation to city development and land use planning. It was not until the election of the next federal Labor government (Hawke-Keating, 1983–1996) that the next mission-scale urban programme emerged: *Building Better Cities*. Focused on the challenge of brownfield redevelopment, this programme's partners in state and local government in collaboration with the property development and construction sector developed a new model capable of successful implementation and replication in all major cities of Australia (Newton and Thomson 2017), continuing to the present with incremental enhancements to sustainability performance. The City Deals programme instituted in 2016 by the Liberal (Turnbull-Morrison) government became an imported UK initiative that has been widely criticised as 'ad hoc' and lacking in an overarching urban policy strategy (Burton and Nicholls 2019); and not supported by the incoming Albanese Labor government in 2022. Over the past decade there have been persistent calls for a national vision and plan for Australia's future settlement system such as that revealed in the Federal Inquiry into the Australian government's role in the development of cities *Building Up and Moving Out*. This report identified twin mission-scale challenges: creating both sustainable densification programmes for the major cities and effective decentralisation programmes targeting regional cities (Commonwealth of Australia 2018). Early reviews of the draft National Urban Policy have highlighted key weaknesses. Apart from it identifying five high-level goals (liveable, equitable, productive, sustainable, resilient) and six principles necessary for successful city planning, Freestone and Webb (2024, p. 1) considered 'there are no specifics in the national objectives, challenges and possible responses … on how the desired urban transformation will be achieved in practice'.

It was also in 2023 that the federal government updated its 2015 National Science and Research Priorities (Australian Government 2023), which should desirably mesh with its national urban policies, also seeking to be innovative and evidence based. In Australia, urban research and innovation is reliant on comparatively narrow sources of funding and resourcing provided by key federal agencies such as Cooperative Research Centres (CRCs) and the Australian Research Council (ARC). Established in 1990, CRCs are a unique model of large, multi-year applied research initiatives supporting industry–government–research collaborations (Newton et al. 2009). Industry increasingly dictates the agenda of research projects in CRCs, although such projects tend to aim for a mix of economic and social outcomes and are often aligned with National Priorities, which currently lack any built environment directive. Two of the chapters in this book present urban innovation that has emerged from CRCs, that is, the Water Sensitive Cities CRC (Chap. 3) and the Low Carbon Living CRC (Chap. 5). However, from an urban transformation mission perspective, it could be said that CRCs tend to focus on sectoral problems that limit the opportunities for systems-oriented innovation needed for city-scale impact. This means that, for CRCs to become a suitable home for an urban transformation

mission, they would need to expand their scope, level, and duration of funding (beyond the typical 7 years), and model of governance.

Research funded through the ARC, on the other hand, provides funding for a wide spread of smaller scale research on a case-by-case basis. Depending on the scheme, projects are either industry-led (Linkage) or academic-led (Discovery). This shorter-term and smaller-scale focus means that it again is not the appropriate mechanism for supporting an urban transformation mission. Furthermore, ARC projects tend to be more narrowly targeted, discipline-oriented, and based on academic credentials, thus often lacking a necessary transdisciplinary approach, and tending to be less applied than is required for an urban transformations mission. Recent media coverage also highlights several problematic issues with the ARC funding, including its politicisation, not covering the full costs of university research (let alone for the applications), the complexity of the application process, and inadequate evaluation metrics and processes (Message 2024; McCarthy 2023).

A scan of international programmes in these areas suggests that it is necessary to look to the European Union for leadership and a blueprint for a mission-scale research, innovation, and implementation programme capable of delivering more sustainable urban development at scale. *Horizon Europe* is such a programme (European Parliament 2023). A successor to previous Horizon 2020 and earlier Framework Programs extending back 30 years (European Commission 2015), it provides significant levels of financial support (currently 95 billion euros) and continuity for research innovation and collaboration unequalled in Australia. Horizon Europe (2021–2027) explicitly targets mission-scale initiatives that have been strongly influenced by the research and writings of Professor Mariana Mazzucato who likewise stimulated the ideas behind this book. Two of the five mission-scale programmes targeted in Horizon Europe in addition to cancer, oceans, and soil are climate and cities. These require the twin transitions of climate change mitigation, adaptation, and resilience and the digital innovations underpinning smart cities of the future with a capacity to achieve climate neutrality. These are two of the three mission-scale arenas of applied research and innovation identified by contributors to this book (again, see Fig. 1.2). The third involves a paradigm shift in city planning and development processes, largely focussed on new systems of governance capable of realising the six key planning principles outlined in the 2024 National Urban Policy. *Together* they can deliver the scale of step change transformative innovations necessary for delivering sustainable urban development this century.

Noteworthy, from the perspective of this book, one of the missions supported Horizon Europe is the 'Climate-neutral and Smart Cities' mission (Beretta and Bracchi 2023). As part of this mission, 100 European cities were selected to become climate-neutral by 2030, highlighting bold and ambitious, yet widely supported innovation missions that both industry and academia can collaborate on. The focus on tangible outcomes, embedded in legislative requirements through climate City Contracts that are co-created with local stakeholders and citizens, and a focus on place-based experimentation and innovation hubs serve as examples of the scale and systemic focus that is required.

The editors of this book argue that this type of ambitious and comprehensive mission, connected in a binding fashion into civil society and business, as we have seen in the EU, is needed in Australia, and indeed globally, to help achieve the cities of the future that are resilient, climate-neutral, climate-adapted, nature-based, regenerative, smart, sustainable, and healthy. If we can achieve this, the future for humanity looks every bit so much brighter.

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