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CRAFTING INNOVATIVE PLACES

**for Australia's Knowledge
Economy**

EDWARD J. BLAKELY and RICHARD HU
Foreword by Peter Newman



Crafting Innovative Places for Australia's Knowledge Economy

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Crafting Innovative Places for Australia's Knowledge Economy

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FOREWORD: SMART CITIES, SMART PEOPLE, AND SMART JOBS

This is a book about creating places in smart cities that attract the kind of work and workers Australia needs to be globally competitive and provide a sustainable and liveable environment. It sounds kind of silly trying to suggest that we need smart, innovation-driven cities—who would want a dumb city that fails to attract creative people and knowledge jobs? But you ask anyone about what worries them in the city where they live, and they will come up with a long list of things that just seem dumb to them—like why heavy traffic is dominated by so many single occupant cars, why the heck can't we be innovative by turning more to the sun and hydrogen for making power, and why don't we use these technologies to create local jobs. We don't have to be big like the United States when small nations like Sweden and Denmark are doing this. Why do we have such boring shopping centres, why don't we solve poverty and crime in our cities, and why don't we make more goods in Australia? The truth is that unless we develop our cities, we lose our best talent to overseas firms and cities, and we cannot develop a sustainable and competitive economy that will maintain our high standard of living. Making good coffee and exporting coal will not be good enough.

This book is not an instruction manual, but it does come up with some serious suggestions that help to answer these kinds of questions. These suggestions are based on analysis of the data and experiences in both Australian and international cities. The authors look at how we compete not just on economic criteria—we always do OK, but only just, on those criteria—but on sustainability criteria. Qualities related to sustainability get to the heart of why we like living and working here. The book identifies

clear links between innovative places and competitive cities. If we make innovative places for smart people to create new ideas, services, and products; good places for them to live and enjoy in our cities, then this will flow through into how strongly we compete against international cities. This is important because the new knowledge economy, a key part of being a smart city, is going to depend on all these factors. Cities that are solving their problems, becoming smarter all the time, are going to attract investment and talent, and generate new, technologically sophisticated jobs. These are the cities that will win in the new economy.

Ed Blakely has spent a lifetime studying cities and advising national and city leaders, including five US presidents. He also has done much to help fix places with problems, such as New Orleans, where he was made the Recovery Czar after Hurricane Katrina. He has made many important contributions to urban policy and planning as an academic, and on a very practical level has always been able to show what should happen next in cities and how to deliver it.

Richard Hu is a different generation of urban planning academic and has begun making a mark on how we create competitive and sustainable cities. His work in combining urban design, urban development, and policy shows wisdom and balance. Ed and Richard have teamed up to write an exciting new book, on a topic that is just beginning to shape policy and practice: how do we attract and retain creative people and use the incredible recent inventions in technology to make better cities? These cities will not be just less dumb but really smart about how they solve the deeper issues of urbanism and tackle the sheer need to be genuinely competitive.

In the end, this book is about making innovation-generating places for smart people to do smart jobs, and Ed and Richard show us how to do it. What I really like about the book is that we have an African American Australian and a Chinese Australian telling us what we ought to do about our cities because they love the place and their insights into our cities are informed by their experiences of living and working in many other places. They are part of the smart talent pool we need to guide us at this critical juncture in shaping our nation in the global innovation race.

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AI	Artificial intelligence
ALP	Australian Labor Party
APS	Advanced producer services
APS	Australian Public Service
ASGS	Australian Statistical Geography Standard
ATP	Australian Technology Park
AV	Autonomous vehicle
BART	Bay Area Rapid Transit
BRA	Boston Redevelopment Authority
BRIC	Brazil, Russia, India, and China
CBD	Central business district
CBR	Confident, bold, ready
CCMIL	City Centre Marketing and Improvements Levy
CDFI	Community Development Finance Institution
CIN	Canberra Innovation Network
COAG	Council of Australian Governments
Comac	Commercial Aircraft Corporation of China
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSR	Corporate social responsibility
EU	European Union
FDI	Foreign direct investment
GaWC	Globalisation and World Cities Research Network
GCI	Global Competitiveness Index
GDP	Gross domestic product
GIS	Geographic information system

GloMo	Global Mobility Index
GMI	Global Migration Index
GNCI	Global Network Connectivity Index
GSC	Greater Sydney Commission
ICT	Information and communication technology
IM	Internal migrants
IMTQ	Internal migrants with tertiary qualifications
IoT	Internet of things
IP	Intellectual property
IPO	Initial public offering
ISR	Innovation, science, and research
IT	Information technology
IUCI	Integrative Urban Competitiveness Index
JBEI	Joint BioEnergy Institute
KBUD	Knowledge-based urban development
KCI	Knowledge City Index
KPCB	Kleiner Perkins Caufield & Byers
LDA	London Development Agency
LGA	Local government area
MBP	Melbourne Biomedical Precinct
MIT	Massachusetts Institute of Technology
NASA	National Aeronautics and Space Administration
NBN	National broadband network
NSW	New South Wales
NYSE	New York Stock Exchange
OECD	Organisation for Economic Co-operation and Development
PPGIS	Public participation geographic information system
R&D	Research and development
RDA	Regional Development Australia
RMIT	Royal Melbourne Institute of Technology
SCP	Smart Cities Plan
SEZ	Special economic zone
SME	Small and medium enterprises
SUA	Significant Urban Area
TNC	Transnational corporation
TOD	Transit-oriented development
UCSF	University of California at San Francisco
UNSW	University of New South Wales
UTS	University of Technology Sydney
WTO	World Trade Organization
WWI	World War I
WWII	World War II

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Rediscovering Places

In this book, we call for rediscovering the role of places in incubating innovation to drive Australia's knowledge economy, drawing upon experiences and practices around the world. We unpack the new imperatives and paradigms of innovative place making within the contemporary forces of globalisation, urbanisation, and especially innovation. We integrate planning, policy, economics, and urban design to forge a 'crafting' approach to co-creating and co-designing innovative places. The world is changing fast, with mounting uncertainty and unpredictability. The power to solve the problems of a post-industrial society lies in communities (Katz and Nowak 2017). This shifting of power towards a local level is occurring not only in the United States and Europe, but also in Asia and other developing regions. Australia is no exception.

Cities have drawn much attention as we have sought to understand and respond to contemporary transformations and challenges. 'Cities are the new countries' (OECD 2016) is not an exaggerated claim. As of 2018, the world urbanisation rate is 55 per cent, and is projected to reach nearly 70 per cent in 2050 (United Nations 2018). More than two-thirds of us will be city dwellers by the middle of this century: our world is urban. There has been a power restructuring from nation states to cities, and this trend will continue with further growth of cities. But cities are still complex systems and are often too large a spatial unit to allow us to fully understand our society's diversity and nuances. Places—within and outside

cities—deserve attention, in both knowledge building and policymaking. Numerous places are innovative nodes interlinked globally and digitally. Place-based innovation capacity is shaping the global competitiveness of nations and cities.

In this introductory chapter, we contextualise the macro forces that underpin our interest in places. We start with the popular thesis of ‘a flat world’ and argue that the world is also more uneven than ever, socially, economically, and environmentally, and especially in terms of innovation capacity. The increasingly uneven world is interlinked with the two interweaving contemporary forces of globalisation and urbanisation. Both have been widely discussed and debated, but our concern is with their impacts on cities and places. We then move on to our focal point of innovation and its disruptive effects. We briefly outline the challenges for Australia’s economy within these broad contexts. The chapter concludes by describing the overall approach and organisation of this book.

A FLAT AND UNEVEN WORLD

‘The world is flat’, as claimed and popularised by Thomas Friedman (2007): people around the world are on a more even playing field today than ever before. Individuals have easier access to stocks of knowledge worldwide due to information and communication technology (ICT) advances and accelerated globalisation. This has increased expectations for standards of living and access to opportunities. Commodities and services have global outreach, with a level of ease and efficiency unimaginable decades ago. A tribesman in Kenya uses his mobile phone to communicate the number of cattle he has in his herd. A New York banker uses the same technology to price her goods and commodities for trade around the world, which may even involve the tribesman’s herd. Knowledge access is being democratised. It promotes business exchange and social interaction at unprecedented speeds and scales. For the first time in human history, we all share the same ideas, ambitions, abilities, and problems.

Technologies have transformed and are continuing to transform the labour-intensive agricultural and industrial sectors. These sectors traditionally consumed an enormous amount of energy, paired with tremendous use of human resources. Technology has been liberating human beings, physically and intellectually. Recent advances in information technology have particularly brought about intellectual liberation. Frey and Osborne (2017, p. 258) observe that ‘historically, computerisation has

largely been confined to manual and cognitive routine tasks involving explicit rule-based activities... [it] is now spreading to domains commonly defined as non-routine'. The exponential advance of technologies poses questions about the future roles of both people and places in situations not experienced before in human history.

In previous eras, physical and natural endowments largely determined economic outcomes. Port Kembla in the city of Wollongong on Australia's east coast contained the country's largest steelworks. This area was one of the wealthiest in Australia with a significant economic advantage at its peak in the 1980s. The comparative advantage this area possessed in natural resources could not be simply imitated elsewhere. But while these sorts of mineral and infrastructure advantages were central to the economies of the industrial era, in the new information era, goods and services can be produced and accessed anywhere. We live in an age of minimal barriers to economic activities. Goods and services are more fluid than ever before. Even raw materials such as steel can be fashioned from recycling waste, or transported at low cost, as seen from the production of automobile frames and ship hulls in resource-poor nations like Japan and Bangladesh. The ability to cheaply transport resources and goods across borders has allowed industries to thrive in places where this was previously impossible.

Physical locations continue to enjoy useful advantages, but a location's natural endowments no longer determine only its economic destiny. While natural settings such as rivers, streams, seashores, and valleys remain useful, their present utility differs from the past. These idyllic venues now attract talented and creative people, who produce goods and services for transmission and consumption globally. It is in the context of this transition from resource to knowledge primacy that we need to re-examine our economic development strategies. It is now possible to reduce our need for and use of raw materials and mineral resources, which require rivers, airports, rail yards, and other infrastructure to transport. More and more, we are substituting lighter and smarter goods composed from materials that do not require as much energy either to create or to transfer to the end user.

Technology has enabled global outreach of and access to products and services, creating 'a flat world':

Whenever civilisation has gone through a major technological revolution, the world has changed in profound and unsettling ways. But there is something about the flattening of the world that is going to be qualitatively dif-

ferent from the great changes of previous era: the speed and breadth with which it is taking hold...This flattening process is happening at warp speed and directly or indirectly touching a lot more people on the planet at once. The faster and broader this transition to a new era, the greater the potential for disruption, as opposed to an orderly transfer of power from the old winners to the new winners. (Friedman 2007, p. 49)

But the technological capacity and innovation that have enabled this remarkable change is much more ‘uneven’. Technologies agglomerate in certain places that enjoy a global competitive advantage. ‘Speed and breadth’, as argued by Friedman (2007), are not the only attributes that make the current changes different from those of the past; there is also the ‘scale and impact’ of the changes. One important attribute of the flattening process is that the world is, at the same time, becoming increasingly uneven and volatile. Fewer barriers to trade and immigration have meant greater flows of information and people across the globe, giving certain locations higher concentrations of wealth and innovation capacity, while other locations are deprived of those assets. This technology-enabled unevenness is place-based, and makes understanding places much more critical in a technology age than in earlier times.

An oxymoron seemingly: the world is flat and uneven. One manifestation of this dichotomy is a global human capital imbalance, as knowledge workers flow from less desirable to more welcoming places and cultures. Attracting globally mobile human capital is the key to a strong and competitive local or national economy. Growing a creative culture and enhancing liveability have been primary urban policy goals in recent decades. Cities brand globally as creative, sustainable, and liveable places. Technological advancements and policy liberalisation have spurred flows of people and information, generating global inequities in human capital and wealth. Successful cities are human capital magnets, attracting people from less competitive and attractive cities and countries. In this sense, we live in a flat *and* uneven world. This has been driven by three contemporary transformative forces: globalisation, urbanisation, and innovation. The third of these forces is a central focus of this book but must be understood and examined in the context of both globalisation and urbanisation.

GLOBALISATION: DECENTRALISING AND CENTRALISING

The globe is the primary competitive framework today, rather than country or region. There is scant room for local forces unless they have global penetration. Not that small businesses cannot pursue a local strategy. They can! And indeed, it is the local level, as represented by places, that we engage with in this book. But very often a local business relies on global taste or a global market, and is dependent on the global transfer of money, information, knowledge, and design. Global engagement is pervasive. We are participating in the global economy or no economy. This seems harsh, but it is a reality. Globalisation does not please everyone. There are those who prefer to fight this trend, justifying their resistance through religious dogma or populist political philosophy to push against this trend. This is not going to work. Globalisation is irreversible, and resistance is futile. Globalisation should be well understood, incorporated, and managed, not only by nation states and international institutions, which have proven to be flawed in recent decades, but by agents operating on smaller and more flexible scales such as cities and regions, and further downward to places, as we argue in this book.

Globalisation is not a recent phenomenon in human history. Human efforts to explore the globe date back thousands of years. What differentiates contemporary globalisation (from the late 1970s onwards) is its pace and intensity. Global forces have been developing at an unprecedented and accelerating speed, and their impacts are transformational, not

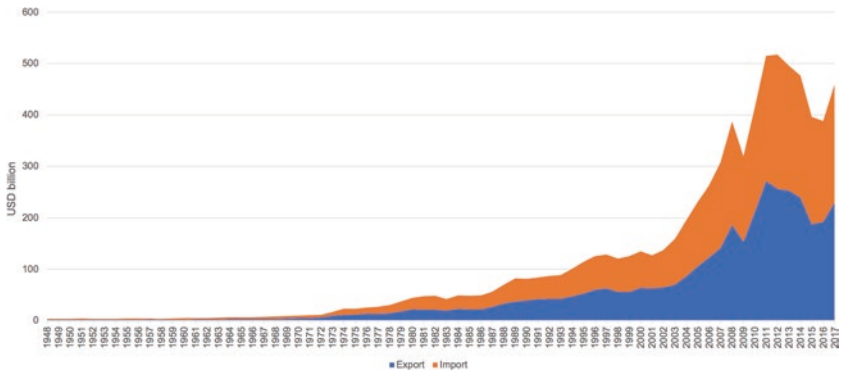


Fig. 1.1 Australia's international merchandise trade, 1948–2017

Source: World Trade Organization (2018), created by the authors

transitional. One manifestation is international trade. Measured by current prices, Australia's international merchandise trade was negligible in the post-World War II (WWII) decades; it surged tremendously from the 1980s, when Australia floated its currency, liberalised its financial system, and lifted tariffs to integrate with the world economy (Fig. 1.1).

Many factors have accelerated recent globalisation. Amongst these, our focus is on technology and the knowledge economy, and the neoliberal policies that have contributed to their dominance. The declining cost of transport has increased incentives for both businesses and individuals to engage, trade, and communicate on a global scale. Reductions in transport costs have also enabled a more intensive exploitation of economies of scale. During the twentieth century, the costs of transporting goods declined in real terms by over 90 per cent (Glaeser and Kohlhase 2004). Widespread application of ICT has facilitated the globalisation of services, knowledge, and innovation. Geographic barriers have broken down; communication and transactions over vast distances are easy and costless. Free information flow has become the greatest threat to nations' sovereignty worldwide (Beck 2000). Citizens readily engage with one another across nations, anytime and anywhere.

The advance of ICT and the rise of the knowledge economy are interwoven and mutually facilitating (Pratchett et al. 2015). The impact of ICT is revolutionary. The newest round of its development has been user-centric, mobile, and ubiquitous, massively expanding its access and use. Technological advancement is reshaping the knowledge economy, which has evolved during the decades since WWII in the transformation from industrial to post-industrial production and society. The surge of the knowledge economy and its rapid development since the 1990s have been largely facilitated by the advancement of ICT (Hu 2016). ICT has reduced costs and enhanced efficiency in the production, transmission, distribution, and use of knowledge.

Globalisation is neoliberal. Firms, cities, and countries are competing on the global stage to maximise interests and opportunities through winning against competitors. Neoliberalism has dominated the multi-scalar policymaking—international, national, and local—that has collectively shaped global integration and competition. Globalisation has generated winners and losers. The uneven outcomes of globalisation have contributed to the recent rise of populism and conservatism in the United States and the United Kingdom. The Trump presidency and Brexit exemplify these new political phenomena. Neoliberalism still penetrates every aspect

of our lives: international trade, finance, tourism, migration, and internet access. If ICT has broken down the physical and geographical barriers to globalisation, neoliberalism has dismantled the ideological and political barriers.

Globalisation is an ongoing process, not a political-economic position (Harvey 1995). Despite discontent and resistance, no country, no place, no government, no agency, no individual can escape. Attitudes towards globalisation are important. It is a threat to some, but it brings opportunities for those who change and adapt. Globalisation connects places, big and small, near and far. The global connection of places involves both decentralising and centralising processes: places are interlinked, with power decentralised from hierarchical structures of nation states and cities; some places have centralised power and capacity that could not have been possible in the pre-global age. This process of decentralising and centralising is discussed further in the context of urbanisation below.

URBANISATION: QUANTITATIVE AND QUALITATIVE

Since the Industrial Revolution, the world has experienced a shift in population from rural to urban areas. In 2007, for the first time in human history, more people lived in cities than in the countryside. This trend is continuing, simply shifting focus from the developed nations to the developing nations. As noted earlier, almost 70 per cent of the world's population will be living in cities by 2050, and the world is increasingly an urban world (Fig. 1.2). China is experiencing the largest urbanisation process in human history, expecting an urban population of one billion by the middle

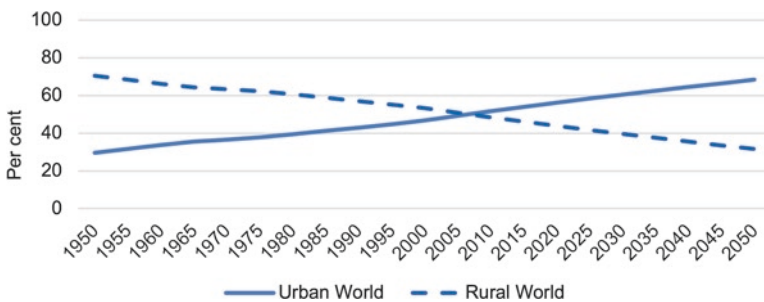


Fig. 1.2 Urban and rural population percentages in the world, 1950–2050
Source: United Nations (2018), created by the authors

of this century. A new round of urbanisation is moving elsewhere, including to Africa, Southeast Asia, and South America. Most of our problems and challenges are now city-based.

But contemporary urbanisation is more than just the numbers of people moving from the countryside to cities. It is a shift in the way we work and live that penetrates all communities around the world. Urbanisation can be summarised as a good cup of coffee, a fashion show, a television programme, a computer app, popular music, or art. Richard Florida's now famous book *The Rise of the Creative Class* (2014) recounts how certain locations have become magnets of opportunity because they have a stronger urban feel and pull, therefore generating jobs in both the open and underground market systems. It matters little whether Florida's tome describes an end state or creates a template for discovering new economic dynamics. He hits the mark. His book captures the new economic base for rising urbanism.

An urban feel is not limited to metropolitan communities. The mass production of urbanism is easily visible in the coffee shops, jeans, hair styles, and smart phones that now occupy every passenger on trains, buses, and street corners across the world. The proliferation of social and technological trends is the best evidence for the global spread of urbanism. Urbanism generates new expectations of lifestyles and forms of work. Today a farmer in central Australia is a professional land manager. She can milk her cows, track her sheep, and control her access to water. She does all these time-consuming tasks herself, tasks that required dozens of people before. The farmer can control hundreds of mundane tasks from the desk console at home, or from an office tower in Sydney, or a hotel in London while she is on holiday with family.

Today's urbanisation differs from the urbanisation process that had originated from the Industrial Revolution. It is mingled with globalisation and generates new urban phenomena unwitnessed before. Because of the concurrent processes of globalisation and urbanisation, a group of cities are becoming so-called 'the global city', a term used to describe this recent urban phenomenon and to capture the structural impact of contemporary globalisation on cities (Sassen 2001). Cities are the new nodes of an integrated global economy. Some cities become 'global cities' by playing more important roles as the command and control centres of the global economy. As trade, politics, and socialisation become centred on the global cities, these cities are becoming the new countries (Barber 2014; Katz and Bradley 2013). Globalisation is a 'denationalising' force in which the

powers of cities and nations are shifting: cities are emerging as dominant spatial scales and are superseding nation states as the central nodes of the global economy (Sassen 2001). Networks of cities are overriding purely political boundaries, expressed through their economic, political, and social relations with one another; the integrated global economic system is then a city-centred world of flows, in contrast to the traditional state-centred world of boundaries (Taylor and Derudder 2016).

Sassen (2001) contends that global cities have grown out of both the decentralisation and the centralisation of global economic activities, in line with the decentralising and centralising effects of globalisation discussed above. Production and retailing activities are spreading across the world, but at the same time the specialised services to support them tend to concentrate within a few global cities. The transnational corporations (TNCs) are increasingly important actors in the global economy, accelerating global competition. The transition to a knowledge economy has led to greater complexity in managing, controlling, and coordinating global activities and organisations. In such a system, greater access to advanced and specialised services is required. Such services are often referred to as ‘advanced producer services’ (APS), including financial, insurance, banking, legal, business, and professional services. The APS both benefit from geographic proximity and act within the global network. Their complexity and their intermediary nature require immediate access to communication and simultaneous inputs and feedbacks (Sassen 2001). Global cities are central places and provide the geographic contexts for these APS. Global activities are further concentrated in the central business districts (CBDs) of global cities.

Cities link with one another, forming a network of urban nodes to underpin an integrated global economy. This intercity network comprises complex relationships embedding competition, cooperation, and connectivity (Taylor et al. 2011). To aspire to global city status and enhance global competitiveness is the primary strategic goal for many cities in the world, an important manifestation of the dominant neoliberal policy direction discussed above. Because the global city is defined by its role in the global economy, an understanding of and approach to global competitiveness has been economy-centric. However, an economic focus is too narrow to capture the multiplicity of a city’s competitiveness and is likely to hamper or limit effective policy responses. A city’s global competitiveness lies in the level of integration of its capacity and assets. This includes not only economic performance, but also liveability, human capital, innovation,

infrastructure, and sustainability. This is truer today than ever before, due to the nature of the knowledge economy and the necessity of nurturing innovation and attracting talent to remain competitive, which we will fully discuss in Chap. 3.

People claimed the death of cities and irrelevance of geography in the early days of the ICT revolution several decades ago. This judgement was based on a surface understanding of what the new technology would bring to the world, but it failed to appreciate the underlying transformative impacts. What we have seen is a growing urbanisation trend and the increasing importance of cities. Cities accommodate and shape the way we live and how we work, and more important, cities incubate the most valuable asset in a global knowledge economy—innovation. This qualitative attribute differentiates today's new urbanisation from the old urbanisation that was marked only by the quantitative indicator of people's movement from the countryside to cities.

INNOVATION: DISRUPTING AND DISRUPTED

Innovation holds the key to thriving in a knowledge economy. Innovation is a buzzword today and calls to mind technologies such as computers and digital communication and production. But innovation is any new way of doing or performing traditional tasks, chores, and functions. It usually involves applying new technologies to existing uses and accomplishing tasks in more efficient and useful ways. This is often achieved through the invention of disruptive technologies, services, or social practices. The Organisation for Economic Co-operation and Development (OECD) (2005) classifies four types of innovation: product innovation, process innovation, marketing innovation, and organisational innovation. The OECD's National Innovation Surveys reveal a high proportion of innovative firms in manufacturing and services sectors, and an even higher proportion of innovative firms in information and communication services across different nations; and nearly 90 per cent of the firms surveyed engage in research and development (R&D) activities (Fig. 1.3). Like globalisation, innovation penetrates across the world.

Disruptive innovations create new markets and redefine the value of commodities or services, revolutionising or replacing existing firms, markets, value chains, or networks (Yu and Hang 2010). One example is the rapid rise in popularity of the sharing economy. The sharing economy is essentially about collaborative consumption through sharing unused

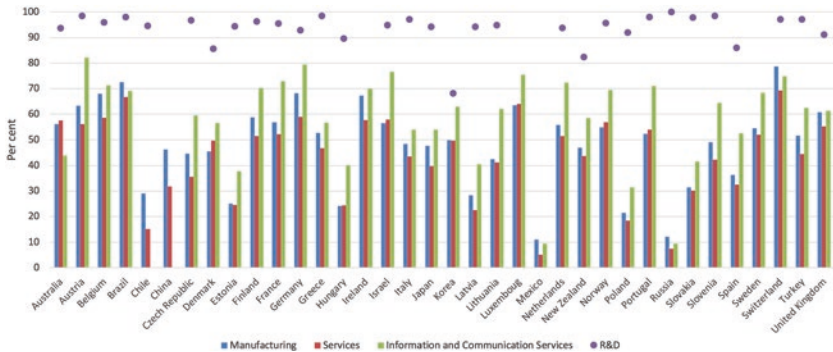


Fig. 1.3 Innovative firms in OECD's National Innovation Surveys

Note: Data for information and communication services are missing for Chile and China; data for R&D are missing for China, Ireland, Luxembourg, Mexico, and Sweden

Source: OECD (2017), created by the authors

services and products (Hamari et al. 2015). It is not entirely new since it does not challenge classic economic theories about transacting the unused. However, the sharing economy's recent surge has benefitted from improved information technology that puts users in instant contact, and it grew rapidly in the aftermath of the global financial crisis of 2008. Through online connections, collaboration, and consumption, users access the sharing economy to loan a product or service to another individual for a limited time (Hamari et al. 2015). The global financial crisis called into question the notions of economic ownership and materialism, and led to a push for more sustainable use of resources. The growth of the sharing economy has involved a renewed belief in the importance of community, driven by the global recession, concerns about the environment and advances in technologies, and supported by the growth of peer-to-peer networks (Botsman and Rogers 2010).

Uber is a prime example of the sharing economy. Uber is at its core a digitally enabled mobile automobile service that moves people, goods, or other materials to an end user or destination on demand. Nothing is new in calling a car and paying to have yourself delivered to your desired location. This has been practised for many years with taxis. The disruptive innovation of Uber is the implementation of time-demand queuing using digital technology. Uber is doing what Federal Express in the United States did with packages two decades ago, using the taxi platform.

The notion of cell disruption is central to innovation. The outer layer remains the same, but the inner workings or core are altered dramatically. Under the two forces of globalisation and urbanisation being discussed here, a traditionally onerous activity, such as acquiring accommodation during travel, can lead to disruptive innovations like Airbnb. These innovations transform our use of space and can even alter the functions of a place to a different land use. As a tourism application, Airbnb facilitates a seamless exchange of spaces and services between end users and property owners. The intermediary, which developed the technologies by deploying the application, has attracted capital and generated revenue through defying the fundamental conventions of traditional deal making. Intermediaries are not doing anything post-disruption but collecting royalties. One of the most obvious forms of disruptive innovation is the development of new forms and spaces of exchange. These exchanges employ new platforms to sell goods that already exist or to make goods in unique ways for end users with no base producer (firm or factory). Alibaba, a China-based e-commerce company that set a record as the largest global initial public offering (IPO) at the New York Stock Exchange (NYSE) in 2014, illustrates these new methods of exchanging goods and services, which do not utilise or engage in traditional producer-consumer relationships.

Technological changes are not the only path to innovation, but we associate innovations with technology because software, hardware, and ICT are the foundations of inventing and transacting new products and services in a digital age. Products and services are based on engineered platforms. Amazon started as an internet book provider and is now using its platform to sell innumerable new and used goods, while also serving as an internet cloud storage service for the online transfer of big databases. In providing these services, Amazon enables small firms to dispense with any form of cataloguing, warehousing, or delivery of operations and responsibilities. Amazon's capacity to provide intermediary services to firms worldwide is technology-based.

Disruptive innovation has offered new opportunities to cities and regions that have declined as the growth of industrialisation and manufacturing has stalled. Let's look at Indian cities. India is emerging as a new innovation capital through capitalising on ICT. Call centres and information services have made several Indian cities and regions competitive globally. Cities such as Bangalore are rising innovation hubs through having abundant local human capital and attracting highly educated immigrants,

and are changing the geography of innovation jobs (Moretti 2012). As we will examine in Chap. 4, such places of innovation are spreading in both developed and developing countries, and reshaping the global landscape of the knowledge economy.

Globalisation, urbanisation, and innovation comprise an ecosystem for the knowledge economy that is locally placed and globally interlinked. They are forging new paradigms of economic development and require new policy thinking. Australia needs to move from its traditional comparative advantage of raw material exploitation to the new competitive advantage of the knowledge economy. It is no longer the raw goods a nation has, but its capacity for disruptive innovation and utilising human capital, that alters the flow of economic activity. We are either disrupting or being disrupted in the global innovation race; there is no third way.

HOW SHOULD AUSTRALIA FIT IN

We must recognise the effects of these three forces of globalisation, urbanisation, and innovation on Australia's economy. Australia's future positioning and ability to thrive in a competitive world must be based on a good understanding of two premises. First, Australia's integration with the world to date has been largely through the export of raw materials and through immigration. Second, Australia is a highly urbanised society. We start with the first premise. Australia is a resource rich country. As the world was being globalised and urbanised, Australia has been able to provide much of the bedrock of raw materials. Australia has used and continues to use its comparative advantage in raw materials to meet the demand in Asian markets. This is well known and recognised. However, Australia's opportunities for surviving the innovation imperatives that the current era presents are poorly understood and inadequately addressed. Australia is a world leader in the consumption and use of digital computer systems for home and business purposes, while contributing relatively little to the production of these same services (Colecchia and Schreyer 2002). Australia, with its small population of 25 million, is experiencing a brain drain. There is a considerable Australian diaspora of talent overseas, working in knowledge-intensive occupations and contributing to local innovation (Hugo 2006). Young and smart Australians are fleeing home cities and regions to seek opportunities in London, San Francisco, Shanghai, and Singapore, all the competitor cities of Sydney and Melbourne.

Australia's immigration strategy has shifted significantly since the late 1970s to attract Asian workers and to emphasise skills. The composition of countries of origin for immigrants has changed over the past few decades. It is now dominated by Asian countries, whereas from the mid-1940s, immigration was largely from Europe and the United Kingdom. Between 2011 and 2016, nearly 1.4 million people moved to live in Australia from overseas: the top three countries of birth were China (14.33 per cent), India (10.77 per cent), and Australia (9.27 per cent) (Australian Bureau of Statistics 2018). The fact that returning Australians occupy the third position reflects the dynamic mobility of people between Australia and the rest of the world. The turn of the century marked a sharp increase in skilled migration to Australia, from 29 per cent in 1993–94 to nearly 70 per cent in 2005–06 (Hugo 2014). But Australia is also facing a 'circular migration' situation—migrants returning to sending countries—along with increasing mobility and fluidity of global people movement. In leading Chinese cities like Shanghai and Beijing, there are recognisable diasporas comprising Australian citizens or permanent residents who were born in China, migrated to Australia, and have now returned. Attractive job opportunities, among other factors, have enabled the circular migration phenomenon. Australia's human capital pool through immigration is facing global challenges.

Turning to the second key premise, Australia is one of the most urbanised societies in the world. Three-quarters of Australians live in urban centres mostly on the east and west coasts. A high concentration of residents live in the eight capital cities, which are largely spread along the coastlines of the continent, except for Canberra. Occupying only 1 per cent of the nation's land area, these capital cities accommodated 67 per cent of national population, and 66 per cent of national employment according to the Australian Census 2016 (Table 1.1). A smaller proportion of Australians live in regional centres away from the big cities. But even the 'bushies' are heavily influenced by the global network and the urban world in terms of both work and lifestyles.

Australia's knowledge economy is situated in a resource-rich, migrant, and urban society. Knowledge is a growing export sector for Australia. Australian building technology and techniques are used to create both tall buildings and small prefabricated homes internationally. Australian architects and engineers are contributing to China's building boom, using their know-how to assist in meeting China's demand for well over 100 new cities just outside its pre-existing urban cores (Zhao et al. 2012). Australian

Table 1.1 Population and employment in Australian capital cities

<i>Capital cities</i>	<i>Population</i>	<i>Employment</i>	<i>Land area (km²)</i>
Greater Sydney	4,823,993	2,209,296	2358
Greater Melbourne	4,485,210	2,046,163	3258
Greater Brisbane	2,270,807	1,037,901	15,826
Greater Adelaide	1,295,712	560,316	3164
Greater Perth	1,943,861	850,158	1696
Greater Hobart	222,356	99,361	9991
Greater Darwin	136,831	72,120	6418
Australian Capital Territory	396,853	220,645	12,368
Total of capital cities	15,575,619	7,095,963	55,077
Australia	23,401,891	10,683,844	7,692,000
Share of capital cities in Australia (%)	67	66	1

Source: Australian Census 2016 (Australian Bureau of Statistics 2018), created by the authors

water technology has been widely recognised, using techniques arising from the Snowy River Scheme (Darby and Sear 2008). Australia has been a pioneer in many technological applications. However, Australia's advantages in these industrial and construction areas are not being translated strategically into national, and therefore global, competitiveness. Australia has the necessary components of a knowledge-intensive nation, and the ability to engage proactively with the global economy. And yet, we have not assembled the pieces, or at least have failed to use them in ways that would place us as a world leader. Other places, whether in the United States, Europe, or Asia, may help us learn how to compete more effectively in this new contest and embrace more fully our economic destiny. Later chapters explore these issues in detail through looking at our strengths and weaknesses and analysing how we grow an innovation-led knowledge economy.

IT'S ALL ABOUT PLACES

Modern cities have a short history, but human beings have lived in places, large or small, for a long time. Before the Industrial Revolution and contemporary globalisation, human activities were mostly place-based. Urbanisation and globalisation have enlarged the spatial scale of human movement from places to cities, regions, nations, and the globe. Consequently, places have been gradually retreating as a spatial focus for policymaking. We have been obsessed with things at a larger and often

global scale with the growing influence of TNCs and international organisations, and with increasing challenges that require global cooperation. However, underlying the global system is a place-based network. We need to discover or rediscover the role of places in innovation and in growing a knowledge economy in the context of contemporary globalisation and urbanisation: ‘place has replaced the industrial corporation as the key economic and social organising unit of our time’ (Florida 2014, p. 188). In 2001, co-author Edward Blakely started a debate about a place-based approach to economic development in a cyberspace age, arguing for a new incubating environment created in every community across the United States to forge a new, globally networked economic development system (Blakely 2001). These arguments are even more valid today: the rise of innovation districts is creating a new geography of innovation in the United States (Katz and Wagner 2014).

It is easy to associate innovation edge with certain locations. Silicon Valley is arguably the innovation capital of the world. Places worldwide have now imitated and continue to imitate the Silicon Valley model. In China and South Korea, building places that resemble Silicon Valley has been a national strategy, linking innovation with national economic restructuring and nation building. Innovation approaches have been copied, repeated, and improved, to generate new competitive advantages. While innovation-led economic restructuring is important, replication is no guarantee of success (Moretti 2012). In this book, we emphasise that lessons learned from successful places cannot just be copied into new environments: every place has its own attributes and solutions.

Just as the assembly line illustrated that more efficient modes of production existed, Silicon Valley has illustrated that more efficient methods of innovation exist. The motorised tractor, for example, changed more than the farm; it transformed the scope and space of farming. Larger acreages of farmland transformed the towns that served farm families. Larger farms meant the need for more and better goods and services for farm communities. The farming economy transformed its places and towns in directions beyond farmers’ capacity to control. Much earlier, the Industrial Revolution was even more transformative, resulting in the places we now call modern cities. As the industrial era progressed, automobiles and other innovations disrupted geography and ensured the primacy of cities. In similar ways, innovation, underpinned by the knowledge economy and technological advancement, is now changing the scope of our work practices and spaces. Tractors, automobiles, and the innovation movement are

‘cautionary tales’, which show that places must not only seize present opportunities but must be ready to recognise and grasp the opportunities of the future.

Recognising the opportunities presented by innovation and a knowledge economy is central to making the most of our urban landscape. For example, the city centre of Chicago was nearly abandoned after the Port of Chicago stopped moving steel and iron ore from the heart of the city through the St Lawrence Seaway across the Atlantic to Europe. Now the area is a global financial and business centre. Even celebrated San Francisco was declining in population with a weak economy before the hi-tech boom in the San Francisco Bay Area led by Silicon Valley. Simply put, economic revolution creates new products or services and in doing so alters the places that nurture this revolution. Mining towns throughout Australia, the United States, England, and across Europe perish when they lose their purposes. Villages in Italy, France, and central Europe are fighting a losing population battle as they are losing their positions in the global economic system. But places do not have to be lost to this transformation. We must adapt to the new order or suffer the consequences.

In Australia, we must integrate global forces and local responses to maintain competitiveness in the new global order and take our place in the knowledge economy. Australia is a first world major industrial power and is already among the world’s most urban and globalised societies. We need to merge the effects of globalisation with urban strategies to produce a harmonious relationship between them. A place-based approach will be central to managing and taking advantage of this relationship. ‘Cities have always been important engines of economic growth, but they are assuming an even greater importance in today’s knowledge-driven innovation economy, in which place-based eco-systems are critical to economic growth’ (Florida 2014, p. 188).

In approaching places, we emphasise crafting. Crafting is not imitating; it is generating new, locally driven but globally connected places that will function as strategic nodes within Australia’s cultural, economic, social, and political systems. This is not a revolution, but an evolution, and we feel it is the logical next step of Australia’s economic destiny. Australia is lucky to be well-situated to take advantage of the new global knowledge economy, but luck alone is not enough! We need vision, strategy, tools, and action.

The United States presents an example of how a nation can foster new economic opportunities with place-specific approaches, encouraging the

engagement of new firms while enhancing old ones in developing innovation districts (Katz and Wagner 2014; Leinberger and Loh 2018). European nations are following a similar approach. African metropolises like Lagos are developing the capacity to interact on a global scale using local economic initiatives to forge their global strategy. The BRIC (Brazil, Russia, India, and China) nations are developing within their borders innovation hubs with a focus on specialised hi-tech sectors. Korea is devoting a substantial portion of its gross domestic product (GDP) to fostering innovation, and has even appointed a minister for innovation.

Australia is neither a leader nor a lagger in the global innovation race, so we can learn as we craft our places and work to shape our future in a globalised knowledge economy. Our way forward should not be a United States dominated one, though in this book we will pull from the lessons of several US cities. We are not putting forward a strategy dependent on a large market share such as the United States has, nor do we focus on the strategies of small, unique, and boutique markets such as Tel Aviv. We are not dependent on operating within the shelter of the European Union as Berlin and Paris do, and some Scandinavian nations. We are seeking a smart way forward that is specific to Australia's context while drawing upon best practices and lessons globally.

APPROACH AND ORGANISATION OF THE BOOK

In this book, we explore approaches to crafting innovative places within the framework of the three forces of globalisation, urbanisation, and innovation (Fig. 1.4). This framework integrates the interwoven relationships discussed above. Individually, each has been widely written about and debated. We do not want to repeat this but rather to extend previous work through focusing on the transformative effects of these forces on places. Our approach is applied and practical. We draw upon our decades of academic and professional experience in urban planning and economic development in both the developed and developing worlds to seek transferable knowledge and practices. Our interest is niche—building place-based innovation capacity to help Australia survive and thrive in a globalised knowledge economy. We examine cases studies of innovative places around the world and in Australia through both theoretical lenses and practical observations. We use qualitative and quantitative analyses, primary data collection through fieldwork and professional engagement, and secondary data from the Australian Bureau of Statistics and Reserve Bank of Australia



Fig. 1.4 Place-based innovation in globalisation and urbanisation
Source: The authors

and online databases from international organisations (OECD, World Trade Organization, United Nations), and we review and synthesise a wide range of academic literature and policy and planning documents. This data collection and analysis lays the foundation for our recommendations for ‘crafting’ innovative places in practice and policymaking.

We select places around the world known for innovation, and benchmark Australian places against them. We dissect these places to reveal the best practice approaches, enabling attributes, and innovation ecosystems to inform innovative place making in an Australian context. Based on our examination, we develop a crafting paradigm and a co-design and co-creation model that integrate governments, the private sector, and the community into shared understanding and collaborative action in crafting innovative places. We classify places by a typology of attributes and suggest directions and solutions for innovative place making. Transitioning the Australian economy from a resource base to a knowledge base will help ensure a strong future in the competitive globalisation environment. Without this, we will be left behind. The directions we outline require a rethinking of Australia’s existing policy approach and practice. Our

approach suggests breaking down silos and transforming them into collaborative, interconnected institutions working to get the most and best from our human capital and ingenuity in innovative place making.

This book is organised into eight chapters. This first chapter has introduced the central notion of innovative places, and outlined the contemporary forces of globalisation, urbanisation, and innovation that have created a world that is both flat and uneven, in which some places demonstrate more innovation capacity than the others and are better positioned in a globalised knowledge economy. We call for a rediscovery of the role of places in our policymaking and in our planning for innovation.

Chapter 2 provides a backdrop of economic development shifts towards a knowledge economy, and Australia's economic evolution and historical contributions to innovation. It argues for an economic transition from exporting minerals and resources to exporting knowledge and ideas, and emphasises the need to maintain Australia's innovation edge to be better positioned in global competition.

Chapter 3 reconceptualises urban competitiveness from an economic-centric perspective to incorporate environmental sustainability and social equity. It then examines the competitiveness of Australian cities in global and national contexts to reveal their strengths and weaknesses so as to inform planning for competitive cities.

Chapter 4 presents case studies of innovative places from the United States, Asia, and Europe. Drawing upon these case studies, it summarises the enabling factors that have contributed to their success.

Chapter 5 further investigates these global innovative places to unpack the approaches, defining attributes, and the innovation ecosystem that have made these places successful, and draws lessons from these experiences for Australia.

Chapter 6 turns to Australia's innovation imperatives and practices. It examines innovative places in several Australian capital cities. It also offers a comprehensive examination of the innovative assets in 25 Australian cities, large and small, through constructing and analysing a 'knowledge city index'.

Chapter 7 offers methods to craft innovative places in Australia. It provides a set of crafting tools ranging from creating innovative environments to financing start-ups. It further suggests several new directions that places in regional Australia could explore to take advantage of opportunities in a global and digital age.

Chapter 8 concludes the book by suggesting a smart way forward for Australia's innovation-led knowledge economy. It outlines several smart opportunities, examines the recent Australian government's smart cities agenda, and ends with putting forward a co-design and co-creation approach to innovative places that involves federal government, state governments, and local institutions.

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CHAPTER 2

The Lucky Country Still?

INTRODUCTION

Donald Horne's book *The Lucky Country* (1964) has given Australia an enduring nickname, although in a favourable sense that, ironically, contradicts the major tenet of the book. Horne's criticism of the lucky country's lack of drive for pursuing technology and innovation in the 1960s lingers on today. While the major industrialised nations upgraded their economies through ambitious and innovative strategies in the 1960s, Australia was able to rely on its rich resources and 'luck', as lamented by Horne. Half a century has passed and the imperatives for growing Australia's innovation and competitiveness have become more acute than in the mid-twentieth century. However, Australia's growth into a wealthy nation was more than an act of luck. It has been built upon hard work and ingenuity, adapting to the challenging circumstances of Australia's vast land. This same adaptive legacy acts as both an impetus and a platform for major changes in Australia's knowledge economy.

In this chapter, we examine the new settings for the lucky country's economic development, globally and at home, to point the way forward. We outline the evolutionary economic development paradigms of comparative advantage, competitive advantage, and collaborative advantage, to illustrate both their thematic continuity and the changes they reflect. We also introduce the urban concepts and approaches pertinent to the knowledge economy—the knowledge city, the creative city, and the smart

city. These concepts provide a prism through which we examine the challenges and opportunities faced by Australia's economy. We then trace the economic development trajectory of Australia from resource-based to innovation-led. We reveal the ingenuity and invention that established Australia's growth into a modern nation and argue that Australia should continue to build upon these strengths to maintain an innovation edge. We cannot pursue the future without knowing the past.

ECONOMIC DEVELOPMENT SHIFTS

The goal of economic development has changed. Economic development no longer equates to economic growth. Co-author Edward Blakely has constructed definitions of economic development over several decades. In 1989, in the first edition of his classic *Planning Local Economic Development: Theory and Practice*, local economic development was described as 'essentially a process ... to create new jobs and stimulate economic activity in a well-defined economic zone' (Blakely 1989, p. 59). In the fifth edition of the book, local economic development has come to be a process in which 'a community's standard of living can be preserved and increased ... based on principles of equity and sustainability' (Leigh and Blakely 2013, p. 72). The most distinctive attribute of the new definition is its incorporation of social equity and sustainability into economic development, instead of the sole goal of economic growth.

Economic development is a function of a city's resources (natural resources, location, labour, capital, entrepreneurial climate, transport, communication, industrial composition, technology, size, export market, international economic situation, and national and state government spending) and its capacity (economic, social, technological, and political capacity) (Leigh and Blakely 2013). These factors 'function' to determine a city's economy. However, the weightings of these factors in economic development keep changing, along with economic evolutions and shifts. Overall, a modern history of economic development shows 'resources' becoming less important and 'capacity' becoming more important. From the late twentieth century, the world economy has been restructuring from an industrial economy to a knowledge economy. In this environment, the more varied the capacity a local community has, the greater its ability to turn resources into economic development opportunities. The shifting importance between 'resources' and 'capacity' marks the move from an old economic development paradigm to a new economic

development paradigm. This shift is also characterised by a move from seeking comparative advantage, to competitive advantage and collaborative advantage in economic development, and the rise of the new knowledge city and its impact on cities. We elaborate on these changes below.

Comparative, Competitive, and Collaborative Advantages

Since World War II (WWII), there have been three broad stages of economic development which focus on comparative advantage, competitive advantage, and collaborative advantage respectively (Stimson et al. 2006). From the 1950s to the 1970s, when economic development was built upon comparative advantage defined by favourable costs of production factors, the priority of economic policy was to achieve lower production costs (land, labour, materials, energy, infrastructure, and tax incentives) than competitors. Economic development strategy was guided by master planning, targeting industry production, infrastructure construction, and market expansion. Seeking comparative advantage dominated the economic strategies of the Asian Tigers—Hong Kong, Singapore, South Korea, and Taiwan—in the 1960s and 1970s through attracting foreign direct investment (FDI) and developing export-oriented manufacturing industries. In the early 1980s, China adopted an opening door policy, and selected a dozen coastal cities in which to create special economic zones (SEZs) with favourable land prices, tax incentives, and infrastructure provisions, following in the steps of the Asian Tigers to attract FDI and promote exports. The most illustrative example of this development approach is the Pudong New Area in Shanghai, which was developed from scratch into a Manhattanised new city in less than three decades (Fig. 2.1). This economic strategy ensured China's two-digit economic growth rates for more than 30 years. But as their economies developed, all these countries (China and the Asian Tigers) gradually abandoned seeking comparative advantage in economic development.

In the 1980s, the focus of international economic development moved to competitive advantage, emphasising the value factors of efficiency, performance, quality of life, and human and social capital. Harvard business professor Michael Porter (1996) played a key role in promoting competitive advantage and argued for its applicability in cities. Cities compete, but in different ways from firms. Cities compete to attract investment and talent through offering more friendly business and attractive living environments than competitor cities. Today, urban competitiveness is a familiar

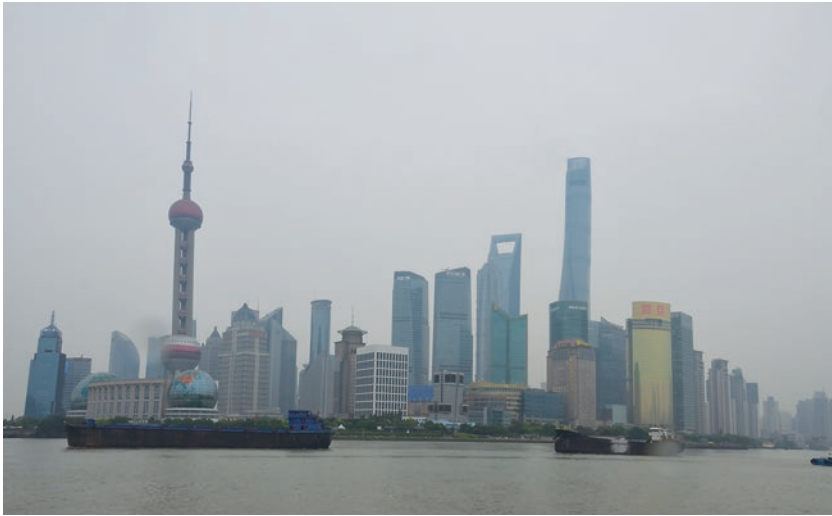


Fig. 2.1 Pudong New Area, Shanghai

Source: The authors

concept in both scholarship and policy. Competitive globalisation has elevated an emphasis on urban competitiveness. Competitive advantage has been the basis for many cities' strategies to pursue 'global city' status. For example, Singapore, an investment-driven city, has for four decades provided businesses with a secure and efficient environment, establishing and strengthening its competitiveness as a global city.

In the 1990s, collaborative advantage started to take hold in economic development and now has a focal position in economic strategies for international cities. There are several reasons for the turn towards a collaborative focus. Heightened competition from globalisation, coupled with environmental sustainability and social equity challenges—so-called 'wicked' problems—has necessitated a need for collaboration. A growing realisation of these problems, which are persistent and difficult to fix and require efforts that are not possible for individual agents or agencies, has encouraged broader international collaborations. In business, globalised production and retail activities demand a higher degree of coordination and management capacity that need collaboration between a diversity of specialised service providers, further triggering the growth of a knowledge economy. Through alliances, partnerships, and other forms of collaboration, competitors will fare better and be more likely to achieve a win-win situation.

The collaborative focus has renewed an interest in industry clusters in economic development. Multiple sectors and stakeholders in pursuit of collaborative advantage are best coordinated in an integrated system. In Singapore, one criticism of the city state's strategy to seek competitive advantage is that it lacks a nimbler and fluid relationship between institutions and businesses (Sim et al. 2003). Places such as Silicon Valley have maintained competitive advantage despite challenges from new and lower cost competitors, largely thanks to socially and institutionally mediated cooperation between actors (Raco 1999). The new innovative places succeed through maintaining a collaborative advantage in competition.

The primacy of collaborative advantage is attributed to the rise of the knowledge economy. Despite different definitions and various names like 'new economy', 'creative economy', or 'smart economy', the knowledge economy contains three distinct attributes: it is knowledge-based; it is facilitated by the advancement of information technology; and it is an agglomeration economy. The knowledge economy is directly based on the production, distribution, and use of knowledge. Its development has depended critically on the emergence of new technologies, based on the rapid dissemination of information and communications. It embeds an enhanced association between agglomeration and productivity. Tacit knowledge—the skills, ideas, and experiences that people have in their minds—is more likely to be generated and shared through the proximity of firms, institutions, and individuals at a local level. Structures within agglomerations encourage learning and innovation, and make up a set of interrelationships that stimulate and channel individual expressions of creativity (Scott 2006). These spatial agglomerations very often form innovative places.

Cities in the Knowledge Economy

Several new city concepts have emerged to respond to the economic development shifts and the knowledge economy. These have become familiar ideas in contemporary economic development literature, and are captured by the terms 'knowledge city', 'creative city', and 'smart city'. While the three concepts overlap, they focus on different aspects of the knowledge economy for planning local economic development. The knowledge city concept captures the knowledge intensiveness in the economy, and focuses on the correlation between a city's economic growth and its knowledge base. This concept builds on the notion that a city's competitiveness is no longer solely based on natural resources or cheap labour, but is increas-

ingly dependent on knowledge assets and the exploitation of knowledge assets in new products or processes of innovation (Johnston 2011). This knowledge-centric thinking has led to the emergence of a knowledge-based urban development (KBUD) model, involving economic, sociocultural, environmental, and urban perspectives to transform knowledge resources into local development (Yigitcanlar and Lönnqvist 2013). The KBUD structure places endogenous knowledge assets at the heart of economic development, and is drawing increasing attention in policy and practice. For example, from the early twenty-first century the city of Melbourne has adopted concerted actions across dimensions of technology, infrastructure, human capital, and clusters to develop knowledge capacity and to brand itself as ‘the knowledge city’.

The creative city concept focuses on the most creative industries in the knowledge economy: art and culture. Creative industries provide not only their own creative production and outputs, but also artistic dividends through forming a production system that enhances the design, production, and marketing of products and services in other sectors (Currid 2007). Richard Florida popularised ‘the creative class’; his study revealed a correlation between the presence of talented people and local economic growth (Florida 2014). One policy implication for economic development is the importance of providing an urban environment that appeals to the creative class, such as cultural amenities and social diversity. The ingredients of the creative city were summarised by Florida (2014) as the already well-known ‘three Ts’: technology, talent, and tolerance. Emphasising the important role of social tolerance, in addition to the well-acknowledged roles of technology and talent, in nurturing a creative culture and attracting the creative class has further informed economic development policies.

The creative city approach has been criticised for its apparent elitism, including its lack of concern about inequalities and insufficient attention to the complexity of localised urban contexts (Scott 2006). Richard Florida’s recent work, *The New Urban Crisis* (2017), goes some way towards addressing these criticisms, injecting into the ‘creative’ thesis the notion of increasing inequality as a ‘new urban crisis’. Putting aside this debate, the creative city approach now has global appeal. It has been applied to planning local cultural facilities and amenity spaces, especially to revitalise traditional downtown industrial areas. One example is Singapore: the city state has sought to create an innovation system and attain science-based industrial development for several decades (Wong et al. 2018). The Singapore government led the planning and development of One-

north—a precinct known as the Science Hub—by reworking a residential area with a ‘little bohemia’ flavour to foster a favourable culture for the creative class. One-north has evolved into an innovative place with a global reputation. We will examine One-north’s planning and development approach as a global case study in Chap. 4.

Finally, the smart city concept captures the latest advances in technology characterised by artificial intelligence (AI), the internet of things (IoT), big data, and the ubiquitous access to information for seeking economic opportunities. However, a smart city is more than pervasive and ubiquitous computing and digital technology. Its economy and governance should be smart, driven by innovation, creativity, and entrepreneurship, and enacted by smart people (Kitchin 2014). The smart city concept suggests a need to invest in digital infrastructure, develop human capital and education, and promote innovation and entrepreneurship, to drive local economic development. It also suggests a need for spatial configurations to accommodate new ways of working and living in both public and private spaces; for example, smart work centres offer a ‘third space’ outside office and home. The ability to work anywhere and anytime will reduce commuting time and cost, and presumably enhance flexibility and productivity. In 2014, the New South Wales (NSW) state government in Australia announced the creation of five such digital work hubs in the Greater Sydney region to grow knowledge-based industries, support flexible work practices, and offer commuters an alternative work location closer to home. In early 2016, the Australian government released the *Smart Cities Plan*, which outlined an intergovernmental co-ordinated approach to smart cities, defined as ‘smart investment’, ‘smart policy’, and ‘smart technology’ (Australian Government 2016d). This was probably the first national urban plan for smart cities internationally. In Chap. 8, we will look closer at the *Smart Cities Plan* as part of our discussion about Australia’s national smart cities agenda.

What do these economic development shifts mean for Australia and Australian cities in a knowledge economy? Australia’s economy is integrated with the global economy. All these new economic development notions and policies apply to Australia, and are triggering debates on Australia’s future economy and global competitiveness. In order to better understand how Australia should fare in the new economic development paradigm and system, we first need to understand Australia’s economic history, which is briefly outlined below.

LUCK AND INGENUITY

Australian economic historians have often derided the nation for basing its economic directions on luck. Yet, intelligence or opportunity, depending on how you look at it, have played an important role in Australia's dynamic, changing, and adaptive economy from the time of first European settlement. The combination of a highly bountiful land and a resourceful people still thrives today. Characteristic of this culture is the use of land and ideas to generate new wealth through hard work and ingenuity. Australia's luck as a mineral-rich nation paired with this culture of ingenuity has resulted in one of the richest nations in the world. We are an adaptive society of great cultural diversity and economic wealth.

The early economic growth of Australia was led by wool and gold. From the Merino sheep that came to dominate the world wool markets to the gold fields that fuelled the wealth for nation building, Australia had long been an important player in the world economy. Australia's contribution to innovation, however, is an often-missed component in writing about Australia's economic history. Many innovations have come about as adaptations to the vast and dry continent in which Australians live. Australians have been able to transform these challenges into new products and services that catapulted the country into being a major player in the world economy. Australia has not just been lucky; skilful adaptation, imitation, and ingenuity have supported Australia's remarkable economic performance.

Desperation is the mother of invention. At the turn of the nineteenth century, an enterprising and somewhat desperate British army officer, John Macarthur, stationed on the outskirts of Sydney, bred Merino sheep as a new source of wool. These hardy sheep proved capable of thriving in the rugged terrain and produced an ideal fleece for transport to England, where it would be processed into the finest wool in the world. Breeding sheep and transporting wool quickly became the backbone of Australia's economy. On 12 September 1854, Australia's first railway line opened in Melbourne. The steam engine conquered Australia's vast terrain and further propelled the wool industry's rapid success.

With the rushes of 1851 and onwards, gold became a secondary driving force of Australia's early economy. Gold discovered in Bathurst, Ballarat, Bendigo, and other areas opened a new wealth frontier for the young colonies. The precious metal was soon discovered over much of Australia's east coast, creating larger urban centres to move gold to

international markets. In the 50 years after gold was found, Australians invented a plethora of new techniques and technologies to extract and smelt it. Yet gold, like sheep, required access to world markets. Together, these industries drove the construction of large harbours and shipping networks. This was the beginning of Australia's transformation into a highly urbanised society.

The early ingenuity was also reflected in the invention and implementation of innovative management systems. In the mid-nineteenth century, the vast distances of the continent, the expansive size of properties, a confused grants system, and land speculation triggered the creation of the Torrens Title system for recording ownership of land, which was first designed and operated in South Australia in 1858. Based on a photolithographic (glass slides) method of keeping records, this system, with minor modifications, was used for many years to keep track of land ownership. These new management techniques, along with several cutting-edge gold harvesting approaches, quickly spread across the Pacific to California. Much of the rich vocabulary of gold miners resulted from the unique trans-Pacific gold digger information exchange, enriching both American and Australian cultures. They also marked early innovation diffusion across the Pacific.

Ultimately, the first stroke of luck provided by the continent's plentiful physical riches, coupled with hard work and ingenuity, served as the foundation for Australia's densely populated urban society. At the turn of the twentieth century, Australia had the highest standard of living in the world. While we have illustrated only a few of the major Australian innovations here, these high standards of living can be attributed, at least in part, to the development and application of unique innovations designed to conquer a harsh environment. Today, Australian cities boast being among the most liveable in the world in terms of factors like stability, healthcare, culture, environment, education, and infrastructure (Table 2.1).

Australia's luck and ingenuity in history have not only created a liveable urban society at home, but also have shared resources and knowledge overseas through international trade. But global economic settings have changed drastically in recent decades, as we outlined in Chap. 1. Australia's increasing integration with the world and the rise of a knowledge economy pose the question of whether Australia should continue to export minerals to maintain its global competitiveness or turn to the export of ideas to achieve this end. In the next section, we will address this question through further exploring Australia's international economic relationships.

Table 2.1 The world’s most liveable cities, 2016

<i>International ranking</i>	<i>Cities</i>
1	<u>Melbourne</u>
2	Vienna
3	Vancouver
4	Toronto
5	Calgary
6	<u>Adelaide</u>
7	<u>Perth</u>
8	Auckland
9	Helsinki
10	Hamburg
11	<u>Sydney</u>
12	Montreal
13	Tokyo
14	Osaka
15	Zurich
16	<u>Brisbane</u>

Note: Australian cities are underlined

Source: The Economist Intelligence Unit (2016)

EXPORTING MINERALS OR IDEAS

There is a widespread debate on when globalisation, defined largely by the spread of trade networks worldwide, began. Some argue that ‘the big bang’ of globalisation happened quite early, at around the end of the fifteenth century and the beginning of the sixteenth century, while others posit that it occurred around the 1820s, driven by the effects of the Industrial Revolution (O’Rourke and Williamson 2002). What is less disputable, however, is that the twentieth-century world wars drove a significant increase in international trade. World trade was in its infancy in the years preceding World War I (WWI). Nations traded surpluses and precious minerals, but most countries remained nearly self-reliant in basic foods and raw materials. The surging demand for resources and materials in the post–World War II (WWII) decades, with decolonisation, technological advancement, productivity, and income growth, changed all of that and fed into globalisation. Demand for Australia’s resources, especially minerals and food, has traditionally been closely tied to global geopolitics. Australia’s economic boom has been attributed in part to the two world wars, and later the Cold War. Australia was relatively remote geographi-

cally from much of the two world wars and conflict on Australian soil was limited. In the Cold War and post-Cold War era, Australia was ‘lucky’ to be in proximity with the world’s new economic boom area—Asia.

Following WWII, Australian society was characterised by high wages and a relatively small population. Australia took advantage of new international trade networks and these networks also enabled international talent movement. Despite political detractors, Australia turned abroad after WWII to recruit its workforce. The question was: what countries might this new labour come from? With few exceptions, policies at the time meant Australia was literally closed to Asians and darker-skinned Europeans. For Australia to move forward, this immigration barrier needed to change, and it did.

This post-WWII period ushered in a long wave of human talent, initially from Europe but later from nearby Asian countries, and most recently from the Middle East and Africa. This increase in labour corresponded with an increase in trade to Asian nations, the United States, and Europe. Australia once again found itself in an enviable economic position. Australia’s economy benefitted from being a net exporter to the rest of the world. These exports were primarily commodities, but the country also developed an industrial base of automobiles and other finished goods. The new labour base and the resultant population growth led to an increased focus on education, including vocational training. As greater educational opportunities were offered and pursued, there was a corresponding increase in national productivity. The period following the 1950s saw Australia’s second highest annual productivity growth rate in the last century, eclipsed only by the productivity boom of the 1990s (Parliament of Australia 2013). These productivity increases can be directly attributed to the increasing quality of the labour pool and investments in education.

Rich resources along with high import tariffs buttressed Australia’s industries in the 1950s and 1960s. As the US and European economies regained their footing after WWII, Australia faced a rising competitive Japanese economy, improving economic conditions elsewhere in Asia and Europe, and a closed China. Floating the Australian dollar in 1983 was in part a response to these challenges and forced Australia fully into global competition and economic transformation. Today Australia’s top exports and imports remain unbalanced: exports remain dominated by minerals and raw materials, and imports comprise much value-added manufactured products (Fig. 2.2).

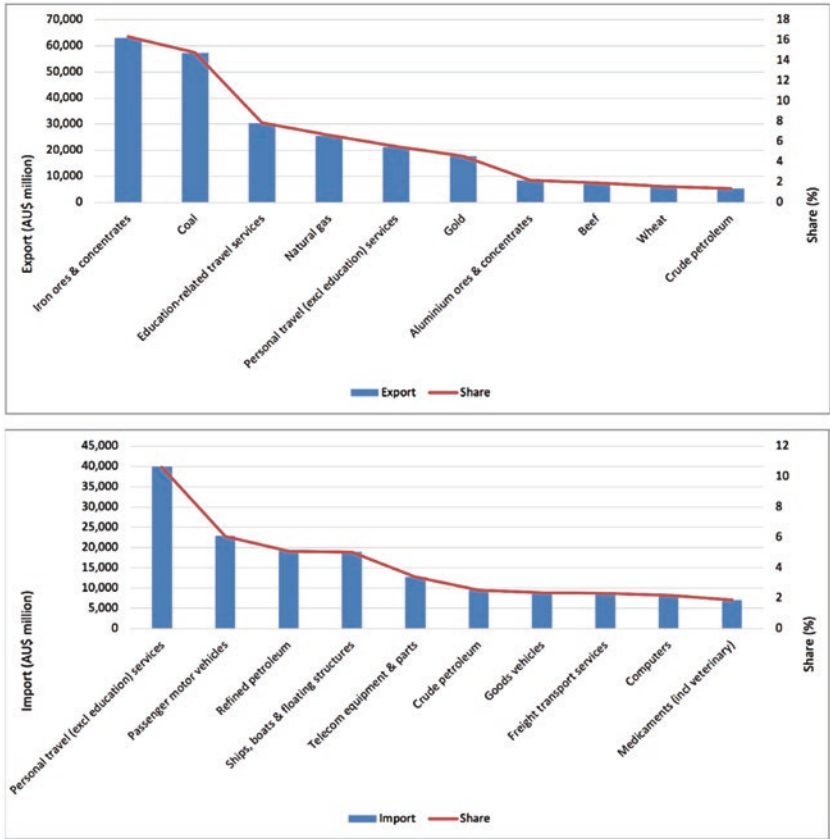


Fig. 2.2 Australia’s top 10 exports and imports, 2017
Source: Department of Foreign Affairs and Trade (Australian Government 2018), created by the authors

Commodities including wool, gold, wheat, and coal formed Australia’s economic base for 200 years. Australia has been fortunate, but not alone, as the United States has historically had similar endowments. Note, however, that in Australia access to these commodities has not led to a strong or robust value-added economic system that produces finished goods for local and domestic markets. Australia’s wool is used to produce jumpers in England; the coal fuels factories in China to make bicycles and toys that

Australians buy back from those markets. Australia, as noted above, is often defined by its production of mineral resources, and yet is reliant upon others to refine these resources into end goods. Australia is a buy-back nation. The most obvious recent example of this is the collapse of the Australian car manufacturing industry, caused largely by a lack of private investment and an antagonistic government stance in 2013. Despite an expected long-term recovery in the labour market, Australia's real wages were expected to fall by up to two per cent due to the move of automobile manufacturers out of the country (The Allen Consulting Group 2013). The absence of automobile and related engineering-intensive industries means there is not a robust manufacturing sector calling on engineering skills, which further weakens the demand for innovation.

While Australia owes much to the country's lucky circumstances, it is time to work towards a more productive and innovative nation. Mining has often been seen as of primary importance to the Australian economy. While there is plenty of evidence to support this, the story is not an entirely simple one. The vast mining industry displaced thousands of Aboriginal people from their lands and wreaked enormous environmental damage while contributing to the gross domestic product (GDP). Mining has been the primary political focus of Australia's economy, and yet 70 per cent of the nation's economy received little direct benefit from the mining boom (Gruen 2011). From the 1960s, Australia experienced a constant upward trend of business investment in mining as a percentage in nominal GDP, which surged in the first decade of the twenty-first century; it then started to fall from 2013, the end of the minerals boom (Fig. 2.3). Australia's future economy is unlikely to, and should not, continue to rely on mining.

Australia's export structure is changing. Education was Australia's third largest export in 2017, accounting for 8 per cent of Australia's total exports (Australian Government 2018). At the same time as the inflow of new post-WWII migrants increased demand for education, a new export sector of education has emerged, catering for the hundreds of thousands of primarily Asian students seeking a high-quality tertiary education in English. Australia exports education at home, with immigrants, including international students, moving into Australian cities. Australian cities have housed the bulk of Australia's population, including many of the quarter of a million or more migrants arriving each year since the 1960s. This new immigration influx of students has created a high-value chain in service industries, from English language lessons to automobiles and housing. In

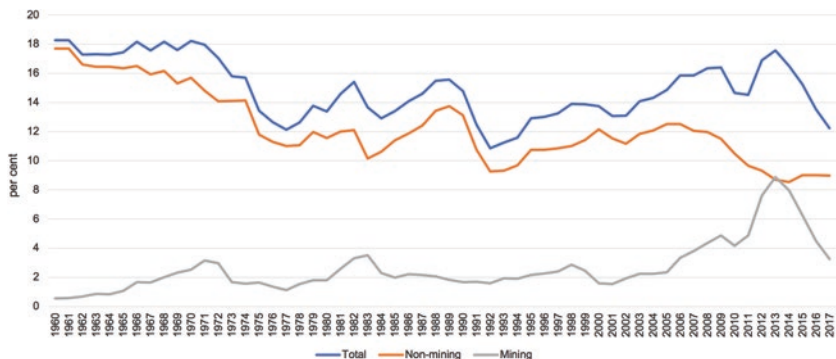


Fig. 2.3 Australia's business investment in mining and non-mining sectors in nominal GDP

Source: Data provided by the Reserve Bank of Australia, created by the authors

the immigration-led economic boom, housing and construction are now among the best-performing sectors in Australia's growing and diversified economy.

The growing educational export sector accounted for about 1.3 per cent of Australia's total employment in the 2014–15 financial year (Deloitte Access Economics 2016). As Australia exports education, our Asian neighbours benefit from more qualified workforces and increased productivity in manufacturing sectors and innovation. They are then competing with Australia in the global market. Australia now faces direct challenges from innovation leaders Japan, China, and Korea, as they increasingly deliver their own education, medicine, information technology, communications, and financial services through top-down national strategies. We are training our competitors, and the students threaten to overtake the master. We cannot simply extract more minerals from the ground, but must transition to the knowledge economy which we are helping our neighbours to adopt.

MAINTAINING AN INNOVATION EDGE

Australia is not large enough to rely exclusively on its own production, nor is it geographically close enough to the large productive nations to have ready access to reliable goods at low cost. Neither is Australia isolated from nor immune to global forces. Australia is more fragile and less capa-

ble than we would like to be. While Australia remains one of the wealthiest countries in the world, it is reliant upon external forces such as Chinese economic growth and friendly US markets to maintain this position. The twin impacts of slowing global demands for raw materials and escalating competition in the Asia-Pacific region have moderated Australia's economic growth at the same time as productivity levels have decreased. Since the 1990s, Australia has experienced lowered growth in labour and multi-factor productivity (Australian Bureau of Statistics 2016).

Australia's economy remains viable but shows numerous signs of vulnerability. We cannot float the dollar again or use high tariffs to protect local firms. The recent declining trend in productivity growth sounds an alarm. The important question is: how can we sustain our position as a high wage, high standard of living nation? The answer must lie in Australia's people and in its places. Australia can and should put greater focus on developing a strong base of innovation and human capital. We must find a platform from which we can compete sustainably in the world market over the coming generations. Perhaps the first step is to recognise that our minerals have run their course. As the Productivity Commission (Parliament of Australia 2013) notes, 'Australia now resides in a different economic construct'. Next, we investigate this different economic construct by looking at the Australian economy's resource-knowledge transition and its innovation performance in comparison with other Organisation for Economic Co-operation and Development (OECD) nations. The results are mixed, as we will illustrate below.

Resource–Knowledge Transition

From the late twentieth century, Australia sped up its process of transitioning from a resource economy to a knowledge economy alongside its increasing integration with the world. Between 1984 and 2017, two industry sectors—agriculture, forestry, and fishing; and manufacturing—reduced employment significantly, with these reductions reflected in their employment shares. In contrast, knowledge-intensive industry sectors—such as professional, scientific, and technical services; and education and training—increased their employment numbers and thus their employment share (Fig. 2.4). In this transition, the sharpest change was experienced in manufacturing: in 1984, manufacturing was the largest industry sector, accounting for 17 per cent of national employment; in 2017, it fell to the sixth position, accounting for only 7 per cent of national employ-

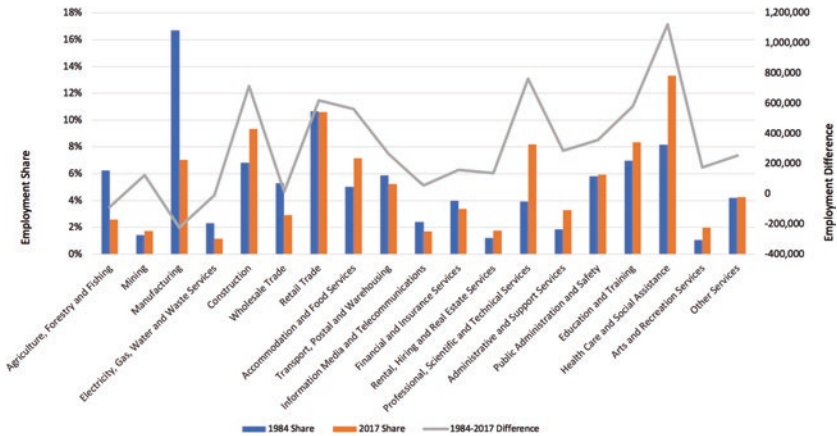


Fig. 2.4 Employment structure by industry sectors in Australia, 1984–2017
Source: Australian Bureau of Statistics (2018), created by the authors

ment. At the same time, professional, scientific, and technical services moved up to become the fourth largest industry sector with 8 per cent of national employment, behind only healthcare and social assistance, retail trade, and construction.

The transition to a knowledge economy is not without challenges. Education has enhanced Australia's national human capital and provided skills training for agriculture, manufacturing, and financial services, but is no longer producing the dividends it provided in the 1990s. Opportunity costs for university students have increased while workforce expectations and requirements have also increased (Daly et al. 2006). A bachelor's degree is the new high school degree, and a master's degree is becoming the new first degree. Despite increased investment in schools and universities, our skills capacity is atrophying and declining. The numbers of Australians studying science and moving into the sciences are in sharp decline while our industrial skills shortages in major science-based industries are increasing. Australia's patent productivity is below the average in the OECD nations (OECD 2012b), largely because we do not have sufficient productive industries to interface with research and development (R&D) to generate patents. The Australian government's investment in R&D as a percentage of GDP was in the middle range in 2011 internationally, below countries like Portugal, the Czech Republic, and

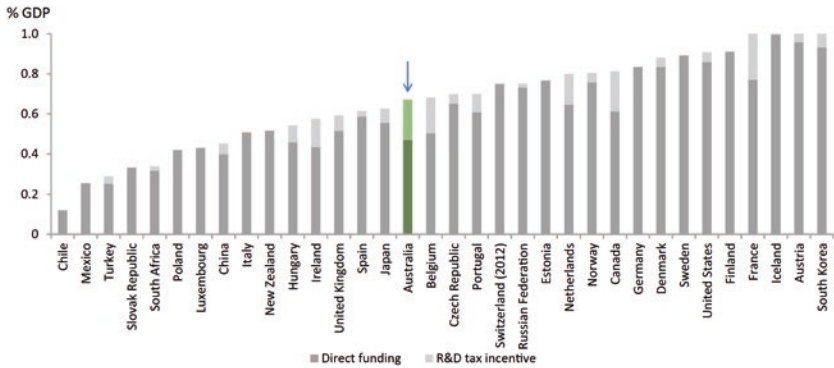


Fig. 2.5 Government investment in R&D by nations, 2011

Source: Australian Government (2015b, p. 2), licensed to use under Creative Commons

Belgium, and the Scandinavian nations with smaller populations than Australia (Fig. 2.5). Australian firms do limited R&D locally, preferring to farm it out or wait for our American cousins to do it for us. There are two systematic barriers preventing Australian firms from translating favourable innovation inputs into outputs: one is the lack of a corporate culture for innovation—the majority of firms are insufficiently outward oriented; the other is difficult access to finance, the greatest barrier to innovation for small young firms (Australian Government 2015a).

Australia must meet and beat the global competition to retain a high standard of productivity. A highly urbanised society such as ours can be both a strength and a weakness. It would be time and resource intensive to alter our pattern of urban settlement. We should instead embrace it by unlocking and encouraging strategic centres through better transportation and communications infrastructure. Building upon and around existing urban centres to form new clusters of ingenuity and create innovation crucibles such as those formed by Tsukuba Science City in Japan, Boston's Innovation District, and One-north in Singapore, which we will examine at length in Chap. 4, is now a global trend. While some fantasise about a 'sea change' or 'tree change', these indulgences of the well-to-do are less than realistic for the majority of the population. They also fail to recognise the benefits of an urban life. Living in a city does not exclude access to nature and healthy lifestyles. Intelligent planning practices can ensure con-

tinuing liveability in our cities while still being able to benefit from their productivity and innovation capacity. Moving forward, we must embrace the lifestyles cities offer as well as their role as our economic engines.

A characteristic shared by most hi-tech and innovative places in the world is proximity to cities. Urban centres are attractive to young talent and entrepreneurs who can engage with each other in environments of knowledge sharing and collaboration. Urban densities allow for easier and more frequent interaction with industries and individuals working in the same or related fields (Florida 2005). Drawing upon the Boston area's 'secret sauce' of innovation, Microsoft (2015) suggests that Australia make innovation a national economic priority, at a national, state, and city level, and redouble efforts to create innovation-heavy districts, especially within cities. However, living in a single dwelling with an expansive backyard as opposed to a unit or apartment is embedded in Australian culture. People are more spread out in Australian cities and the required infrastructure to serve this population is fragmented in both its design and its implementation. While Australia is highly urbanised, it is one of the least densely populated countries in the world. Most Australian cities are marked by high sprawl and suffer from a lack of connectivity and a high reliance on automobile transportation.

Poor primary infrastructure, such as slow internet speed and inadequate public transport, is a further hindrance to innovation. Again, these issues relate to urban sprawl, making construction and maintenance of such infrastructure costly. These primary infrastructure limitations discourage private investors and firms, especially those engaged in the information and community technology (ICT) fields, from working within Australia. And Australia's geographic location also hurts, being so far from the United States and Europe. While this geography is less of a barrier now than in earlier times, without sufficient incentive to attract investment, private firms and businesses will continue to move overseas to the more attractive environments of the United States and Asia.

Australia has traditionally done a poor job of encouraging and creating innovation within the economy. This has been due in part to poor linkages between universities and industry, low expenditure on R&D compared to countries of similar status, insufficient attention to the development of human capital, and lower than average business sizes (Roos et al. 2005). In the past decade, the Australian government has changed how it approaches innovation and is pushing for businesses and researchers to build networks to contribute new projects and new ideas. The largest por-

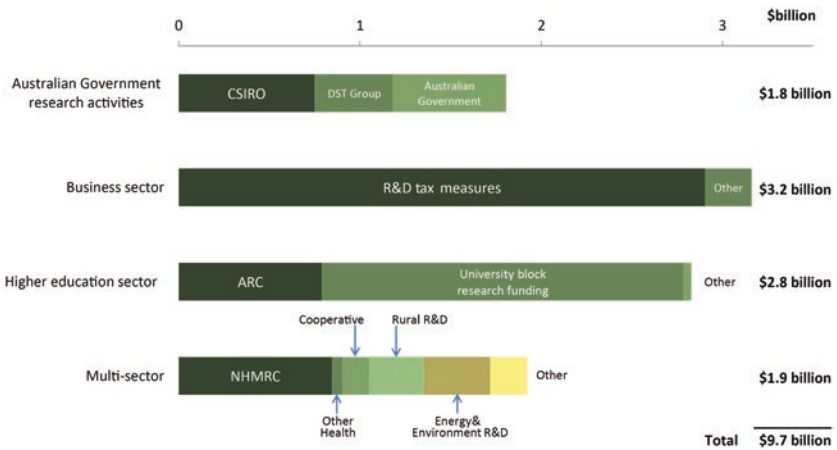


Fig. 2.6 Australian government's investment in R&D, 2015–16

Source: Australian Government (2015b, p. 3), licensed to use under Creative Commons

tion of the Australian government's investment in R&D has been in the form of R&D tax measures for the business sector (Fig. 2.6). Since 2013–14, the overall Australian government support for R&D has been stagnating or falling (Australian Government 2016a). The Turnbull government, which was toppled on 24 August 2018 by an intra-party split, had been calling for a new focus on the research *impact* of universities: to what extent research activities have generated impacts on industry productivity and policymaking in addition to the conventional publication of academic papers. Focusing on real world impacts and the commercialisation of research activities in deciding on research funding is a positive step towards linking innovation and productivity. But insufficient support and incentives for basic research will harm the nation's strategic innovation capacity in the long run.

Despite these drawbacks, a simple online search illustrates the Australian contribution to world innovation in the past century, and shows Australia has pioneered in a wide range of areas. And yet, it is other countries that have benefitted most from the application and wide-scale production of these innovations. Until the 1980s, Australia was an innovation leader and the source of numerous scientific and technological advancements. Australia has a strong history of innovation: for example, as well as the

farming, mining and land management innovations highlighted earlier in this chapter, Australian-invented techniques have served as the backbone of the ICT revolution of the twentieth and twenty-first centuries, including the microprocessor, modem, mobile phone, and digital arithmetic integrated circuit (Nicol 2000).

However, Australian inventions, such as the bionic ear and the flight recorder, have disproportionately benefitted other leading and growing economies, particularly the United States. The United States has gained a great deal from Australian scientific advances by further utilisation or commercialisation of these advances. Australia has acted as an alpha and beta site for many American products and services. For example, the Ford Motor Company designed and tested many of its automobiles in Australia, and today, Boeing Aircraft uses several Australian techniques and technologies in developing its planes. Following Australia's heavier investment in its national education and research base during the 1980s, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) became a leader in developing new scientific apparatus. These developments included core aspects of Wi-Fi technology, the insect repellent—Aerogard, extended-wear contact lenses, and plastic banknotes (CSIRO 2017).

The list of major Australian inventions (see Fig. 2.7) is staggering considering its population. The inventions of the late twentieth century were spurred in part by an increased national focus on R&D in the higher education sector. This, paired with CSIRO funding, buttressed national productivity levels. CSIRO, as a direct extension of the Australian government, has acted as a backbone for Australia's scientific engagement worldwide. Its innovations led to increased interest by foreign investors. However, the twenty-first century has seen a decline in innovation from previous levels, and a resultant fall in foreign private investment and interest in Australian firms. While this situation should prompt increased Australian investment to try and reverse this situation, contemporary trends are of declining government investment in R&D in all sectors. As a result, Australian firms have less incentive to invest in R&D, and instead have become dependent on labs in the United States for developing new products. We have become an innovation importer. Reductions in funding for R&D, a decline in the health of CSIRO, and a pattern of exporting the benefits of our innovations are trends that must be reversed to reclaim our position as one of the world's innovation leaders.

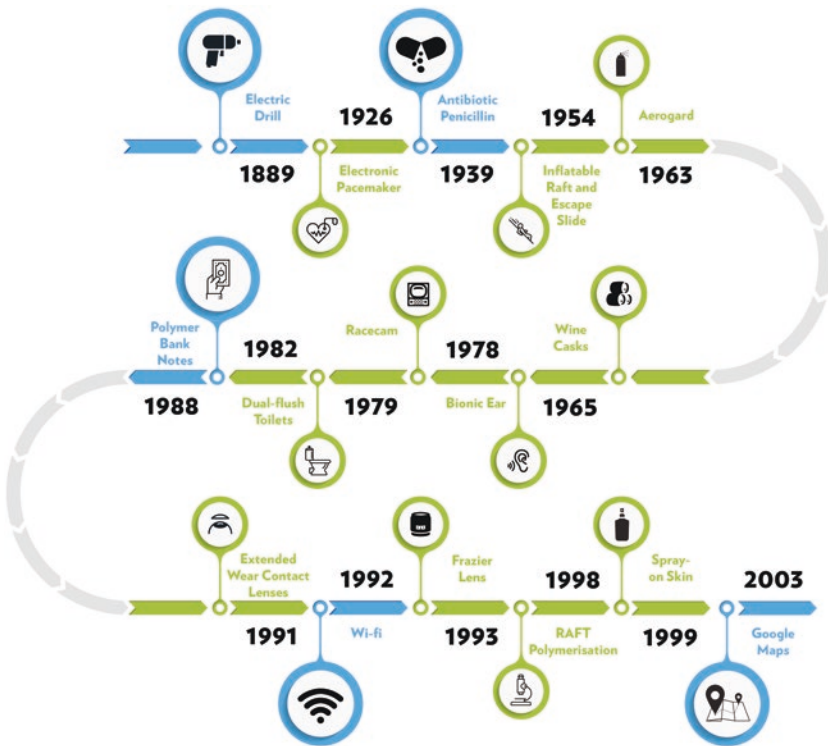


Fig. 2.7 Australia's signature innovation contributions

Source: The authors

Australia in the OECD

Comparing Australia with other OECD countries helps us further understand the opportunities and challenges in Australia's transition from a resource economy to a knowledge economy. Australia has generally performed well among OECD countries on a number of measures, with high ratings in tertiary education levels, management practices, and teamwork within the workplace (OECD 2016b). In the latest wave of digital transformation, Australia had the third-highest rate of mobile penetration in the OECD in 2016, with 128.8 subscriptions per 100 inhabitants, behind only Japan and Finland (OECD 2017). Australia's gateway cities, Sydney and Melbourne, are often cited in discussions about innovative cities (Innovative Cities 2014). They, like other major Australian cities,

enjoy a reputation for liveability and social diversity and tolerance, adding to their competitiveness in attracting and retaining global talent. We have a solid base to attract human capital to these places, but to move forward we must harness and build upon it.

While the Australian economy will continue to grow through other sectors, effort should be directed to becoming a nation of innovative places and people. Australia has a strong potential for businesses and institutions coming together to contribute new ideas and share knowledge to help grow the economy. In OECD rankings, Australia performs well across several fields that are essential components of innovation capacity: teamwork skills (as noted above), high education levels, and strong rates of participation in training (OECD 2016a). In these ways Australia remains, and must continue to remain, globally competitive. Minerals are a finite resource. Innovation is infinite. It is encouraging that recent economic growth in Australia has been not only in traditional industries, but also in new, knowledge-intensive industries. Throughout the last century, increasing growth in service sectors sustained the growth of the Australian economy. In terms of employment composition, the service sectors increased from a little more than 50 per cent in 1910 to nearly 90 per cent in 2010, while in the same period the combined employment share of agriculture, mining, and manufacturing decreased from under 50 per cent to a little more than 10 per cent (Connolly and Lewis 2010).

The *2016 Economic Outlook for OECD Nations* identifies Australia as a nation that should focus further on innovation in the coming years (OECD 2016b). This imperative has occurred in the aftermath of the decline of the resource sector, and the subsequent need to create new jobs, services, and ideas to maintain the country's economic growth and strength. The *Global Competitiveness Report 2015–2016* ranks Australia at the twenty-first position in the world (Schwab 2015). Australia's global competitiveness increasingly relies on its innovation capacity and innovation-led economy. However, despite the strong building blocks for innovation noted above, several factors have been identified as barriers to its pursuit of innovation. In an OECD economic study for Australia in 2014, a poll was conducted asking businesspeople what was holding back the Australian economy (OECD 2014). The most common response was too many regulations for businesses. The Australian government should seek opportunities to streamline processes, making it easier for small businesses to establish and reducing risks for financial backers of new ideas. The Australian Bureau of Statistics (ABS) Business Characteristics Survey for small and medium

enterprises (SMEs) also identified similar barriers to innovation and business activities, including lack of access to funds and complex government regulations and compliance systems (Australian Government 2015a).

Within the OECD, Australia's national science and innovation system performs only moderately well. The OECD compared the performance of member countries across six dimensions—science base, business R&D innovation, entrepreneurship, internet use for innovation, knowledge flows and commercialisation, and human resources—with a total of 22 indicators (Fig. 2.8). Australia's performance is above the OECD median in most indicators, but is not outstanding overall. A recent Australian government review (Australian Government 2016c) benchmarked Australia's performance in innovation, science and research (ISR) against the OECD nations, and also found uneven results. Australia performs in areas such as knowledge creation at levels above the OECD average, which are central to Australia's global compositeness (Australian Government 2016c). However, there are also concerns that do not surprise us:

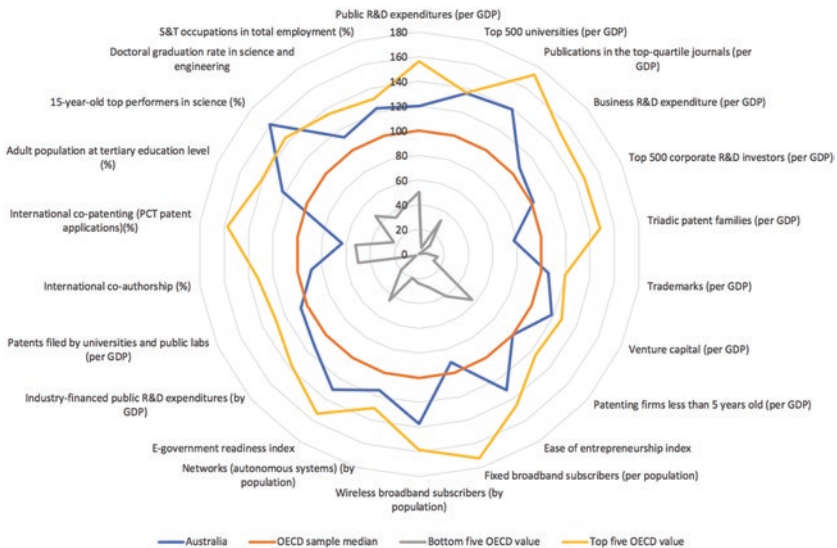


Fig. 2.8 Comparative performance of national science and innovation systems for Australia and OECD

Note: There is no data for Australia for the indicator 'Patenting firms less than 5 years old (per GDP)'. Instead, the OECD median value is used

Source: OECD (2012a), created by the authors

[I]n too many areas, a lack of connectivity across the ISR System means that strong performance in research is not matched by similar performance in commercialisation. The business innovation that we do see can be characterised as incremental rather than new-to-world, and our education system is not equipping young Australians with the skills and entrepreneurial perspectives necessary for achieving a stronger ISR System in the future. There is an apparent lack of urgency and understanding about this national mission in the broader community. Complacency will endanger the shared prosperity Australians have historically enjoyed. (Australian Government 2016c, p. xvi)

CONCLUSION

Australia's transition from a resource economy to a knowledge economy is not an isolated process. Australia's economy is part of the global economic system: the decreasing role of 'resource' and the increasing role of 'capacity' in economic development; the shift from seeking comparative advantage to competitive advantage and collaborative advantage in economic growth; and the new city development notions in the knowledge economy all apply to Australia's economic evolution. These broad conceptual shifts have underpinned our outline of Australia's economic history and its performances in innovation today.

Australia has been a lucky country, but luck is no longer enough to maintain its place in the world's economy. Australia's rich mineral and other resources have driven its economy. However, a continued focus on primary production and extraction of resources has led to comparative decreases in Australia's multifactorial productivity (Australian Government 2016b). Australia's mining boom acted as an economic boost, increasing output but failing to increase real productivity or drive long-term business investments. Australia has exported innovations for many years, but has let other nations take control of their production and the associated benefits. Australia has implicitly and explicitly encouraged its neighbours and competitors to transition to a knowledge economy. But as the resource boom dries up, Australia must engage in its own regeneration of innovation. It is time to return to the ingenuity and adaptive practices this nation was built on.

Australia remains in a strong position to engage in the global knowledge economy despite recent concerning trends. Its education levels remain high relative to other industrialised nations. Yet, we cannot take solace in education rankings, but must focus on remaining competitive

with our growing neighbours. We must keep pace or jobs and opportunities will move to newer, more attractive, places. Work and talent are now more mobile than ever; it is hard to move a factory but easy to change the location of an information technology support centre. Physical endowments are overshadowed by the availability of human capital and innovation infrastructure. Australia was lucky to have a strong human capital base paired with a land rich in resources, but these advantages are no longer insulated or isolated from global forces. We must fuse the two important ingredients in the growth of a knowledge economy: places and people. We should work smarter, although not necessarily harder; as observed in *The Lucky Country* half a century ago, ‘what will be needed will be a great deal more thinking, training, organisation, and cleverness’ (Horne 1964, p. 224). A smart working Australia starts with its cities. In the next chapter, we turn to Australian cities to examine their competitiveness in global and national contexts and to unpack the role of innovation in forging urban competitiveness.

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Australian Cities in Competition

INTRODUCTION

Today's world is city-based and Australia is no exception. Australian cities form a national urban system to accommodate the majority of its population and economic activities. The Australian urban system was quite self-contained and somewhat isolated from the rest of the world until the early 1980s. Four decades of integrating with the world has now made Australian cities, large and small, part of the global city system. Australia's competitiveness lies in its cities: national competitiveness is equated with urban competitiveness (Hu 2018). However, the notions of urban competitiveness have changed drastically in recent years along with the economic development shifts discussed in Chap. 2. A sole emphasis on economic performance, as has long been the case, is insufficient to understand how cities should compete in a globalised knowledge economy, and thus is likely to mislead policy and planning responses. We cannot continue to simply use economic means to achieve an economic end; we should go beyond economics and seek other urban attributes and assets. This imperative calls for revisiting urban competitiveness within these new contexts so that we can map out a way to achieve it.

In Chap. 2, we examined Australia's economic trajectory and the new opportunities and challenges associated with a transition from a resource economy to a knowledge economy. In this chapter, we focus on Australian cities in an increasingly competitive world and how they perform compared

to each other and globally. We conceptualise urban competitiveness, moving from an economic-centric approach to an integrative approach that incorporates economic growth, social equity, and environmental sustainability. We outline the overall positions of Australian cities in the global city system; we apply the new conceptualisation of urban competitiveness to examining Australian gateway cities—Sydney and Melbourne—to identify their competitive strengths and weaknesses; and we compare three ‘S-cities’—Sydney, Singapore, and Shanghai—to better understand Australia’s competitiveness in the Asian Century through its gateway global city Sydney. Within Australia’s national urban system, we explore the competition between cities to attract people and talent, revealing how this is associated with cities’ knowledge economies and innovation capacity. These conceptual and empirical examinations draw attention to the role of innovation in a city’s competitiveness in a knowledge economy, and underpin our argument for developing knowledge-based agglomerations in cities.

URBAN COMPETITIVENESS REVISITED

Australian cities, like other cities around the world, face many challenges. Important among these are competitiveness and sustainability. These two factors are interwoven and often conflict with each other, which further limits effective policymaking and planning for building competitive and sustainable cities. Both challenges require innovative pathways and solutions. They are reshaping our understanding of economic development, which has evolved from a focus exclusively on economic growth to a concept that now incorporates environmental sustainability and social equity, as we discussed in Chap. 2. When we discuss urban competitiveness and how innovation contributes to it in a globalised knowledge economy, we need to take an integrated approach that addresses the contemporary ‘wicked problem’ of sustainability and its association with competitiveness.

Integrative Urban Competitiveness

The notion of urban competitiveness derives from the competitiveness of industries and firms. National competitiveness has also been widely discussed and is an accepted factor that informs national policies about shifting from comparative advantage to competitive advantage in world trade (Porter 1990). There have been debates on how the notion of competitive-

ness applies to cities. Nobel Laureate for Economics Paul Krugman (1996) holds that cities do not compete with one another; rather they are the locus for firms and enterprises, which compete. The counterargument is made by the equally well-known Howard Business School professor Michael Porter (1996), who argues that cities compete in more complex ways for more diverse goals, such as investment, population, talent, funding for public infrastructure, and events like the Olympic Games, which are different from the focus and goals of business competition. Business competes for profit maximisation. Cities compete by providing better environments than others for business. Thus, from this viewpoint, urban competitiveness is equated with a mix of attributes for business operations.

The above predominantly economic perspective determined the early conceptualisation of urban competitiveness. Urban competitiveness in this framework is defined and measured by economic success. This economic-centric approach to urban competitiveness has been questioned, however, for insufficiently representing the complexities of urban competitiveness and therefore possibly contributing to problematic policy development (Jiang and Shen 2010). The importance of incorporating non-economic dimensions into the conceptualisation of, and the methodological approach to, urban competitiveness, such as governance, liveability, social cohesion, and environmental sustainability, is now recognised. A more integrative approach is necessary since the economic, social, and environmental dimensions are interrelated and contribute to a city's comprehensive competitiveness (Hu et al. 2013).

An integrative approach to urban competitiveness faces challenges; one of these is environmental sustainability, which is bound up with contemporary concerns about climate change, energy use, and resilient cities. A city's economic performance and environmental performance are closely interrelated. The fusion of the two urban agendas is not easy. Examples of cities that include environmental sustainability as part of their drive for urban competitiveness are recent and few. However, environment and natural hazards are determining factors of a city's ability to attract capital, businesses, talent, and visitors (The Economist Intelligence Unit 2013). Ecological environment has also been put forward as a strong driving factor in a city's efficiency at producing wealth and providing welfare (Ni et al. 2014). There is an increasing awareness of the importance of environmental sustainability in urban competitiveness, through contributing to economic output or enhancing a city's branding.

The Sustainability Challenge

This relationship between competitiveness and sustainability is challenging for Australian cities. In the global city system, Australian cities, as represented by Sydney and Melbourne in Fig. 3.1, are characterised by a high quality of living and low population density compared with other global cities. The feature of low population density is linked with low built environment density, urban sprawl, a high reliance on private vehicles for commuting, and a large ecological footprint. Sydney and Melbourne are the most densely populated cities in Australia, but still rank very low in the global context in population density, although both, like other Australian cities, have great reputations for liveability (Fig. 3.1). Liveability makes Australian cities competitive, but sustainability presents a challenge. In the Australian urban system, stronger performance in urban competitiveness is correlated with a higher ecological footprint (Hu 2015c). In Australia, urban competitiveness is improved at an environmental cost, and the larger the cities are, the more this holds true.

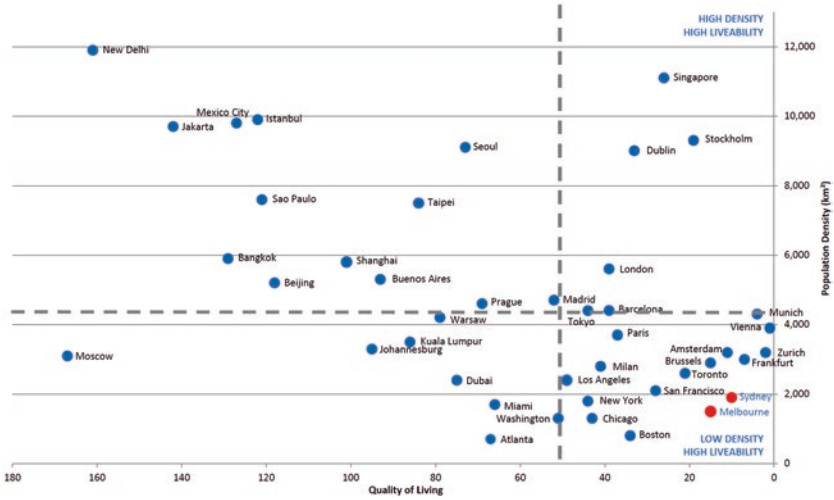


Fig. 3.1 Quality of living and population density of global cities
Note: The dotted lines mark the median values of ‘quality of living’ and ‘population density’
Source: ‘Population density’ data from Demographia (2016) and ‘quality of living’ data from Mercer (2016), created by the authors

More than 85 per cent of the Australian population lives in urban areas, and three-quarters of Australians live in major cities with populations of more than 100,000 (Hu 2015a). Population growth and economic growth are continuing in Australian cities, but environmental sustainability is a major concern. Internationally, unlike the United States and Europe, which show signs of levelling-off per capita energy use and emissions, Australia shows no clear signs of a long-term trend in that direction. Instead, Australia's energy use and emissions have both climbed along with per capita gross domestic product (GDP) (Australian Government 2013).

There have been efforts to incorporate sustainability and competitiveness into strategic policy goals for Australian cities since Kevin Rudd's prime ministership began in 2007. The Council of Australian Governments (COAG) (2009, p. 20) set the national objective 'to ensure Australian cities are globally competitive, productive, sustainable, liveable and socially inclusive and are well placed to meet future challenges and growth' and a set of national criteria were established for capital city strategic planning systems. As an implementation step of the COAG initiative, a national urban policy established the first long-term national framework for 'a productive, sustainable and liveable future' (Australian Government 2011). This approach reflects the integrated approach to urban competitiveness discussed above. That is, productivity, sustainability, and liveability—the economic, environmental, and social dimensions of a city's well-being—are interrelated in a dynamic system. Addressing one goal can have an impact, either positively or negatively, on the others. The Australian Labor Party's city agenda during the period 2007–13 was toppled by Tony Abbot when he became prime minister in September 2013. When Tony Abbot was succeeded by Malcolm Turnbull in September 2015, Turnbull renewed the federal government's interest in cities through a smart cities agenda. The Turnbull government's smart cities agenda will be discussed in Chap. 8.

Urban form and public transport improvement have long been discussed as solutions to the sustainability challenges to Australia's urban development. They remain the major policy tools. COAG's (2009) national criteria for capital city strategic planning systems included nationally significant economic infrastructure, an appropriate balance of infill and greenfield development, and world-class urban design and architecture. The following issues were identified as drivers of change: car dependency, long and crowded commuting, the need for compact cities, and improving urban morphology (Australian Sustainable Built Environment Council 2010). Changes to either urban form or public transport infrastructure

require long-term strategy, investment, and implementation to take effect. Australia has been slow in reaching consensus between political parties and among stakeholders on understanding, strategy, and action. This tardy process is putting Australian cities in a disadvantageous position compared to Asian counterpart cities, and is affecting their global competitiveness.

Sustainable Development

Internationally, the sustainable development discourse started to influence economic development in cities in the 1990s. The pivotal 1987 Brundtland Report *Our Common Future* disseminated and promoted simultaneous aspiration to three Es—‘economic development’, ‘environmental protection’, and ‘social equity’ (World Commission on Environment and Development 1987). For the first time, a formal document with international influence put environmental protection and social equity together with economic growth, and treated them as of equal importance. Since that time, the challenges of global warming and growing inequality have heightened the importance of a sustainable approach to economic growth.

The three Es embed conflict and integration; sustainable development hinges on fixing conflicts to achieve integration. The three Es represent three perspectives on the city: the city as a location of production, consumption, distribution, and innovation from an economic perspective; the city as a consumer of resources and a producer of wastes from an environmental perspective; and the city as a location of conflict over distributing resources, services, and opportunities from a social equity perspective (Campbell 1996). Economic growth often conflicts with environmental protection and social equity. The economic–social conflict defines the boundary between private interest and the public good (Campbell 1996). Social equity and environmental protection come into conflict in the attempt to increase social equity through economic growth, and to protect the environment through growth management. Fixing these interlocking conflicts is the most challenging conundrum in achieving sustainable development.

It has not been an easy task to translate sustainable aspirations into effective planning, policies, and decisions. Reasons for these difficulties include a limited understanding of sustainability science and a lack of commitment and apprehension by governments in advancing sustainability (Vojnovic 2014). In the United States, cities adopt sustainability in a piecemeal, ad

hoc manner: while much is known about environmental initiatives, comparatively little is known about social equity and sustainable economic development (Opp and Saunders 2012). Experiences in Switzerland indicate promising signs of integrating the three Es of sustainable development, where ecological innovation can generate social and economic benefits, and natural spaces and biodiversity have synergetic benefits for the health and safety of people (Hansmann et al. 2012). Best practice in one place may not work elsewhere however. Success factors are often localised. But some principles may be borrowed. Knowledge diffusion precedes international policy transfer. The need to balance economic growth, environmental protection, and social equity, after three decades of diffusion and advocacy, has now been widely accepted, if not yet widely practised.

One good example that illustrates the turn towards sustainable development in both understanding and policy is China. China is experiencing the largest urbanisation process in human history, and is expecting one billion people to be living in hundreds of cities by the mid twenty-first century with scales much larger than Australia's. Chinese cities are successful in an economic sense, having made China the second largest economy in the world (after only the United States) in just a few decades. In parallel with this rapid economic growth, however, have been increasing pollution of air and water, and increased social polarisation. For some time, these environmental and social costs were seen as 'acceptable' as a necessary cost of economic prosperity. This mindset has changed recently, and this change has been reflected in policy and practice. The government has tightened controls over environmental protection and considered both social equity and economic efficiency in promoting a 'harmonious society'. As one political slogan says, 'green mountains and water are also GDP'.

The Chinese experience provides a useful recent example of a change in thinking. It supports the overall notion that the sustainable development discourse has enabled a re-conceptualisation of urban competitiveness as urban sustainability. It is now recognised that the interrelated economic, social, and environmental dimensions contribute to a city's competitiveness (Jiang and Shen 2010). As discussed in Chap. 2, a sustainable development perspective has shifted the goals of economic development from economic growth alone to include environmental and social well-being. It has also shifted the traditionally economic-centric conceptualisation of, and policy approach to, urban competitiveness to an integration of economic, environmental, and social dimensions.

A more balanced and integrated sustainable approach to urban development has required city leaders to pay attention to a city's endogenous development. Friedmann (2007) identifies seven tangible assets for contemporary cities' endogenous development: basic human needs; organised civil society; heritage of the built environment and popular culture; intellectual and creative assets; resource endowment; quality of environment; and urban infrastructure. These clusters of assets cover the major dimensions of a city's competitiveness in a comprehensive, or sustainable, manner. An emphasis on endogenous development requires a whole-of-government collaborative approach to planning (Friedmann 2007), which we will further discuss with regard to innovative place making in Chap. 8. Since the 1990s, as discussed in Chap. 2, sustainability has become one focus of a city's collaborative advantage. With the increasing importance of collaborative advantage (in contrast to comparative and competitive advantage), governance has become a city's most valuable asset in contemporary competitive globalisation (Blakely and Hu 2007). Collaborative governance is the key to a city's collaborative advantage. These new notions are affecting our understanding and measurement of urban competitiveness as illustrated below.

GLOBAL COMPETITIVENESS

In Chap. 1, we introduced the contemporary force of globalisation, and described how a group of 'global cities' has emerged since the mid-1980s as a result of the impacts of globalisation. The global economy has been generating simultaneous processes of decentralisation and centralisation—the decentralisation of production and retailing activities across the world and the centralisation of specialised services and command and control within these global cities (Sassen 2001). The transnational corporations (TNC) are major actors in the global economy and global competition. Their global activities and reach have required greater complexity in management, control, and coordination; and greater use of global services, or 'advanced producer services' (APS), including financial, insurance, banking, legal, business, and professional services (Sassen 2001). Functionally, global cities are the command and control centres of the global economy, and key locations of the global services firms. In contemporary globalisation, global cities are formed specifically to differentiate from pre-global cities.

Several theorists have contributed to ‘the global city’ concept. John Friedmann (1986) first put forward world cities as the sites of spatial organisation and articulation of the world’s production and markets. Saskia Sassen (2001) coined the term ‘the global city’ in her seminal book with the same title, and defined global cities as the command and control centres of the integrated global economy. Manuel Castells (2000) injected information technology’s impact into conceptualising global cities as the strategic urban nodes in global spaces of flow within a networked society. These theories have evolved from an initial focus on cities’ role in the global economy to an expanded focus on their connectivity, enabled by the advancement of information technology. Global cities have a high degree of intra-city concentration and intercity relations. They form a global city network: the activities of global services firms constitute ‘strategic networks’ that link global cities as ‘strategic places’ (Taylor et al. 2014). Their knowledge activities contribute to the formation of innovative space within global cities; their intercity interactions contribute to the formation of innovative flow between global cities (Hu 2016).

Global Network Connectivity Index

According to the above theorisations of global cities and networks, major Australian capital cities are important urban nodes in the global network system. The Globalisation and World Cities (GaWC) Research Network has systematically analysed cities’ integration with the global economy through their provision of APS since the turn of the century. The computed Global Network Connectivity Index (GNCI) ranks global cities by measuring their capacity to provide APS, and their positions in the global network system. The latest 2016 results are based upon the office networks of 175 APS firms in 707 cities (GaWC 2017). Six Australian capital cities are ranked in the index (Table 3.1). Sydney and Melbourne are established global cities in the second tier of Alpha cities. Perth, Brisbane, and Adelaide are in the Beta and Gamma ranks, reflecting their regional rather than global roles. Canberra is ranked as having a sufficiency of services, not because it is already a global city, but because of its role as the national capital city.

Table 3.1 Global Network Connectivity Index, 2016

<i>Classification criteria</i>	<i>Classifications</i>	<i>Global cities</i>
Alpha++ cities: The most integrated with the world economy and constitute their own high level of integration	Alpha++	London New York
Alpha+ cities: Other highly integrated cities that complement London and New York, largely filling in advanced service needs for the Asia Pacific region	Alpha+	Singapore Hong Kong Paris Beijing Tokyo Dubai Shanghai
Alpha and Alpha– cities: Very important world cities that link major economic regions and states into the world economy	Alpha	<u>Sydney</u> Sao Paolo Milan Chicago
	Alpha–	... Dublin <u>Melbourne</u> Washington
Beta-level cities: Important world cities that are instrumental in linking their region or state into the world economy	Beta+	... Prague Ho Chi Minh City Boston
	Beta	... Doha Karachi Nicosia ... <u>Perth</u> ... <u>Brisbane</u> ...
	Beta–	Port Louis Minneapolis Chennai ...

(continued)

Table 3.1 (continued)

<i>Classification criteria</i>	<i>Classifications</i>	<i>Global cities</i>
Gamma-level cities: World cities linking smaller regions or states into the world economy, or important world cities whose major global capacity is not in advanced producer services	Gamma+	Guayaquil Cleveland Riga ... <u>Adelaide</u> ...
	Gamma	Phoenix Tegucigalpa Austin ...
	Gamma–	Taichung Charlotte (North Carolina) Baltimore ...
Cities with sufficiency of services: Cities that are not world cities as defined here but have sufficient services so as not to be overtly dependent on world cities	High sufficiency	Queretaro Abuja Porto Alegre ...
	Sufficiency	Belo Horizonte Christchurch Florence ... <u>Canberra</u> ...

Notes: Australian cities are underlined

Source: GaWC (2017)

Integrative Urban Competitiveness Index

The GaWC's GNCI reveals Australian cities' performance in providing APS and is indicative of their degree of integration with the global economy. It captures the economic dimension of their global competitiveness. However, other factors, not captured by this index, also influence their performance and thus their global competitiveness. A more comprehensive index incorporating multiple economic, environmental, and social dimensions, as well as governance (which, as argued earlier, is a key competitiveness factor) would provide a holistic understanding of the competitiveness

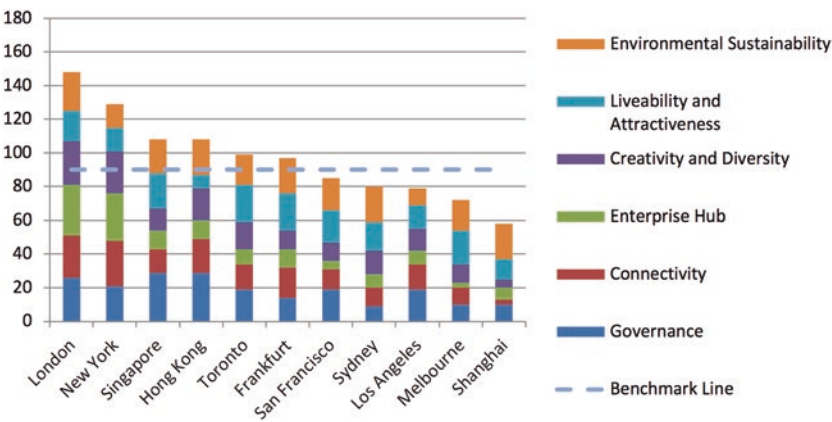


Fig. 3.2 Integrative Urban Competitiveness Index
Notes: An ‘ideal’ IUCI value is 180, with each of the six indicators having an ‘ideal’ value of 30; the benchmark line is set at the median value of 90
Source: Data collected from case study cities, created by the authors

of Australian cities in a global context. For this purpose, we have developed an Integrative Urban Competitiveness Index (IUCI) of six dimensions: governance, connectivity, enterprise hub, creativity and diversity, liveability and attractiveness, and environmental sustainability. The methodology used to construct the IUCI is provided in this chapter’s Appendix. We use the IUCI to compare Sydney and Melbourne against a group of leading global cities (Fig. 3.2). This comparison informs where Australian cities, as represented by Sydney and Melbourne, stand and what directions they should head in to enhance their global competitiveness.

This group of global cities is in the top (Alpha) category of GaWC’s GNCI (Table 3.1). They are either the global leaders or competitor cities for Australian cities in the Asia Pacific region. The results and rankings in this IUCI, however, differ from those produced by the GaWC, reflecting the differences between the GNCI’s focus on economic performance and the IUCI’s inclusion of multidimensional indicators. Overall, Sydney and Melbourne are below the benchmark line set at the median point of an ‘ideal’ global competitiveness index value of 180. In the IUCI, London and New York lead, with a considerable gap between them and the two Asian cities of Singapore and Hong Kong. London and New York are sometimes referred to as ‘NYLON’ to indicate their critical importance in

global network connectivity (Taylor et al. 2011). The high placement of Singapore and Hong Kong appropriately reflects their strategic roles in the Asia Pacific region. Among the group of leading global cities in Fig. 3.2, Sydney and Melbourne are positioned ahead of Shanghai, with Sydney appearing before Los Angeles by a small margin. However, to understand these overall results, we need to look at the dimensions that make up the index. We find that Sydney's and Melbourne's dimensional competitiveness varies compared to the other global cities.

Sydney and Melbourne have modest ratings in the 'governance' dimension. They are lagging in government structure and governance innovation compared to other global cities. Like all Australian capital cities, neither Sydney nor Melbourne has a metropolitan-level government to assume direct responsibility for planning and development. Constitutionally, Australian cities are run and managed by the state governments. Although the state-led governance structure could provide much stronger resources and control, it generates both vertical conflicts (between the state and the local governments) and horizontal fragmentation (between numerous local governments) in metropolitan strategy and planning (Blakely and Hu 2007). The lack of a metropolitan authority and the multi-scalar governance structure are hindering the potential of Sydney and Melbourne as global cities. Internationally, Toronto and London had similar governance structures at the end of the twentieth century. In Toronto, six cities were amalgamated into a unified City of Toronto in 1998, a megacity government, directly under the administration of the Ontario Province. In London, the Greater London Authority was established in 2000 to oversee 33 local governments and provide region-wide vision, management, planning, and implementation. One push behind these governance initiatives in both Toronto and London was to improve global competitiveness through a streamlined governance structure. Similar initiatives have long been debated in Australia. In 2015, the New South Wales (NSW) state government established the Greater Sydney Commission (GSC) to coordinate metropolitan-wide strategic planning, with Lucy Turnbull, the ex-Lord Mayor of the City of Sydney (2002–04) and the wife of ex-Prime Minister Malcolm Turnbull (2015–18), as the Chief Commissioner. Co-author Edward Blakely served as the West Central District Commissioner for the GSC from 2016–18. Although the GSC's responsibility is strategic and coordinative, it marks an important first step towards a metropolitan-level planning mechanism in Sydney.

In the ‘connectivity’ dimension, Sydney and Melbourne perform better in the virtual connectivity of broadband access than the physical connectivity represented by air passengers and metro transport systems. Sydney and Melbourne are not global transport hubs. But Sydney–Melbourne intercity air connectivity is world-leading, reflecting the two cities’ roles in Australia’s national economic activities and exchanges. Similar intercity air connectivity includes New York–Los Angeles, Beijing–Shanghai, and New York–London. However, the intra-city connectivity of Australian cities and other new world cities, due to their sprawling urban forms, is less than their Asian and European counterparts.

In the ‘enterprise hub’ dimension, Sydney is doing well, reflecting its role as Australia’s leading global city, linking the nation with the world. It provides services for the Australasian markets, including Australia, New Zealand, Southeast Asia, and increasingly East Asia. Melbourne ranks the lowest in business services among this group of leading global cities. London and New York are ahead of other global cities in the enterprise hub dimension, with a considerable gap between these two leaders and the runners-up, indicating their dominant position in providing business services for the global market.

The two dimensions of ‘creativity and diversity’ and ‘liveability and attractiveness’ are interrelated in linking a city’s innovation with social and urban attributes. Sydney and Melbourne rank in the middle range of creativity and diversity. London and New York again lead in this dimension, largely thanks to their innovation capacity, world class universities, and cosmopolitanism. A city’s creativity is correlated with its social and cultural diversity, and innovation agencies such as universities, research and development (R&D) institutes, and cultural and arts centres. Global cities have the scale to have all these within one city, creating an advantageous position over regional or smaller cities in growing innovation and a knowledge economy. Melbourne performs better than Sydney in liveability and attractiveness, but both cities score well internationally in this dimension.

Our index includes environmental sustainability as an indicator of the cities’ global competitiveness to reflect the move towards including sustainability as a factor in urban competitiveness and its importance in a city’s sustainable development, as discussed in the last section. An analysis of the ‘environmental sustainability’ dimension shows that Sydney and Melbourne celebrate good air quality and have average energy consumption rates but high reliance on private cars for commuting. Cities with high population and built environment densities such as Hong Kong, Singapore,

and Shanghai perform better in energy consumption and in the provision and use of public transit systems. Shanghai is an exceptional case in that it has the lowest air quality, since China is still in the middle of an industrialisation and urbanisation process, and environmental sustainability presents a challenge to its rapid economic growth.

Sydney–Singapore–Shanghai Comparison

Australian cities compete globally and regionally. They have direct engagement and competition with Asian neighbour cities, which have had rapid growth in international rankings in recent decades. Opportunities for a productive and resilient Australian economy in the Asian Century include not only trade within the region but partnerships with it, as Asia is growing to be a global science and innovation hub (Australian Government 2012). The three S-cities—Singapore, Shanghai, and Sydney—form an urban corridor linking through the Australasian region. This corridor plays a strategic role in establishing Australia’s links with the most economically dynamic area in the world. The three cities are different in size on a number of measures: land, population, and economy. However, contemporary globalisation is bringing them into a closer relationship, in addition to their geographical proximity. The interaction between these cities, including transactions, trade, movement of people, education, and knowledge and innovation diffusion, constitutes an important Asia Pacific subsystem within the global city system.

The three S-cities are at different stages and paces of development. Recent trends show that Shanghai and Singapore have demonstrated a stronger growth trend than Sydney, as measured by employment and GDP per capita (Hu 2017). In the global context, Shanghai had the strongest growth in GDP per capita, while Singapore experienced a robust employment growth. There are growing Australian diaspora in Shanghai and Singapore, doing business and living there. The majority are professionals, having some sort of business links back home in Australia. Singapore and Shanghai are thus not only competing for global talent with Sydney; they are also attracting home talent from Sydney. Sydney-based global business and service providers, such as Lend Lease and the Macquarie Group, have a strong presence in the Singapore and Shanghai markets. Many Sydney-based architecture and design firms have set up offices in the two cities to provide services to the booming Asian building markets.

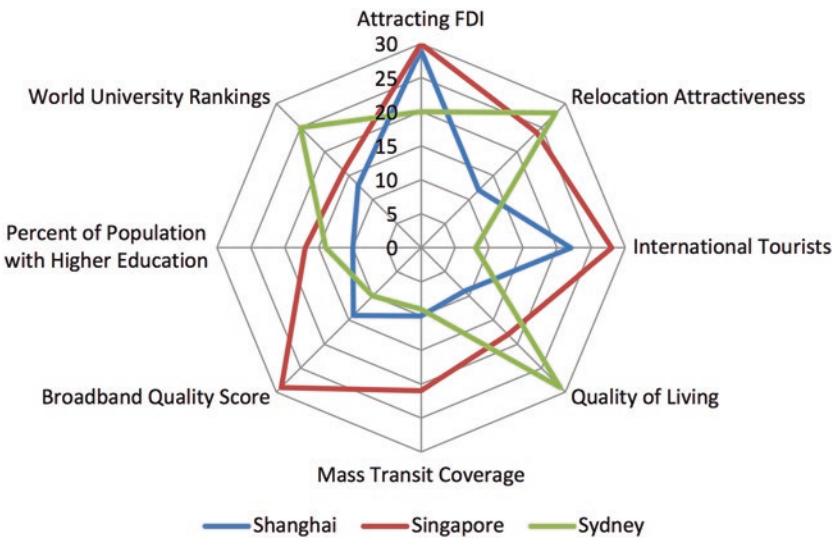


Fig. 3.3 Sydney–Singapore–Shanghai comparison
 Source: PWC (2016), created by the authors

Cities learn from each other. Global cities diffuse best practice planning and economic development approaches. The ability to learn from counterpart cities is crucial for a city’s success in the global competition. Sydney demonstrates different strengths and weaknesses compared to Singapore and Shanghai (Fig. 3.3). Broadly speaking, Sydney is competitive in three areas: quality of living, relocation attractiveness, and world university rankings. However, it is in the areas of its relative weakness where Sydney should learn from its Asian neighbour cities. In terms of attracting investment, attracting tourists, improving infrastructure, and enhancing human capital, Sydney lags behind Singapore and Shanghai and should learn from these cities’ experiences and approaches.

Both Singapore and Shanghai are successful in attracting foreign direct investment (FDI). To develop Shanghai as the ‘dragon head’ of the Chinese economy, first through attracting FDI, has been China’s national strategy from the 1990s. The Pudong New Area in Shanghai was planned and developed to accommodate investment and international business activities within less than three decades. Now it is a global financial centre and innovation hub. In Singapore, the city state’s strategy to attract FDI dates to the

1960s and 1970s. Growing FDI in the two cities has come with an improved business environment in terms of governance capacity and policy effectiveness, business friendliness, infrastructure, and urban amenities. Among many factors that attract investment, governance plays an important role in both cities. The Shanghai Municipal Government enjoys a province-level status in China's hierarchical political system; Singapore has a unique city-state system. Both systems have ensured a consistent and effective approach to global city strategy and implementation.

Sydney attracts the fewest international tourists of the three cities. Tourists do not come to a city only for holiday, or just to visit friends and relatives. Increasingly, they visit a city for non-tourism purposes—business meetings, conventions, exhibitions, training, cultural exchange, research and development, education, and so on. The intensity and diversity of the movement of people between cities is growing at an accelerating pace, adding a new layer of global connectivity. The benefits of tourists for a destination city are far more than simply local spending: tourists bring business opportunities, diffuse knowledge and innovation, and spread local knowledge and experience. International tourists are correlated with a city's economic and cultural dynamics and integration with the world. In recent decades, Singapore and Shanghai have attracted more international tourists through branding a global image, holding mega events, and developing tourism facilities and infrastructure (hotels, conventions and exhibitions, entertainment, and international airports). Signature tourist projects include the World Expo 2010 and the Disney Resort in Shanghai, and the Marina Bay Sands waterfront redevelopment and the Formula 1 in Singapore.

Sydney must improve not only its mass transit coverage, but also its broadband quality score, to catch up with the other two cities. Singapore has a world-class metro system. Its convenience and efficiency have enabled a nearly zero reliance on private cars in the city. The transition between different modes of transport is seamless. Transport infrastructure planning and readiness precedes major urban development in Singapore. In Shanghai, the World Expo 2010 boosted massive investment in the construction of a metro system. Large-scale public transit projects are continuing in both cities, paving the way for further urban development and economic growth. Broadband infrastructure supports a city's grasp of opportunities in the new economy. Both Singapore and Shanghai made strategic investments in improving digital access to put the cities in an advantageous position for embracing smart cities. Both cities were learners from Australia in city planning and technology. But now, the students have become the teachers.

Sydney sits between Singapore and Shanghai in the percentage of population with higher education. Global cities are essentially knowledge cities; knowledge workers are global citizens. Singapore has been attracting talent from around the world during its ascendance to becoming a leading global financial centre. In recent decades, Shanghai has been speeding up efforts to attract global talent, especially Chinese expatriates. Sydney's liveability and attractiveness are magnet factors for global talent. But Sydney's cost of living, particularly housing affordability, affects its capacity to attract and retain talent. Sydney faces competition for talent from not only overseas cities, but also cities within Australia. Sydney has been losing young people to other Australian cities that provide more affordable living and easier lifestyles. Continuing loss of human capital will prevent Sydney from maintaining its position as an established global city and Australia's leading global city. In the next section, we will further investigate the association between global competitiveness, migration, and people movement in Sydney as a global city, and intercity migration within Australia's urban system.

INNOVATION MOBILITY

The spatial patterns of knowledge workers mark innovative places in global cities. Within a global city, the most innovative place has the highest concentration of knowledge workers for the APS. At the same time, the movement of knowledge workers between global cities forms a people flow, which originates conceptually from the intercity flow of digital information (Castells 2000). Global cities compete for knowledge workers and their location decisions, as opposed to traditional competition for firms. A focus on the role of knowledge workers in forging innovation places responds to the increasing mobility in contemporary globalisation: a global city's competitiveness is correlated with its mobility of people (Hu 2015b). We illustrate this viewpoint below, using Sydney as an example.

Competitiveness, Migration, and Mobility in Global Sydney

In contemporary global cities, we cannot continue to understand migration by ethnicity or country of birth. Migrants are defined by 'mobility'. For numerous places in the Greater Sydney region, global competitiveness is more associated with global mobility than global migration. We have developed three indexes—a Global Compositeness Index (GCI), a Global Migration Index (GMI), and a Global Mobility Index (GloMo)—which demonstrate diverging and converging spatial patterns (Fig. 3.4). GCI

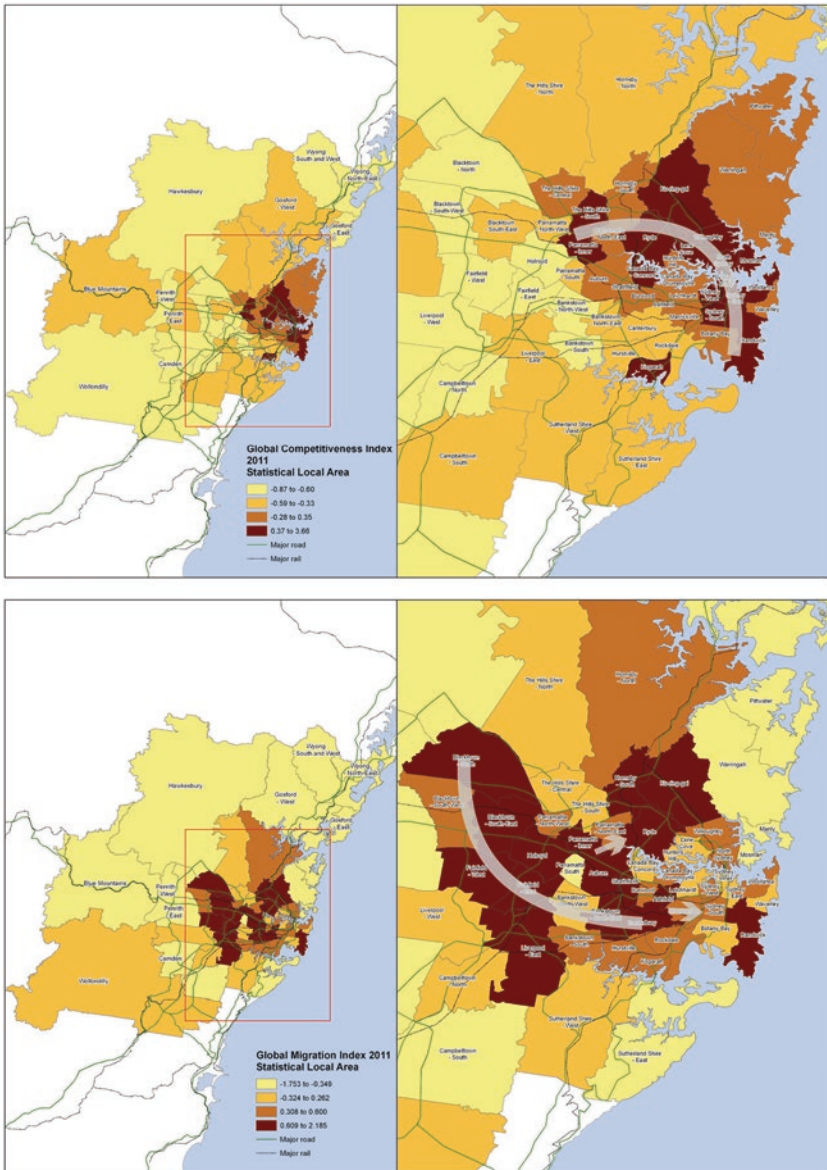


Fig. 3.4 Global competitiveness, global migration, and global mobility in the Greater Sydney Region

Source: Australian Bureau of Statistics (2018a), created by the authors

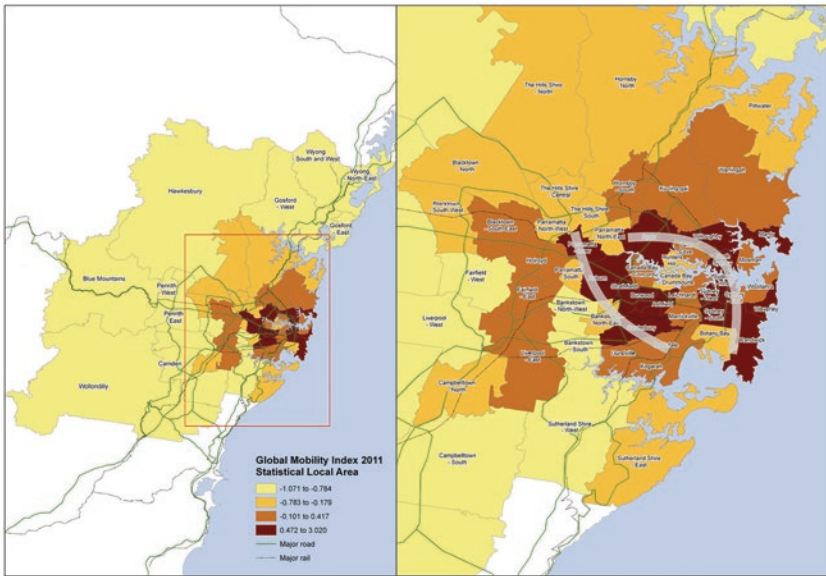


Fig. 3.4 (continued)

measures each place's knowledge-intensive industries, as a proxy for global services, knowledge economy, and innovation capacity; GMI measures the concentration of people born overseas, which is the traditional definition of immigration; GloMo measures newcomers from overseas and elsewhere in Australia into these places, regardless of country of birth.

Places with high GCIs form a 'global arc', which runs through central Sydney and links northwest and southeast communities at both ends. The 'global arc' was first suggested in Sydney's metropolitan strategy *City of Cities* (NSW Government 2005), referring to the economic corridor of jobs and major infrastructure stretching across an arc-shaped belt of global services and innovative places. Communities with the highest GMIs are in the west and southwest areas, which have been traditionally known for having the highest ethnic concentrations in the Greater Sydney region. The GloMo coverage combines the spatial patterns of GCI and GMI.

Communities with the highest GloMos form dual arcs, facing each other. The east arc almost coincides with the ‘global arc’ of places with high GCIs in the east area; the west arc almost coincides with places with high GMIs in the western area.

As a global city, Sydney’s global capacity is correlated more to its global mobility than its global migration. Sydney’s rise as a global city has come with multiple and profound changes in its migration patterns. One prominent change is the growing scale and diversity of the foreign-born population (Burnley 2000; Hugo 2008). However, classifying global migration simply by counting the number of people born overseas is an insufficient reflection of the association of migration with global Sydney. The ‘global mobility of people’ measure better addresses the complexities of contemporary migration in global cities.

The GloMo includes the movement of people from within Australia (internal migration) and from overseas (international migration). Internal migration and international migration are determined by the direction of movement, not by the country of birth; both internal migration and international migration include people born in Australia and overseas. Between 2006 and 2011, returning Australians (Australian-born people) accounted for 10 per cent of international migration, and represent the third largest group by country of birth in the Greater Sydney region, after only China and India (Australian Bureau of Statistics 2018a). For the knowledge-intensive industries that constitute Sydney’s knowledge economy, returning Australians accounted for an even higher share (18 per cent) of international migration (Australian Bureau of Statistics 2018a). To understand Sydney’s knowledge economy and global city status, we need to redefine migration according to this global mobility of people.

The global city discourse has tended to focus on the economic dimension, as stated earlier. But migration also constituted an important component in the early global city hypothesis. In Friedmann’s (1986) world city hypothesis, world cities are points of destination for large numbers of both domestic and international migrants. Sassen (2001) argues that global cities are the main destinations for immigrants, with social polarisations between skilled migrants and unskilled migrants. We need to integrate a global city’s economic competitiveness with migration through the nexus of the movement of people, or mobility, to articulate interrelationships between the global city and migration.

Australian international migration has undergone significant transformations in the last few decades of globalisation in terms of its nature,

composition, and effects. One dimension of the transformation is the increasing role played by those Australian cities most linked into the global economic system. A single world economic system is overtaking the traditional economic roles and powers of nation states; cities or city regions are emerging as dominant spatial scales and as central nodes in the global economy (Friedmann 1986; Sassen 2001). Global cities are now ‘active agents in shaping globalisation itself’ as the ‘motors’ or new ‘spatial nodes’ of the global economy (Scott 2001, p. 11). The global city is an important spatial scale for new migration analysis, incorporating both international and internal movement of people, in addition to the conventional nation-based approach to studying immigration.

Intercity Migration

People move with innovation. The case of global Sydney, discussed above, illustrates the correlation between place-based knowledge activities and people’s mobility. Both this people mobility and associated innovation mobility apply to the global city system and the national city system. The Australian capital cities also form a dynamic ‘people mobility’ system, and an associated innovation mobility system. Figure 3.5 illustrates the patterns of Australian capital cities in attracting internal migrants from the other capital cities in the period 2011–16, broken down by tertiary qualifications. The patterns capture the intercity competition for people gener-

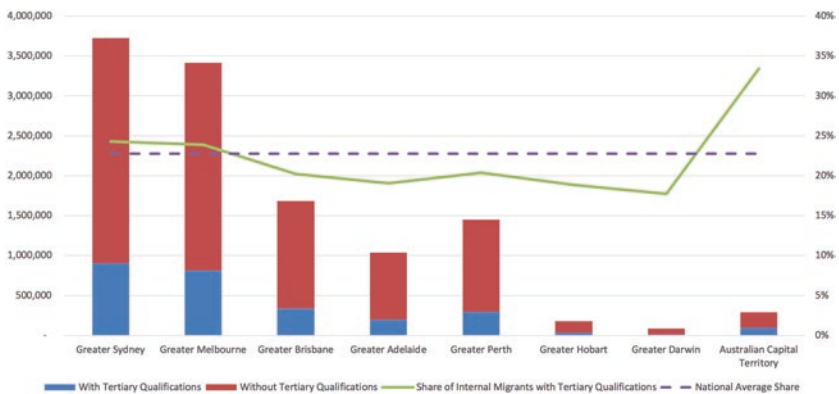


Fig. 3.5 Intercity migrants in Australian capital cities, 2011–16
Source: Australian Bureau of Statistics (2018b), created by the authors

ally, and for ‘knowledge people’ with innovation capacity in particular. The total numbers of internal migrants were broadly aligned with the capital cities’ population sizes: larger cities attracted more internal migrants from the other cities overall.

But the shares of people with tertiary qualifications as a proportion of the total number of internal migrants reflect a city’s inward knowledge mobility. In this regard, three cities have shares that are above the national average—Sydney, Melbourne, and the Australian Capital Territory (ACT) (the administrative area of Canberra). The ACT attracted the highest share of internal migrants with tertiary qualifications compared with the other capital cities. This performance is aligned with the city’s knowledge economy base, despite the small size of its population and labour force. However, the specific intercity people mobility and innovation mobility patterns differ between cities (Table 3.2). For example, Melbourne attracted more people, including people with tertiary qualifications, from Sydney, than Sydney attracted from Melbourne, in this period of 2011–16. But in terms of the percentage of internal migrants with tertiary qualifications, Sydney attracted a higher share from Melbourne (53 per cent) than Melbourne attracted from Sydney (43 per cent). These different percentages reflect Sydney’s stronger competitiveness in innovation mobility than Melbourne. This stronger innovation mobility also reflects Sydney’s stronger innovation capacity and knowledge economy.

Innovation concentrates within cities; and innovation flows between cities, as we have examined above. Cities with high concentrations of knowledge activities tend to further attract knowledge workers from other nations and cities. One important attribute of innovation is agglomeration, a notion that we frequently refer to in this book. Agglomeration defines innovation, incubates innovation, and differentiates innovation from conventional industrial sectors. In the next section, we unravel the notion of knowledge-based agglomeration, drawing upon several theoretical explanations.

KNOWLEDGE-BASED AGGLOMERATION

A digital era does not mean that places are less important, or that geography will die, as frequently claimed in the 1990s at the heyday of the information technology expansion. On the contrary, as recent decades have shown, cities have become more and more important. Places will be even more crucial in capitalising on the upcoming smart cities opportunities.

Table 3.2 Intercity migrants in Australian capital cities, 2011–16

<i>Origin cities</i>	<i>Destination cities</i>	<i>Greater Sydney</i>	<i>Greater Melbourne</i>	<i>Greater Brisbane</i>	<i>Greater Adelaide</i>	<i>Greater Perth</i>	<i>Greater Hobart</i>	<i>Greater Darwin</i>	<i>Australian Capital Territory</i>	<i>Total</i>
Greater Sydney	IM		27,396	21,291	6384	10,103	1673	1881	11,157	3,725,131
	IMTQ		11,700	6150	2346	3681	647	663	5099	906,105
	Share of		42.7	28.9	36.7	36.4	38.7	35.2	45.7	24.3
	IMTQ (%)									
Greater Melbourne	IM	18,739		13,419	6182	10,842	2406	2156	5326	3,413,054
	IMTQ	9946		4605	2362	4087	986	824	3012	814,601
	Share of	53.1		34.3	38.2	37.7	41	38.2	56.6	23.9
	IMTQ (%)									
Greater Brisbane	IM	15,222	16,600		3304	5667	1367	2451	3701	1,682,109
	IMTQ	6502	6502		994	1869	456	597	1736	340,194
	Share of	42.7	39.2		30.1	33	33.4	24.4	46.9	20.2
	IMTQ (%)									
Greater Adelaide	IM	6816	12,074	5525		4138	507	1860	2048	1,040,339
	IMTQ	3363	5253	1702		1425	196	563	1097	198,260
	Share of	49.3	43.5	30.8		34.4	38.7	30.3	53.6	19.1
	IMTQ (%)									
Greater Perth	IM	8645	14,182	6048	2677		966	2064	1825	1,452,303
	IMTQ	3798	5655	1769	830		297	539	847	295,814
	Share of	43.9	39.9	29.2	31		30.7	26.1	46.4	20.4
	IMTQ (%)									
Greater Hobart	IM	1292	3727	1446	510	956		214	503	175,516
	IMTQ	616	1480	406	179	308		65	236	33,106
	Share of	47.7	39.7	28.1	35.1	32.2		30.4	46.9	18.9
	IMTQ (%)									

Greater Darwin	IM	1644	2751	3351	2312	2243	261	935	86,088
	IMTQ	477	802	690	414	465	69	321	15,283
	Share of	29.0	29.2	20.6	17.9	20.7	26.4	34.3	17.8
	IMTQ (%)								
Australian Capital Territory	IM	8033	6588	4207	1328	1544	354	477	290,210
	IMTQ	4474	3641	1673	631	739	202	239	96,956
	Share of	55.7	55.3	39.8	47.5	47.9	57.1	50.1	33.4
	IMTQ (%)								
Total	IM	3,705,651	3,437,290	1,689,083	1,030,088	1,451,375	174,401	83,702	11,864,758
	IMTQ	904,992	823,815	338,536	192,420	294,660	32,663	15,528	2,700,322
	Share of	24.4	24	20	18.7	20.3	18.7	18.6	22.8
	IMTQ (%)								

Note: *IM* internal migrants, *IMTQ* internal migrants with tertiary qualifications

Source: Australian Bureau of Statistics (2018b), calculated by the authors

This is because the knowledge economy is an agglomeration economy. The recent growth of the knowledge economy has been largely facilitated by the advancement of information technology, which has reduced costs and improved efficiency in transmitting and transacting knowledge, and knowledge-based products and services. Compared to the traditional economies, the knowledge economy indicates an enhanced association between agglomeration and productivity performance (OECD 1996). Productivity grows out of agglomeration of specialised labour, specialised providers of intermediate inputs and services, and technological spillovers (Krugman 1991). Geographic proximity generates external economies of scale from shared physical infrastructure, reduced transaction costs, enhanced knowledge circulation, and inter-firm collaboration and networking (Porter 1998).

While these agglomeration theories apply to both traditional and knowledge-intensive industries, there are factors specific to the agglomeration of the knowledge economy. These are related to the indispensable role of instant and often face-to-face contact in knowledge production and innovation generation. Face-to-face contact is an important mechanism for coordinating economic activities involving creativity and tacit knowledge, in which people learn by doing and being around others (Storper and Venables 2004). Knowledge acquisition and generation require more frequent interactions between agents to communicate, exchange, and provide feedback. Knowledge-based activities often require direct and instant contact to solve unforeseeable uncertainties. However, the knowledge spillover facilitated by face-to-face contact is less important to non-knowledge workers, such as low-skilled labourers and personal service providers, or in generating codified knowledge that can be easily transmitted electronically. These agglomeration attributes explain the formation of innovative places that have a very high concentration of knowledge economic activities.

Agglomeration of knowledge activities in itself alone does not necessarily generate innovation. Innovation is more likely to be generated through the proximity of linkages between firms, institutions, individuals, and supporting environments in cities. The diversity and density in urban areas help attract knowledge workers and enhance their creativity and productivity. Diversity in cultures and expertise leads to high knowledge production and diffusion, and high tolerance for new ideas (Florida 2014). In cities, there is a higher diversity of specialisations and more favourable environments for innovation and knowledge production; and it is easier to

contact people with similar or different specialties to exchange ideas and generate knowledge (Florida 2008). Agglomerations involve both specialisations and diversifications, which form a structural system to encourage learning and innovation, and stimulate and channel individual expressions of creativity. In the Greater Melbourne region, for example, the central city area has the highest urban density and the highest concentration of knowledge workers and knowledge activities (Fig. 3.6). The concentrations make central Melbourne an innovation cluster, which we will discuss in Chap. 6. The agglomerations of knowledge economy activities mark innovative places. The presence of these innovative places strengthens a city's competitiveness in a knowledge economy.

CONCLUSION

Australia is amongst the world's most globalised and urbanised nations. It is integrated with the world through its cities, especially its gateway global cities. Australia's national competitiveness relies on the global competitiveness of its cities. Notions of and policy approaches to urban competitiveness have shifted, incorporating multidimensions of economic, social, and environmental developments and governance in cities. Australian cities are at the crossroads to either pursue urban competitiveness along the old pathway, or to explore new directions. Policymakers for Australian cities must turn an eye to sustainable development to better preform in the increasingly competitive global and Australasian environments.

To move forward, Australian cities must use innovation to meet the demands of global competitiveness. The Australian economy remains strong, but is facing increasing competition from rising regions and cities in Asia. The sooner we adapt to the realities of twenty-first-century competition, the stronger and more resilient we will be. It will take a public and private focus on these issues to reverse recent downward trends. Attempts to simply impersonate successful innovation centres, such as Silicon Valley, will always fail. While some concepts may be similar, new innovative places must target new markets and attract new businesses to succeed. The key is to attract smart people and design places that encourage collaboration and innovation while also promoting policies and laws friendly to entrepreneurialism and risk-taking.

In a knowledge economy, it is not only what you produce but who produces it, and how, where, and why it is produced. Innovation acts as both an input and an output. The input is human creativity and the output

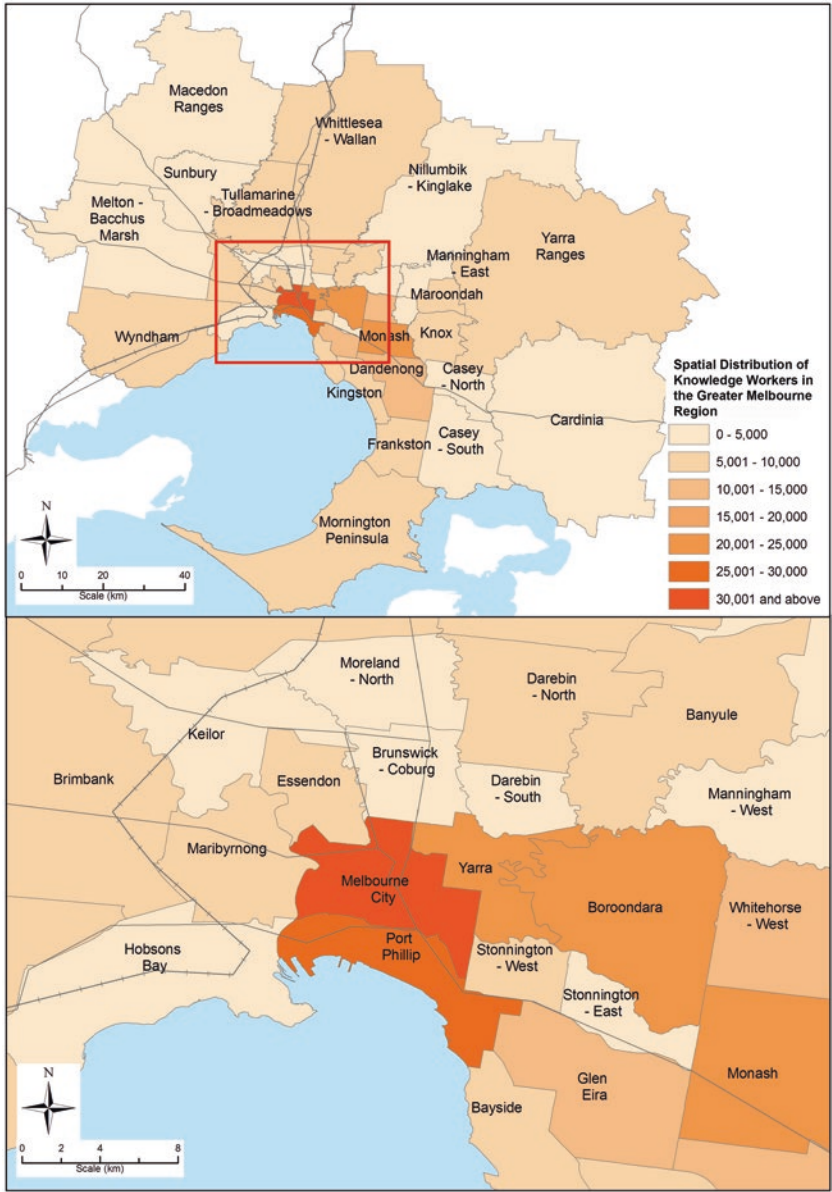


Fig. 3.6 Concentration of knowledge workers in Central Melbourne, 2011
Source: Australian Bureau of Statistics (2018a), created by the authors

is new products and services, either applying pre-existing methods or new methods. China will soon be one of the world's largest winemakers and exporters, despite few environments agriculturally suited to winemaking. Nevertheless, by utilising the new techniques and technologies developed largely in Australia and France, the Chinese can produce wine in environmentally challenging areas. Similarly, drone technologies are used to bomb a terrorist facility in Pakistan and to deliver parcels for Amazon. Now delivery robots are walking on streets in Beijing, dispatching parcels for China's e-commerce giant Jingdong, which used to be the most labour-intensive aspect of business for this hi-tech retailer. Combinations of new and old technologies and their related applications are forming the core of business competitiveness and disrupting the global market. Of these, disruptive technologies, the game-changing innovations that revolutionise industries, have the greatest impact.

Producing disruptive innovations has become the end goal of innovative places around the world. Silicon Valley, Soho in New York, and South of Market in San Francisco are all places that attract human capital consisting of primarily young, well-educated, and adventurous risk-takers. They generate economic productivity by incubating entirely new modes of thinking, producing new information systems and forms of organisation. Some of these, Uber and Google, for example, are transforming entire industries. Such innovation clusters inflate local talent density while also contributing to economic development at the city and national level. National economies have become reliant upon these innovation clusters and the attributes that define them. In the past, the inventor had to remain close to the machinery or apparatus of invention. Information technology, as discussed in Chap. 1, has made the world flat, with instant fluidity between manufacturing, design, and human capital. However, the heart of the twenty-first-century knowledge economy remains in the urban core, a space often comprising no more than a 3-km radius. Agglomeration is the defining feature in this equation. Without it, innovations would be few and far between, and limited in their economic impact.

Innovation opportunities are reshaping urban competitiveness. The difficulty with setting a goal of innovation is that every other major city is aiming for that same goal, whether it be through designing attractive environments, creating a support network for entrepreneurs, or promoting a culture of creativity and diversity to attract talent. Innovation is a globalised urban strategy nowadays. Active engagement with global competition will propel our cities to pursue innovation and enhance competitiveness. This

will further attract businesses, big and small, to choose our cities as their organisational and operational locations, which in turn will drive the reputation, economy, and standing of our cities. Entrenching new businesses and markets in a city increases the likelihood of future innovation, creating a positive feedback loop. In the next chapter, we will examine global examples of innovative places, and draw insights that can inform innovative place making for Australian cities, a new source for our cities’ competitiveness.

APPENDIX: METHODOLOGICAL NOTE ON THE IUCI

The IUCI contains six dimensions, and each dimension contains three indicators with specific measures as presented in Table 3.3. We used relative weighting and equal weighting to compute the index: relative weighting is

Table 3.3 Dimensions, indicators, and measures for the IUCI

<i>Dimensions</i>	<i>Indicators</i>	<i>Measures</i>
Governance	Business friendliness	Legal and regulation framework for ease of doing business
	Government structure	Governance consolidation and fragmentation
	Governance innovation	Digital governance capacity in urban management and services
Connectivity	Physical connectivity	Number of air passengers
	Virtual connectivity	Broadband access
	Intra-city connectivity	Metro length by land area and population
Enterprise hub	Global services	Advanced producer service firms
	Finance	Financial services and transactions
	Creative economy	Global creative and cultural firms
Creativity and diversity	Innovation capacity	Research and development outputs
	Universities	Number of world top 500 universities
	Cosmopolitanism	Foreign-born population percentage
Liveability and attractiveness	Cost of living	Cost of housing, transport, food, clothing, household goods, and entertainment
	Health	Medical supplies and services, sanitation, and infectious diseases prevention
	Attractiveness	Number of international visitors
Environmental sustainability	Air	Air quality by micrograms of particulate matter per cubic metre in air
	Energy	Energy consumption per capita
	Cars	Private car ownership per thousand population

Source: The authors

used for each indicator; equal weighting is used for each dimension and the overall index. We collected data for the 18 indicators from individual case study cities. The original data were in different forms and were standardised for each indicator. Of the 11 cities, the city with the highest value (or best performance) was standardised as 10, while the city with the lowest value (or worst performance) was standardised as 1, and the remaining cities were weighted according to their original values between the highest and the lowest. This standardisation method means that the values for one city's indicators are relative rather than absolute; that is, their values are relative to the values of the other cities in the group. With a maximum value of 10 and a minimum value of 1 assigned to each indicator, we computed the value for each dimension by aggregating the values of the three subordinate indicators, and the overall IUCI by aggregating the values of the six dimensions. The underlying assumption for the aggregation is that the three indicators are of equal weight in each dimension; and the six dimensions are of equal weight in the IUCI. Thus, an 'ideal' city could achieve a value of 30 for performance in each dimension, and a value of 180 for the IUCI.

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Global Innovative Places

INTRODUCTION

In this chapter we analyse examples of innovative places from around the world to better understand how such places develop and thrive. This case study analysis can then inform the planning and creation of great places to regenerate Australia's innovation and to drive Australia's knowledge economy. A place-based innovation approach is already happening overseas. In the United States, cities such as Boston, San Francisco, and New York are re-gearing their economic capacities by innovating and re-creating traditional economic bases, fostering new economic activities, and exploring new business models in old districts. Germany and Finland are following similar models, while South Korea and China are now developing innovation districts and wielding great influence in the global market for new technology through national strategies. Australia, though, has failed to adopt or effectively implement similar strategies.

In many respects Australia is unique. Unlike the United Kingdom, France, and much of Scandinavia, Australia does not operate within the shelter of the European market. Neither do we wield the vast market share of the United States. We also remain culturally and politically distinct from the BRIC (Brazil, Russia, India, and China) nations. The innovative places within these economies act as the springboards to the global knowledge economy. They either are dependent on large markets in proximity, or are unique and boutique markets themselves. By unravelling the case study

places, we are not calling for a revolution in Australia's economy, but instead, an evolution which draws on the experiences of global leaders. To move forward, we must learn from these places, picking and choosing the parts that best suit our unique social, economic, and political contexts.

The case study places are designed to be representative, and they include innovative places that we have observed or studied, or for which we have provided advice or participated in planning. These cases illustrate general attributes that may be relevant to the Australian contexts, but our central aim is to suggest what factors have worked and what have not. While the United States has a similar socio-economic environment to Australia, our analysis is not America-centric. We have also selected cases from Asian and European systems. Given the globally recognisable nature of Silicon Valley as an innovative leader, we start with it and the United States, then move to Asia, and end with Europe.

UNITED STATES

Silicon Valley, California

Silicon Valley is in the San Francisco Bay Area's San Jose metropolitan region. At the heart of Silicon Valley is Santa Clara County, which has a low population density of approximately 530 people per km² (United States Census Bureau 2010). Silicon Valley has a highly diverse population, with 37 per cent of residents foreign-born (Massro and Jennings 2016, p. 6). With easy access to urban amenities in the Bay Area, enjoyable weather, and low crime rates, life in Silicon Valley is let down only by its high cost of living. The Bay Area generally rates strongly in international liveability indices.

Silicon Valley is globally renowned for its leading innovation capacity and productive outputs of new technologies and inventions. Housing hundreds of start-up firms and home to hi-tech giants such as Facebook, Yahoo, Google, and Apple, the Valley is indeed a global innovation engine. Several factors have contributed to this success, including its culture, collaborative system, and entrepreneurialism. In the 1950s, a culture of collaboration, idea-sharing, and risk-taking played an important role in Silicon Valley overtaking Boston's Technology Corridor (Route 128) in hi-tech innovation. Excellent research institutions, federal and state government funding, high-skilled immigration, university and private sector leadership, and coordination between government, university, and private

sector actors jointly created an international innovation leader (Baily and Montalbano 2018). This active collaboration between university, industry, and government has been a hallmark of the Valley:

- Universities are an integral component of Silicon Valley, and have played a major role in knowledge generation and sharing. Stanford University is a world leader in research in electronics and has a tradition of collaborating directly with industry. In the 1950s, Stanford University created the Stanford Research Park in cooperation with companies such as Hewlett-Packard and IBM. This facility now houses over 20,000 employees working for more than 150 companies.
- Inter-firm collaboration and competition have formed an innovation network and value chain. Collaboration is not limited to universities and industry. Fluidity of knowledge and personnel movement between competing firms is a unique component of the Valley. It is natural for many start-ups in such a high-risk environment to fail. But with this failure comes knowledge and experience that employees take with them to other companies or start-ups, thereby increasing the capabilities of other companies in proximity or more broadly in the sector.
- State and local governments have played a major role in the success of the Valley. A number of government-funded research centres were located in the area, which was of crucial importance in the early stage of its formation as an innovation hub. These centres include Lawrence Berkeley, Lawrence Livermore National Laboratories, and the Stanford Linear Accelerator. Government policy has also shaped the region, especially in allowing for universities and inventors to take ownership of their own patents rather than these becoming government owned.
- A very entrepreneurial and risk-taking culture has contributed to the business prosperity of the Valley. The corporate structure of many firms within the Valley encourages innovation and collaboration. The standout feature of these firms is their ability to integrate their innovation strategies with the overall aims of broader communities. Private and public incubating facilities increase entrepreneurs' access to relevant industries and soft services of legal, accounting, and management support, and facilitate the marriage between start-ups and venture capital.

Silicon Valley benefits from the transport infrastructure in the San Jose region and surrounding areas. With the Norman Y. Mineta San Jose International Airport, the San Francisco International Airport, and the Oakland International Airport in the region, Silicon Valley is well connected internationally and domestically. A variety of transport options from these airports, such as the Bay Area Rapid Transit (BART) system, further cater to international travellers and other business visitors, ensuring a smooth transition to and from the business centres of the Valley, and the wider Bay Area’s connectivity.

In Silicon Valley, a culture of risk-taking and entrepreneurialism has been thriving. This culture is further supported by the presence of high levels of venture capital. Venture capital firms and other companies and individuals have invested heavily in start-ups within the Valley, due in large part to its past success stories and the substantial soft support services available in the area. Easy access to venture capital for start-ups not only nurtures a risk-taking culture, but also serves as a magnet to attract and encourage entrepreneurs to create the next breakthrough firm. Creating a start-up in Silicon Valley forces entrepreneurs to vie with countless competitors. This type of risk-taking and capital-attracting environment builds and promotes itself over time, leading to a natural expansion of the innovation ecosystem. The Valley’s prior successes have created long-term positive feedback loops, attracting and retaining entrepreneurs, investors, and talent in an ever-expanding innovation region.

But Silicon Valley does not keep moving forward without challenge. One recent article in *The Economist* warns that Silicon Valley’s pre-eminence in the global innovation system is on the wane: high costs of living and property prices mean more people are leaving than moving to



Fig. 4.1 Silicon Valley venture investment, 2002–17
Source: Wikimedia Commons (2017), licensed to use under Creative Commons

it, and hi-tech firms and venture capital are turning to attractive places elsewhere to diversify their business locations (The Economist 2018). From 2015 on, the venture capital investments and deals both started to turn downward (Fig. 4.1). As a flagship in the global innovation system, Silicon Valley's importance might be reduced with the rise of other innovative places around the globe, but it will nevertheless continue to be the strongest innovation hub in the foreseeable future.

Silicon Valley is unique in that it has developed, in a way, naturally over time, despite low population densities and a lack of directing vision. This natural evolution and the liberal cultural tradition in the Bay Area cannot be readily copied. There is no single policy or regulatory practice that has promoted the creativity and diversity of the Valley. The Valley has become its own brand, one that cities worldwide try to copy. Innovative places come in many forms and the Silicon Valley formula is perhaps the hardest to replicate and least applicable to the Australian context, even if it has been the most successful.

Emeryville, California

Emeryville, California, is a good illustration of a small (less than 3 km² in area), well-bounded, and easily identifiable innovative place. An indirect result of Silicon Valley, Emeryville is located just across the Bay from San Francisco on the major east-west rail line connecting California to the East Coast. The City of Emeryville has a population density of approximately 3100 people per km² (United States Census Bureau 2010), and 28 per cent of residents are foreign-born (United States Census Bureau 2017). If Emeryville were not situated adjacent to the University of California at Berkeley, which boasts more than 40 Nobel Prize winners, and without its entrance to the freeway leading to downtown San Francisco, it would have almost no strategic advantages. It is these two attributes—a world-class university anchor and natural accessibility—that have directly cast Emeryville into the biotechnology limelight.

Emeryville became an innovative place in the right location at the right time. It was formerly the home of noxious industries that had no alternative areas in San Francisco to produce their goods and dispose of their wastes. These industries declined in the 1970s and Emeryville found itself on the brink of bankruptcy in the late 1970s. In this same period, however, Silicon Valley reached a point where hi-tech firms were running out of physical spaces. It happened that the latest ventures of the time were in

biotechnology, thereby naturally favouring locations near the University of California at Berkeley. Furthermore, the nearby City of Berkeley, where the University was located, proved resistant to firms generating or disposing of potentially toxic materials within its borders. Emeryville, with old industrial spaces designed to hold combustible materials, was well placed to step in. It was not long before entrepreneurial academics and venture capitalists found Emeryville the ideal site for the development of new biochemical and bioenergy scientific enterprises (Fig. 4.2).

Because of Emeryville's history with chemicals and pharmaceuticals, it was not long before large firms worked with these existing entrepreneurs to create a new foundation for the biotechnology industry. Through this process the city quickly became known as a hotbed of biotechnological innovation. Furthermore, entrepreneurial real estate development companies acted as major landlords, incubating start-ups and supporting established companies through providing flexible spaces for their growth. Wareham Development leased offices to many biotech labs, and was



Fig. 4.2 Emeryville labs, California
Source: The authors

responsible for several award-winning developments that used innovative planning to encourage job creation and to provide affordable housing. Their clients now include two large biofuel ventures in one building: Amyris Biotechnologies—a synthetic biology company to re-engineer yeast to make biodiesel; and the Joint BioEnergy Institute (JBEI), which is currently researching an enzyme capable of breaking down cellulose in non-food plants used as biofuel feedstock. The JBEI originally received federal funding through the Department of Energy.

The expected profits or outcomes of these ventures have not yet come to fruition, and this may still take some time. But they have acted as the foundation for the biofuels and biotechnology industry in Emeryville. They are stimulating existing firms to engage in these new markets. British oil giant BP spent \$500 million on a lab called the Energy Biosciences Institute with a similar research basis and aim. In addition, since the formation of Amyris, a significant investment in upgrading transportation within Emeryville has been made to increase connectivity, due in large part to a desire to attract further investment and entrepreneurial activities.

As an innovation hub, Emeryville has seen mixed results. In the short term, Amyris acted as an anchor, drawing in other firms in the biotechnology industry. However, a relative lack of regulatory flexibility and vision, uneasy intra-district accessibility, and a lack of soft support services have been barriers to exploiting the long-term potential of the area. The city has become strongly tied to its brand and identity as a biotechnology innovator. However, without a clear strategy or vision, its strategic future as an innovation leader is uncertain. In addition, Emeryville must improve its built environment—an industrial legacy—and liveability to attract and retain human capital for its biotech sectors, competing with many other attractive places in the San Francisco Bay Area.

Boston's Innovation District

Boston has a population density of approximately 4900 people per km² and an ethnically diverse population, with 27 per cent of its residents foreign-born (United States Census Bureau 2010). Boston was ranked the world's 34th most liveable city in 2017 by *The Economist* (The Economist Intelligence Unit 2017). Boston's Innovation District is nestled between Boston's transportation gateways: abutting Boston Harbor, adjacent to Logan International Airport, and at the nexus of two major interstate highways. It previously contained the largest tract of underdeveloped land

in the City of Boston. Unlike many other innovative places in the United States, this district has no anchor university or research institute; instead the city government is the main actor (Baily and Montalbano 2018).

Boston's Innovation District was launched in 2010 to build Boston into an innovative city. It was the direct result of former Mayor Thomas M. Menino's initiative to renew 1000 acres of the South Boston waterfront and transform it into a place that fosters innovation, collaboration, and entrepreneurship, to maintain the city's competitiveness. A partnership led by the City of Boston and the Boston Redevelopment Authority (BRA) (now the Boston Planning and Development Agency) with the private sector, the district has generated over 5000 new jobs, and has an economic focus on technological and creative industries. The City of Boston did not use public funding and incentives to attract business into the district. Instead, it negotiated with real estate developers to instil 'Innovation Uses' into development plans and used public relations to encourage entrepreneurs and start-ups to relocate to the district (Morisson 2015). The 'Innovation Uses' required by the BRA included innovation spaces like laboratories, small business incubators, shared co-working spaces, public event and exhibitions spaces, and hotels. The BRA also required provision of innovative and affordable housing for the knowledge workers, and flexible spaces for living and working, co-housing, and public sharing.

The District Hall is one of the district's 'Innovation Uses' (Fig. 4.3). The District Hall has an area of around 1100 m² and was opened in 2013. It was established through a unique public-private partnership. It was funded and built by real estate developer Boston Global Investors as its first project in the precinct, and was leased back to the City of Boston and the BRA at a nominal cost of US\$1 per year in its early years of operation. Then the City invited the Cambridge Innovation Centre, an innovation space solution provider, to design an innovation hub concept, and to manage and hold the lease of the District Hall. Branded as 'Boston's Public Home for Innovation', the District Hall serves as an event venue, technology hub, and public workspace comprising free public facilities and private spaces for networking and collaboration. The District Hall provides not only physical infrastructure, but also educational opportunities for interested businesses and citizens. It regularly hosts free talks and programmes on subjects ranging from exploring innovation in Boston to improving existing client services. The District Hall now plays an important networking role for entrepreneurs and new business owners in the Boston area. It



Fig. 4.3 District Hall, Boston's Innovation District

Source: The authors

is an example of the successful production of an innovation space through a focus on collaboration and networking.

Boston's Innovation District is a prime illustration of the power of vision and branding. It is frequently cited in publications and media reportage on innovation districts as a best practice example. There is now a course at the Howard Graduate School of Design bearing its name. Using itself as an anchor to attract entrepreneurs, start-ups, and human capital, the district promotes a collaborative innovation system and a culture of creativity. Through collaboration with real estate developers, its provision of educational classes, collaborative spaces, and free facilities, it has increased Bostonians' awareness of and access to creative industries and soft support services. It presents an example of the promotion of a culture of creativity necessary to a city's success through cross-sector collaboration and entrepreneurship between the government, industry, and the community. This is a formula that can be replicated on a small scale in cities and towns across the globe, and shows the strength of a concerted innovation vision and strategy.

ASIA

Zhangjiang Science City, Shanghai

Zhangjiang Science City, Shanghai, reflects the role of government in the planning and development, from scratch, of a new place for innovation. It was rebranded as Zhangjiang Science City from Zhangjiang Hi-tech Park after the launch of the new *Zhangjiang Science City Construction Plan* in late 2017. Beginning with an area of only 25 km² in 1992 when it was first planned, the precinct expanded to encompass 94 km² in the new 2017 plan. When Zhangjiang Hi-tech Park was initially planned, it was a national-level hi-tech development park forming part of the bigger Pudong New Area development and opening strategy, together with three other national-level development parks—Lujiazui Financial and Trade Zone, Jingqiao Export Processing Zone, and Waigaoqiao Free Trade Zone. Since 1992, Zhangjiang has experienced four distinctive phases of development (Table 4.1).

Table 4.1 Zhangjiang development phases

<i>Phases</i>	<i>Periods</i>	<i>Strategic planning and development</i>
Phase I: Zhangjiang Hi-tech Park formation	1992–99	‘Pudong development and opening’ national strategy A national level hi-tech development park Focus on constructing infrastructure and attracting FDI
Phase II: Zhangjiang Hi-tech Park growth	1999–2009	‘Focus on Zhangjiang’ strategy by the Shanghai Government Acceleration of development: support, investment, and incentives Key industry sectors: integrated circuits and software, information technology, and biopharmaceutical industries Zhangjiang self-identity: China’s Silicon Valley and Medicine Valley
Phase III: Greater Zhangjiang	2009–17	Amalgamation of Kangqiao Industrial Park and Shanghai Pharmaceutical Park Shanghai-wide innovation brand of Zhangjiang China (Shanghai) Pilot Free Trade Zone
Phase IV: Zhangjiang Science City	2017–	Shanghai—a global science-technology and innovation centre Positioning of ‘a national science centre’ Global Shanghai strategy From Park to City

Source: The authors

These four phases have marked significant transformations of Zhangjiang's planning and development within the past two and half decades. Zhangjiang phase I in the 1990s was about its formation as a hi-tech park with a focus on infrastructure construction and attracting foreign direct investment (FDI). In this phase, Zhangjiang was part of the Pudong New Area's development with a specialisation in hi-tech sectors; its own identity was in a formative stage. Zhangjiang phase II in the first decade of the new century experienced a stage of rapid development, largely thanks to the Shanghai government's 1999 'Focus on Zhangjiang' strategy to accelerate the speed of its development through supporting measures, such as a one-stop service for incoming enterprises, venture capital and special funds for entrepreneurs, tax and financial incentives, and the integration of industry, education, and research and development (R&D). In phase II, Zhangjiang built up its branding as China's Silicon Valley and Medicine Valley based on its rapid development of clusters in the sectors of integrated circuits, software, information technology, and biopharmaceutical industries. In this phase, many parks for different clusters were established to provide quality space for innovation activities, such as the Pudong Software Park (Fig. 4.4). These new parks in phase II demonstrated better urban design quality and public spaces than phase I construction.

Zhangjiang phase III saw the development of a Greater Zhangjiang to incorporate the new areas of Kangqiao Industrial Park and Shanghai Pharmaceutical Park from the Nanhui District, when the Nanhui District was amalgamated into Pudong New Area in 2009. In phase III, the Shanghai government integrated all 22 hi-tech zones across the city under the brand of 'Zhangjiang Innovation Zone'. Thus, Zhangjiang became an innovation brand for the whole of Shanghai. Zhangjiang phase IV formally acknowledged its future development as 'Zhangjiang Science City' and strategic transition from Park to City, signalling a shift of focus from hi-tech industries to city making and place making. This repositioning of Zhangjiang was aligned to Shanghai's new strategic plan *Shanghai 2035*, which was approved by the State Council in late 2017, targeting the establishment of Shanghai as an 'excellent global city'. *Shanghai 2035* also set a vision for Shanghai to become a global science-technology and innovation centre. Zhangjiang plays a leading role in carrying out these city-wide visions, and Zhangjiang itself has been positioned in the *Shanghai 2035* strategy as a national science centre. These grand visions—at the



Fig. 4.4 Pudong Software Park, Zhangjiang Science City

Source: The authors

national, city, and place levels—will guide Zhangjiang’s planning and development in the coming two to three decades.

Zhangjiang presents a typical Chinese approach and pace in urban construction and in the development of an innovation district. There are several takeaways from the two and half decades of Zhangjiang’s planning and development. First, it has been government-led from the very beginning, starting from rural land. But the government has been very entrepreneurial and flexible in designing its strategy and policy to attract investment, mainly FDI, through infrastructure provision, favourable tax incentives, and enhanced support services. Second, Zhangjiang’s development has been closely linked to China’s national strategy: for example, the Pudong New Area development in the early 1990s, and the recent strategy to be an Innovation Nation. Third, the focus on place-based innovation capacity itself is also important. Zhangjiang reveals a hybrid approach to growing innovation in China, which combines state developmentalism at the national government level and local entrepreneurialism at the

hi-tech park level (Zhang and Wu 2012). For the hi-tech industry clusters in Zhangjiang, government has played a critical role in the initial stage of infrastructure development and investment invitations. In later stages, these industry clusters have grown their own capacities to join the global knowledge flow and to become internationally competitive.

One-north, Singapore

One-north, branded as Singapore's very own Silicon Valley, covers an area of approximately 2 km². It was strategically positioned and developed to host a cluster of world-class research facilities and business park spaces, to support the growth of biomedical sciences, information and communication technology (ICT), media, physical sciences, and engineering (Fig. 4.5). It is located about a ten-minute drive from downtown Singapore, and is linked with the whole city's metro system. It is in the immediate vicinity of the National University of Singapore, National University Hospital, Singapore Science Park, and Singapore Polytechnic. This prime location provides close linkages to these research and tertiary institutions and facilitates cross-fertilisation of ideas and research–industry collaborations.



Fig. 4.5 One-north Business Park, Singapore

Source: The authors

One-north is an experimental enterprise established by the Singapore government to make a catalytic place for innovation and to build the city state's global competitiveness in the knowledge economy. Launched officially in 2001, the park has been developed by JTC Corporation, a Singapore government development branch formerly known as Jurong Town Corporation. The park was master planned by the celebrity Zaha Hadid Architects. Its planning and development has been characterised by mixed use, connectivity, rejuvenation, and identity. The area is well served by road and rail networks and has a large, mature residential population base in nearby private and public housing estates. Combined with educational institutions, residences, and recreational amenities, One-north creates a work-live-play-learn environment conducive for attracting the creative class and generating innovation. This approach aims to make it a melting pot of talent, ideas, and business opportunities.

The development of One-north is a long-term strategic investment to promote an innovation-driven focus for Singapore's economic development, so as to maintain Singapore's cutting-edge position in Asia. It is a government-led attempt to transform Singapore into the new knowledge economy. One-north is more than an R&D space. Its planning involved considered selection and reworking of residential areas as a 'little Bohemia' to foster new-economy cultures (Wong and Bunnell 2006). The vision was to create an exciting place to attract, nurture, and sustain a dynamic, vibrant, and distinctive community of innovators, students, professionals, technopreneurs, researchers, venture capitalists, corporate lawyers, investment bankers, business consultants, e-commerce specialists, and even media stars and artists. This diversity of talent could live, work, congregate, or just be there, to interact with each other, to exchange ideas, collaborate and strike deals, or just to have fun.

Teheran Valley, Seoul

Teheran-ro, a 3.5 km section of Korean Highway 90 in the Gangnam district of Seoul, is colloquially known as 'Teheran Valley', after Silicon Valley, because it is a hub for the ICT industry. Seoul has a staggering population density of 16,364 people per km², and is one of the largest cities in the world by population (Seoul Metropolitan Government 2017). Seoul boasts an efficient transportation infrastructure. Incheon International Airport and Gimpo International Airport connect Seoul globally, and are linked to the city's public transit systems of metros and

buses. Most international flights come into the Incheon International Airport, which is up to a 40-minute train ride from the downtown area. Despite a high cost of living, Seoul achieves a reasonably high liveability ranking compared with other Asian cities, and is in the mid-upper range of liveable cities in the world.

Ranked number one in the Bloomberg Innovation Index (Bloomberg 2015) and number seven on the Arcadis Sustainable Cities Index (Arcadis 2015), Seoul's growth as an innovative city can be largely attributed to the role of government in promoting and investing in the city. In 1981, R&D investment accounted for 0.81 per cent of South Korea's gross domestic product (GDP), whereas by 2005 this had increased to 2.9 per cent. This increase reflects the implementation of the National Research & Development Program launched in 1982. One central aim of this programme was to expose Korean firms to international markets and competition. The government offered tax incentives for businesses that invested in R&D and worker development, and provided financial incentives based on their export performances. The government also invested heavily in education. With these initiatives and investments, the South Korean government ensured that the country was well prepared for development through training and providing a pool of highly educated workers. In the Bloomberg Innovation Index 2015, South Korea ranked number one in post-secondary education (Bloomberg 2015). Korean business names such as Samsung are now global commercial and hi-tech brands. In recent years, the government has turned much attention to branding Seoul as an innovative city.

The development of Teheran Valley has been one outcome of this government-led strategy. Teheran Valley is home to an increasing number of start-ups and entrepreneurs, as well as global giants such as Google and Facebook. Teheran Valley is a legitimate rival to Silicon Valley. Its excellent broadband infrastructure and innovation environment have led to Google introducing its first Asian entrepreneurs' campus, housing eight start-ups including WantedLab Inc and Fluently Inc. Underpinning these advancements is further government backing to build a creative economy and to attract entrepreneurs through providing support services and facilities such as incubators, accelerators, and innovation centres. Attracting overseas innovation business is paying off in terms of building up a Korean-global innovation circuit. For example, Google has introduced Korean start-ups such as SparkLabs to the US market and helped them build a global profile. These international collaborations have enabled South

Korean companies to work against their traditional approach to business, and to create a more risk-taking corporate culture, much like Silicon Valley.

The government's strategic role, coupled with private sector and social groups, have facilitated the rise of ICT entrepreneurs and the hi-tech industry cluster in Teheran Valley. This has involved a dynamic interplay between the state, ICT entrepreneurs, and other social forces in the post-industrial restructuring process in South Korea. Importantly, the Korean state continuously and flexibly revised its mode of governing in response to technological change and social demands, forming a 'relational governance' system involving partnerships with enterprises, large and small (Jung 2013).

In South Korea the government invested heavily in and created a regulatory and policy environment conducive to innovation. Investments in post-secondary education led to long-term increases in human capital, while a focus on R&D investment has ensured sustainable outputs of innovation activities. These factors have led to Seoul having the fourth highest density of hi-tech firms in the world and the highest level of patent intensity internationally (Bloomberg 2015). South Korea's formula of a government-led innovative city strategy has firmly established Seoul as a place for innovation, attracting entrepreneurs from across the world, and winning the city and nation a global reputation for innovation.

Tsukuba Science City, Japan

Tsukuba Science City has long been part of the Japanese government's efforts to promote innovation as a national strategy. It is an icon of Japan's developmental state in the 1960s, and achieved notoriety as a 'technopole of the world' (Castells and Hall 1994). This innovation area is located within Tsukuba City, 50 km from Tokyo, and is home to innovation businesses, three universities (University of Tsukuba, Tsukuba Gakuin University, and Tsukuba University of Technology), and approximately 30 per cent of Japan's research institutes. Tsukuba City itself had a population density of approximately 800 people per km² in 2015 (Brinkhoff 2017), a low density in the East Asian context. The City's closest airport—Ibaraki Airport—is up to a 50-minute drive away, and Narita International Airport up to a one-and-a-half-hour drive away. Public transportation within the city is mainly a bus system and the major transport mode is car driving. Tsukuba is a safe city with a low crime rate, and enjoys high liveability. The city has



Fig. 4.6 Civic Garden, Tsukuba Science City

Source: The authors

a reputation as a ‘garden city’ (Fig. 4.6). When it was first planned and constructed in the 1960s, it was meant to alleviate the overcrowded population pressure in Tokyo through transferring research and education institutions and maintaining an environment of a balanced garden city.

The rise of Tsukuba Science City as a world leader in R&D can be attributed to government investment, and collaboration between the government, educational institutions, and private businesses. In 1963 the Japanese government, with Cabinet approval, selected Tsukuba district as the construction site of a Science City and subsequently passed a Tsukuba Science City Construction Law in 1970. After more than two decades of construction, Tsukuba City was established through merging three towns and one village in 1987. Decades of consistent planning and construction with a focus on research and education lifted Tsukuba Science City to an innovative place of international influence. In 2011 the Japanese government designated it as a Special Zone for Comprehensive International Competitiveness. Designating a science city as an international competi-

tiveness zone verifies our argument in Chap. 3 for the growing role of innovation in global competitiveness. Tsukuba Science City presents a good example of the power of vision paired with a focused strategy by the national government. It began as an international garden-campus-suburb concept, and has now developed into an in-between place: somewhere between an independent city and a suburb of the Greater Tokyo region (Miao 2018).

The Japanese government is the traditional driving force for innovation in Japan, and has aggressively pursued innovation policies to invest in scientific infrastructure, provide incentives for R&D, and support commercialisation of inventive ideas. Under the guidance of the government, the three universities in Tsukuba Science City have taken a proactive role in transforming innovation outcomes into economic outputs, and building partnerships with non-governmental agencies and firms. Japan's innovation activities, including those in Tsukuba Science City, are closely linked with the Japan External Trade Organisation, which has a mission to promote Japan as an innovation destination for foreign investment. This strategy has successfully attracted growing foreign investment in Tsukuba. A mature innovation ecosystem in Tsukuba Science City has created a hotbed for hi-tech entrepreneurs and start-up ventures.

Japan is an innovation powerhouse of global influence. It ranks third in the Bloomberg Innovation Index for R&D intensity (Bloomberg 2015). Japanese patents accounted for approximately 25 per cent of the world's total patents in 2010–17. Much of Japan's growth and progress in innovation are attributed to the vision and leadership of the government, which is strongly reflected in the development of Tsukuba Science City. Long-term investments in human capital, a focus on branding (e.g. Tsukuba International Science Expo in 1985), and more recent improvements in accessibility, such as the construction of the Tsukuba Express Line from Tokyo in 2005 (Fig. 4.7), have paved the way for Tsukuba to become a world innovation leader. However, Tsukuba Science City is also facing challenges in the changing national and international landscapes of the knowledge economy. Nationally, the broader policy environment in Japan is shifting from a developmental to a post-developmental state, with reduction in the direct government intervention or support for innovative places that Tsukuba experienced in much of the later twentieth century. Internationally, challenges come from rising innovation competitors in South Korea and China, making it more difficult to insert Tsukuba into an increasingly globalised market for skilled labour and to secure it a central

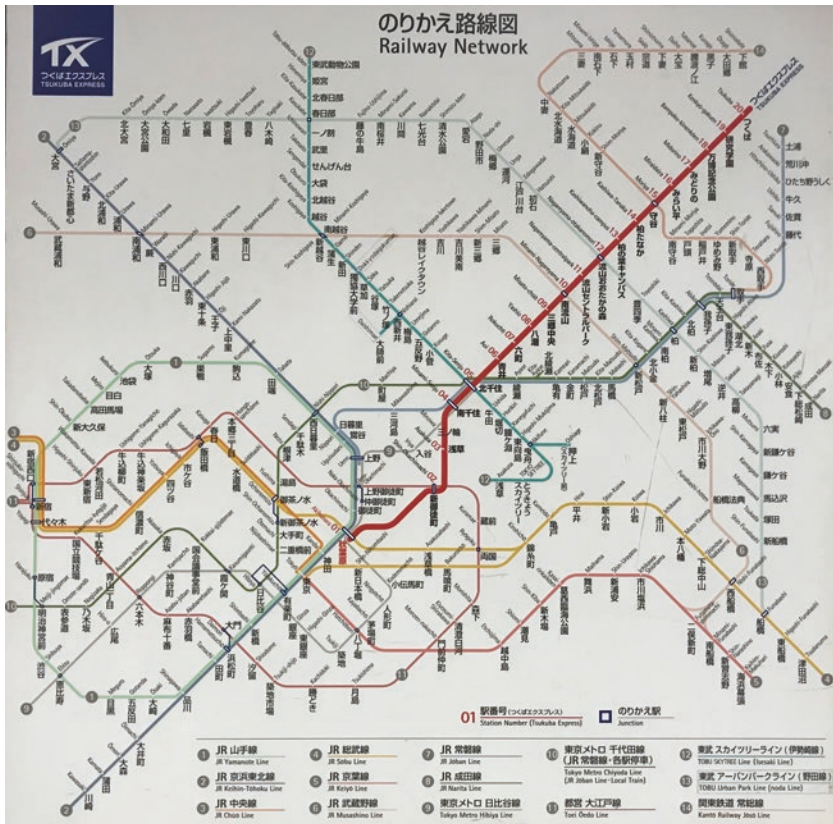


Fig. 4.7 Tsukuba Express Line

Source: The authors

position within the global science landscape (Miao 2018). However, these challenges confront not only Tsukuba, but other innovative places elsewhere in a globalised competitive innovation system.

Bangalore Technology Parks, India

Like the Japanese government with Tsukuba, the Indian government has focused on Bangalore as an innovation centre. The city had a population density of approximately 11,500 people per km² in 2011 (Brinkhoff 2017), with a relatively homogenous 78.87 per cent Hindu population

(Census Organization of India 2015). Bangalore is serviced by the Kempegowda International Airport with up to a two-hour drive from the city, depending on traffic. The area generally suffers from busy traffic and congestion, with relatively poor transportation infrastructure. To an extent, however, the city has overcome some of these problems through utilising ICT and digital networks to circumvent its accessibility problems.

Bangalore ranks poorly on international liveability indices, ranking 146th out of 231 in Mercer's Quality of Living Survey (Mercer 2017). However, the city is recognised internationally as a technology, education, and ICT hub for its abundance of hi-tech companies and workers. The evolution of Bangalore as a technology cluster has been associated with hi-tech ups and downs in Silicon Valley. In the late 1990s heyday of dot-com, there was a high demand for Indian-trained engineers to work in the Silicon Valley region. In 2001, when the dotcom bubble crashed in Silicon Valley and the United States more broadly, many Indian hi-tech workers returned to Bangalore, creating an influx of human capital. This circular migration of knowledge workers linked both the destination country and the source country with these migrants' innovation capacity and knowledge diffusion.

The large number of well-trained workers in the region has resulted from the importance placed upon education throughout its history. India invested in a long-term vision of human capital, and despite temporary emigration of much of that capital to Silicon Valley, benefitted from it in the end. Early ruler Krishna Raja was a passionate advocate of education and played a key role in the creation of a research institution named the Tata Institute, later renamed the Indian Institute of Science. The Indian government poured funding into the region for a number of reasons, including its culture of innovation, hi-tech infrastructure, connection to major cities such as Madras and Hyderabad that also had large pools of educated workers, and the large hi-tech workforce present in the region. This collaboration of political will and place-based human and infrastructure resources led to Bangalore becoming one of the world's major hi-tech centres.

Occupying Bangalore are several technology parks that offer hi-tech companies the opportunity to access facilities and resources to start and develop their innovation products and services. These parks include Bagmane Tech Park, International Tech Park, and Ecospace Business Park. As the region grew, it became the headquarters for several anchor

firms and organisations such as the National Aerospace Labs, the Indian Space Research Organisation, and Hindustan Aeronautics Limited. Bangalore became a world-class innovative place specialising in information technology because of several factors: education, a hi-tech workforce, and hi-tech infrastructure, all backed by government funding support and vision. Today, Bangalore is not only a government-backed hi-tech centre but a globally recognised networking centre for entrepreneurs to bring ideas and generate innovation. It is a complete innovation hub that links people, ideas, and innovative products and services for the international hi-tech market.

EUROPE

Soho, London

Soho is located in Westminster, London. It is known worldwide as having a cluster of creative and media industries. Historically, artists, writers, and particularly immigrants flocked to the area. It has a vibrant, diverse culture as seen throughout the district in the form of eateries, cafés, and pubs and clubs, forming an innovative milieu for its creative cluster (Fig. 4.8). From the 1980s, Soho's industries started to restructure towards a creative economy of media, fashion, and entertainment. The urban amenities, cultural and historical flavour, and the creative industries mix together in the small area of 2.5 km².

Soho's cluster of media and film companies rivals Los Angeles. Its creative industries form a value chain internally and externally linked, comprising film, TV, and music products, and design and advertising services. The central nodes of Soho's value chain are advertising companies and marketing and sales agents, which facilitate commercialisation of the media products and services and their access to the UK and global media markets. On the fringe of the value chain are human capital and investment. The cluster of artists and media talent in Soho provides a key pivot to support the creative industries. Soho's proximity to the City of London provides easy access to the world's leading financial and business services. The uniqueness of the media value chain in Soho is that it specialises in film, TV, and music industries only; it does not include other media such as publication, printing, news, and magazines. As a media cluster area, Soho does not house the headquarters of any giant companies. Most companies are small or medium-sized, or are run by individual artists.

Fig. 4.8 Soho, London
Source: The authors



Historically, London could not take full advantage of its film post-production opportunities because of its geographical distance from Los Angeles. However, digital infrastructure improvements have seen London successfully grasp innovative opportunities to establish a post-production powerhouse. An example is Sohonet, a faster and more reliable version of the internet that allowed large files to be transmitted from one computer to another at high speeds and covering long distances. Sohonet was the world's first network solely dedicated to one specific industry, linking film post-production companies with each other and with collaborative com-

panies overseas. This digital infrastructure was part of the UK government's *Digital Communications Infrastructure Strategy* (2015), aiming to create an ultrafast broadband available to all premises across the country.

Soho's cluster of media industries contributes to London's status as a creative capital. Media and creative industries are the second largest sector in London, behind business services only. Of every five new jobs created in London, one is in the media industry. In 2004, the London Development Agency (LDA) launched a plan called *Creative London* to maintain London's role as a global creative leader. This plan attracted funds from government and the private sector to set up venture capital, provide intellectual property (IP) and legal support, and organise marketing and promotional events. The LDA also established a special Creative Space Agency to mediate between artists and investors, to find suitable spaces for artists, and to attract more creative talent to work and live in London. The *Creative London* plan was in itself an innovative government initiative, and has been followed by similar plans for other global cities, including New York.

Tampere, Finland

Tampere City in Finland is situated 200 km north of Helsinki, with a population density of approximately 1200 people per km² in 2015 (Brinkhoff 2017). This city is often forgotten in liveability indices in light of Helsinki's successes. However, the city benefits from the high levels of liveability, attractiveness, and accessibility that characterise Finland as a nation. It is serviced internationally and domestically by the Tampere-Pirkkala Airport, only 13 km from the Tampere city centre. Tampere is recognised as one of the most innovative places in the world. It is home to 36,000 university students and 34,000 technology industry professionals, and accounts for nearly two-thirds of Finland's economic activity and up to 15 per cent of Finland's R&D budget (Business Tampere 2016).

Tampere has become an innovative region through collaboration among government, industry, and academia. This collaboration is encouraged by Finland's platform-based innovation strategy to pursue open innovation. Universities, companies, communities, and citizens are encouraged to interact, learn, experiment, and co-create new businesses, products, and services. The knowledge capacity of Tampere University of Technology and Kauppi Medical Campus attracts both local and foreign businesses to the area. Firms within Tampere have focused on innovation

and R&D whilst also running cluster programmes, networking and training services, promoting testing and development environments, and assisting foreign companies to establish operations in the region. Tampere boasts of its human capital. Locally based popular writers, television comedies, and regular cultural festivals have made the area appealing to the creative class. The assets that have facilitated knowledge-based development in Tampere include its very good regional image, competent regional actors, congenial atmosphere, and eagerness for future-oriented development (Lonnqvist et al. 2014).

Finland has long focused on participating competitively in the global knowledge economy through attracting and retaining knowledge workers, and provides an example of a nation shifting from a forestry to a manufacturing and then a knowledge economy (Park and Lee 2005; Schienstock 2004). It was among the first countries to adopt a national innovation system for its technology and innovation policy; its systems approach has a strong focus on regional development through technology transfer, skilled labour, networking, and a diverse range of capital providers for innovation, both private and public (Roos et al. 2005). From the late 1980s, nationwide networks of technology parks and centres of special expertise were set up in Finland, which was identified as one of the top four ‘Innovation Leaders’ in the European Union (EU), together with Sweden, Germany, and Denmark (European Commission 2014). Tampere’s long-term initiatives have worked to promote and encourage entrepreneurial activities in a creative culture. Its urban development programme ‘Grow Smart Together’ has led to it becoming a finalist in the 2017 European Capital of Innovation contest (European Commission 2017).

Berlin, Germany

Berlin presents an example of a holistic approach to innovation. It has been branded as a ‘Creative Metropolis’ teeming with artists: there are an estimated 20,000 artists living and working in Berlin (Dercon 2015). It has an approximate population density of 3900 people per km² (Brinkhoff 2017). Berlin has a high level of liveability, ranking third in Monocle’s 2015 Quality of Life Survey (Monocle 2015). The city boasts a plethora of open spaces and cooperative working spaces. Berlin has made such cooperative spaces openly available while also providing educational opportunities and support services. With more than 40 incubation

precincts currently operating in the city, Berlin has achieved a reputation for entrepreneurialism and collaboration, with a focus on creative and social businesses.

Germany was ranked as one of the ‘Innovation Leaders’ in the EU, with innovation performance well above the EU average (European Commission 2014). The German vision of innovation differs from the standard formula in that it aims at the need for widespread productivity gains, rather than focusing on individual industries. This holistic approach has been led by a government engaged with a number of universities and institutes, such as the Fraunhofer Institute, to provide education support and inject new ideas into industries. Like most innovative places examined in this book, education is also a key to the success of the innovation system in Berlin. Overall, this system innovation approach focuses on unlocking the potential of citizens through the provision of high quality collaborative spaces and services to nurture home-made talent. Such a system has the benefit of not overly relying upon single industries, such as the reliance on the biotechnology industry in Emeryville, or on ICT in the Bangalore hi-tech parks. This holistic approach insulates the city’s economic base from over-reliance on a small number of industry sectors to diversify its knowledge economy.

Copenhagen, Denmark

Copenhagen provides a unique case of innovation based around its social system, life sciences, and clean-tech industry. Denmark has a ‘classless’ social structure. This social culture influences the corporate world, which encourages open collaboration that thereby creates a more innovation-friendly environment. Much of the innovation in Copenhagen has been orchestrated by the municipal government and supported by both society and business. These supports include unemployment benefits and free higher education that allow firms to take larger risks because if failure occurs, welfare support will be available as a back-up. Denmark has a world-leading healthcare system where both parents can take paid maternity or paternity leave—a Danish ‘flexicurity’ that mixes neoliberal flexibility and democratic welfarism in healthcare.

Medicon Valley is one of Denmark’s particularly well-known innovative places and is a leading international biotech cluster and life sciences hub spanning the Greater Copenhagen region and southern Sweden. The name Medicon Valley has been in use since 1997, in part borrowing from

Silicon Valley and in part reflecting the area's cluster in medical technology and production. Medicon Valley has a unique 'triple helix' ecosystem made up of companies, academics, and the public sector, comprising 28 hospitals (11 university hospitals), 3 global R&D pharmaceutical companies, more than 200 medical technology companies, more than 150 biotech companies, 3 universities (Lund University, Copenhagen University, and Danish Technology University), and world-class research facilities such as the European Spallation Source (Copenhagen Capacity & Invest in Skane 2018). This ecosystem fosters an innovation environment within a commercial framework, under which both Danish and Swedish governments have employed ambitious strategies to build long-term strategic partnerships, provide advanced research support and facilities, and bridge business and academia. Medicon Valley Alliance is one organisation dedicated to such collaborative initiatives and networks. Life sciences companies in Medicon Valley employ 41,300 people, accounting for 58 per cent of the total employees in the life science sectors in Denmark and Sweden (Andersson et al. 2017). Life sciences are on the national agenda for Denmark and Sweden, and contribute a significant portion of the two nations' hi-tech exports to the principal markets of the United States, China, and Japan.

Denmark has the highest expenditure on tertiary education by percentage of GDP in the Organisation for Economic Co-operation and Development (OECD) nations at nearly 8 per cent (OECD 2014). Together with Finland, Germany, and Sweden, Denmark was named an 'Innovation Leader' in the EU, with innovation performance well above the EU average (European Commission 2014). Denmark not only excels in its eco-friendly infrastructure, but is also a world leader in clean-tech industry as a result of 30 years of focused energy policy. Denmark's renewable energy consumption share is projected to be 40 per cent in 2020, and targets are for at least 50 per cent by 2030 (Danish Energy Agency 2017); both these are above the EU targets by a large margin.

Copenhagen is famous for its eco-friendly infrastructure, particularly its cycling planning and infrastructure. Its driverless metro line will service the entire city in 2019. With more than 50 per cent of the city's workers commuting by bike, Copenhagen leads the way in creating an environment that encourages people to participate in active travel, such as the Copenhagen Super Cycle Highway, and train carriages custom made to carry bikes. Copenhagen is exporting its cycling and pedestrian-friendly urban design and planning model to other global cities. Danish architect

Jan Gehl, who led the transformative design of Copenhagen's public space and public life system, has advised on many cities' urban design policy and practice, including New York, London, and the Australian cities of Melbourne, Perth, Adelaide, and Sydney.

Copenhagen has a unique social and innovation system. The combination of a classless society, social welfare system, eco-friendly policy, highly educated workforce, and people-centric liveable urban design have not only led Copenhagen to become a world leader in innovation, but have placed it amongst the top cities for liveability in the world. This liveability further enhances its reputation and global competitiveness as an innovative city.

22@Barcelona, Spain

Barcelona's knowledge hub is known as 22@Barcelona, and is located in the district of Poblenou within 2 km of the city centre and near the coast. The 22@Barcelona district has helped shape Barcelona as a leading European smart city. The city's compact form and grid layout have inspired the New Urbanism movement since the 1980s, and have won the city a global urbanism brand for attractive space (Fig. 4.9). The urban form stimulates innovation and encourages collaboration through compactness and proximity, and appeals to international visitors and entrepreneurs. The Mediterranean climate, long coastline, entertainment, services, urban design, and city brand provide entrepreneurs and talent with a great lifestyle that complements their innovation work.

The first half of the twentieth century saw a strong concentration of textile industries in Poblenou. The district evolved from unplanned rapid industrialisation that produced a land layout distinctly separate to the main city (Charnock and Ribera-Fumaz 2011). Over time, these textile industries declined and left behind abandoned buildings. Some sites were adapted for other purposes such as garages, workshops, and transportation companies (Jutgla and Pallares-Barbera 2015), but industries continued to decline and many historical buildings no longer had a use. The Poblenou district became an area locally known for low employment and low income.

This industrial decline and the city's prime location made Poblenou an ideal district for urban redevelopment. Redeveloping rundown parts of the city was inspired by the transformation of the Montjuïc district in preparation for the 1992 Olympic Games, which created shared spaces between residential and commercial uses in a compact urban design



Fig. 4.9 Las Ramblas Street, Barcelona

Source: The authors

(Barber and Eastaway 2010). Starting in 2000, Poblenou was referred to as 22@Barcelona, and was intended to become a hub of knowledge and innovation under the former Mayor Joan Clos. Three core objectives were laid out for the redevelopment of the district: urban refurbishment—a diverse and balanced environment for recovering economic dynamism; economic refurbishment—an important scientific, technological, and cultural platform; and social refurbishment—a district for new professionals and social participation (Barber and Eastaway 2010). Media, biomedical, ICT, energy, and design were the industrial clusters prioritised for future growth (Pareja-Eastaway and Pique 2011).

The redevelopment scale was massive. Land that was previously zoned for industrial use was changed to new uses for the knowledge sectors. Hard urban spaces were replaced with open green spaces. In the end, 35 km of city streets were re-urbanised; 4614 existing dwellings were refurbished for social housing; and another 4000 new homes were created (Barber and Eastaway 2010). These spatial redevelopments paid off economically. By 2012, a total of 55,000 jobs and over 1500 companies were established in the district (Bakici et al. 2013); more than 70 per cent of the employees and companies were in knowledge-intensive sectors (Pareja-Eastaway and Pique 2011). Further, 22@Barcelona has provided a healthy environment for smaller businesses to operate: a 2011 study found that 68

per cent of companies employed no more than ten people, with most of these companies having all of their employees located in 22@Barcelona (Pareja-Eastaway and Pique 2011).

To support industrial clustering, the Barcelona city government relocated public companies and universities to support the redevelopment of the district. Density of employment and workspaces was increased to allow for short distances between places and centres, to spark innovation. The Barcelona city government has also introduced the Barcelona Urban Lab programme to further encourage innovation and collaboration. This programme has encouraged testing of innovative products and services for urban space improvements within the district in the first instance, in order to develop new solutions and ideas in areas such as sustainable living, planning, and advanced mobility (Bakici et al. 2013). Once tested successfully, the companies in Barcelona can promote and sell new ideas and innovations globally.

22@Barceloma has evolved from a dilapidated industrial site into a fully integrated innovative place and an international benchmark of innovation development. It presents a successful example of innovation-led urban redevelopment underpinned by strong civic leadership and vision, innovative planning solutions in zoning and urban design, global branding of the city in the post-Olympics period, and collaboration and entrepreneurship. Barcelona's urban redevelopment started in the years leading up to the 1992 Olympics Games, and has continued ever since to shift from an industrial economy to a post-industrial knowledge economy. The pioneering innovation district development of 22@Barceloma has put the city in a leading position in the latest global smart city movement.

ENABLING FACTORS

We summarise in Table 4.2 the enabling factors of the global innovative places examined in this chapter. Here we do not want to develop a formula that is applicable to innovative places anywhere. This is neither necessary, nor is it possible. As we can see from our discussion of the case studies, several places have taken their names from Silicon Valley, or used Silicon Valley as a model to copy or follow when the vision for a place was first developed. As it turns out, none of these places has proved to be another Silicon Valley. Silicon Valley is unique; its success has never been transplanted or effectively copied. Each of the cases we present is unique, resulting from a set of enabling factors that replicate no other case exactly.

Table 4.2 Enabling factors of global innovative places

<i>Global innovative places</i>	<i>Enabling factors</i>
Silicon Valley, California	Natural development over time University–industry–government–community collaboration Liberal cultural tradition in the region Risk-taking and entrepreneurialism Venture capital Liveability
Emeryville, California	Small and clearly delimited Adjacency to a world-class university and a global city Transition from noxious industries Specialisation in biotechnological innovation Anchor firms Entrepreneurial real estate developers
Boston's Innovation District	Waterfront urban renewal Concerted innovation vision, strategy, and branding Collaboration and networking platform Intensive financial resources An anchor place to drive a city's innovation brand
Zhangjiang Science City, Shanghai	Government-led planning and development from scratch National strategy for science and technology innovation Favourable policies on land and tax to attract investment, firms and talent Transition from a hi-tech park to a city
One-north, Singapore	State developmentalism and local entrepreneurialism Government-led cluster of research facilities and business park National strategy for the new economy Proximity to universities, research institutes, and amenities Work–live–play–learn mixed environment to attract and retain talent Clearly articulated and effectively implemented vision and strategy
Teheran Valley, Seoul	ICT-focused National strategy for hi-tech industries Innovation capacity-building through education Flexible and adaptive planning and policymaking to enable technological and market changes
Tsukuba Science City, Japan	Government lead and investment in scientific infrastructure Proactive locally based universities Collaboration between government, educational institutions, non-government agencies, and private business Long-term investment in human capital Focus on branding Conservative corporate culture

(continued)

Table 4.2 (continued)

<i>Global innovative places</i>	<i>Enabling factors</i>
Bangalore Technology Parks, India	ICT-focused Emphasis on education Government investment in human capital Presence of quality workforce Research institutions
Soho, London	Historical precinct's economic transformation Vibrant and diverse local culture Specialised cluster of film, TV, and music industries Internally and externally networked value chain Digital infrastructure
Tampere, Finland	Greater London's creative base and strategy National innovation leadership and system Government–industry–academia–community collaboration Human capital and education Regional knowledge assets, image, and culture Urban development programme
Berlin, Germany	Liveability National innovation leadership Holistic approach to innovation Focus on productivity gains 'Creative Metropolis' branding
Copenhagen, Denmark	Liveability Education National innovation leadership Classless society Innovation-friendly environment Government investment in higher education Highly educated workforce Eco-friendly infrastructure and policy
22@Barcelona, Spain	Corporate culture encouraging open and creative collaboration Civic leadership and vision Urban redevelopment from industrial legacy Compact urban form and design City brand Liveability Collaboration and entrepreneurship

Source: The authors

However, this does not mean that we cannot learn from these examples. The diffusion of best practices among these and other places in the world has contributed to their origin, evolution, and success. While not a blueprint, Silicon Valley was the inspiration for a number of places which are now world leaders in innovation.

There are multiple ways to understand innovative places. While places in the same country differ in innovation pathways and specialisations, places in different countries may share common visions and strategies. Silicon Valley and Emeryville are located in the same San Francisco Bay Area, but they had different evolution processes: Silicon Valley developed naturally, and Emeryville emerged in the right location at the right time as a spillover of Silicon Valley. Boston's Innovation District demonstrated an approach that seems more Asian than American in that it has been orchestrated by the city government; it was innovatively planned and developed into an innovative place. Of the Asian places, four (Zhangjiang Science City, One-north, Teheran Valley, and Tsukuba Science City), despite being in different countries, employed a strong government-led approach in vision, planning, and funding, and aimed to become their own versions of Silicon Valley. For three of the places in Europe (Tampere, Berlin, and Copenhagen), a systems approach that involved a well-coordinated national innovation system played a key role in their long-term innovation capacity-building. 22@Barcelona is an international pioneer in redeveloping an innovative place from an industrial legacy, capitalising on the city's assets of internationally appealing urbanism and lifestyle. These places also differ in terms of innovation specialties. ICT or biotechnology are not necessarily the focus areas of all places. For example, Soho is a cluster of media and creative economy firms, and 22@Barcelona's innovation is more diversified than most places. A place like Zhangjiang Science City is repositioning itself from a hi-tech park of several specialised hi-tech sectors to become an entire city of innovation paired with urban amenities for liveability. This new direction suggests a move from traditional hi-tech parks to urban place making in the latest round of innovation-led urban planning and development.

CONCLUSION

In this chapter, we organised these innovative places by the continents in which they are located. However, this does not mean that a typology should be developed based on their geographical locations. As suggested

by the enabling factors summarised above, these places share both commonalities and differences that are not necessarily geography-based. We intend to draw insights from all the cases presented here and suggest useful lessons for making innovative places in Australia and developing a knowledge economy. Our interest focuses on the variety of approaches we have found in these innovative places, and what lessons and directions they can provide in the Australian context. For this purpose, in our next chapter we further dissect the global innovative places described here to seek patterns of approaches and attributes that define their success.

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Dissecting Innovative Places

INTRODUCTION

On the basis of the previous chapter's examination of 13 innovative places across the world, in this chapter we offer an anatomy of the characteristics and mechanisms that have helped these places develop and succeed. Each of the places has been studied from various academic and professional perspectives. We are the first to put them together to draw out takeaway messages for innovative place making. Local contexts differ, but pursuing innovation is a shared aspiration. Innovation is a rare type of policy goal in the sense that it draws consensus among stakeholders in the public sector, the private sector, and the general community. This consensus occurs despite the diversity of sociopolitical systems and the different stages of economic development we have seen in the innovative places described in Chap. 4. The contemporary challenges and embedded conflicts of economic growth, environmental protection, and social equity require innovative thinking and solutions to achieve balanced sustainable development and to enhance integrated competitiveness. We are exploring how place-based innovation may suggest a new direction.

We start with four approaches that have been employed in making the innovative places we discussed in the last chapter: the anchor approach, the hub approach, the community approach, and the stand-alone approach. Then we introduce each of the five attributes that have defined the success of innovative place making: cluster, anchor, brand, social good, and

government. Based on these approaches and defining attributes, we develop an innovative place ecosystem: a triple helix system comprising collaboration, acceleration, and urbanism. We argue that the interactive mechanism of factors within the triple helix structure enables the making of an innovative place. Drawing upon these analyses and interpretations, we suggest a set of lessons for making innovative places and pursuing innovation in Australia.

INNOVATIVE PLACE APPROACHES

Innovative places share strikingly similar characteristics. However, the particular mixture of the characteristics is unique to each place. Well-known innovative places have evolved differently. Some have emerged from existing opportunities, such as the availability of specialised infrastructure; some were the product of international investment or domestic policy interventions. The way these innovative places evolve is determined by the approaches taken. These approaches can be classified into four categories: the anchor approach, the hub approach, the community approach, and the stand-alone approach. Their corresponding characteristics, and representative places that have been created through following these approaches, are summarised in Table 5.1. And then we discuss each approach in more detail. Note that a place cannot be built by following one approach only. Often, an innovative place's creation involves the application of several approaches, but one approach might play a major role, or a more important role, than the other approaches.

The Anchor Approach

The anchor approach is based on facilities like a university, hospital, research facility, or a large-scale manufacturer or manufacturers with some research base, being the seedbed for start-up activities that build on this existing institutional environment. The anchor may also be a place like Silicon Valley where an agglomeration of hi-tech firms already exists, or a university such as Stanford University acting as a supporting environment for start-ups in an already highly competitive space. There are also anchors based on science and technology facilities, such as the life science research facility in the Greater Copenhagen region's Medicin Valley and the bio-tech cluster that has spun off around this facility.

Table 5.1 Innovative place approaches

<i>Innovative place approaches</i>	<i>Major characteristics</i>	<i>Representative places</i>
The anchor approach	Anchor facility: university, hospital, large-scale manufacturers Ecosystem to create new enterprises Innovation on the fringe Village atmosphere comprising innovative spaces, housing, and amenities Intensive public design and development	Silicon Valley Emeryville Teheran Valley Tsukuba Science City One-north
The hub approach	Urban environments transformed Location is the key Networking locations or incubators Proximity to universities Promotion of social entrepreneurship Networking for social good	Silicon Valley Emeryville Boston's Innovation District 22@Barcelona
The community approach	Community regeneration Utilising existing facilities as platforms Improving local skills and community participation Relatively low cost and low resource demands	Boston's Innovation District Soho London
The stand-alone approach	Purposefully designed and built Intensive government investment Clear vision, strategy, and effective implementation 'Stand-alone' in terms of geography, function, and identity	Zhangjiang Science City Teheran Valley Tsukuba Science City

Source: The authors

These places usually have a long history of knowledge production. They can produce knowledge-intensive goods and services through taking advantage of the available research and development (R&D) and human resource pool to create new enterprises. In many instances, these new enterprises simply emerge from the technological ecosystem. 'Tech-eco' is a system of enterprise creation which arises from the notion that a large firm is not an appropriate vehicle for continuous technological extension and expansion. It is smarter for firms after they reach a certain size to spin off the technologies they have created rather than capturing them in their own space. This is why Google and Microsoft have not created greater vertical integration of business. Instead they have spun off new activities,

investing a small amount of money, time, and space in new ventures rather than using the old corporate approach to control the development of a product or service and then marketing it through the same channels and controls. For these firms, this approach works because they do not know whether a particular idea has merit and whether the investment that they put into it will yield a strong return. So it is smarter to let one million flowers bloom. Some of these internal and external start-up activities will yield marvellous new outputs that they can either recapture or use to build on the technological edge that they already have. The innovative disruption occurs on the fringe and not in the centre of these organisations. Similarly, some innovation districts we see around universities such as the University of Washington, the University of Pennsylvania, and the University of California at Berkeley (in Emeryville, California) are the direct result of those anchors trying to maximise their outputs with minimum intervention.

The anchor approach uses the ‘anchor’ to generate myriad start-ups and attract their associated capital, both human and financial, to the area. Some of these start-ups will yield disruptive technologies and products, with high returns. Many will fail, but in so doing set the groundwork for future innovation and build human capital. The anchor itself can either engage with these ideas or merely create a generative environment, whether cultural or physical, for them. Large innovation firms take the same approach. The Mission Bay district in San Francisco has a cluster of medical firms and laboratories (Fig. 5.1). These include Bayer’s CoLaborator. Bayer recognises that collaborative science is a new way forward. Establishing a place for collaborative research where there is already an anchor with the appropriate R&D capacity, such as the University of California at San Francisco’s (UCSF’s) medical school, allows Bayer to reap the benefits of these resources with minimum investment. So, by providing co-laboratory space, Bayer has developed the instruments for its own extended development without the corresponding investment.

Places with anchors have a corresponding design style. This is not a rigid orientation, but there are certain features that we can trace through our case studies. These types of places may have a small village or town atmosphere. They are now subjects of public space design, as illustrated in Philadelphia with the area around Drexel University and the University of Pennsylvania. In that district, we find a rational organisation of activities and movement in a public space, creating an environment to support the social and scientific activities fostered by an anchor there. An urban grid,



Fig. 5.1 Mission Bay's lab space, San Francisco

Source: The authors

in circular, radiative, or linear forms, helps organise people's movement and activities with easy access to, if not centred around, the anchors. Large innovation firms are often at the centre of the anchor approach and physical design of these spaces corresponds to these realities. Housing, amenities, and services are provided in an area surrounding spaces of innovation and collaboration. This is the same campus-style design used on a smaller scale by successful major firms to foster innovation and promote creative work. In many ways, campus design aims to further blur the line between work and life, encouraging smart work through seamless transition between these two spheres. The anchor approach requires intensive public space design and development to succeed. Although many innovative places have some form of anchor to varying degrees, the innovative places specialising in information and communication technology (ICT) and biotechnology—Teheran Valley, Tsukuba Science City, One-north, and Emeryville—especially fit into this approach.

The Hub Approach

The hub approach usually occurs in areas where the urban environment has proved conducive to creativity. Such environments are characterised by a high density of human capital and soft support services. The innovative places—Silicon Valley, Emeryville, and Boston’s Innovation District—in the San Francisco and Boston regions are excellent illustrations of this approach. In the San Francisco Bay Area, the presence of Google, Twitter, Yahoo, and other unicorn firms has attracted young professionals and creative workers. The urban environment has added to their ability to attract talent; and this talent has further improved the quality of the urban environment. The resulting density of human capital creates a positive feedback loop through attracting other related firms and young professionals. These urban environments are not always purposefully built, but are often transformed by the synergies among the firms and people attracted to them. The base attraction for firms and talent is these places’ urbanism and associated culture of creativity and diversity.

The hubs are mostly in urban areas, like 22@Barcelona. There are few suburban environments that can offer appropriate levels of accessibility and amenities. Campus communities are the natural reaction to a desire for a suburban setting with easy accessibility and proximity to urban spaces. These campuses allow workers to escape the city while still retaining access to its flavour and lifestyle. The city’s amenities, such as restaurants, pubs, museums, galleries, and theatres, are magnets for knowledge workers. While urbanism is key to the hub approach, innovation districts can, by accident or design, be outside cities, but within accessible distance. The innovative places in the San Francisco Bay Area and the City of San Francisco form such a relationship, which involves geographical proximity and cultural and functional links. The creative class is an urban class. Many young professionals work in Silicon Valley, but live in the City of San Francisco. The City of San Francisco is a focal hub of the Bay Area for its renowned urbanism and lifestyle (Fig. 5.2). Yahoo used to provide commuting buses for staff who worked in Silicon Valley but chose to live in the City of San Francisco.

Location is the key to developing innovation hubs. The co-location of economic activities affects the advantages and disadvantages that different cities have. Greater distances are unproductive, incurring extra costs of transportation and time, and may even lead to legislative differences. Areas



Fig. 5.2 Urban hub in San Francisco

Source: The authors

that feature reduced transport times and costs, increased accessibility, and access to educational or research institutions are favoured by knowledge-intensive sectors. Proximity to universities is especially favoured for knowledge spillovers. In addition, universities provide natural spaces for collaboration and cooperation among firms, research institutions, and academics. Educational institutions provide research and design infrastructure; they also increase an area's knowledge and human capital density. Innovation clusters occur in cities and near educational institutions for these reasons. For example, Stanford University and the University of California at Berkeley have successfully served such roles in developing innovative places in their region, such as Silicon Valley and Emeryville.

Innovation hubs usually act as either networking locations or incubators. In their role as networking locations these districts create a beehive of activities, assisting new entrepreneurs and start-ups occupying the spaces and engaging existing knowledge workers and firms. WIX in New York and several firms in web development and similar spheres of

creative information congregate in these networked spaces. Incubators engage city government, philanthropists, and investors, and provide working spaces and funding for new ideas and innovations. Incubating districts attract non-profit and social ventures to seed fund new but promising ideas. They are excellent actors for developing place-based human capital. They also promote social good: social entrepreneurship provides opportunities for individuals from all spheres of life to find solutions to the world's 'wicked' problems.

The Community Approach

In distressed communities, such as Roxbury in Boston, there is a new movement to bring technological and innovative solutions to regenerate communities. Community innovation programmes are one method used to achieve this. These programmes utilise existing schools and community centres, or other neighbourhood facilities such as libraries, as platforms for introducing research and other low-cost knowledge activities. This approach can be as simple as the creation of a local research club or as complicated as constructing a District Hall style innovation centre in Boston's Innovation District. These activities work to teach local residents and improve local skills, while also building a sense of community and participation. This subsequently makes these communities more likely to produce entrepreneurial ventures, while also attracting greater outside investment. This approach is growing in popularity and is usually coupled with other innovation activities, such as government funding and private venture capital, in the urban or suburban environment.

Community-based innovation spaces are often directly owned by arts or education institutions, or by government. Community innovation programmes share the use of these innovation spaces, due largely to their lower financial capacity, or they initially receive direct resources and support from the government or investors. They provide a new way of bringing innovative practices into locations that face challenges of community decline or economic restructuring and upgrading. These programmes create innovation capacity and human capital in areas where other approaches may fall short. Their effects are often less powerful than those of the other innovation approaches, but community programmes require less resource inputs to start and to experiment with. Community innovation programmes provide the missing link between innovation and struggling urban or suburban communities. Using this approach will be key to ensuring the health of Australian

communities that face the challenges of economic decline and falling population. With successful implementation, such communities could increase their potential to generate start-ups and become future innovation hubs.

The Stand-Alone Approach

The stand-alone approach applies to an innovative place purposefully designed and built to encourage innovation and grow a knowledge economy. Tsukuba Science City, Teheran Valley, and Zhangjiang Science City are all prime examples of the stand-alone approach. Stand-alones result from intense government investment in money, time, and resources. These three East Asian case study locations all built their success on strong political will and a national innovation strategy. These types of places require clearly articulated vision and strategy in the design stage, and need to be effectively implemented through strong co-ordination of actors and resources across several decades. Tsukuba Science City was a national government-led effort for more than half a century. The resultant outcome included not only Japan emerging as a leading innovation nation, but also the construction of a new city as a ‘stand-alone’ in the Greater Tokyo region (Fig. 5.3). Zhangjiang Science City is also a stand-alone, both geographically and functionally. When it was designed in the early 1990s as part of the Pudong New Area development, it was the only new development zone specialising in innovation activities, separate from the other three development zones which focused on finance and trade, free trade, and export-oriented manufacturing respectively. After nearly three decades of intense development led by the government’s vision and the inflow of foreign direct investment (FDI), it has grown to be a ‘stand-alone’ identity and brand as a national science centre to facilitate China’s transition from a manufacturing nation to an innovation nation.

The stand-alone approach is used mostly in Asian nations, which have employed a catch-up mechanism to propel their countries into the global knowledge economy. A similar approach, the multifunction polis, was once proposed in Australia. The idea was to create a separate innovation city using Japanese technology and financial support. However, it was determined that this would culturally and logically be a poor fit in the Australian context. We agree with this assessment. As a highly urban nation with pre-existing growth centres, Australia is better suited to improving and channelling its existing cities and infrastructure, rather than building a new city from scratch. But certain ingredients in the stand-alone approach can



Fig. 5.3 Tsukuba Centre

Source: The authors

provide useful lessons for Australian cities, including government's lead role in designing places to drive innovation and community renewal, and more important, the mechanisms to ensure consistent implementation over a long period despite political changes. We will discuss the particular roles of governments in co-creating innovative places in more detail in Chap. 7.

DEFINING ATTRIBUTES

We can pull out several common attributes that define the global innovative places we have examined. These attributes run through the approaches outlined above. The approaches govern the process and mechanism of making places; the attributes reveal the qualities characterising them. The approaches and attributes interact and intersect: for places that have employed the anchor approach, an anchor is naturally a defining attribute; for places that have evolved through the hub approach, a cluster is likely to be a key attribute. There is potentially a long list of attributes for any of

these places; the five we discuss here are the leading attributes shared by most places that are geared towards innovation. We first summarise each of the attributes then break these components down further and discuss their implications for providing a recipe for innovative places.

- **Cluster:** An innovative place is first a cluster of associated innovation actors that collaborate, compete, and share so as to further enhance their own and overall innovation capacity and output. The formation of a place-based innovation cluster has a good rationale—innovation requires more agglomeration than traditional industrial sectors. Digital technology does not reduce clustering but rather enhances it.
- **Anchor:** As noted in our discussion of approaches, many innovative places start with an anchor. These anchors, whether they are business entities or educational institutions, form the core of innovation districts and act to attract more firms and investors to an area. From these anchors the brand of an innovation district evolves.
- **Brand:** The brand of a place is its identity. Brand has a value, and is an important component of a place's competitiveness. It informs investors, firms, and talent what the place is about and what it has that may appeal to them.
- **Social good:** Social good derives from applying the disruptive technology and innovative practices incubated, developed, and commercialised from innovative places. It is in the application of these technologies and practices that their benefits are spread. It is not only economic growth that defines the success of a place; social well-being is also an important outcome measure.
- **Governance:** Government regulation and management are crucial in making a successful innovative place. However, a 'government' role alone is insufficient. There has been a shift of emphasis from 'government' to 'governance' to encourage collaborative planning and development. This requires partnerships with the business sector, community participation and engagement, and governance capacity building. Smart governance is the soft power that works to create competitive and attractive places and cities.

Cluster

It sounds counterintuitive, but place-based concentration matters more in a digital age. This contention is supported by the growing geographical clusters of hi-tech and other knowledge-intensive industries in the past



Fig. 5.4 Education and R&D clusters, Tsukuba Science City
Source: The authors

several decades. Geographical proximity and linkage between key players assure the density of innovation in a place. In Tsukuba Science City, there is a prominent cluster of universities and R&D institutes in proximity (Fig. 5.4). Innovative industries can benefit both economically and professionally (through improved innovation) by being located close to one another (Pratt et al. 2007). Face-to-face communication becomes easier with increased accessibility, bringing numerous benefits for brainstorming, knowledge sharing, and ready access to expertise. An industry cluster promotes cooperation and competition between firms, creating

areas where labour, information, ideas, and knowledge are easily accessible to businesses and social organisations within the cluster (Wu 2005). While firms within a cluster may struggle to remain on top, the cluster provides an ideal location for businesses to keep their fingers on the pulse of the industry and to identify opportunities for growth and innovation. A business's ability to keep on top of current trends and obtain up-to-date information outweighs the disadvantages of increased scrutiny and competition. Firms in clusters have numerous advantages over isolated firms.

Accessibility to key industries can affect a place's productivity. Firms in clusters often progress faster than firms by themselves. This helps in accomplishing innovation goals and strengthens local economies. Firms in clusters will also have a better understanding of buyer needs and trends than firms placed in separate locations, due to the proximity of competitors and sister firms. The concentration of specialised information-generating entities, buyer knowledge, and strong relationships between firms are significant advantages that clustered industries hold over their competitors (Porter 2000). Furthermore, these clusters promote an environment attractive to the creative class, making the attraction and retention of human capital easier (Comunian 2011).

Anchor

Innovation anchors are central to the early formation of an innovation area. They act as the force for drawing in investment, research institutions, entrepreneurs, and talent. Hi-tech anchors can be major firms that spur further start-ups. Other enterprises are drawn to the area by the supportive services and infrastructure that build up around major firms. Major firms such as Amazon and Microsoft are so large and diverse that they act as front doors for many smaller firms to participate in the innovation value chain. For example, Microsoft has its own campuses to capitalise on the local human capital and research environment, where workers can innovate, collaborate, and engage with sister industries and workers. Microsoft Research has labs in Silicon Valley, New York, Redmond, Cambridge UK, Montréal, Cambridge MA, and Bangalore. The Microsoft Research Lab (Asia) was established in Haidian district, Beijing, a well-selected place given its highest density of universities and R&D and its role as a leading innovation anchor in China.

Educational institutions are the most common anchor for the progenitors of innovation. Their relationship with the government and community,

the availability of expertise which they represent, and the access to research activities and infrastructure they provide are naturally conducive to innovative environments. Unlike other types of anchors, educational institutions actively engage with innovation, rather than just attracting innovators. They assist in the formation of anchor firms which further attract investors and entrepreneurs. Educational institutions fill a need for the management and disciplinary knowledge demanded by the innovation firms. New firms and their innovation activities often require their staff to engage with and learn from educational institutions. In this way, educational institutions and their facilities both promote the formation of innovation firms and further support their growth.

Innovation anchors have influenced the movement of firms across the world, and are often the base from which an innovative place grows. Google is moving some of its employees closer to South Lake Union to take advantage of the spillover effects and human talent that Amazon has created in that area. Microsoft is nearby in Renton, Washington, with a large contingent of highly specialised talent in the software and hardware arenas, which other firms can use or subcontract. South Lake Union is a beehive created by the queen bee Amazon. Similarly, the UCSF is the queen bee for many pharmaceutical firms in San Francisco's Mission Bay area (Fig. 5.5). Massachusetts Institute of Technology (MIT) and Kendall Square are another example of an educational institution's role as an innovation anchor. MIT is the backbone for many hi-tech Kendall Square firms, which range in focus from electronics to biomedicine. The talent and facilities MIT supplies are used by these firms, which cannot or should not invest in the high-cost laboratory tools and infrastructure the university provides.

The formation of anchors happens in multiple ways, whether through the presence of educational institutions, or through the success of an innovative start-up, or the relocation of a major firm or research facility. In Zhangjiang Science City, Shanghai, the local government agency lobbied the research branch of the Commercial Aircraft Corporation of China (Comac)—Shanghai Aircraft Design and Research Institute—to relocate into the area to become an anchor facility (Fig. 5.6). In the newest plan for Zhangjiang Science City in 2017, a considerable portion of land was reserved for the Institute's expansion and the future growth of a cluster in aerospace industries. The Pudong New Area, where Zhangjiang Science City is located, now enjoys a reputation in aerospace industries due to the presence of Comac's headquarters, manufacturing base, and research



Fig. 5.5 UCSF's presence at Mission Bay, San Francisco

Source: The authors

institute. An anchor is more than just a building or set of facilities. It provides an identity for a place, nurtures a culture, and further attracts associated firms and workers. This identity provides a strong basis to grow a place brand. Channelling this identity and creating a recognisable brand, as discussed next, is the new role of local government.

Brand

Innovative places are innovation brands. Like any brand, they are characterised by signature activities and images: creative industries in Soho, London, global connectivity in Bangalore, R&D in Teheran Valley, disruptive inventions in Silicon Valley, bohemian culture in One-north, and so on. The signature activities and images define the core competitiveness of these places, act as the primary draw for investors, promote a culture of innovation and entrepreneurship, and market the innovation outputs. Branding is about how to attract investors, firms, and knowledge workers to drive the innovation capacity in a local community. In an age of auto-



Fig. 5.6 Shanghai Aircraft Design and Research Institute, Zhangjiang Science City
Source: The authors

mation, a shift from fossil fuels to renewable energies, and the primacy of technologies, innovation capacity has become our currency. If innovation capacity is the currency, local innovation environments are the bank. A place's brand, then, reflects how easy it is to access, build, and use that currency and bank.

Silicon Valley is far more than an innovative place in California. It is a brand of global penetration and influence. It is a model that places across the world want to follow. It is hard to count the number of places elsewhere that bear the name of 'Valley' or aim at becoming their own versions of Silicon Valley. The power of branding assists Silicon Valley in attracting firms, talent, and venture capital, and continues to a global leader in innovation. A place's brand should be set in its vision at the very beginning, when new hi-tech parks or innovation districts are being planned. Achieving the vision should include a process of building up and promoting the brand. When Zhangjiang Science City, Shanghai, was first

envisaged as a hi-tech park in the Pudong New Area, the government set a vision for it to become an innovation district of international standard and influence. Thus an international innovation brand was designed in the early 1990s, when the site of Zhangjiang was still a vast expanse of agricultural land. Its planning and development in subsequent decades witnessed the rise of a hi-tech park and its brand, and then renaming it as ‘Zhangjiang Science City’ to further strengthen the brand. The Shanghai government also consolidated the branding of the hi-tech parks citywide under the name ‘Zhangjiang’. Zhangjiang as an innovation brand is now spearheading Shanghai’s innovation capacity and its increasing integration with the global innovation system.

Social Good

Innovative places should not aim only at economic growth. They should also commit to social good through using their innovation technologies and practices. They can help address social problems in local communities, such as homelessness and drug and alcohol abuse, and work for poverty alleviation and disaster prevention and relief. Collaborative planning systems can foster the involvement of firms in tackling these issues, even indirectly. Such systems can both increase long-term innovation capacity, and deliver concrete short-term public benefits. A central element of all these applications is establishing close connections among all concerned agencies to address the same social issue. Inter-agency collaboration in solving social problems through technological inventions provides a new channel for innovation firms to fulfil their corporate social responsibility (CSR).

For example, blockchain technology—the technology behind the Bitcoin—is being used to more effectively deliver food and other needed resources to victims of natural disaster or famine. This consists of a physical computer database stored in limited locations but accessible from any device with a connection. The key feature of this technology is to instantly record transactions, allowing for much greater accountability in both the financial and distributional sense. In 2017, the United Nations World Food Programme initiated a programme called Building Blocks using this technology, to provide food and cash support to famine-stricken families in Pakistan’s Sindh province (Alden and Haddad 2017). Payments were authenticated via smart phones connected to the internet. Using this technology sped up assistance to targeted areas at much lower costs than when traditionally delivered.

There are also places where organisations develop an early warning system for social problems, such as homelessness, through the creation of a database tracking the frequency of late rent payments. This system enables government to predict and quickly respond to growing social crises before they reached a boiling point. Several interventions are also being developed as pre- and post-disaster mitigation applications. In Australia, a strategy called Participatory Action Research directly involves vulnerable populations in both the definition of a problem and in the most effective and efficient means of addressing it (Rosler et al. 2015). This information is then fed into a database which enables all organisations concerned with the vulnerable population to access information on demographics, needs, and locations of vulnerable people; and on other organisations that are already engaged in addressing the problem.

New York provides another example, with its introduction of a database called StreetSmart that integrates information on the homeless population—including demographics, locations, and specific needs—that is now available to all organisations dealing with homelessness. This has greatly improved the efficiency of financial and other resources available to assist people who are homeless, and has dramatically improved the targeting of these resources (Palacio and Banks 2015). The internet-of-things (IoT) and ubiquitous access to information have significantly enhanced the application of innovation outcomes for achieving social good. Innovative places should be leaders in addressing social problems using innovative technologies and systems. Social good does not necessarily concern social problems only; it can be any form of public interest derived from an innovation capacity or facility. The District Hall in Boston’s Innovation District is simply open for public use for free or at a nominal cost to generate community-based innovation capacity through an innovative public–private partnership.

Governance

Local governments have a key role in making places and communities attractive and competitive while ensuring local businesses deliver concrete community benefits. This is often achieved through special zoning or performance-based zoning, since local governments are the enforcers and implementers of zoning. Local governments must maintain a flexible and healthy regulatory framework for land use in an innovation district. An innovation district is bounded, but its benefits are not. They have run-on

socio-economic impacts. Innovation districts, through government regulations and collaborative management, can provide efficient use of land and buildings, often involving recycling of these assets from an earlier, different use. Some local governments attract firms through the location and adaptive reuse of defunct infrastructure and buildings. Local government's power to influence and control these changes lies in its flexible control of regulatory frameworks.

Regulation is a means to an end: its purpose is not to limit but to enhance the public domain in innovation districts. Local governments often work with both community and business agencies to design and develop commercial, residential, and mixed-use spaces. Such iterative and consultative methods of development are not without their downsides. Community engagement, regulatory flexibility, and rezoning all take time. The increased time demand for developers, however, has hidden advantages. Time-intensive developments attract long-term investors and discourage fly-by-night development. As illustrated in the redevelopment of Boston's Innovation District, the government's lead role in planning for 'Innovation Uses' in collaboration with the developers laid a solid foundation for this place's success.

Community participation is more important in planning today than ever before. And with the proliferation of Twitter, Facebook, and other social media platforms, it has never been easier. Not that engaging with communities in the planning process is simple, but it is both feasible and necessary to ensure optimal results. The days of local governments controlling and setting the standards that firms must meet is ending. Local governments still play a key role in ensuring that quality and safety standards are met, but adaptive local councils are moving to a private-public co-development model to balance public and private interests. Encouraging new firms and developers to engage with the public brings the advantage of local knowledge and provides local people with greater opportunities to become emotionally and financially invested in a project. And social investment by firms has myriad run-on benefits, including, but not limited to, fulfilling CSR, enhancing public relationships, improving branding and marketability, and developing local human capital. The District Hall in Boston's Innovation District is one outcome of such a collaborative public-private partnership. Initiated by the City of Boston and the Boston Planning and Development Agency, the District Hall was privately funded and built by Boston Global Investor, but for public use.

These collaborative approaches to regulating, planning, developing, and managing innovative places mark a significant shift from government to governance. Governance is more than the government; governance includes all partnership activities designed to maintain an innovation location as a smoothly run organisation. Federal and state governments provide leadership and direction, while local governments provide the structure and regulation, firms are the apparatus, and the public are the gears and cogs of that apparatus. A successful innovation district relies on good leadership, and starts from this to develop structure, resources, and a built environment to attract capital, firms, and talent. A good governance structure will channel and manage its mechanisms so innovative places can transform, evolve, and adapt to meet the needs of the future.

AN INNOVATIVE PLACE ECOSYSTEM

The innovative place approaches and attributes described above do not work in isolation. They operate and interact to form an ecosystem that fosters innovation. Individually, none of the approaches or attributes will lead to an innovative place, nor will a mechanical composition of all of them together. It is the ecosystem that links them together to construct an organic entity and that enables the incubation, development, and input and output of innovation. This system-based thinking is the key to understanding how an innovative place evolves and works. We deconstruct three hinges—collaboration, acceleration, and urbanism—which underpin the mechanism of an innovative place's ecosystem (Fig. 5.7). The three hinges link the components of the system, and interact with each other, to operationalise the functioning of an innovative place.

Collaboration

The first hinge is collaboration. Collaboration is a system of people and firms working in a mutually advantageous manner to define, investigate, research, gain, or refine an understanding or output of an innovative technology, product, or service. Whether scientific, economic, or social, the aim of collaboration is to comprehend how a phenomenon works and to identify interventions that will transform, heal, reorganise, displace, or disrupt the phenomenon. For example, medical collaboration leads to new medical practices, drugs, therapies, or alternative methods of fighting disease. In a human organisation, collaboration can mean simply a new way



Fig. 5.7 Mechanism of an innovative place ecosystem

Source: The authors

of organising people that maximises the efficiency of delivering a good or service. The apps on smart phones and tablets illustrate this well: they are predominantly developed in a collaborative atmosphere with co-investigators searching for solutions using their collective skills. These collective efforts can draw from a diverse range of expertise, such as electrical engineering, physics, music, business, media, and social work. In the information era, collaboration has become common, due largely to the breaking down of accessibility and communication barriers through the IoT and ubiquitous technology. Collaboration has become an integral component of the lexicon for innovation. In every respect, our cities are collaborative laboratories of invention and collective platforms for sharing knowledge, and resultant wealth, fame, and opportunity. As illustrated by

Boston's Innovation District, the 'secret sauce' in the Boston area's innovation success is 'a mix of shared sense of purpose and a culture of collaboration' (Microsoft 2015, p. 7).

If we think about collaboration specifically with reference to innovative places, it broadly involves two types of innovative practices: horizontal collaboration and vertical collaboration. Horizontal collaboration involves parties working in the same area or parties from different areas working towards one shared goal. The business parks focused on ICT industries, such as Teheran Valley in Seoul and the hi-tech parks in Bangalore, have clusters of collaborators largely in the same area. However, parties do not have to collaborate just because of their commonalities. Differences can also lead to collaboration for the purpose of complementing one skill set with others. The complexity and uncertainty in addressing innovative issues require inputs and contributions from different disciplinary areas. It is hard for one person or institution to complete a major invention alone nowadays. Fortunately, today's digital advancement facilitates collaboration across the globe through online or cloud-based platforms, or the IoT. The other type of vertical collaboration involves parties working along one value chain of an innovative product or service. A typical example of vertical collaboration is the value chain of the media industries in Soho, London (Fig. 5.8). While the Soho area specialises in post-production of film and TV products, its value chain connects various service providers for these products, including advertising, marketing, graphic design, and art galleries, other providers of capital in the City of London, and movie-making and distribution firms based in Los Angeles. Very often, the collaboration mechanism in innovative places integrates both horizontal and vertical collaboration to facilitate innovation outcomes. The geographical boundaries of places are not barriers to collaboration any more, either horizontal or vertical. The ubiquitous access to digital technology disrupts the scope of collaborative innovation, geographically and conceptually.

Acceleration

Acceleration is the second hinge of an innovation place ecosystem. Acceleration involves the assembly of soft and hard support services and activities to improve efficiency, and is often provided or orchestrated by governments. Soft support refers to support services such as lawyers, technicians, accountants, and related actors that assist in business design and

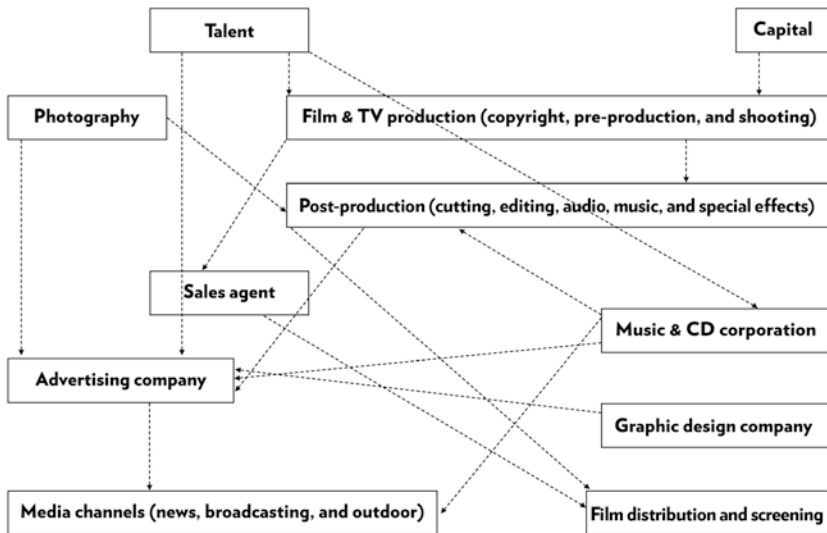


Fig. 5.8 Collaborative value chain in Soho, London

Source: The authors

development. Soft support can also come in new, innovative forms such as computer apps to streamline the regulatory and bureaucratic process. Hard support includes readily available or free-to-use physical and virtual infrastructure. In the early stages of newly developed business parks, hard support might include favourable tax policies, reduced land cost or even free land, and government subsidies for export-oriented hi-tech products. These supports were widely provided in the early 1990s by the Chinese government to support the growth of special economic zones (SEZs), most of which had a focus on ‘hi-tech’ or ‘international trade’, as reflected in the names they were given. These types of hard support gradually ceased when the SEZs evolved to a stage of maturity or self-sustainability. As the knowledge economy grows, soft support will increasingly prevail over hard support in accelerating an innovative place.

Launching a successful start-up requires a combination of marketing, legal, accounting, and management skills in addition to the specialist skills of the entrepreneurs. It is not enough to merely have a brilliant idea; the entrepreneur needs personal knowledge or access to specialist knowledge in order to design, produce, and distribute their innovation. Soft and hard support providers are embedded firmly within any successful innovative place,

and are a critical component of start-ups and the business development and delivery system. These providers do not have to innovate themselves; they accelerate innovation. An established government bureaucracy might get things done, but without acceleration its process is frequently exhausting, complex, and unsatisfying. Providing the resources, support, and environment for early stage entrepreneurs and their businesses in a single, easily accessible location by the government or government-commissioned agency is key to the acceleration of innovation. In short, acceleration both helps businesses to navigate and cut red tape, and assists them in moving through the maze of rules and regulations in design, development, and production stages. In Zhangjiang Science City, the Zhangjiang Administrative Service Centre, an accelerator to provide one-stop services for firms and individuals, is co-located with the local government's management agency to streamline the bureaucratic process (Fig. 5.9).

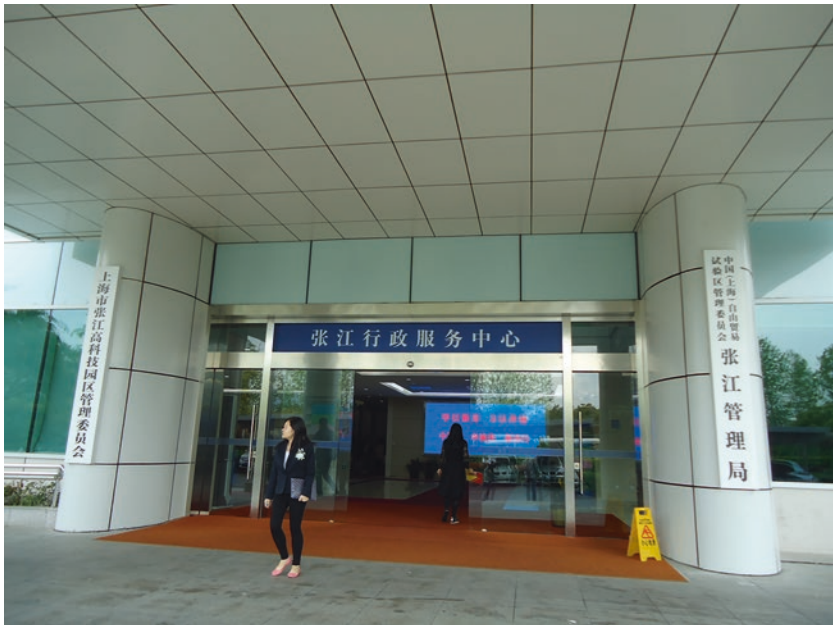


Fig. 5.9 Zhangjiang Administrative Service Centre
Source: The authors

Urbanism

The final hinge is urbanism. Urbanism is the sine qua non: without it there is nothing. Urbanism is the built environment, and the way in which it attracts and encourages innovation. Thus, the physical dimensions of connectivity, liveability, attractiveness, and sustainability all affect access to collaboration and acceleration, attraction of knowledge workers, and the creation of an environment of innovation. Urbanism is a magnet infrastructure itself, comprising networking, location and density, movement, migration, and liveability, which all combine to contribute to the making of an innovative place.

Innovative places develop and are developed in networks. A network brings with it investment, business know-how, soft support, or knowledge of legal and accounting practices. It also brings market knowledge and access that new firms seldom possess. Networking events can be organised by a business to draw knowledge and resources, and to brand the business. For example, the Canberra branch of the global urban consultancy AECOM regularly organises events on topical issues for cities, inviting participants from government, business, universities, and the community to be involved (Fig. 5.10). These events provide excellent networking opportunities for people who would seldom meet otherwise. Networking is the new buzzword for college graduates and job-seekers throughout Australia and abroad. It is now seen as an essential component of job searching and career progression. Networking within business locations, however, is a bit more sophisticated. Networking activities are organised and occur on certain evenings or during certain periods while projects are underway. Institutional networking has become highly organised and orchestrated. Professional event coordinators are employed to ensure positive networking experiences. In these fast-moving environments, old approaches to identifying the right human resources for an opportunity are too slow and cumbersome, frequently leading to dead ends or low returns. Networking locations are therefore central to the innovative place. For example, the District Hall in Boston's Innovation District occupies a central location in an urban hub, to accommodate networking activities.

Location and density are key elements of urbanism. Innovation locations can be relatively small areas that contain either many specialised firms or a wide variety of integrated sciences, arts, and other activities that work in harmony together. These firms and activities do not merely occupy the same area; they have synergy with one another. This synergy assists each



Fig. 5.10 Networking event on Brilliant Cities in Canberra

Source: The authors

party in reaching their objectives. Working in close proximity and sharing facilities stimulates collaboration and learning, in addition to efficiency gains from the co-location of lawyers, accountants, and other soft support services that facilitate innovation output and market entry. It is important to locate specific innovation spaces in places where everyday support activities and amenities are within easy reach of all participants. In these settings, technical experts and non-technical workers engage with one another over lunch, during a workout at the gym, or in any other of a variety of activities. This allows increased exposure to both similar and dissimilar points of view. These interactions are the catalyst for more moments of inspiration and encourage a more creative workforce. In most of the case studies we presented in Chap. 4, this style of co-location is central to the notion of an innovation-stimulating space.

Urbanism is characterised by accessibility and movement. Movement includes all forms and modes of moving within and to areas where

individuals work, play, and live. Movement is central to the dynamics of urbanism: many communities form solely based on the ease with which individuals can travel in and around them. The importance of movement is not only local, but also global. New York and Philadelphia, for example, require effective intra-city transportation to function, yet their roles as gateways to international transport makes them effective participants in the global market. International airports allow knowledge workers, entrepreneurs, and investors to move more easily to and from global cities. In the cases we have studied, no recognised innovation districts were located far from first-tier air transportation systems. Human capital and knowledge are fluid. Efficient access to international travel allows a city's inhabitants to consult, engage with, and diffuse knowledge across the globe.

This is not to say that international travel is more important than local or intra-city systems. Without an effective link between international and local transportation infrastructure, accessibility will remain low. High international connectivity, in addition to a variety of transport modes that are seamlessly connected, is key to engagement in both global and local domains. This is why hotels are built adjacent to international airports and innovation centres are constructed near them. Concentrating innovation districts and centres near international transit hubs enables a freer flow of human capital and knowledge exchange and transaction. This concept has been mastered in many European countries, which boast high levels of both internal and external movement infrastructure, with multiple modes of well-connected transport.

The flow of skilled workers and the migration of talent sharpen the edge of innovation districts. There is a set of local characteristics that have proven ideal for attracting human capital. Attractiveness is, in essence, liveability. Anchors, branding, place making and management, community participation and engagement, and good governance combine to create liveable, and thus attractive, places. These encourage an open environment of collaboration and knowledge sharing between individuals, leading to higher levels and greater frequency of disruptive innovation. Knowledge workers prefer locations with these characteristics because they allow for and encourage innovative work. In an age when entrepreneurs and innovators are footloose globally, liveability has never been so important as it is today in maintaining a place's competitiveness and innovation capacity.

A Functioning Ecosystem

Innovative places must create an environment that enables collaboration, acceleration, and urbanism; and be able to adapt to changes, engage with actors and stakeholders, and provide attractive spaces. The separation of work and living spaces is becoming less distinct, and this challenges the way we understand a place's liveability and the factors that influence people's decisions to migrate or live there. In this new context, work is no longer a separate activity during the day and to be kept distinct from other enjoyable and beneficial uses of one's time. Workers in an array of industries now work when and where it best suits them. Crafting the right kind of community in and around the workplace is essential. In One-north, Singapore, life, work, and the community merge as one. Commercial building is frequently an adjunct to the creation of living spaces and entertainment spaces. In Silicon Valley, the innovation incubators do not turn on and off but stay on and engage with innovation in multidimensional ways. So physical facilities need to be provided to cater to the myriad of mixed social, work, and life needs of entrepreneurs and innovators. The café in a housing complex can be as important to how you work as the park and exercise facility located adjacent to or within your office space. Community planners must think holistically to create a built environment conducive to facilitating innovation through a recognition of workers' changing relationships with work.

Here are two examples to illustrate how ecosystems have functioned in different settings. One example is the case of Greenwood, Mississippi, in the 1990s. Greenwood is a typical American Midwestern town that has experienced a decline in its population and economy in recent decades. However, this decline was slowed for a time in the 1990s because of a single innovative individual, Fred Carl Jr, who chose to create a kitchenware start-up (Feldman 2014). This start-up provided jobs and employment for people in the declining small town, and its Viking Range Corporation became one of the biggest kitchen appliance manufacturers in the United States. After the business was sold, Greenwood returned to its previous population size. While an individual did not completely halt the decline of Greenwood, his leadership and philanthropy gave Greenwood, at least for a time, the ability to compete against other local communities.

The local Greenwood economy received major advantages from the success of a home-grown innovation. Businesspeople interested in inspecting the company needed accommodation and services while visiting, the

business provided local jobs, and its new-found success fostered a more positive culture. These factors encouraged the growth of other markets within the town, especially improvements to the service and manufacturing sectors. However, the Viking Range Corporation did not set about creating an innovation-conducive atmosphere through increased investment in education and human capital, and without this the town reverted to its previous declining trend upon the loss of the business. An individual innovator can generate short-term benefits for a community, but without investment in the physical and human dimensions of innovation these benefits will remain limited in the long term. Greenwood gained access to the necessary short-term resources to implement long-term improvements, but failed to do so.

Vienna is an example of a historically innovative city. Vienna was the centre of Europe's knowledge economy at the beginning of the twentieth century. It was an attractive place for many intellectuals to live. And the city earned a reputation for innovation, rich public life, and strong networks for people (Hospers 2003). These networks were of primary importance at the time; all academic institutions in the city were within walking distance, enjoying a level of accessibility and communication at a time when Skype and mobile phones were non-existent. The city also boasted a strong culture of cafés, providing spaces for intellectuals to meet and discuss ideas. Vienna faced political instability with the end of the Austro-Hungarian Empire, which encouraged discussion about what the political future of both the city and empire might entail. While Vienna has lost some of the innovative advantages it once held over competing cities, it has shown some of the crucial dimensions of long-term innovation. Its built environment, location, and living conditions are advantages that the city has leveraged to great success. This culture has helped maintain its innovation capacity, and continues to contribute to the city's liveability and competitiveness. In the latest 2018 City Liveability Ranking by *The Economist*, Vienna overtook Melbourne as the world's most liveable city (The Economist 2018).

LESSONS FOR AUSTRALIA

The characteristics and mechanisms of innovative places we have outlined are not exhaustive, nor are they defined within rigid boundaries. We would suggest, however, that these are often the basis for developing innovation districts almost anywhere in the world. Inevitably, there will be a mixing

and matching of these factors based on the particular locale and the opportunities it presents. Policymaking and planning for place-based innovation is a field of increasing importance. Here, we explore this field and its applications, and in so doing learn from the strengths and weaknesses of practices elsewhere. So, what are the lessons learned?

First, an anchor in some form is important. Anchors may be pre-existing facilities or institutions, such as arts institutions and other creative enterprises. There needs to be a direct relationship between the anchor and its environment for an innovative place to evolve. A university's research needs to be closely linked with and embedded into its surrounding industries to create an innovation district. Large firms, singly or in a group, can offer collaborative spaces but must also participate in a relationship with entrepreneurs and researchers. The form of innovation activity must be thought out carefully. Imitation may not be the best way to proceed, but the ingredients of innovation can be pulled from similar contexts. In some cases, simply providing accessibility is enough to spur innovation, but in most instances, all steps from idea generation through to product design and development need to be well entrenched in the planning of the place. This can be accomplished by providing a strong network of soft and hard support services. Accountants, lawyers, investors, and others located in areas nearby are important accelerators for innovation firms. Silicon Valley is surely the best illustration of this. The physical and virtual distance between idea and production should be as small as humanly and organisationally possible.

Second, place making and design is vital to making certain places innovative and attractive. These innovation districts 'represent a new geography of economic development, indicating a radical shift from previously isolated suburban research parks toward amenity-rich, hyper-connected areas' (Brookings 2017, p. 2). This requires high quality design that is people-friendly, arts-endowed, clean, and curated. To do this, we look to universities for inspiration. In many ways universities were the first innovation districts, designed with collaboration, innovation, and accessibility in mind. The village or campus design style is now widely used by major firms and innovation districts worldwide. Zhangjiang Science City, Shanghai, contains a software park. Its design was carefully considered when its construction started in the late 1990s, aiming at a park environment conducive to creative activities (Fig. 5.11). Design cannot and must not be an afterthought. And not only must quality spaces be designed and developed, but they must be continually maintained, improved, adapted, and celebrated to maintain their attractiveness. Doing so will enable



Fig. 5.11 Place making in Zhangjiang Science City

Source: The authors

government and private enterprise to attract talent to an area. Working environment is a crucial part of a job's attractiveness for the creative class. Place making and space design contribute to innovation; and they are in themselves innovation activities.

Third, governments play a central role in the creation and maintenance of innovative places. Governments are not bystanders in these activities; they should be innovators in developing new ways of regulation and management. More importantly, they should take the lead in embracing and facilitating the shift from government to governance. New zoning approaches, new forms of housing, new financing instruments, and the addition of specialised staff will allow and encourage a place's growth and evolution. Local governments must engage with the emerging professionals of the knowledge economy. These professionals act as the entrepreneurs of innovation districts; they are the producers of business design and development. Engaging the new generations of professionals informs 'smart governance', and enriches 'smart cities': in the end, cities are not smart; people are smart.

Fourth, for cities to engage in the global knowledge economy, they must attract and generate sufficient human capital. Attracting talent is not a zero-sum game; all cities can achieve higher levels of human capital. Talent is increasingly fluid between places. Globalisation is enabling individuals to move to places that advantage them in terms of options and opportunities. A globally connected and competitive place can draw sources of human capital without the barriers of national borders (Hu 2016). Intensified global mobility of people brings opportunities and challenges. A place can win people; it can also lose people. Cities cannot rely on migration alone to survive and sustain a knowledge economy. Cities must generate knowledge workers and aim for high education levels amongst their populations. To this purpose, public spending on childhood education and academic support from an early age can help new generations grow into the innovators of the future. Of equal importance is the retention of home-grown talent through providing good job opportunities and high standards of living. Housing unaffordability and high costs of living are pushing young people out of Australian cities, creating a brain drain not pulled by high incomes elsewhere, but pushed by high local costs.

Last but not least, an open-minded culture encourages innovation. It is important to recognise that most innovative activities will fail or be slow to succeed. Indeed, 90 per cent of start-ups fail and those that succeed take time. Risk-taking is in the gene of entrepreneurship. It needs to be accepted in our communities if we are to effectively engage with innovation activities. The failure of nine start-ups can build human capital and knowledge foundation for the success of the tenth. This open-minded culture, supportive of experimentation and accepting of failure, nurtures entrepreneurship. Creative individuals contribute to the culture and image of their locale, both through their products of art, music, science, inventions, and through their failures. These individuals have proven more open to new ideas and more adaptive to changing economies (Hollanders and van Cruysen 2009). They will be at their most creative in an environment that is tolerant of difference and diversity, and most importantly, tolerant of risk-taking, experimentation, and failure.

CONCLUSION

In this chapter, we have dissected the innovative places we presented earlier through looking at the approaches employed to create those places, the attributes defining their success, and the ecosystem underpinning their

functioning. We summarised four approaches, five attributes, and three hinges of the ecosystem. These are far from exhaustive; but providing a long list is not our intention. We focus on the most prominent factors so as to draw out some key lessons. Not all factors that we selected contribute to innovation outcomes in an economic sense. In Chap. 3, we re-conceptualised urban competitiveness from an economic-centric perspective to an integrative perspective incorporating multiple dimensions of economic growth, social equity, environmental sustainability, and good governance. Aligned to this shifted notion of a city's competitiveness, in this chapter we have stressed the importance of social good and the role of governance, community engagement, and benefits to the community in identifying best practices in innovative place making. The five lessons drawn for Australia are not meant to be comprehensive either. These five areas—anchor, place making, government, human capital, and culture—are those we think are the most relevant to making innovative places in an Australian context. In the next chapter, we will examine the pursuit of innovation in Australian cities and regions to reveal how they fare, and will use this assessment, along with the lessons we have drawn out in this chapter, to suggest new directions forward.

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CHAPTER 6

Pursuing Innovation in Australian Cities

INTRODUCTION

We now turn back to Australian cities after examining and analysing global innovative places in the previous two chapters. Innovation strengthens the competitiveness of Australian cities and pursuing innovation is now a primary policy goal for Australian cities, large and small. The Australian government has released several innovation strategies to drive innovation-led productivity growth and economic restructuring in the nation's transition from a resource economy to a knowledge economy. Australia's economy entered its 27th year of constant growth in 2018. This economic performance is remarkable, and leads that of other developed countries. This record-making economic growth could easily be attributed to Australia's 'luck' in being strategically close to the booming economies of China and other Asian countries, to which we export minerals and raw materials, and from whom we import people—immigrants and students—who drive up demand for housing and other areas of domestic consumption. However, putting our economic growth down to 'luck' does not tell the full story. One important determining factor has been the structural reforms of our national economy in the 1980s and 1990s, which integrated Australia with the world economy, and assured its smooth navigation through the Asian Financial Crisis in 1997 and the Great Recession in 2008 (The Economist 2017). Australia now faces new challenges. The mining boom has already ended. China's economy is transitioning to a 'new norm' of

lower growth, and is facing grave uncertainty with the mounting trade wars with the United States, which in turn are likely to exert considerable costs on Australia's economy given its high exposure to the world's top two economies (Bagshaw 2018). Australia's economy will continue to grow; but we argue that to achieve the best results it should grow smartly. An innovation-led knowledge economy provides a way forward to ensure Australia's sustainable prosperity, and our resilience to global economic competition and uncertainty.

In this chapter, we begin by outlining the imperatives for Australia to adopt an innovation approach with reference to global best practices. We then examine several innovative places and initiatives in the Australian cities of Sydney, Melbourne, Adelaide, and Canberra. Several innovative precincts in Sydney and Melbourne are built upon these cities' innovation capacity and knowledge base; these precincts have contributed to the two cities' global competitiveness. City leaders in Adelaide and Canberra have been active in pursuing smart city strategies in recent years to drive local economic transformations. In 2017, the city of Adelaide Lord Mayor, Martin Haese, and the Australian Capital Territory (ACT) Chief Minister, Andrew Barr, signed a Smart City Cooperation Agreement to collaborate on innovation in the smart city sphere. A suite of smart city initiatives has been introduced in both cities to digitise the local infrastructure and economy. These innovative experiences help us draw insights to inform future innovative place and city making in Australia. We conclude this chapter with a comprehensive examination of the innovative assets that currently exist in 25 Australian cities, on the basis of a Knowledge City Index. This index reveals each city's strengths and weaknesses in acquiring knowledge capital and performing as a knowledge economy.

THE IMPERATIVES FOR PURSUING INNOVATION

Transition from a resource economy to a knowledge economy requires that we recognise and use new approaches to policymaking and place making to pursue innovation in Australia. As we have shown in our international analysis in Chaps. 4 and 5, while innovative places share many similarities, no two are the same. Globalisation and urbanisation have driven the creation and evolution of linked but heterogeneous innovation areas. The focus of pursuing innovation is no longer the standardised organisation of work, nor is it the mass production of goods and services, as we have seen in the industrial age. In a post-industrial age, innovation is about differences.

Differences make the innovation process difficult, but rewarding once achieved. No single best practice approach or innovation strategy will provide a panacea. By the very nature of innovative activities, the places in which they occur must have unique characteristics. The role of policymakers and urban planners is to create the context and environment within which the places can develop, brand, and evolve. In this context and environment, the actors, organisational and individual, do not define the structures and processes that will operate in any place. Instead they design a place in which structures and processes can emerge organically in response to constantly changing innovative activities and disruptions.

Seeking an Australian Way

Our investigation of innovative places internationally has revealed intricate and complex activities that facilitate innovation, but crafting innovative places for Australia cannot mean merely imitating the approaches of other countries. Australian approaches must be carefully thought through so that they are not just shallow and hollow imitations, but a set of real activities that reflect and respond to our unique local environments. As we have clearly shown, the success of innovative places internationally is intrinsically tied to how these places fit in their milieus in ways that would make any attempt to simply try and export them as a total package very difficult. Therefore, we need to tease out of these examples the essential components of success and then search for how these can be most effectively transformed for application within the Australian context.

Australia lacks a global profile as an innovative nation. Even the relatively impressive innovation histories of Sydney, Melbourne, and Canberra have failed to attract high levels of innovation firms and investors. We have the places, we have the knowledge, and we have a long-standing culture of innovation. But without performing on the global stage, we cannot and will not compete for global inflows of investors, entrepreneurs, and human capital. Crafting Australia's innovation places requires embedding Australia's innovation nodes firmly within the global network.

We can certainly identify places at home with the necessary underpinnings for innovation. Parkville in Melbourne is already a well-endowed, well-anchored place. It has a medical and entrepreneurial base in the University of Melbourne's medical school and a technological base nearby at the Royal Melbourne Institute of Technology (RMIT). In this small area of less than 5 km², most of the ingredients required for an innovation



Fig. 6.1 RMIT Campus in Downtown Melbourne

Source: The authors

zone already exist: density, urban amenities and lifestyle, proximity of universities and industry, hard and soft support, accessibility, and business services (Fig. 6.1). New innovative products are emerging from the area, and it attracts students from around the world who bring both ideas and money to help maintain the area as a high-quality scientific zone. Similarly, there are areas near the University of Sydney and the University of Technology Sydney (UTS) that would benefit from increased investment from government and industry to grow the scale of their operations and to help them act as a global innovation hub. We see similar places on a smaller scale or in early stages of evolution in Western Sydney, Adelaide, and Canberra. While these places have a solid base, unlike the global innovative places we have examined, they are not yet attracting risk-taking and high-stakes venture capital groups.

The Essential Role of Governments

Of all the actors operating in and with innovative places, it is governments that provide the essential ingredients for healthy growth and development. While engaging venture capital is not the work of governments, it is governments that can create an atmosphere to attract firms to come to a place and build their business there. Governments can create zoning, regulatory, and design conditions to establish an environment that is likely to draw in these types of business activities. As we have seen in our international examples, the government's role has been to encourage the creative, economic, and social activities that are the bedrock of attracting human capital and generating innovation outputs. A government's inputs are not necessarily investment-intensive. They can be as large as a housing project or as small as a local town hall meeting. The purpose is not to directly generate money, but to increase the attractiveness and liveability of the area.

One area of innovative place making in which state, regional, and local governments are often involved is housing, working to ensure affordable rent and support housing options. Indeed, affordable housing is the base requirement for attracting human capital. Entrepreneurs and start-ups are often strapped for cash before their products become a reality in the market. In the United States this is often solved through house sharing schemes and through incubators. Several members of a start-up will split the rent and living quarters of a single house, or an incubator will provide living quarters in exchange for a stake in future product development. In Emeryville, California, government-sponsored affordable housing is provided for moderate-income local scientists (Fig. 6.2). In Zhangjiang Science City, the local Pudong New Area government subsidised the provision of affordable housing for talent who are employed on the precinct. In the initial phases of innovative activities, high rent and housing costs can keep entrepreneurs from engaging fully in their targeted activities. Government support for affordable housing, in addition to a focus on liveability and a culture of creativity, is an important part of ensuring a healthy innovation environment. This also ensures future investment in these areas. As entrepreneurs succeed, they are more likely to financially invest in areas to which they are personally and emotionally attached.

The collective of individuals in government should actively engage with a locally based innovation system. The greater the number of these individuals, the greater the likelihood of effective government support for innovative practices and developments. For this reason, it is important to



Fig. 6.2 Government-sponsored affordable housing in Emeryville, California
Source: The authors

encourage open debates and discussion about innovation issues. Without awareness in government, innovative place design and implementation is impossible. If the drivers of a local innovation system are the individuals in government, the vehicle for this system is the structure and form of governance comprising the public sector, the private sector, and the community. We need both a sound vehicle and a trained and aware driver if we are to effectively foster innovative places and practices.

Governmental awareness of innovation should be closely tied to actions in developing innovative places. This sort of awareness can often be established through considerable communication efforts, for example, through newsletters, newspaper articles, and bulletins. These communication forms help articulate innovation vision and actions. They can often be further extended through social media, television, and radio to engage with wider communities. These engagements represent a new form of collective management, with important implications for developing innovation dis-

tricts. After several centuries of concentrating on individualism and industrialisation, we must now turn our attention to collective understanding and action. Australia must look not only to its political but to its social form for collaboration. This starts with our governments at all levels fostering a collaborative culture of innovation and adaptation.

In Australia's neoliberal, market-oriented economy, governments have tried to encourage competition in business. Governments give subsidies and financial support to specific sectors and firms. Agricultural supports are well established and entrenched in our political system. Film production has enjoyed government incentives and support for many years. The Australian government has had a history of supporting, propping up, and strengthening a variety of industries to remain competitive on a global scale. In recent decades, we have seen a partial shift in focus to small businesses. Under the Coalition governments, in particular, a variety of tax and other incentives have been introduced in the hope of such inducements stimulating new start-ups, especially in the technology and innovation industries. The Australian government's *National Innovation and Science Agenda* (2015), despite its mixed results, was characteristic of this shift in focus.

Translating Rhetoric into Action

Unfortunately, despite the rhetoric about supporting innovation, the actual impact on the ground has been troublingly limited. In 2016–17, the research and development (R&D) expenditure by the federal government and state/territory governments decreased by 5 per cent and 6 per cent respectively from the previous year; total governments' R&D expenditure steadily reduced from 0.29 per cent to 0.19 per cent of gross domestic product (GDP) in the single decade of 2007–17 (Australian Bureau of Statistics 2018d). The major cuts to the R&D tax incentive in this period have led to high value-added innovation and technology companies such as Cochlear and CSL to publicly consider shifting their R&D activities offshore. Telstra and others have also criticised what they call the 'artificial' cap on claims for the R&D tax incentive. These companies claim that, given the tax structure in Australia, many Australian companies will be likely to shift innovation and R&D activities to other countries with more innovation-friendly environments.

The Australian government has given conflicting signals about its recognition of the importance and potential benefits of providing a legal and

political framework conducive to innovation. The Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Australian innovation standard bearer, has experienced small budget top-ups in the past several years. But these have not made up for major cuts since 2014, and since those cuts CSIRO has been forced to reduce staff numbers by over 1000. The National Broadband Network (NBN), launched with great fanfare at its first connection in 2011, has suffered from high end-user prices and consequent slow rollout. The Australian government has not shown it recognises the social value and innovation benefits to be realised from information technology infrastructure, but instead seems narrowly concerned with generating a profit directly from the NBN system. This has slowed rollout of the system and has diminished the value of the NBN with respect to encouraging innovation. The NBN represents one vehicle through which the Australian people could reach their innovation goals, but at this point the driver of that vehicle—the Australian government—has not shown it deserves to be a licensed driver. In a globalised knowledge economy, digital services should be recognised as basic services, just like water and electricity, for Australian households.

Australia's knowledge economy is paying for the price of declining incentive for business's R&D activities and ineffective delivery of digital infrastructure. Australia's new businesses are in a mixture of knowledge-

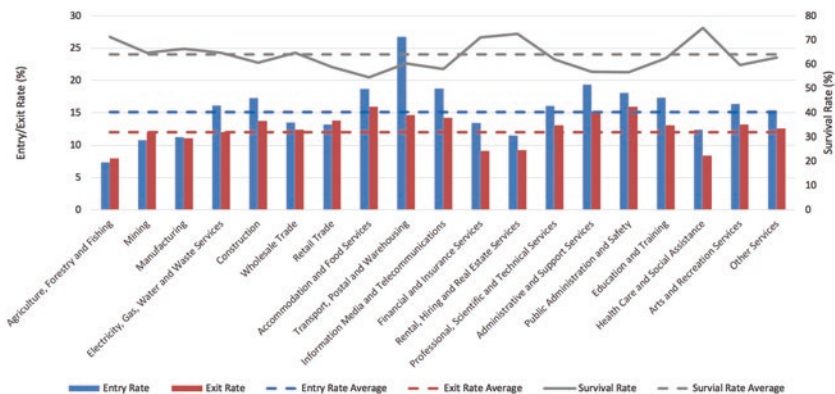


Fig. 6.3 Australian businesses by industry sectors, 2016–17

Note: Entry and exit rates are based on businesses in 2016–17; survival rate is based on businesses operating in June 2013 that survived to June 2017

Source: Australian Bureau of Statistics (2018c), created by the authors

intensive and non-knowledge-intensive sectors; but the survival rates of many knowledge-intensive businesses (in areas such as information, media and telecommunications, and arts and recreation services) have been lower than the national average (Fig. 6.3). The majority of Australia's new businesses are local and small. While these small businesses can serve as the base for local economic development, higher levels of direct government intervention are needed to generate internationally competitive enterprises. Firms with global outreach can help attract greater human capital and produce more innovation-focused start-ups; but to generate these positive changes, we first need to create innovation-stimulating milieus.

The Australian government has employed the rhetoric of innovation, such as through the *National Innovation and Science Agenda* (2015) and *Australia 2030: Prosperity through Innovation* (2017), but has failed to do more than set the groundwork for the future crafting of innovation places. We need more refined policies that assist and support globally oriented innovation hubs and enterprises. We already know that local support institutions are important in creating the community character and ambiance required to generate innovation; now we must focus on that place making. Clearly this is no simple matter. At the macro level, it can be difficult and contentious to identify the right places to invest in. A more intelligent approach might be to use a system of open competition, where governments at the local level compete for state and federal resources to create and support innovation districts. This would require sophisticated craftsmanship by local governments in setting policies and making places. In this chapter, we will outline such imperatives, and will elaborate on the co-design and co-creation approach to crafting innovative places in Australia in Chap. 7.

INNOVATIVE PLACES IN AUSTRALIAN CITIES

So where should Australia start? We have a combination of resources, people, and places well-suited to innovation. Our prominent cities already have the necessary innovative ingredients. We are not searching for a needle in a haystack, but looking instead for promising haystacks. Australia's highly urbanised society is an advantage during this time of economic transition. We can use and leverage this urbanism to penetrate the global knowledge economy and win the global innovation race. Unlike many urban societies in the world, Australian cities encompass a diverse, multi-cultural, and cosmopolitan milieu. This provides a superior ability to

attract talent, and increases our linguistic, cultural, and innovative capacities. Major Australian cities have these characteristics in common but, as we have seen, there is an intersection between the macro and micro aspects of innovative places. These places act as incubators and spawning grounds for innovation, and are our focus here. To begin, we look at a number of initiatives towards the development of innovative places in four major Australian cities with significant opportunities or substantial potential to become global innovation hubs. In Sydney, we select several cases to help us unpack the practices of creating innovative places in an Australian setting. In Melbourne and Adelaide, we look into strategic policies aimed at growing innovation capacity and economic development. In Canberra, we are interested in the government-led smart city initiatives to digitise and diversify the local economy.

Sydney

Sydney is Australia's leading global city and dominates the nation's urban landscape. It has the highest concentration of knowledge economy sectors, including finance and insurance; information, media, and telecommunications; and professional, scientific, and technical services (Hu 2016). These concentration levels have been strengthened since the late twentieth century. Among these knowledge economy sectors, Sydney has the largest proportions of high-skilled occupations at the professional and managerial levels, further attesting to Sydney's knowledge intensity. In recent decades, Sydney has been losing population to other cities, Brisbane and Melbourne in particular, largely due to its high cost of living and housing unaffordability. However, at the same time Sydney has attracted larger proportions of knowledge workers from other cities, who are attracted by the job opportunities and can afford the cost of living. Sydney is still the first stop for much global talent arriving in Australia. Sydney's competitiveness in both national and global contexts has underpinned its role as Australia's economic engine and innovation hub. In the Greater Sydney region, there are several knowledge clusters, notably in the central Sydney area, Macquarie Park, and Western Sydney (Fig. 6.4). Below we look at the innovative places within these clusters, which are in either established or incubating stages of evolution.

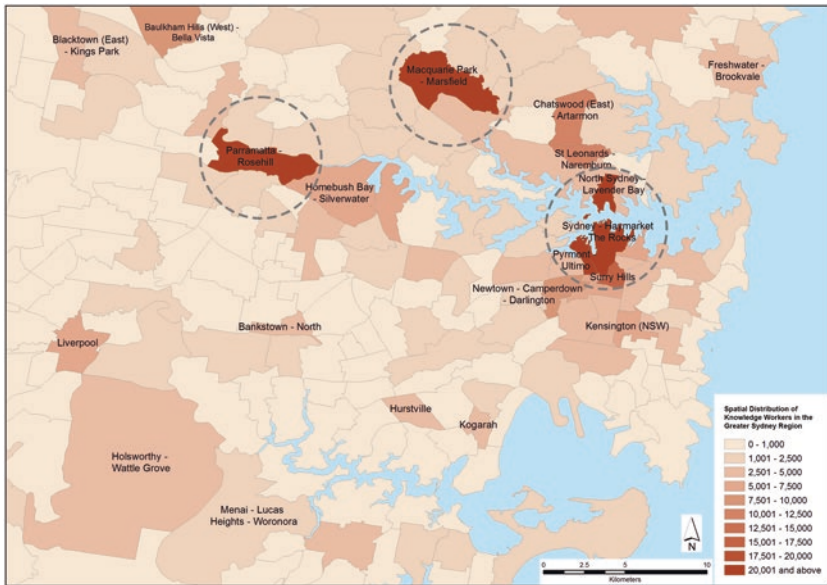


Fig. 6.4 Knowledge clusters in the Greater Sydney region, 2016

Source: Australian Census 2016 (Australian Bureau of Statistics [2018b](#)), created by the authors

Macquarie Park

Once farmland, Macquarie Park is now an innovation district of over 200 hectares, home to many hi-tech and innovation companies, Macquarie University, Macquarie University Hospital, and Macquarie Centre (a regional shopping centre). Macquarie Park is the second largest business area after only the Sydney central business district (CBD) in the Greater Sydney region. Macquarie Park has gained a reputation as a leading innovation district in Australia. It attracts many local and international hi-tech companies specialising in communication, electronics, computing, medical research, pharmaceutical, and business supply solutions, in a truly park-like setting (Fig. 6.5). The park is home to 180 large life science, technology, and digital corporations; 200 small businesses; 45,000 workers; and 40,000 students (Macquarie Park Innovation District [2018](#)).

Macquarie Park has a strategically important location in the Greater Sydney region. It is a major node in Sydney's 'global economic corridor',



Fig. 6.5 Macquarie Park, Sydney

Source: The authors

linking the prime CBD in central Sydney, and the second CBD in Parramatta (NSW Government 2014). Macquarie Park as a suburban innovative place has high accessibility and connectivity. It is within a 30-minute drive to the Sydney Airport. Lane Cove Tunnel, completed in 2007, alleviates busy traffic in the area. A major rail line—the Epping-Chatswood Rail Link—was opened in 2009 with three stations within Macquarie Park. It is also served by a major bus stop, and is connected to the Macquarie Centre via a free shuttle running every 15 minutes. The toll road Hills M2 upgrade in 2013 has reduced travelling time between the Sydney CBD and Macquarie Park. These infrastructure elements have facilitated faster growth and expansion of Macquarie Park. It is now spilling over into the surrounding areas with a considerable number of new commercial and residential spaces under planning or construction.

The approach of designing and developing Macquarie Park in some ways followed the pathway of Silicon Valley, with Macquarie University as an anchor. In the mid-1960s, the area was rezoned from a green belt to

industrial activities, and Macquarie University and the Macquarie Park Employment Area were established. The initial concept was similar to the hi-tech zone surrounding Stanford University in Palo Alto, California, to achieve an interaction between the university and industries. Macquarie University is now an integral part of the park, through collaboration between businesses, researchers, and students. The spatial proximity and university–industry collaboration make the process of leaving university and joining the workforce easier for students, and recruiting talent more straightforward for businesses. The Macquarie University Hospital, Australia’s only not-for-profit private teaching hospital on a university campus, is an anchor for the medical cluster in the park. The mix of these actors and the overall milieu enables a cross-sector collaboration that has made Macquarie Park a competitive contender for the title of ‘Australia’s Silicon Valley’.

Australian Technology Park

The Australian Technology Park (ATP) is a 14-hectare campus first initiated to create an environment for sharing knowledge, collaborating, and exchanging ideas. The site was formerly the Eveleigh Railway Workshops, and much of its history has been preserved to form the basis of the park, including office spaces, conference facilities, and technology hubs all based within the historic railway buildings (Fig. 6.6). The ATP sits next to Redfern Station, one train stop to Central Sydney, and one kilometre from the University of Sydney. The ATP was created in 1995 by the New South Wales (NSW) government, and locally based universities—the University of Sydney, UTS, and University of New South Wales (UNSW)—under the operation and control of the Redfern-Waterloo Authority, a NSW state agency. It has seen a number of changes since it was first developed (as outlined below) and now primarily houses innovation start-ups, and spin-offs from university research. There are currently 100 tenant firms on the site in the fields of science, technology, communication, and media, providing 5500 jobs and research positions (Mirvac 2018).

The ATP originated from a bold initiative in the mid-1990s to regenerate and reuse the largely vacant industrial site as a technology and innovation hub—a transformation ‘from steam to silicon’ (Mirvac 2018). One intent was for researchers to be located alongside firms with the capital and expertise to commercialise their ideas. The NSW government intervened and took the lead to transform the area into an innovative place by 2000. Its development involved conversion of the heritage workshops into



Fig. 6.6 Workspace in Australian Technology Park, Sydney
Source: The authors

office and conference spaces, and construction of new buildings for hi-tech uses, such as the Biomedical Building (2000), Data 61 (2008), and Media City (2010). The names of the new buildings appropriately reflect the space uses and innovation businesses of the tenant firms.

In 2015, the ATP was sold to a consortium led by developer Mirvac. The precinct is being redeveloped into a mix of commercial, retail, and public spaces, and the Locomotive Workshops are to be revitalised with a dedication to technology and innovation users and start-ups. A total of 75,000 m² of land has been reserved for technology uses in the future, a long-term commitment to the park's innovation gene. An anchor of the redevelopment is the Commonwealth Bank of Australia (CBA) headquarters, which will boost jobs on the site by 10,000. On completion, scheduled in 2019–20, the CBA headquarters will significantly transform the ATP's business services, and its urban morphology from an industrial legacy to a modern commercial precinct that still draws on its history. The

three decades of the ATP's evolution have seen leadership by the universities, the government, and the developer at different stages, presenting a collaborative model between the major actors in the making of an innovative place.

Western Sydney

The Greater Sydney region's second CBD, Parramatta, is the urban core of Western Sydney. The Western Sydney University is a locally based education and research anchor (Fig. 6.7), with several campuses in the CBD and suburban centres. The Western Sydney region is striving to restructure its economic base from manufacturing industries to a knowledge economy. Forty years ago, Parramatta and its environs were dominated by manufacturing jobs and heavy industries. However, in the 1980s and 1990s, tens of thousands of such jobs were shed, not only in Parramatta itself but in surrounding areas, including Blacktown, the Hills, Holroyd, Auburn, and Bankstown. In response to this trend, local leaders decided to transform the economic base of the area from traditional manufacturing



Fig. 6.7 Western Sydney University in Parramatta CBD

Source: The authors

industries to small-scale pharmaceutical and cosmetics firms, advertising, digital technology, and hi-tech production of scientific and medical equipment, electronic components, and small machine tools. The outcome of this effort is reflected in the current employment structure of the city of Parramatta local government area (LGA), with leading sectors comprising both labour-intensive and knowledge-intensive industries. In 2016, of Parramatta LGA's total of 137,956 employments, the top five industries were: health care and social assistance (15 per cent); public administration and safety (12 per cent); financial and insurance services (10 per cent); manufacturing (8 per cent); and construction (7 per cent) (Australian Bureau of Statistics 2018b).

The Western Sydney region has long been pursuing an innovation-led knowledge economy. An example of the forward-thinking vision of the Western Sydney councils is the development of the Westmead innovation district. Within a period of 40 years, Westmead has been transformed from an abandoned showground to one of Australia's largest clusters of education, research, and health facilities. Officially renamed the Westmead Health Precinct, it now has Sydney's most significant concentration of biotechnology, pharmaceutical, and medical companies (NSW Government 2014). In 2013 the key stakeholders established the Westmead Alliance to more efficiently and effectively promote the development of the area as an innovation hub. The Alliance consists of the Western Sydney Local Health District, the Sydney Children's Hospitals Network, the Westmead Institute for Medical Research, the Children's Medical Research Institute, the Westmead Private Hospital, the University of Sydney, Western Sydney University, the City of Parramatta Council, the Sydney Business Chamber, and the Cumberland Council. These stakeholders signed a Memorandum of Understanding in which the signatories committed themselves to working together towards a shared vision for a health precinct. The Alliance advocates for the interests of the precinct, demonstrates leadership in the maintenance and growth of the precinct's core objectives, and supports business and industry growth.

The effects of these concerted actions by local stakeholders have been dramatic and have led to an impressive transformation of the Westmead Health Precinct. From fewer than 1000 employees in the 1970s, health services alone provide approximately 18,000 jobs today in Westmead, and it is expected to achieve 50,000 health-related jobs by 2036 (Deloitte Access Economics 2016). Increases in other sectors—such as education, research, and electronic components—are expected to be even greater.

The growth in knowledge jobs has more than compensated for the decreases in manufacturing jobs in the Parramatta area, which dropped from over 20,000 to 10,000 between 1981 and 2016 (Australian Bureau of Statistics 2018b). Parramatta is growing into the new heart of a knowledge-intensive industries hub, a profound departure from the region's traditional identity of heavy industrial activities.

The latest innovation opportunity for the Western Sydney region came from the Australian government's City Deals programme (Australian Government 2018). On 4 March 2018, the Western Sydney City Deal, a 20-year agreement, was signed by three tiers of government—the Australian government, the NSW government, and the governments of eight LGAs—to transform Western Sydney into a 'Western Parkland City'. Under the City Deal, the Australian government will invest \$5.3 billion in the Western Sydney Airport to catalyse investment, development, and jobs; and both the Australian government and the NSW government are committed to the first stage of the Western Sydney Rail and a North-South Rail Link via Western Sydney Airport (Australian Government 2018). The Western Sydney City Deal includes commitments from all levels of governments across six priority domains—connectivity, jobs for the future, skills and education, planning and housing, liveability and environment, and governance—to improve the region's infrastructure, competitiveness, and liveability (Australian Government 2018). These infrastructure provisions, especially the Western Sydney Airport, and spillover development opportunities and economic growth, will significantly unleash Western Sydney's innovation potential, and it is likely to become a global innovative place in due course. The latest strategic plan for the Greater Sydney region *A Metropolis of Three Cities—Connecting People* has outlined a bold vision of three cities—Eastern Harbour City, Central River City, and Western Parkland City (Greater Sydney Commission 2018). The Central River City and Western Parkland City cover Greater Parramatta and the Western Sydney Airport areas respectively. This plan, if implemented effectively, will further strengthen Western Sydney's innovation capacity by the middle of this century and link it with the global economic system.

Melbourne

As an Australian global city, Melbourne is second only to Sydney. But unlike Sydney, with its two CBD areas and multiple economic clusters, Greater Melbourne's economic activities are largely monocentric, mostly

concentrated in the CBD, where the City of Melbourne is located. Accordingly, Melbourne's knowledge workers and innovation activities are also most heavily concentrated in the CBD, with a much smaller second concentration in Clayton, where Monash University is located. Figure 6.8 shows these distributions. Knowledge-based urban development has been long pursued in Melbourne through a state-city inter-governmental collaboration and partnership with industry and community, and this has assisted in establishing Melbourne as 'a knowledge city' (Yigitcanlar et al. 2008). 'A creative city' and 'a knowledge city' are the visionary goals in the City of Melbourne's Council Plan 2017–21 (2017), and the city has *A Knowledge City Strategy 2014–18* (2014) in place, all pointing to the city's aspiration towards, and branding as, a knowledge city. This knowledge city identity is built upon Melbourne's solid knowledge economy base in the sectors of financial and professional services, education, creative and design services, research and science, biotechnol-

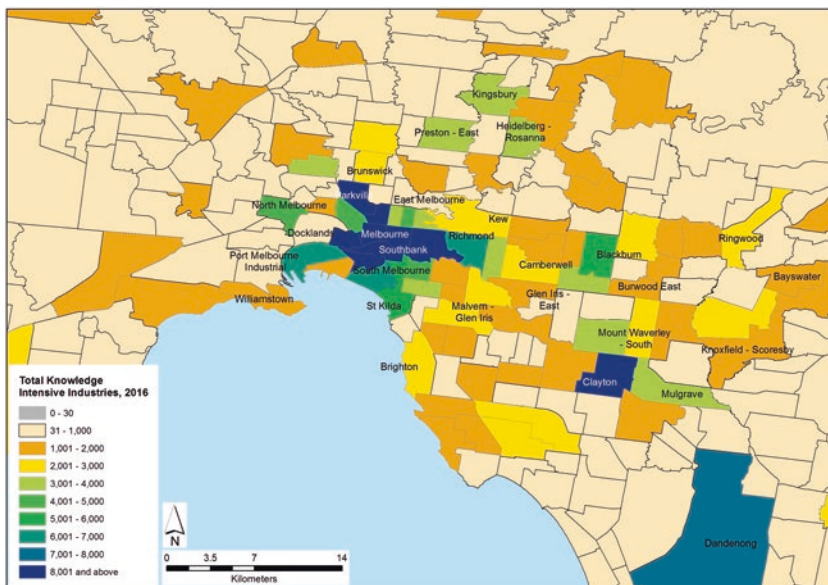


Fig. 6.8 Knowledge clusters in the Greater Melbourne region

Source: Australian Census 2016 (Australian Bureau of Statistics 2018b), created by the authors

ogy, information and communication, health, and advanced manufacturing (ACIL Tasman 2013). Melbourne is one of the most liveable cities in the world. It achieved the number one position on *The Economist's* Global Liveability Index for seven consecutive years until 2017, and ranked second in the latest 2018 index after Vienna (The Economist Intelligence Unit 2018). Liveability is Melbourne's global brand, and this is an attraction to talent at home and overseas.

Melbourne's most notable innovative place is the Melbourne Biomedical Precinct (MBP), which has a prime location to the north of Melbourne's CBD within close proximity to Australia's leading universities and a downtown with dynamic public life and easy accessibility. The MBP hosts a cluster of more than 40 hospitals, research, education, and biotechnology institutions; employs 49,000 people; and educates 7000 students in biomedical and health areas every year (Victoria State Government 2018). In late 2016, the Victorian government established the Melbourne Biomedical Precinct Office to coordinate the precinct's growth to be a world leader in biomedical research, development, and innovation, and thus to drive a knowledge economy in Melbourne. The MBP represents another example of the forging of a cluster-based innovation precinct through a partnership between university, industry, and government. In the MBP's latest 2018 strategy, the Victorian government set a vision of 'a renowned world top 10 biomedical precinct and a driver of healthcare advances, economic growth and jobs for Victoria' (Victoria State Government 2018, p. 12). This is a global vision for innovation situated in the context of Melbourne as a global knowledge city.

Recognising this potential for Melbourne to become a global knowledge city, strategic plans at both the Victorian state and the City of Melbourne levels have been geared towards that direction from the beginning of the twenty-first century. At the state level, *Melbourne 2030* (2002) focused on issues such as sustainability, liveability, regional growth, housing, and regional transport. It highlighted 'more opportunities for innovation, education, research and the knowledge economy' under the strategic principle of 'a more prosperous city' (State Government of Victoria 2002, p. 3). It also promoted the development of an information and community technology infrastructure programme. As such, it started to touch on some basic dimensions of a global knowledge city. *Plan Melbourne* (2015) expressed an explicit aspiration for Melbourne to be a high-profile global city—a globally connected city through its internationally competitive economy, urban design, and its public realm. It clearly articulated most of

the relevant attributes of a global knowledge city: creative people and creative industries, a vibrant central city to attract global headquarters, a second airport, and more knowledge precincts. At the city level, *City Plan 2010* (2001) provided strategic directions for the city's development focusing on the triple bottom lines of sustainable development: economic prosperity, social equity, and environmental quality (City of Melbourne 2001). This plan was replaced in 2008 by *Future Melbourne 2026*, which was refreshed in 2016. *Future Melbourne 2026* was remarkable in embracing a global knowledge city vision and setting specific objectives for Melbourne as 'a global city', 'a knowledge city', and 'a creative city' (City of Melbourne 2008).

Policies at both the state and the city levels have strategised Melbourne as a global knowledge city. However, there are still several policy gaps in terms of human capital, especially in developing home-grown talent and providing equity for international students. Human capital matters for all global knowledge cities, but is especially important for Melbourne for two reasons. First, Melbourne is a migration city; Melbourne's knowledge economy relies heavily on migrant knowledge workers. Second, international students are important agents for making Melbourne a global knowledge city: they are attracted by the world class universities and research institutions, and they also form a human capital pool for Melbourne's global competitiveness and innovation. To attract and retain global talent should be high on any policy agenda for a global knowledge city, and this is reflected in the strategic plans for Melbourne. But attracting global talent should not be prioritised at the expense of overlooking endogenous knowledge assets. Knowledge is a locally embedded resource, rather than exogenous, imported, and supplementary; a city should grow its local knowledge base instead of trading or importing it like products and services (Yigitcanlar and Lönnqvist 2013). While Melbourne is attractive to knowledge workers from overseas and elsewhere in Australia, it is equally important to incorporate home grown talent and international students into its strategies for making innovative places.

Adelaide

Adelaide is the fifth largest city in Australia by population, and is geographically isolated from much of Australia and the world. The City of Adelaide's transportation system is integrated with the Greater Adelaide region, relying on an interconnected system of buses, trains, and trams. Public trans-

portation costs are relatively cheap compared with other Australian cities. The Adelaide Airport services both domestic and international travellers and has won several awards for good services and innovation. Adelaide's transportation system is one of the contributing factors to its consistently high ranking in international liveability indices. The city ranked the fifth most liveable city, tied with Calgary, in *The Economist Global Liveability Report 2016* (The Economist Intelligence Unit 2016). Despite its location, the city's accessibility, liveability, and physical and environmental endowments have made it an internationally known destination. In 2014, Lonely Planet rated Adelaide the ninth best city in the world to visit, the only Australian city to make their list (Lonely Planet 2014).

Adelaide faces both challenges and opportunities as it transitions to a knowledge economy, and these are shared by cities with similar geographical locations, population sizes, and largely industrial economic bases. The Greater Adelaide region's largest industry sectors by employment shares are health care and social assistance (16 per cent), retail trade (11 per cent), and education and training (9 per cent), closely followed by public administration and safety (8 per cent), and manufacturing (8 per cent) (Australian Bureau of Statistics 2018b). In recent years, governments (at both state and local levels) and industry sectors have made great efforts to upgrade its economic structure and develop it as 'a smart city', through capitalising on its liveability endowments and innovation capacity. The University of Adelaide is working with state and local governments to implement smart technologies throughout the city as part of the Australian Smart Cities Consortium. Adelaide's commitment to becoming a smart city resulted in the international hi-tech firm Cisco naming it Australia's first smart and connected 'Lighthouse City', along with Barcelona, Chicago, Hamburg, Amsterdam, Copenhagen, and Dubai internationally (The Lead 2015). This strong striving towards becoming a smart city is felt in many corners of Adelaide. In the 'city of churches', it is notable that a church is also used as a creative centre (Fig. 6.9).

The smart city goal has been pursued through a concerted strategy of clustering and engaging businesses and communities in Adelaide. The Cluster Coordination Office of South Australia, as a state government agency, provides support for industry and research communities, runs educational programmes, and monitors existing clusters. In 2014, supported by the South Australian government, the University of Adelaide partnered with the Stockholm School of Economics to form the Australian Cluster Observatory. The Observatory was established to develop partner-



Fig. 6.9 A Church as a creative centre in Adelaide
Source: The authors

ships nationally and globally, while providing businesses and development agencies a way to analyse the level of industry concentration in areas throughout Australia (Australian Cluster Observatory 2017). The City of Adelaide has been most active in creating an ‘Adelaide Smart City’: at the moment, the city has a support network of 116 innovation programmes, including 13 incubators and 18 co-working spaces (City of Adelaide 2017). With technical support from Cisco, most ‘Adelaide Smart City’

projects involve using technology to advance city infrastructure and services, such as its fibre-optic network, lighting, parking, environmental monitoring, and waste bins, using Adelaide as ‘a living lab’. The Smart City Studio is a dedicated public use space to support innovators, entrepreneurs, and start-ups to translate their ideas into urban solutions and commercial outputs. These initiatives and programmes have contributed to Adelaide’s branding as ‘a smart city’, although their full effects on transforming the city’s economic base towards a knowledge economy will take more time to reveal.

Canberra

Canberra is a knowledge city: it is a city that makes nothing but knowledge. Despite its small population of around 400,000, its outreach of command and control, as the national capital city, is global. It leads the other Australian capital cities in several key indicators: it has the highest education level, the highest income level, and the largest proportion of knowledge workers, including those attracted from other Australian capital cities, as illustrated in Chap. 3. Countering the general perception of Canberra as an uninteresting place, it has been ranked high in lists of liveability—a ‘hidden secret’ of the city. Canberra maintains its competitiveness in the Australian urban system at a higher level than its size indicates, especially in areas of R&D, human capital, and access to digital infrastructure and technology (Hu 2015). The Canberra Airport is mainly a domestic airport and is serviced by two international airlines only—Singapore Airlines and Qatar Airways. Most international flights need to transfer via Sydney, which involves a one-hour flight or a three-hour drive.

One challenge to Canberra’s economic development has been its over-reliance on employment in the Australian Public Service (APS), which often experiences ups and downs dependent on federal political changes. The corresponding imperative, then, has been to diversify the city’s economy to reduce the impact of these politically led economic fluctuations. Economic diversification has been a major policy goal, and the knowledge economy and digital technology have the capacity to provide new pathways for achieving this goal. The Australian Capital Territory (ACT) government has been under the Australian Labor Party’s (ALP’s) rule through minority or majority governments during most years since the ACT became self-governing in 1989, and consistently in the twenty-first century. This long-term experience of ALP government has ensured some

consistency in economic policies. The city's economy has become increasingly diversified and knowledge-intensive, even though the public sector still remains the largest industry sector with an employment share of 32 per cent in 2016, followed by health care and social assistance; education and training; and professional, scientific and technical services all at around 10 per cent (Australian Bureau of Statistics 2018a).

The ACT government has launched several policies and initiatives to grow Canberra's innovation capacity and knowledge economy using recent digital technology advances. In a 2016 *Statement of Ambition*, Chief Minister Andrew Barr outlined his vision for Canberra as 'one of the world's most liveable and competitive cities' through four success factors: talent attraction and retention; open and diversified economy; better infrastructure, and a digital mindset (ACT Government & ARUP 2016). The ACT government appointed a Chief Digital Officer, Jon Cumming, who authored the *ACT Government Digital Strategy 2016–2019*, with a focus on the development of three digital dimensions: digital economy, digital services, and digital foundations (Cumming 2016). The ACT division of Regional Development Australia (RDA), a coordinating federal agency for regional development, advocated for digital opportunities to drive the ACT region's growth. RDA ACT commissioned co-author Richard Hu's research team to complete a study entitled *Smart Work in the ACT and Region* to map out spatial clusters of smart workers to inform possible locations of future digital work hubs (Pratchett et al. 2015).

The above strategies, initiatives, and advocacies have helped inject the digital economy and technology as a central focus of policy debates and policymaking. However, Canberra's high APS employment has been a barrier to reaching the potential of smart work using digital technology for the city. Compared to other Australian capital cities, Canberra performs well in almost all indicators of a knowledge city except for smart work (Pratchett et al. 2017). Smart work, the flexible mode of working anywhere, anytime enabled by the knowledge economy and digital technology, has been long and widely practised in the private sector, but has been slow to be embraced in the public sector. In Australia the public sector, across all three tiers of government, is far below the national average, let alone the private sector, in practising smart work (Fig. 6.10). The presence of a large APS base presents a challenge not only to the diversification of Canberra's economy, but also to the digitisation of its economy.

The year 2013 marked Canberra's centenary, and the ACT government unveiled the city's brand CBR (an abbreviation of its name) and a narrative of

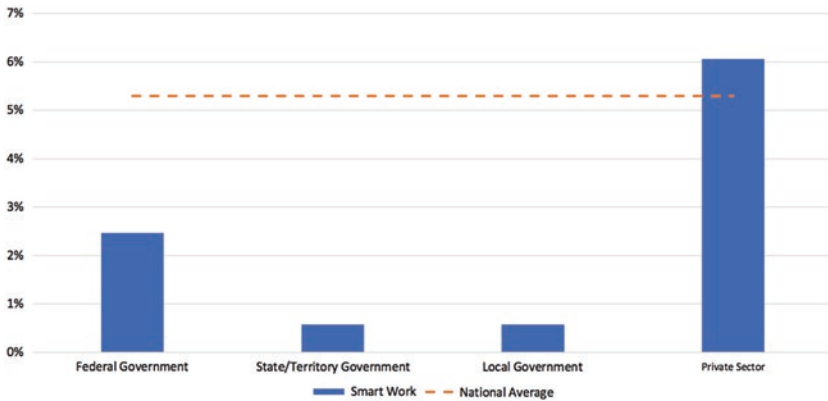


Fig. 6.10 Smart work in the public sector and private sector in Australia
 Source: Australian Census 2016 (Australian Bureau of Statistics 2018a), created by the authors

identity in terms of ‘confident, bold, ready’. The CBR brand has been used to promote the city, and its innovation aspiration. In 2014, the ACT government led the establishment of the Canberra Innovation Network (CIN), an innovation initiative, in collaboration with six education and research institutions based in the city (Australian National University, University of Canberra, CSIRO, Data 61, Canberra Institute of Technology, and UNSW). The CIN aims to accelerate innovation and diversity in the ACT’s economy. Located in the city centre area, the CIN hub contains a business incubator and a co-working space, and holds start-up accelerator programmes and business events to build up networks and support innovation ideas and activities. The CIN is starting to create an innovation ecosystem that, with government initiation and support, links research and industry.

The knowledge economy, including in the public sector, is reshaping the spatial forms of Canberra, especially in the city centre area, Burley Griffin’s design legacy of 100 years ago. In the original Griffin Plan for Canberra, the city was a lively business centre with density retailing and commercial uses. It was connected by avenues of fast connectivity, with a citywide tram network running through these roads’ median strips, supported by density development along the corridors. The City Hill was intended to be a heart for the city’s citizens. This vision, however, was not truly fulfilled.

The new knowledge economy seems to be providing an opportunity to vitalise the city centre, in ways unforeseen by Burley Griffin. The city centre area now has the highest concentration of knowledge workers in the ACT region (Fig. 6.11). These knowledge workers are transforming the

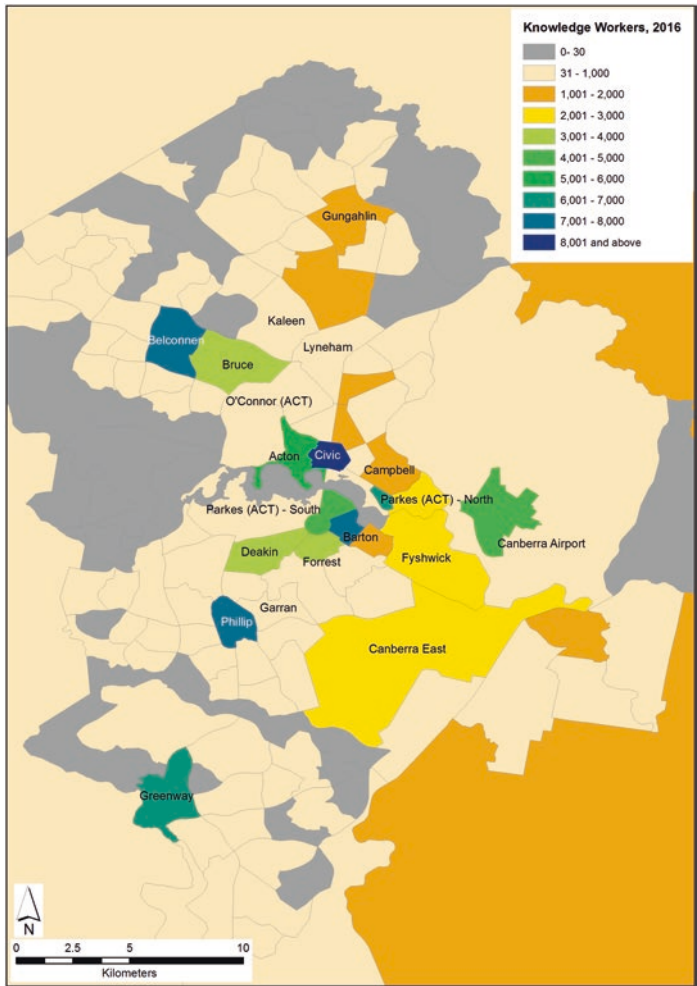


Fig. 6.11 Knowledge clusters in Canberra, 2016
Source: Australian Census 2016 (Australian Bureau of Statistics 2018a), created by the authors

city centre's functions, and its spatial uses and patterns. The transformation of city centres is a global phenomenon and is happening in major Australian capital cities. Canberra presents an extreme case for illustrating this point, as a planned city known for being a 'bush capital', and for its suburban sprawl. Its centre is nevertheless becoming more important in a globalised knowledge economy and a networked society.

The city centre is more than a geographical or spatial centre. Its 'centrality' is cultural, social, political, and economic. Canberra's city centre, a Modernist planning legacy, is facing new settings, driven by multi-scalar forces—global, national, and local—intersecting with economic restructuring, ubiquitous information technology, knowledge diffusion, and people movement. Knowledge work and knowledge workers are redefining the use of spaces and the public realm in the city centre. Innovation activities require more interaction and exchange, more access to public space and amenities, and a higher degree of spatial-temporal flexibility. They are blurring the conventional division of land uses and space uses, which are an industrial legacy, and challenging the old ways of design thinking that derived from an industrial age.

Responding to the transformation of the city centre area in the new contexts of economic and community activities, the ACT government established the City Renewal Authority on 1 July 2017, and scoped a City Renewal Precinct covering the city centre and the strip along the main thoroughfare of Northbourne Avenue, to shape the growth of the central parts of Canberra. Malcom Snow, the former chief executive of the National Capital Authority, was appointed as Chief Executive of the new City Renewal Agency. The City Renewal Agency has commenced a suite of programmes and plans to revitalise the precincts in the city area. One innovation programme is City Grants, a funding programme open to public applications to support activation activities—events, art activities, short-term installations, marketing, and research—in the city centre area. Administered by the City Renewal Authority, the City Grants are funded by the City Centre Marketing and Improvements Levy (CCMIL) from city businesses, and the activities must be in the CCMIL area and have the potential to activate the public realm and drive the economic activities of the businesses. It presents a collaborative public-private-community model in revitalising the public realm of a city centre area.

The innovation-led transformation of Canberra's city centre is generating spatial and social imprints. Braddon was an inner city industrial precinct, and has experienced significant urban renewal in recent years,

putting an old car wash shop and new luxury apartments in contrast (Fig. 6.12). The urban renewal and associated gentrification processes are very much underway; it is anticipated that the whole precinct will be occupied by creative working and living spaces with boutique shops, art and design studios, and well-designed quality apartments to cater for the lifestyles of the new creative class. In Braddon and other inner-city precincts, the original low- and middle-income workers and residents have been relocated, or are facing displacement. There are people moving out; there are people moving in. People working at a managerial or professional level in these areas are more likely to be able to afford the property prices and be attracted by the urban amenities, despite these high prices, to live there. Canberra is following in the steps of Sydney and Melbourne in terms of growing housing unaffordability and rising costs of living. Young graduates and other talent are being pushed out of central city areas to seek opportunities elsewhere. The city has the educational institutions to train



Fig. 6.12 Urban renewal and gentrification in Braddon, Canberra
Source: The authors

talent, from home and overseas, but it needs to retain these people with opportunities and affordable living costs. Affordability presents a challenge to the city's innovation strategy, and the aspiration for 'a place of people' in the city's renewal precinct programme.

INNOVATIVE ASSETS IN AUSTRALIAN CITIES

In Australia, major capital cities have attracted the most policy attention, investment, and resources. This is wrong. We should include smaller cities and regional centres, which have the potential to drive Australia's innovation and knowledge economy but have long been overlooked. For this purpose, we examine the innovative assets in 25 Australian cities, defined not by administrative boundaries, but by the Significant Urban Areas (SUAs) used in the Australian Statistical Geography Standard (ASGS) (Table 6.1). Encompassing an area of less than 0.5 per cent of Australia's total land, these 25 cities or SUAs accommodate 76 per cent of Australia's national population, and 72 per cent of all jobs. These cities, both large and small, together should be the focus of our pursuit for innovation to drive a knowledge economy in Australia.

How do these cities compare in terms of innovative assets? We begin by calculating a Knowledge City Index (KCI) for these cities. The KCI comprises the dual domains of a city's 'knowledge capital' and 'knowledge economy', aggregated from six indicators with three indicators for each domain. The methodology for computing the KCI is provided in this chapter's Appendix. It is not a surprise that the major capital cities take the lead in the KCI overall: of the eight capital cities, seven occupy the top seven positions except for Hobart, which ranks tenth; the regional centres and small cities take the remaining positions, generally behind the capital cities (Fig. 6.13).

Looking at these results more closely, we can use the KCI to broadly classify the 25 Australian cities into four groups with a discernible gap between groups: group 1 consists of Sydney and Melbourne, the two largest cities in Australia; group 2 includes Canberra–Queanbeyan (they together form one SUA in the ASGS), Brisbane, and Perth; group 3 consists of Adelaide, Darwin, Sunshine Coast, and Gold Coast–Tweed Heads; and group 4 includes the remaining cities, led by Hobart, and comprises mostly smaller cities or regional centres. Among other things, the KCI reveals two new findings that do not conform to people's general perception of Australian cities. First, Canberra–Queanbeyan ranks the

Table 6.1 Twenty-five cities in Australia

<i>SUAs</i>	<i>Population</i>	<i>Employment</i>	<i>Land area (km²)</i>
Adelaide	1,198,467	510,682	2024.4
Albury–Wodonga	82,083	36,749	628.2
Ballarat	91,800	39,167	343.6
Bendigo	86,078	36,295	287.4
Brisbane	1,977,316	886,345	5056.10
Bunbury	65,608	22,756	22.5
Bundaberg	67,341	23,709	305.7
Cairns	133,912	55,145	254.3
Canberra–Queanbeyan	391,643	205,352	482.3
Central Coast	304,755	85,643	566.2
Darwin	106,257	52,672	294.7
Geelong	173,450	73,203	918.8
Gold Coast–Tweed Heads	557,823	202,143	1402.80
Hobart	200,498	89,875	1212.60
Launceston	82,222	35,525	435.4
Mackay	77,293	36,936	208.2
Melbourne	3,847,567	1,668,358	5679.30
Newcastle–Maitland	398,770	165,994	1018.90
Perth	1,670,952	733,832	3367.10
Rockhampton	73,680	32,432	580
Sunshine Coast	270,771	97,670	1633
Sydney	4,028,525	1,735,438	4046.70
Toowoomba	105,984	46,980	498.1
Townsville	162,291	69,888	696.2
Wollongong	268,944	89,275	572.2
Total of 25 cities	16,424,030	7,032,064	32,535
	21,507,719	9,807,530	7,692,000
Share of 25 cities in Australia (%)	76	72	0.42

Source: Australian Census 2011 (Australian Bureau of Statistics [2018a](#)), created by the authors

third after only Sydney and Melbourne despite its small population and employment bases. Second, several coastal regional cities, including Sunshine Coast, Gold Coast–Tweed Heads, and Central Coast, perform well; these cities are within one to two hours' driving distance to the metropolitan centres of Brisbane or Sydney. These regional cities' positions in the KCI are largely based on their comparatively strong performance in smart work, that is, the flexible working modes enabled by digital technology and a knowledge economy. In contrast, Canberra–Queanbeyan's performance in smart work is relatively weak. This is

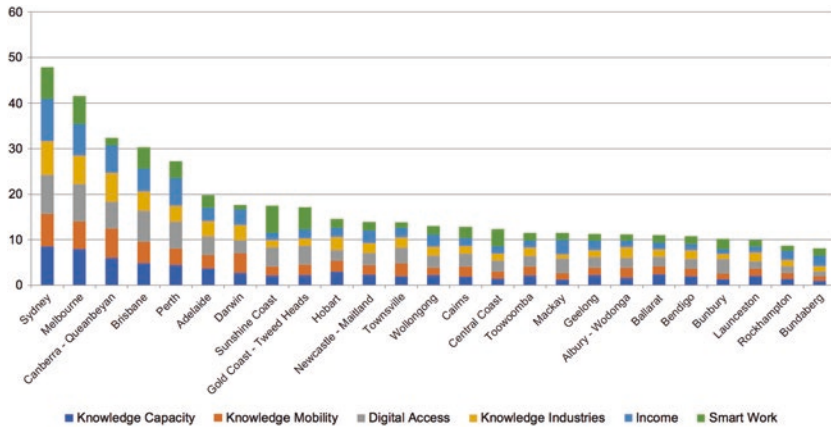


Fig. 6.13 Knowledge City Index of Australian cities

Source: Australian Census 2011 (Australian Bureau of Statistics 2018a), created by the authors

because, as noted earlier, the spatial and temporal flexibility required for smart work has been slow to be accepted and practised in the APS agencies in Canberra.

The KCI reveals the knowledge strengths and weaknesses of individual cities in the national context. The findings challenge several perceptions of Australian cities and offer two important new insights into their prospects for innovation. First, the KCI results suggest we must reconsider the relationship between a city's knowledge performance and its size. The conventional approach to cities by size (population, employment, area, GDP, and so on) defined mostly by administrative boundaries, may not be valid in the context of a knowledge economy and recent technological advancement. Urban studies in Australia have been dominated by a focus on the major capital cities, based on their large populations and heavy concentration of economic activities. However, size may not be an important variable in defining a knowledge city any more. Although Sydney and Melbourne occupy the top two positions in the KCI, reflecting their sizes and concentrations of knowledge capital and knowledge economy, Canberra-Queanbeyan outperforms other, much larger capital cities, including Brisbane, Perth, and Adelaide. Canberra-Queanbeyan stands out because it enjoys the highest knowledge intensiveness measured by the percentage of knowledge sectors in the local economy, outpacing any

other Australian city. What matters more for a knowledge city is knowledge intensiveness, not necessarily population size or employment numbers, as have traditionally been measured for industrial cities.

Second, we must re-examine the competitiveness of small cities in surviving the knowledge economy. Overall, small cities are dominated by large cities as measured by the aggregated KCI, except for Canberra–Queanbeyan, which is an outlier. However, in certain indicators, especially digital access and smart work facilitated by digital technology, several small cities such as Sunshine Coast, Gold Coast–Tweed Heads, and Central Coast outperform many other cities of larger sizes. These three cities share one common geographical characteristic: they are all regional centres on the edge of larger metropolitan areas, and are known for quality coastal lifestyles. This suggests new ways to approach local economic development for these cities, which have been traditionally disadvantaged by their small scale and geographical distance, through capitalising on opportunities from the knowledge economy and digital technology, coupled with using the local lifestyle to attract and retain talent. The world does not belong to large cities only; local economies of small cities may be capable of competing on a global basis (Kresl and Ietri 2016). In recent years, there are an increasing number of remote coastal centres in Australia that have grown to be hubs of creative and cultural industries, largely facilitated by digital technology and attracting talent through their local lifestyle (Hu and Blakely 2013). This marks a shift in understanding and planning for economic development in small cities and centres. Size still matters for knowledge cities, but it is less important than it was for cities in the industrial age. The knowledge economy and new technology provide new opportunities and tools for small cities to survive and prosper in a knowledge age, and to pursue innovation.

CONCLUSION

In this chapter, we have examined the pursuit of innovation in Australian cities. We outlined the imperatives for pursuing innovation in Australia. Compared to international leaders in national innovation, such as Denmark and Germany, as discussed in Chap. 4, Australia does not have a well-structured and coordinated national innovation system. Australia's national innovation strategies remain at the level of rhetoric; the Australian government's inputs and supports for R&D have been constantly reduced in an increasingly neoliberal political setting in recent years. However,

despite a lack of innovation policy focus at the national level, Australian cities have been active in making innovative places. The ‘smart city’ buzzword has triggered a round of smart city initiatives in smaller capital cities such as Adelaide and Canberra. But a ‘smart city’, as we have said before, should not be narrowly understood as smart technology; a smart city should be, first of all, about smart people and a smart economy. Forging innovation capacity takes time. Places with some history of innovation by design or by chance are better positioned. Sydney’s Macquarie Park and Melbourne’s MBP are Australia’s leading innovation districts, but they are not international leaders yet. In order to win the global innovation race, Australia needs more such innovative places in its cities. The KCI reveals innovative assets in all 25 Australian cities, large and small, and suggests potential strengths and directions for further growing their knowledge capital and knowledge economy, especially opportunities for smaller regional centres. In the next chapter, we suggest approaches and tools for crafting innovative places to help us better use the innovative assets already embedded in our cities.

APPENDIX: METHODOLOGICAL NOTE ON THE KCI

The KCI contains two domains, and each domain contains three indicators with specific measures, as presented in Table 6.2. Of the two domains, ‘knowledge capital’ comprises the knowledge infrastructure and resources that a knowledge economy can draw upon; ‘knowledge economy’ captures

Table 6.2 Indicators and measures of the Knowledge City Index

<i>Domains</i>	<i>Indicators</i>	<i>Measures</i>
Knowledge capital	Knowledge capacity	Residents with tertiary qualifications (bachelor’s degree or higher)
	Knowledge mobility	Residents who moved from elsewhere in 2011–16 and worked in knowledge intensive industries
	Digital access	Dwellings with internet connection
Knowledge economy	Knowledge industries	Workers in knowledge intensive industries
	Income	Workers earning the highest bracket of income (more than \$104,000 per year)
	Smart work	Non-commuting workers (workers who did not commute to their jobs on census day)

Source: The authors

knowledge-based activities and prosperity. We used relative weighting and equal weighting to compute the KCI: relative weighting is used for each indicator; equal weighting is used for the overall index. This approach is similar to that used for the Integrated Urban Competitiveness Index in Chap. 3. The measures for the six indicators of the KCI use data from the Australian Census 2011. The original data were in different forms and were standardised for each indicator. Of the 25 cities, the city with the highest value (or best performance) was standardised as 10, while the city with the lowest value (or worst performance) was standardised as 1, and the remaining cities were weighted according to their original values between the highest and the lowest. This standardisation method means that the values for one city's indicators are relative rather than absolute; that is, their values are relative to the values of the other cities in the group. With a maximum value of 10 and a minimum value of 1 assigned to each indicator, we computed the KCI by aggregating the values of the six indicators. The underlying assumption for the aggregation is that the six indicators are of equal weighting, or importance, in the KCI. Thus, an 'ideal' knowledge city could achieve a value of 60 for the KCI.

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CHAPTER 7

The Art of Crafting

INTRODUCTION

We turn in this chapter to the art of crafting innovative places, and how this art can be applied to innovative place making in Australia. Crafting innovative places is not about imitating what is done elsewhere; it is about generating new locally based but globally oriented places as launching pads to a knowledge economy. We draw upon the innovative practices, both overseas and at home, examined in previous chapters, and synthesise and consolidate them into a ‘crafting’ approach to innovative place making. We emphasise the notion of ‘crafting’ and argue that making an innovative place is never a linear process in a scientific sense, nor is there a therapy that fits all places. It is an art, an often cyclical helix process involving multiple dimensions and multiple factors that intersect and interact to generate an outcome, and embedding a certain degree of uncertainty and unexpectedness. Achieving the desired outcome requires strategic judgement, sophisticated ‘crafting’ skills, and concerted actions from a consortium of stakeholders and actors, and all this sometimes works with ‘luck’ in terms of timing and endowments, as several case studies illustrated. Here we have no intention of providing a manual or toolkit, which would lead to a complete installation if the steps had been followed or the tools used correctly. That sort of approach is not art; and it will not generate innovation. Rather, we select a suite of key issues that have proven crucial

in our case studies of innovative places, then translate them into crafting tools to both inform practice and trigger imagination.

We start with five crafting tools of milieu, catalyst, collaboration, place making, and financing. We consider each of these more closely, drawing on our case studies to reveal how each tool works. We then turn to regional Australia to explore innovation potential and new economic opportunities for small regional urban centres and non-metropolitan areas. We suggest six strategic opportunities for regional Australia in the new context of a globalised knowledge economy, and offer four strategic elements that have proven useful in driving local economic development and finding new growth opportunities for regional communities. On the basis of these crafting tools and strategic directions, we develop a crafting paradigm for innovative place making, underpinned by the triple pillars of vision, strategy, and support. This paradigm has wider application than simply the Australian context.

CRAFTING TOOLS

It might be difficult to conceive of policy and action at the city level as the basis for developing global innovation and economic might in Australia. Given our top-down structure of governance, institution building, and control, this is understandable. But as we argued in Chap. 1, it is the metropolitan revolution that will lead us forward in a globalised world:

The lines, in essence, between the macro and the metro, the global, the national, and the local, have become blurred. Cities and metros... are innovating on the big stuff: policies and practices that drive the wealth generating, tradable sectors of the economy; commercialisation of innovation; support for advanced manufacturing, export promotion, and foreign direct investment; public-private financing of advanced transport and energy infrastructure; upgrading the education and skills of a diversifying workforce; attracting foreign-born talent and assimilating immigrants; engaging globally on the seamless movement of people, goods, services, ideas, and capital; forging strong relationships with trading partners in mature and rising economies alike. (Katz and Bradley 2013, p. 10)

We must place cities at the core while stimulating action from the bottom-up. The true difficulty in doing so lies in the lack of tools and low levels of power which our cities have. Except for Brisbane, Australian cities enjoy no

real operational power at a city level. The power to govern cities rested with the old colonial states that formed our national federation. Federation is a better descriptive term for the Australian system than federal has ever been. States still have the greatest share of power in urban planning and development, with relatively weak local governments reliant on state mandates and funding (Blakely and Hu 2007; Hu 2016). Until recently, the Australian federal government was an anomaly amongst the Organisation for Economic Co-operation and Development (OECD) nations in having no ministry for cities during much of Australia's comparatively short history as a federated nation. However, this was changed by the Coalition government led by Malcolm Turnbull, who came into office as Prime Minister in September 2015, and was deposed in August 2018. Turnbull renewed federal interest in a national cities agenda, appointed ministers for cities, and left an urban legacy that we will examine in Chap. 8.

To drive a 'metropolitan revolution', we must re-examine the different roles for the three tiers of Australian governments and pay closer attention to the local-level governance that has the most direct relationship with innovative places. Promoting local governance does not mean that all local entities must be owned and operated by a local council. Rather, the idea is to create municipal capacity. This may be (as in Boston's Innovation District) through a local development corporation jointly run by city and local actors (e.g. real estate developers and innovation district managers) who both operate within the larger city and state contexts. Development corporations have a mixed but mostly positive record in Australia. They have proved especially beneficial when their mission is clear and well-articulated. Brisbane's South Bank, the Hunter Development Corporation, and Sydney Harbour Foreshore Authority are examples where both physical and economic spaces have been well managed and generated good returns. Innovation grows out of municipalities, but not all municipalities spawn innovation districts. There are several widely used tools for municipalities to develop and grow innovation capacities: milieu, catalyst, collaboration, place making, and financing. Each represents a different element of a place's innovation capacity:

- Milieu: A strong sense of place and identity that is conducive to innovation, inclusion, and sustainability.
- Catalyst: A unique strength of a place that takes the lead in driving innovation.

- Collaboration: A partnership of public, private, non-profit, and the community with a focus on collaborative design and creation of innovative places; and a spatial reconfiguration to facilitate collaborative consumption and production.
- Place making: An intelligent application of innovative planning, design thinking, and approach to make spaces, both private and public, which facilitate and stimulate innovative activities and attract the creative class.
- Financing: A flexible financing system, including new channels such as crowdfunding and social financing to support innovators, entrepreneurs, and start-ups.

We discuss each of these tools in more detail below.

Milieu

Local milieus are incubators of innovation (Maillat 1998a, b). A creative milieu is an especially important feature that allows for innovation-oriented development to participate in the increasingly intense global competition (Ku et al. 2005). Knowledge workers are attracted to communities with a strong sense of place and identity. They are attracted by a city's brand, and the milieu associated with the brand. By providing milieus, cities attract human capital and encourage the development of start-ups. Improving local communities begins with building creative places or revitalising urban and natural spaces, drawing knowledge workers, firms, and investors from around the world. Increased activity in these spaces has run-on benefits for public safety, business viability, and social vitality (Vazquez 2012). This further enables a city to develop around activities that highly skilled workers enjoy in their leisure time, while providing benefits to local communities.

Developing a milieu of creativity, in particular, fosters the sharing and development of new ideas. The arts sector contributes to the crafting of innovative places and local economic development through improvements in creative production, attraction of knowledge workers, and increased collaboration (Gadwa 2013). It is these creative pursuits, and the spaces conducive to them, that act as magnets for knowledge workers and knowledge activities. The sense of place and inspiration these activities create, their social nature, and the strong culture they nurture are enabled by milieus that combine the construction of appropriate built environments and the utilisation of existing natural ones. In this regard, Barcelona presents a good



Fig. 7.1 Public space in Barcelona

Source: The authors

example of using the historical and cultural flavours of its built environment to create a milieu appealing to innovators and innovation activities (Fig. 7.1). Since the early 2000s, political leaders in the United States have also looked to the arts and their associated milieus as a strategy to attract knowledge workers to build up municipal innovation capacity (Florida 2005).

Thriving innovation milieus are inclusive. Social capital is a central element in enhancing innovative capacity (Tura and Harmaakorpi 2005). Inclusive communities are defined by their eclectic and diverse nature, mixing people from all walks of life, different nationalities, educational experiences, and cultural backgrounds. This type of social capital especially appeals to the creative class. General Electric Labs, the heart of the engineering industry, relocated to Boston's Innovation District because of its popularity with millennial knowledge workers. The human capital and diversity of Silicon Valley draws hi-tech firms and talent from around the world to work and invest. Increasingly, in San Francisco, Boston, and many other cities, both the growing economic competition and the need for a multicultural and diverse workforce to address that competition are prompting cities to invest in their local communities to create an innovation milieu. Firms are drawn to and reinforce a culture of diversity and creativity. The rapper has as much to offer as the electrical engineer. Furthermore, these creative environments have proven more capable of

adapting to both negative and positive economic, social, and political changes (Yigitcanlar 2010). Therefore, the first step in crafting an innovative place is to foster a milieu that incubates and nurtures innovation. Melbourne's Lanes, New York's Streets, and London's Soho are the meccas in this regard and are characterised by their ability to adapt, renew, and reinvent themselves to create an innovative milieu.

Catalyst

Growing new enterprises and fostering innovation builds on a place's strengths. Places use these pre-existing qualities as the basic construction materials for their innovation projects. They might be specific physical resources, location, institutions, or people. These strengths come in the form of innovation anchors as discussed in Chap. 5. But having strengths is not the same as using them. A catalyst is needed to trigger and lead the process of taking advantage of the strength. A catalyst is an enabler of growth, a unifying force across an area, performing a representational function in multiple domains (Bradford 2003). The most essential component in all the cases we studied is for a particular person or group of people to act as the catalyst for an innovative place. What these people all have in common is a collective vision that combines the unique strengths of a place to begin the crafting process. Vision is not a simple set of goals, but grows from and is informed by a place's strengths.

In some instances, a vision comes from the strong will of a few individuals who do not take 'no action' for an answer. Parramatta in the Sydney region exemplifies this. Three generations of Parramatta leaders of diverse political and cultural backgrounds saw the potential to transform old factories into the base for new biomedical and environmental industries. In Emeryville, California, Rich Robbins of Wareham Development took a dying town and helped transform it into one of the leading biotechnology zones in the world. The old train sheds at Eveleigh in Sydney seemed wasteful and of little use, but the intent of several university leaders transformed them into the Australian Technology Park (ATP) innovation centre. These individuals, or catalysts, consistently challenge the usual paradigms and comfort zones, and find new and different ways of changing the status quo. Making innovative places requires a combination of both the right people and the right places, at the right times. This is what we meant in our Introduction of this chapter by the 'luck' involved in making successful places.

Catalysts are no guarantee of successful innovative places. Catalysts work through combining place-based strengths to create new ways of seeing things and remaking existing features into innovation. Catalysts vary case by case: they could be, for example, the innovative individuals we have just discussed, or existing infrastructure, or a new district development model. In the property development industry, a ‘catalytic development model’—a place-based response to changing demands that facilitates large-scale investment in concentrated and walkable urban areas—is drawing growing research and policy attention (Leinberger and Loh 2018). This model, built upon close collaboration between government, developers, builders, and the community, also applies to developing innovation districts that involve large-scale property development, such as Boston’s Innovation District. Collaboration underpins the functioning of catalysts, whether the catalysts are individuals, infrastructure, or models.

Collaboration

Collaboration is a buzzword today, and has been frequently referred to in this book. The emphasis is on the ‘co’, meaning a sharing and mingling economic and social environment, not the stand-off and stand-alone individualism of the post–World War II years. In the global and digital era, collaboration is much more important than it was before. Here we look at collaboration at the meso and micro levels, in contrast to our discussion in Chap. 5, where we identified collaboration as one of the three macro-level hinges of an innovation ecosystem.

At a meso scale, proximity between knowledge sectors and workers enables collaboration. It is something of a paradox that this sort of proximity (or agglomeration) matters so much for innovative activities. Globalisation and the digital revolution, which can so readily conquer distance, have led to an increasingly important role for innovation, which ironically is generated more efficiently in the context of local proximity (Audretsch 1998). Local knowledge transfer between key actors stimulates further innovation. The agglomeration of knowledge industries and workers creates thriving workspaces that benefit related industries as a whole (Yigitcanlar 2010). Knowledge spillovers educate workers, inform businesses, and create more innovation opportunities. This meso-scale collaboration requires compact urban form and high accessibility, both of which are reflected in the transit-oriented development (TOD) approach to innovation district development. TOD is more than a sustainable transport and development integration model; it enables cluster-based collaboration.

TOD not only benefits environmental sustainability and economic growth; it also services local communities. It encourages the development of public spaces and provides residents with more opportunities to connect and interact (Dorsey and Mulder 2013).

This cluster-based collaboration is well explained in the City of Boston's strategy for its innovation district:

Ideas need a tight eco-system to foster creative growth – distance equals death. The ability for small firms to generate ideas and intermingle with larger firms who have the access to capital and the ability to scale and grow those ideas is imperative in entrepreneurial fields. This tight location clustering leads to job creation as well as more efficient product and service design. These Innovation District clusters become the new economic engines for the region, retaining home grown talent from the surrounding city and intellectual institutions. (City of Boston 2012)

At a micro scale, innovative spaces are collaboration oriented. This is reflected in some new ways of using spaces, such as fewer doors, more transparent and open spaces, more communal spaces, and the establishment of community gardens. In the knowledge-intensive sectors, there has been a trend towards 'communalisation' of space use—more use of shared space and less use of partitioned space—in commercial office buildings (Hu 2014). This shift in space use is required because of the increasing need for collaboration (and the innovation that collaboration supports) in knowledge sectors. Micro spatial collaboration is also reflected in the 'domestication' of office space—designing and providing home-like working environments—in hi-tech firms such as Google, Microsoft, and numerous new boutique creative firms. The recent emergence of the sharing economy in the form of smart work, largely facilitated by the advance of information technology, is reinforcing the trend for spatial collaboration, incorporating both collaborative consumption and collaborative production, which we will further examine in Chap. 8. A prime example is the rapid spread of co-working spaces for small start-ups. The very nature of this new space is collaboration, designed to share, to save, and more importantly to innovate. There is a role for local government to play in developing these types of collaborative spaces. The Canberra Innovation Network (CIN), an initiative between the Australian Capital Territory (ACT) government and locally based universities and research institutes to connect entrepreneurs with science and research, provides co-working spaces and support for new entrepreneurs with innovative ideas (Fig. 7.2).



Fig. 7.2 Co-working space for start-ups, Canberra Innovation Network
Source: Canberra Innovation Network, used with permission

Collaboration in crafting innovative places involves more than the meso and micro scales in a spatial sense discussed above. It also involves partnership-building between key stakeholders. Crafting new places requires the creation of new institutions to design, organise, and manage them. These new partnerships are not just the traditional public–private partnerships, but a vast array of public–public and non-profit and community associations, which form local and non-local networks to sustain a knowledge economy (Boschma and ter Wal 2007). They span all levels of local, state, and federal governments. These organisations are purpose-designed and built to fit the local situation. Some are single purpose infrastructure building or educational organisations. In New York, for example, there are engineering and science centres which involve complex partnerships including multiple levels of governments to engage, in various ways, with the city’s innovative future.

Almost all the cases we have discussed have specially built organisational structures designed to meet myriad interests, and address the

financing and operational requirements essential to make the places work in a collaborative manner. These organisational structures need to include not only governments—at several levels—but also a range of key regional and local stakeholders. Governments cannot to be stingy with sovereignty. Rather than holding on to power, they can facilitate the formation of collaborative decision-making approaches characterised by authenticity, engagement, and common purpose (Feldman 2014). New approaches like this are being forged in many innovative places. City and local governments can focus on building effective structural institutions and developing processes necessary for driving the success of entrepreneurs and start-ups, and attracting talent and investment. This means creating an environment of reliable and stable governance, infrastructure, branding, and place making, and combining these with a capacity for collaborative design and development. These are the new rules for crafting innovative places through government-led collaboration.

Place Making

Place making is the crafting tool for an innovative place's physical assets, which are 'designed and organised to stimulate new and higher levels of connectivity, collaboration, and innovation' (Brookings 2017, p. 10). As we have discussed throughout this book, innovative place making focuses on research and development (R&D), education, and working and living spaces that promote creativity and collaboration. Cities like Vancouver have an abundance of charming and liveable spaces and neighbourhoods through innovative place making. Granville Island, Vancouver, previously an industrial manufacturing area, is now an innovation hub as well as a top tourist and entertainment site (Fig. 7.3). These neighbourhoods are liveable and loveable; and the creative class is comfortable living in, working in, and raising families in communities like this. This type of careful urban design, also found in Seattle, is the backbone of any innovation district. Communities that fail to provide high-quality and well-integrated social, physical, and economic environments cannot compete in a global knowledge economy. Innovative place making intersects economic development, community development, and cultural development, and focuses on developing local assets and connections, not just objects (Vazquez 2012).

Crafting innovative places requires intelligent application of planning and regulatory tools as levers. This often means local governments need to reframe traditional zoning and planning conventions. Any successful innovative place must customise its planning and zoning regulations to fit its



Fig. 7.3 Innovation hub in Granville Island, Vancouver
Source: The authors

distinctive context. In Emeryville, California, special zoning was implemented to create an innovation zone conducive to the incubation and growth of biotechnology sectors in the city. A clear vision informs this planning reframing and adaptability, providing the goal of innovative places towards which planners strive.

Physical environment can be a source of innovation, and such an innovation-supporting environment is often collaboration enabling, attractive, and value reflecting (Stähle 2013). But our current planning practices were designed around the needs of the industrial age. New performance-oriented land use planning must be employed to integrate work places and living areas into one creative development arena. The spatial and temporal blurring of work and living, the integration of consumption and production, and ubiquitous access to internet anywhere and anytime render our land use coding system, which was based on industrial production, obsolete. Australian states, as the rule makers, must craft special planning regimes with an eye towards the end product rather than handicapping themselves and local governments with arduous regulations

and prohibitions. Flexibility must be built into the planning system. Regulation can act as a tool to design new ways of generating business and investment in our cities. Overhauling our regulatory system in such a way holds negligible risks and promises great rewards.

Financing

Enterprise marches on money. Early on, the money might come from the support of friends and family, the believers and dreamers. It might also come from crowdfunding, through websites such as Kickstarter. These social and crowdfunding networks are the flexible financing that start-ups build from. The early capital investments are the riskiest, often more akin to donations than investments. Venture capitalists do not participate in this phase of the process, but instead want to see more developed versions of a product that has some potential for reaching the market.

These natural networks of flexible financing can be emulated. The United States has pioneered this through community investment funds. The Community Development Finance Institution (CDFI), for example, has generated new enterprises in America's most distressed communities. It was established by the *Community Development and Regulatory Improvement Act 1994* to assist new business by leveraging US Treasury resources. Many European cities, such as Helsinki and Dublin, have followed this model. Australian company VentureCrowd is bringing this model closer to home with offices in Sydney, Melbourne, and Shanghai. Universities can also be active players, with more educational institutions, such as Massachusetts Institute of Technology (MIT), using internal funding programmes to encourage and invest in start-ups. Australia lags, primarily because of a lack of entrepreneurial culture for supporting promising but possibly high-risk new ventures. For such systems to work there needs to be a recognition that the early stage investments are highly risky, but are highly rewarding if successful. The success of San Diego's Bioscience Beachhead was underpinned by many of the factors we keep returning to in this book, such as a research university, leadership, entrepreneurial culture, and networks. But one important factor in its success was risk financing, which was interlinked with other factors specific to the local innovative environment (Walcott 2002). In the Australian context, entrepreneurs are more reliant upon community and locally based funding options. Lack of access to funds was identified as a barrier to the development of small business in Australia in Chap. 2. We need to move towards a greater reliance on flexible financing from crowdfunding and social financing movements.

The innovation programmes and initiatives in Australian cities need to encourage the commercialisation of inventive ideas. More importantly, they need to assist start-ups in developing skills to raise funds, for example, through workshops (Fig. 7.4). These workshops build up not only financing capacity, but also networking opportunities.



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Fig. 7.4 Financing workshop invitation, Canberra Innovation Network
Source: Canberra Innovation Network, used with permission

NEW DIRECTIONS FOR REGIONAL AUSTRALIA

In this book, we have spent a lot of time discussing cities, and the crafting tools for innovative places we have just presented mostly apply to urban contexts. But we have not forgotten regional Australia, including regional urban centres and non-metropolitan communities. The growth of Australia's regional communities has been mixed: in the decade between 2006 and 2016, while both skilled workers and international visitors increased, the new business entry rate decreased overall (Australian Government 2017). Compared with inland communities, the coastal rural communities, or so-called 'sea change' communities, experienced significant growth between 2006 and 2011, as measured by a growth index comprising indicators of population growth rate, employment growth rate, and income growth rate (Fig. 7.5). Regional Australia is a new frontier for pursuing an innovation nation and making innovative places. But we cannot rely on path dependence of the old approach; we need new directions

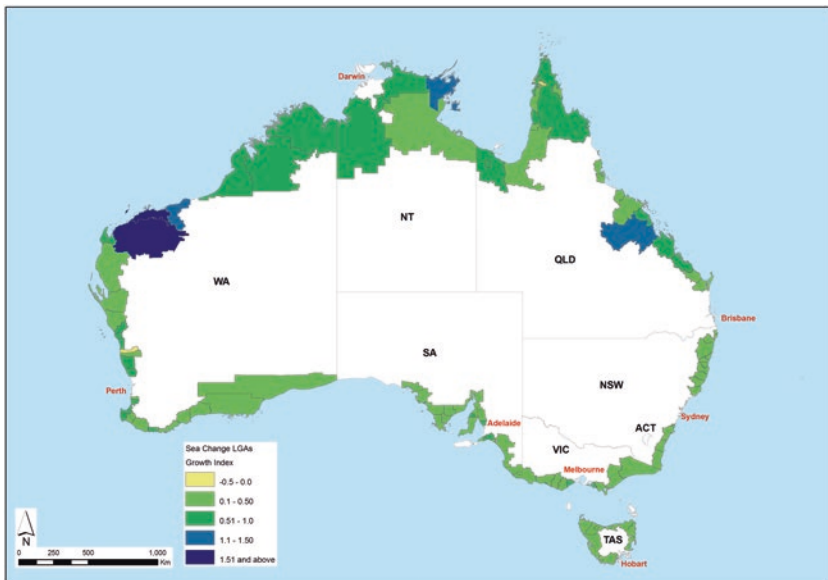


Fig. 7.5 Growth in Australian Sea Change Communities, 2006–11

Source: Australian Census 2006 and 2011 (Australian Bureau of Statistics 2014a, b), created by the authors

to make our regional communities globally connected and competitive. The Australian government's City Deals programme seems to have a good appreciation of global opportunities for developing regional Australia. This global orientation is well reflected, for example, in the Townsville City Deal, the first of Australia's city deals to be signed. This deal set the following economic visions for Townsville by 2030: the economic gateway to Asia and Northern Australia; a prosperous and lifestyle-rich city for its community and visitors; and a global leader in tropical and marine research and innovation (Australian Government et al. 2016). We will discuss the Australian government's City Deals in more detail in Chap. 8.

In 1979, Ted Bradshaw and co-author of this book Edward Blakely wrote a seminal book: *Rural Communities in Advanced Industrial Society* (1979). Here they first argued that rural places had as much chance to seize the opportunities of the post-industrial society as any other location in the emerging technological era. Since then, digital technology has made new opportunities in the global economy possible for small rural communities. Rural places might lose jobs from the old economy, but technologies and techniques with lower costs of transmission and transportation have provided multiple opportunities for such places to compete effectively in an integrated world. We found three options used by non-metropolitan communities in the United States to create innovation opportunities, which could be useful references for regional Australia.

The first option is connected with the rise of the service sector, which places human capital, technology, and natural resources together in a new configuration. Small communities that have incorporated broadband internet with great lifestyles can be competitive in attracting new sites for information employment, such as call centres. Non-metropolitan areas with both attractive lifestyles and low costs can compete globally if they become the nodes for information transfer and the agglomeration of service and support for technological applications. We have seen the rise of international call centres and information centres to support banks, hi-tech firms, and universities from a great distance, such as in India and the Philippines. But there are growing concerns over internet security and an increasing sense that digital information should be transferred only in safe and secure environments. Outsourcing these services across international borders increases the possibility of information systems being intercepted and hacked, to the detriment of national security and business interests. With upgraded digital infrastructure, local non-metropolitan areas may be a far better option for technical applications than distant overseas venues.

Unfortunately, Australian non-metropolitan communities have not seized this opportunity to any great extent. In the United Kingdom, the epicentre for British intelligence is located far from London, allowing it to operate in an environment that is better for both digital transmission and the operation of the service. Similarly, in the United States, large digital fingerprint and forensic services are located in rural West Virginia. In these cases, and in many locations in Canada and elsewhere across the world, non-metropolitan places are showing they can be very competitive in taking up technology-facilitated services. Non-metropolitan areas can compete if they become nodes of specialised knowledge and technology rather than simply being single users of these applications.

The second option is building concentrations of products or services to match certain natural resources. This is undertaken through using highly skilled and technologically enabling production strategies to increase the capacity of resource extraction and move it more quickly and strategically into finished products. Regional communities can become highly specialised in developing new materials which have a ready international market. One example is Colorbond, a steel fabricator product developed by BlueScope Steel in Port Kembla near Wollongong, which meets international demand for speciality building products. Similarly, communities that can produce high quality water and move it to markets are finding they are very competitive in the emerging health market. Huge investments are being made into bottled water, new pressed juices, and other food products aimed at the emerging high-income middle class at home and overseas. This new class is food conscious and wants quality production with guarantees of authenticity regarding the origins of these products. Other communities are combining production of foods with the development of 'pure' vitamin pills and other supplements to create new markets for community-branded products.

Finally, communities with precious resources are becoming the central point for developing new technologies, practices, and policies for these resources. Water is a good example again. The Murray-Darling Basin is a new experimental lab for water irrigation techniques and technologies, which are becoming increasingly important in crop development and in creating new production opportunities, such as wine for international markets like China. In addition, these communities are becoming increasingly sophisticated in developing opportunities by selling techniques and technologies for growing better and cleaner crops for a growing middle-class market in Asia, especially China.

Crafting Regional Opportunities

There is no reason for non-metropolitan communities in the global and digital era to feel as though they might be left behind when they have the resources to compete globally. But they must be mindful of how to craft these new opportunities cleverly so they are not merely the pawns of a larger system but are themselves originators of new economic activities. Non-metropolitan communities are not all the same, so the directions they might follow to craft their economic development potential vary. We see five typologies of opportunities that can form the base for crafting better and more specific directions.

Government Network Centres

Government clusters are far more efficient in servicing non-metropolitan areas across large regions than local communities individually. It makes national sense to build strong technological capacities in certain non-metropolitan areas that already have adequate regional infrastructure to attract and retain human capital. Well-located regional government centres for services, such as business and financial support or income tax, can be strengthened if they are amalgamated into a single place rather than spread out. One area that is already well positioned is in Victoria's Gippsland region, where the Australian Securities and Investment Commission has centralised certain services. If higher end services were also placed there, with specialised financial education, it would be rather like the concentration of insurance education and services at Stevens Point, Wisconsin, which has made that area a national node for the US insurance industry.

University Professional Communities

There is a trend towards increasing the number of university places in non-metropolitan areas at home and globally. This is a good move. However, the regional universities need to build their reputations and attract academics, so they can become global knowledge nodes and competitive places. Places like the University of California at Davis have become globally competitive because the small town that is the home of this campus has a concentration of agricultural and cultural education that has helped build the surrounding area's reputation as a global wine centre. We have few such well-defined globally competitive non-metropolitan universities. James Cook University is a world-class university in marine sciences, but it

has not yet become the place that people all over the world think of as Australia's most important centre for this area of study. National policy would need to be forged in ways that would facilitate its identification as a highly central node in that specialisation. Similarly, if a nation embarks on developing space science, it needs to identify an institution and location that becomes so clearly associated with space science that it is a magnet or attractor for global talent. But regional communities do not have to wait for the government to nominate a particular direction; they can take a direction themselves.

Launceston in Tasmania is already embarking on this journey with its thrust to place a campus of the University of Tasmania in its downtown core. Like Newcastle and Parramatta, placing higher education institutions at a place's core brings life and activity to the civic environment and allows the area to be a strong competitor for retaining and attracting human resources, including the vital 25–45-year-old age group. Places like Bundaberg and Toowoomba in regional Queensland have enormous capacity to play a role like this, with the Hinkler centre for air and space science in Bundaberg and a new airport in Toowoomba already providing features that have the potential to make these places globally competitive.

High-Value Industrial Communities

Regional communities can be strong competitors in attracting and retaining new, emerging industries because they are away from the congestion and density of cities but have amenities that may appeal to technological industries. Communities like Orem, Utah, which is home to many software companies, successfully use their lifestyle advantages to continue to attract and retain talent because they compete for opportunities collectively, as a community, not as single firms. Many communities in the Midwest United States have found this a very valuable formula, and are competing successfully at a global level for everything from industrial design to space science and small parts creation, by having the city act as a fulcrum for a collective firm presence. Port Kembla, not far from Sydney, plays a similar role in steel and light material fabrication.

Specialised Tourism

Too many communities think they are attractive tourism destinations just because they have great beaches, good sunshine, and friendly people. This is simply not enough. The first step towards a tourism policy that is more likely to make a place globally competitive is to build up outsiders' knowl-

edge about a community's special qualities, through very concerted, organised, and differentiated information campaigns, so that people will see the place as so unique that it deserves to be experienced and seen, and not visited merely for a rest. Information technology is an enormous help here, as it allows people from around the world to obtain, and then commit to, a consistent vision of the place and the special resources it offers. There are special communities around the world such as Ashland, Oregon, the home of international Shakespearean theatre and drama education, which maintains a rural character while attracting global audiences. Communities that create recognisable magnet infrastructure at the heart of their community make the place and its surrounding activities memorable experiences.

In Australia we have some of the world's most attractive tourism opportunities, such as turtle nesting grounds and penguin areas. The town of Port Campbell in Victoria has a small population of 600 people, but it is close to the great natural feature of the Twelve Apostles limestone stacks (Fig. 7.6) and to the scenic Great Ocean Road, both enviable specialised



Fig. 7.6 The Twelve Apostles limestone stacks, Victoria
Source: The authors

tourism resources. Communities with these sorts of advantages have a non-metropolitan rural character that can be a global attractor, and can be amplified to the world through smart use of social media and live media, not merely static web sites. A few places, like Tasmania, are already using YouTube in a very consistent manner to promote the quality of what they offer and how visitors can access and become part of it. The end game for a good tourism programme is not only to retain existing human resources but to attract new human resources. Tourism should not be just a side-show or an adjunct to a rural region's economic development programme; it should be a central resource, well developed through a good story transmitted over social media so the right people who are interested or might be interested get the right story. One of our studies some years ago found tourism played a dominant role in driving economic development in Australia's rural coastal communities, but growing cultural and recreational services were also creating new local economic opportunities (Hu and Blakely 2013). These findings further confirm the importance of exploring specialised tourism through adopting innovative approaches to identifying and communicating the unique character of a place.

Retirement Venues

The retirement age is rising around the world. People are leaving their fulltime jobs but they are not stopping working. Retirees like to move to small places, so they can get away from some of the noise of big cities. But they want many attributes of a big city in both how a place treats them and what they can receive from it. Most importantly, they want to be engaged in a place through activities that help build a sense of community and that contribute to the local community's well-being. Many communities in the United States and in Europe offer opportunities for retirees to reopen stores on the main street so they can contribute back to the community and be active in local affairs. One of the best examples of a community that successfully engages with retirees is Rochester, Minnesota, the home of the Mayo Clinic. Here, almost every retiree and people at every other age level can be an active volunteer with the clinic, with the city, and with the region. The farm community provides healthy foods and recreation, and through growing healthy food farmers become a part of the community. Retirees can provide services such as postgraduate education because of the large number of ex-professors who live in the area. These high-quality educational services can be offered to students who might be in the region or people who might visit the region in order to combine a holiday with

education. Retirees are also students: there is a well-established higher education summer programme for retirees at New England University. It is very successful and helps build business for hotels and other venues in otherwise low periods.

Strategic Elements

We suggest four strategic elements that run through the five typologies of opportunities discussed above in building a new economic development strategy for non-metropolitan areas. These elements are not complex, but local leaders and planners need to follow them clearly and carefully because there is a tendency for many small communities to imitate larger places or to try and move in too many different directions, and thus reduce their chances for success. Simplicity is powerful in setting strategies.

A Clear Focus

The first necessary element is to determine from the list of possible opportunities, such as those described in the previous section (e.g. an emphasis on natural resources for lifestyle and tourism, retirement venues, or a high-value industrial activity) a clear central focus. The central focus should become the brand and identity of the community and be supported by a set of activities and communications that undergird this direction. The focus can and should include logos and other communication vehicles to avoid confusion with other places that emphasise similar activities. Bundaberg, Queensland, is a good example, with the Hinkler centre for air and space exploration as its most distinctive local feature. The unique aspect of this centre is its connection with the National Aeronautics and Space Administration (NASA) in the United States, which presents unique opportunities to forge a globally attractive youth education programme combined with tourism and recreation opportunities that encompass the wonders of the Barrier Reef.

A Magnet Infrastructure

Non-metropolitan communities can forge a global image through having globally recognised assets assembled in a facility or group of facilities. An example is the Mayo Clinic in Rochester, Minnesota. Rochester is a small, liveable city that contains one of the most well-known cancer institutions in the world. It is a smart city incorporating many features that small cities can learn from to achieve global reach. It is not just the importance of

having a hospital or clinic or major government facility. It is positioning these assets at the core of the city and combining them with a rich variety of resources that make the place attractive. One way for non-metropolitan communities to assemble high-quality and high-value technology centres and information-rich resources is to place a research university at the core of a small city or town. This brings with it knowledge capacity that can couple with the surrounding environment to generate a powerful knowledge base. The vitality that a university brings to the core of the community alters the dynamics and boosts the potential for attracting younger people and retaining them as major resources for connecting with the wider world.

A Connectivity System

We have emphasised, some might say overemphasised, the concept of connectivity. Connectivity in the global digital era is everything. Being connected by the internet brings the world to you. Small communities far from major cities must develop their capacity to reach the world. Many communities are doing this across the United States. Small communities are developing their own telecommunications companies with 5G and higher bandwidth. This degree of digital connectivity infrastructure alters the entire game for non-metropolitan areas. When communities can be the launching points for new products, devices, and storage technologies, they can compete effectively in the global innovation race for goods and services. Non-metropolitan areas can be central to the rollout of new forms of the information and economic order, such as drones, artificial intelligence (AI) devices, and autonomous vehicles (AVs). Communities in Australia are exploring connectivity-based innovation opportunities. For example, the City of Casey, Victoria, is developing internal capacities in precision technologies to participate in the information age.

Communicating digitally is still not the same as face-to-face interactions. Physical connectivity remains important for people and product movement. Small airlines are servicing non-metropolitan communities across the United States and Europe. Old military bases are now thriving new airports. Innovation still travels with people. Non-metropolitan airports are becoming economic hubs based on people movement. There is no better example of this in Australia than the emergence of the Toowoomba Wellcamp Airport, which moves people and can now transport fresh fruits, flowers, and other agricultural products to Asia over-

night. This airport is already increasing the centrality of this small region as an educational centre and a place for innovation, by retaining young people and increasing the number of international students at the local University of Southern Queensland. There are additional plans to intersect the airport with a rail line that would put this region in the national economic equation. Similar examples are also emerging in Tasmania and other places in Australia, with air travel and the national broadband network (NBN) in place.

In the more strategic and longer-term future, transport technology will further connect Australia's regional communities with the wider world. The price of air travel is falling. Both solar and new alternative fuels are cheaper than traditional fossil energy, and new aero-engineering is moving very rapidly in aircraft design. New materials are used to make smaller and faster aircraft, and these are predicted to replace entire aircraft fleets in a decade or less. But even low airfares may not compete with safe and fast trains, linking Australia's east and west coasts and connecting large and small cities, much like Europe. These high-speed trains can now be built at relatively low cost. China has mastered this technology, and has built up the widest high-speed rail network in the world, linking numerous urban centres and rural communities across the nation within one decade. China is diffusing this technology across the world at a low cost.

A Civic Heart

Some small communities are losing their heart and soul. Many places have the requisite resources, but they suffer from poor image. For example, stores in the centre of towns may be boarded up or closed: these small cities are suffering from the deep depression many urban areas went through decades ago. Small cities without a sense of place will not attract or retrain the new generation and will lose their charm for seniors. A good place to fish and hunt does not replace the high-quality public spaces and charm that small places must be able to offer residents and visitors, investors and talent, who they wish to attract and retain. There are no bad-looking cities with good-looking jobs. The importance of appearance is magnified because small non-metropolitan places must compete with big cities: small places need to be able to capitalise on local charm. We need not provide too many illustrations of this. Strong places have strong identities. These identities are often articulated in combination with a magnet infrastructure—a hospital, a university, or an urban facility known regionally or globally—and are connected both by air and high bandwidth internet

communications. These are not things that are just nice to have; they are necessary for any community that wants to grow innovation capacity, develop their identity, and compete globally.

THE CRAFTING PARADIGM

Vision, strategy, and support form the three pillars of our crafting paradigm (illustrated in Fig. 7.7). These pillars have emerged from, and draw together, our analysis of how innovative places are crafted, regardless of whether they are in urban or regional areas. Each pillar contains underlying elements. These elements have been elaborated elsewhere in the book, but here we put them together within a single paradigm structure. Vision is the first and most fundamental pillar of the paradigm. Without it the paradigm crumbles. Vision refers to a collective aim with a grounding in data and empirical evidence. Once a broad vision is generated for a place (like the Emeryville, California biotechnology centre), new city planning and governance rules are crafted. The old way cities were made was good for farms and factories, but has no applicability to a new knowledge economy. Public and private actors establish themselves in their roles when a clear vision is provided. Once established, the combination of vision and

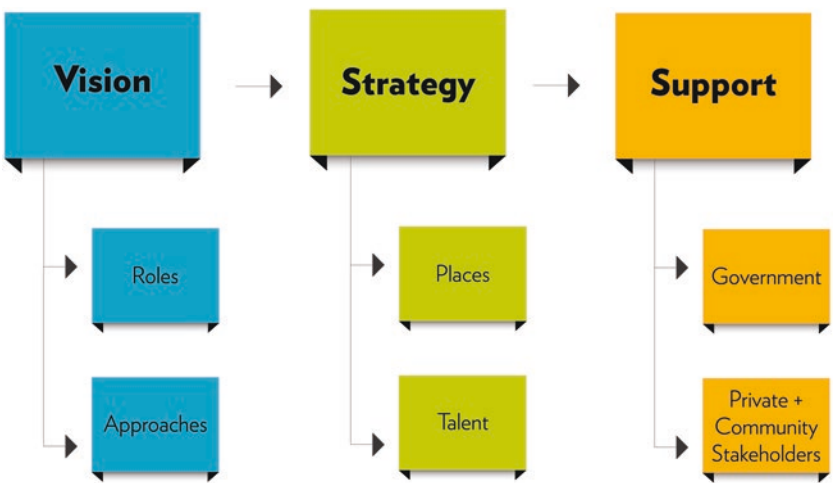


Fig. 7.7 Crafting paradigm for innovative places
Source: The authors

actors determines the approach that is most effective. The actors and their respective roles identify and utilise the resources and assets that local places have available.

Once a vision is set, a strategy is developed that encompasses viable approaches to innovation. The organisation of Boston's Innovation District provides an example of this. At its core, strategy is the method of accomplishing a vision for a place, just as business management aims to achieve a profit goal. The linearity of these steps (vision then strategy) is important. Too often, strategy is established without a clear vision. After a vision is conceived the first step in developing a strategy is to find the place: determining the appropriate venue to match the roles and resources at hand. This might be an area of obsolete infrastructure that can be co-opted for future use, an especially attractive neighbourhood, or a centrally located space. It will vary from case to case.

Once the location is determined, talent must be brought in to design, develop, work in, and live in this place. Talent extends human capital, the primary resource in the new economy. Initially this can be done through design competitions, advertising, and international collaboration. Cities are establishing their own informal trade delegations to develop and sign up to mutual intellectual and financial ties with other like-minded cities. As the pillars become established, long-term and short-term access to human capital will increase. Build the place, and people will come.

The final pillar is support. In many respects, this is the role of government in the new paradigm. It does not entail financial support services only, but includes changing rules and procedures to create regulatory environments that are more conducive to innovation and entrepreneurialism. Part of this is simplifying the relationship between all levels of governments, and part is the provision of soft support services. It also means cutting red tape and streamlining rules and procedures for firms. In doing so, the government can maximise the ability of new and existing firms to co-invest and partner with local and global enterprises. Especially internationally, uncertainty is the biggest enemy to investment. Besides an easy-to-navigate institutional climate, engaged private and community stakeholders help attract investors and firms to new innovative places. Community support underlies all aspects of work and life in innovation districts. In Chap. 8, we further elaborate on the co-design and co-creation of innovative places led by government.

CONCLUSION

In this chapter, we set out to build an innovative place paradigm to help create environments that can act as seedbeds for innovation and the knowledge economy. A new framework is needed, not an array of new policies or new policy apparatuses. We are suggesting augmentation of the existing policy framework to strengthen the directions that will produce competitive and productive economic output. Context and vision will be different in every case, but policy and programme structures are shared. Our proposal is not to create many new institutional arrangements but rather to organise the policy system so that it is more responsive and flexible to each particular locus. That locus is the city, metropolitan or regional area, precinct, or other organising vehicle for innovation generation and dissemination. In one respect, we already have such an arrangement in Infrastructure Australia, which examines the intersection between federal and state physical and economic infrastructure requirements to determine the best vehicle for delivering those services to increase the nation's productivity. This approach might be adapted or refined so that Infrastructure Australia becomes Innovation Australia. Such an institution could act across governments to assemble the appropriate resources to meet the needs of metropolitan and regional innovation policies and programmes. This would unleash bureaucratic innovation across government at every level, allowing existing programmes to be refined or rearranged to meet local innovation district needs. In our concluding chapter, we will further examine the government's role and how Australia's governments at all levels fit into a co-design and co-creation system for crafting innovative places.

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CHAPTER 8

The Smart Way Forward

INTRODUCTION

Australia's current economic system falls short of achieving a sustainable trajectory as a knowledge economy. For two centuries, the forces that have shaped our economy came from the earth and what we put on it or took from it. Such a system was efficient in an industrial age, but made us a global dependent on demand for our raw materials and minerals from economic booms elsewhere. While some elements of the natural resource economy remain essential in the information age, a more subtle and localised approach is needed to sustain our competitiveness and prosperity. Human ingenuity, not natural resources, is reshaping the world economy. Australia's basic resource is our natural endowments; institutional capacity and human capital must be forged into a new innovation engine to drive future economic growth. This is the fundamental game change we are proposing: restructuring the current top-down approach and turning to a paradigm shift of co-design and co-creation to make innovative places.

In this concluding chapter, we focus on how all three tiers of Australian government should work in the co-design and co-creation of innovative places. We start with several smart opportunities derived from cutting-edge technologies that will be shaping the future pursuit of innovation and the future practice of work. We then discuss the recent Turnbull government's (2015–18) smart cities agenda from the perspectives of internal policy setting and the global competitive environment. At the end of the

chapter and book, we elaborate on how a co-design and co-creation approach represents a smart way to drive Australia forward as an innovation nation.

SMART OPPORTUNITIES

There are always new opportunities. The key is to identify and grasp the opportunities that are not just new, but also right. Here, we select several smart opportunities that are especially worth paying attention to in shaping future innovation policies and places—smart work, artificial intelligence (AI), and low-tech innovation. As argued in the previous chapters, Australia’s ‘luck’ with natural endowments, and with timing and strategic location in the Asian Century, have contributed to the nation’s economic growth for 27 consecutive years until 2018. This is the strongest economic growth among advanced economies over this period. Apart from our strong ties with Asia, this strong growth has also resulted from an increasingly diversified and steadily growing service-based economy; that is, a knowledge economy (Australian Government 2017b). This economic achievement is certainly worth celebrating. However, path dependence and a reluctance to move out of our comfort zone are already putting us in a disadvantageous position in the international innovation race. Australia’s domestic spending on research and development (R&D) is lagging compared with international leaders: countries that have gained a reputation as innovation nations through consistent R&D investment, effective national innovation systems, and innovation-led knowledge economies (Fig. 8.1). These leaders include countries such as Denmark

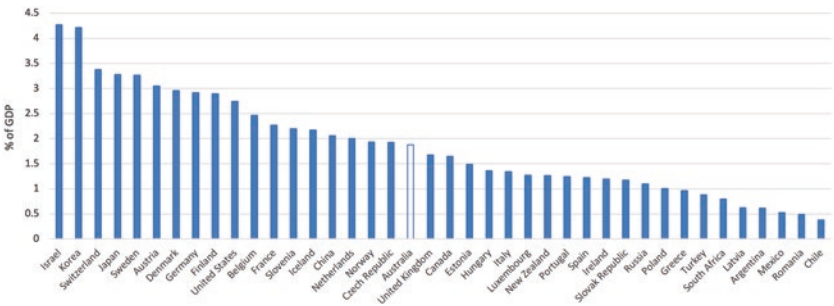


Fig. 8.1 National domestic spending on R&D, 2015
Source: OECD (2018), created by the authors

and Germany, discussed in earlier chapters. Australia is even lagging behind nations that have not been traditionally known for innovation investment and outputs, like Slovenia and the Czech Republic. The Scandinavian countries, which have smaller populations than Australia, are ahead of Australia not only through higher rates of investment in R&D and higher education, but also through higher levels of R&D employment, collaboration, and foreign investment, all of which have contributed to their significant R&D impacts on the world stage (Pettigrew 2012).

The time-series trend of Australia's domestic spending on R&D (shown in Fig. 8.2) is even more concerning. In the twenty-first century, Australia has been consistently below the Organisation for Economic Co-operation and Development (OECD) average in R&D investment. In 2008, Australia almost reached the OECD average after years of constant upward growth; but this was a turning point from which Australia kept declining, despite generally constant or upward trends internationally. There has always been a considerable gap between Australia and the international innovation leader, the United States, and the gap has been further enlarging in the last decade. China, a major destination for Australia's export of minerals, knowledge, and education for several decades, surpassed Australia in 2014 in the rate of R&D spending. As we warned in Chap. 2, our Asian students are

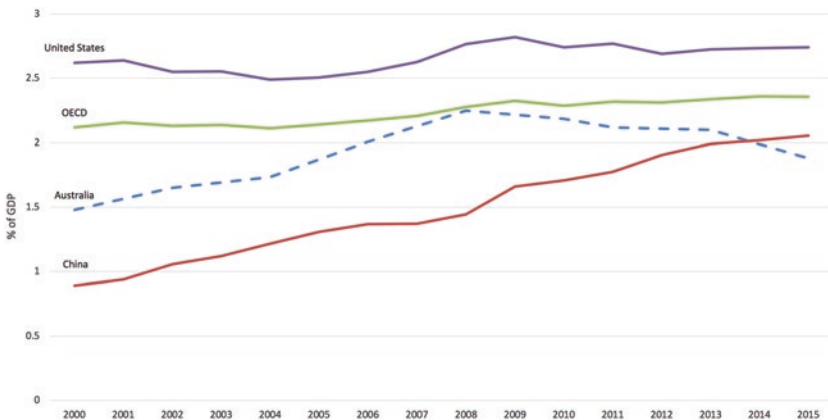


Fig. 8.2 National domestic spending on R&D, 2000–15

Note: The values for Australia in years 2001, 2003, 2005, 2007, 2009, 2012, 2014 were averaged from neighbouring years due to data unavailability

Source: OECD (2018), created by the authors

now becoming our teachers. The continuing growth of China and other Asian nations' innovation capacity (Japan, South Korea), which has contributed to Australia's economic growth and prosperity in the recent half century, will instead begin to marginalise Australia's competitiveness in the Asian Century. Australia is already lagging and must catch up. Given these challenging conditions, there is a need for continued national debates 'to ensure that Australia's policies for research and innovation support a national economy that can thrive and adapt to challenges as global economic circumstances change' (Pettigrew 2012, p. 4). Next, we outline three examples of smart opportunities that are likely to reposition Australia and other nations in the future global innovation race, and to change the way we understand and plan cities and places so as to drive innovation.

Smart Work

Smart work relates to smart cities. The rise of the 'smart city' has been based on both digital technology and on smart people working for the knowledge economy, and this new thinking presents an opportunity to re-examine the conventional approach to urban development and planning (Kitchin 2014). The growing relationship between smart cities and urban form is of crucial relevance to the future of urban planning and place making because of the radical changes this may bring to how urban environments are understood and shaped. Ubiquitous technology will ultimately shape human interactions with the urban form and influence the daily function of the city (Zanella et al. 2014). Big data produced from perpetually streaming technology is generating massive datasets with the potential to deliver unprecedented insights into city functions and urban problems (Tien 2013). The big data revolution in technology and science will manifest itself in the urban form—especially regarding modelling people's behaviour in urban environments (Keller et al. 2012). The smart city concept reinvents how we identify and predict the services required to meet existing and future needs through accessing and collecting digital data. The most obvious example of this is the widespread use of pedestrian and automobile traffic data in the optimisation of transportation systems. These data are used to determine the location, timing, and cost of parking facilities, toll roads, and arterial systems. This data-intensive design and development is a defining attribute of smart cities, or cities in a smart age.

Businesses are leading governments in using big data. They track customers' spending, online activity, biographical information, and geographi-

cal data to provide tailored and sophisticated advertising to consumers to increase sales. This same model can be applied in our cities and local communities through using geographic information system (GIS) technologies to both generate and analyse such data. There are, of course, limitations to this application of data; we are not suggesting breaching privacy, removing net neutrality, or using and obtaining data in nefarious ways. Public data on safety, transportation, and demographics is included in the day-to-day work of planners worldwide. This is a movement that should be embraced. Data is prolific, but must be appropriately applied and analysed to prove useful. Information and social systems should be integrated to make cities safer and smarter places. This includes engaging with communities in information gathering processes. For example, in tracking regrowth in forest fire areas, a single sign asking hikers to take a picture of that space and upload it to a government website can generate data that would otherwise require extra public sector time and funding. Increasingly, public participation geographic information systems (PPGIS) are applied to engage the community to collaborate with government officers and planners in information sharing and decision-making processes.

The technological dimensions of smart cities are facilitating the increasing practice of smart work. But smart cities are more than smart technology; they are also about smart economy, smart people, and smart policy and governance. Smart work—working anywhere and anytime—is emerging in two broad contexts. These are the advancement of digital technology and the rise of the knowledge economy—two interwoven and mutually facilitating processes. The exponential advancement of information technology has revolutionised its application and accessibility: the newest round of information technology development in user-centricity, mobility, and ubiquitousness has massively enhanced its use and efficiency. This underlies the fundamental flexibility of smart work. The knowledge economy has been growing since the post–World War II (WWII) decades, which saw a transformation from industrial to post-industrial production. But its accelerated development since the 1990s has largely been facilitated by the advances in information technology. These advances have reduced cost and enhanced efficiency in the production, transmission, distribution, and use of knowledge and information. These knowledge activities often involve the practice of smart work. Hence, the technological advances of information technology and the rise of the knowledge economy have combined to lead to the temporal–spatial flexibility of smart work—working anywhere and anytime. In Australia, as shown in Fig. 8.3,

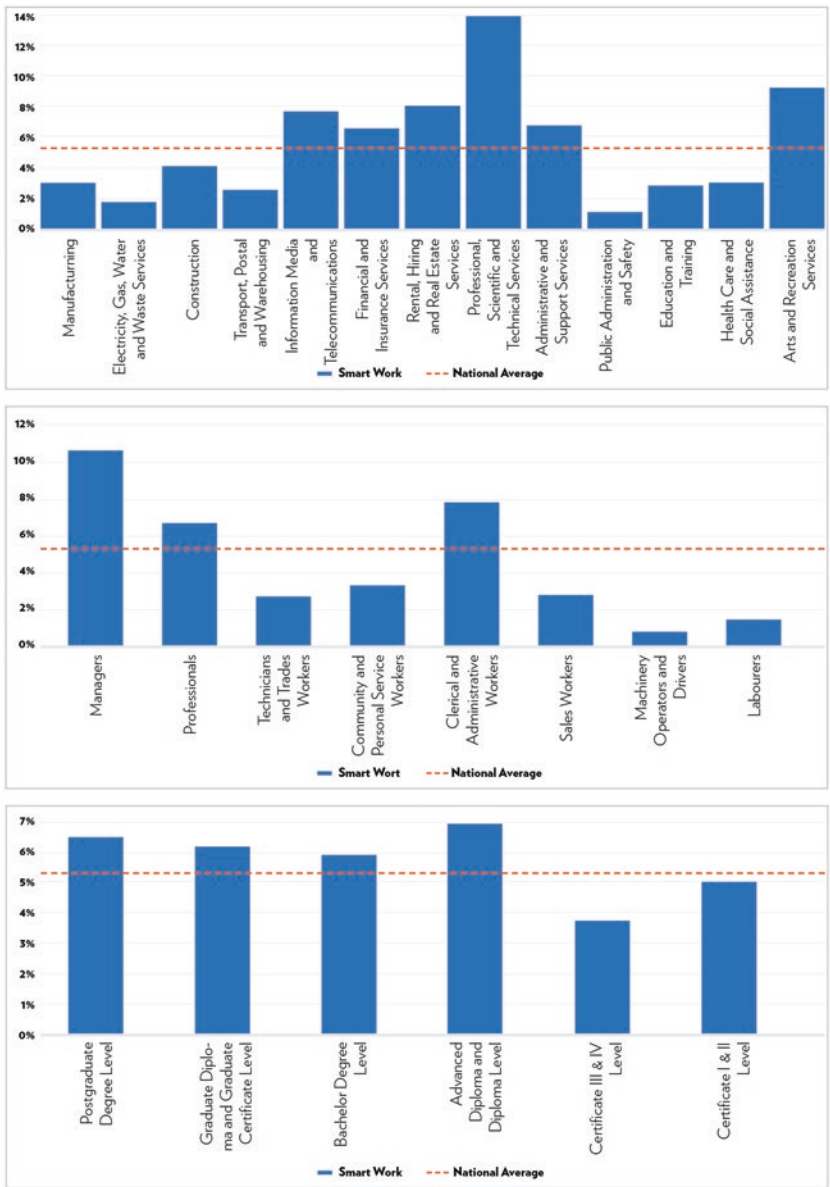


Fig. 8.3 Smart workers by industry, occupation, and qualification in Australia
Source: Australian Census 2016 (Australian Bureau of Statistics 2018), created by the authors

the percentage of smart workers is higher in more knowledge-intensive industries and occupations and among people with higher educational qualifications in general.

As we have noted earlier in this book, smart work creates temporal–spatial flexibility and blurs the conventional division of working hours and non-working hours, and the division between working space and other space uses, such as living and consumption. It also involves a form of collaborative consumption–production. For example, one common form of smart work is co-working in a shared space, which involves not only collaborative consumption of space, but also collaborative production of work. Co-working enables an emergent collaborative production in the form of ‘working alone together’ through networking within a given space (Spinuzzi 2012). Further, smart work is more than co-working; it is about ‘workplace mobility’ (Pajević and Shearmur 2017). ‘Working anywhere’ liberates smart workers from collaborating in a fixed space. This spatial flexibility involves collaborative consumption with different users or with different land/space uses. At the same time, it involves collaborative production with workers elsewhere, which is only possible in the contemporary contexts of digital technology and the knowledge economy. These attributes of temporal–spatial flexibility and collaborative consumption–production define the increasing practice of smart work. And they also create spatial disruption, as we discuss next.

Smart work disrupts conventional land use and space use. At a macro level, smart work may cluster in or near suburban centres surrounded by residential zones. At a micro level, smart work encroaches into spaces that are not traditionally for work-related activities. Working from home—one form of smart work—is not new in itself; what differentiates the current phase of smart work is its increasing practice and acceptance. Further, smart work encroaches into ‘the third place’ other than home and office, such as cafés, restaurants, pubs, libraries, parks, and public transport. For example, airports increasingly incorporate and provide spaces and facilities for working while passengers are waiting for flights, such as the smart workspace at Canberra Airport (Fig. 8.4). This disruptive effect involves spatial reconfiguration not only of non-workspaces for work activities, but also of workspaces for non-work activities. Consequently, we see special allocation of spaces for smart workers in Starbucks; we also see living and leisure spaces in the offices of Google. At this stage, the most strongly felt impact of these changes in the use of space is on blurring the division between working and living through working at home (Pratchett et al.



Fig. 8.4 Smart workspace at Canberra Airport

Source: The authors

2015). This blurring is also increasingly felt in the ‘domestication’ of commercial spaces, through bringing creativity and comfort into office design to make it ‘homey’. These forms of spatial disruption, at both macro and micro levels, fit well into so-called post-functionalist cities, which are no longer based only on predetermined and designed functions. Since the boundaries between traditional urban functions have become blurred, different functions co-exist in the same spaces, and new functionalities emerge as people put space to new uses (Marino and Lapintie 2017).

The emerging and anticipated spatial disruption of smart work informs a revisiting of the urban–suburban relationship and a rethinking of the spatial configuration of place. The conventional dichotomy of the urban and the suburban is largely built upon the locational separation of working and living, and the linking of these locations through commuting and transport infrastructure. Smart work provides a new lens through which to examine infrastructure provision and urban and suburban development. Integrating digital infrastructure with transport infrastructure in a mutu-

ally supportive manner to grow suburban and regional communities requires smart policy design and implementation. The combination of both physical and virtual connectivity contributes to a city or region's competitiveness in the knowledge economy. Economically, suburbanised employment generates a commercial floor space demand and associated economic opportunities for local communities, in addition to savings of time and cost.

At a regional level, smart work has triggered an increasing interest in and demand for digital work hubs within Australia and across the world. The locational preference is for regional centres that are at a certain distance from the central business districts (CBDs) linked through public transport or roads, but that are comparatively easy to access for surrounding communities. In July 2014, the New South Wales (NSW) government announced five regional centres (Rouse Hill, Oran Park, Penrith, Gosford, and Wyong) for digital work hubs across the Greater Sydney region, which all fit these locational preferences. But digital work hubs are not necessarily suburban; they can be co-working spaces dedicated to a knowledge-based, creative, digital, and sharing economy, in proximity to knowledge clusters. It is envisaged that more such digital work hubs or co-working spaces could be proposed and developed in light of the broader social and political interests of smart cities and places in Australia and across the globe.

Smart work implies a new spatial configuration approach to the communities and spaces where this work takes place. Although the functionalist division of urban spaces into the basic functions of housing, work, leisure, and transport has been criticised since the 1980s, it still dominates land use planning. A new thinking informed by smart work needs to first be appreciated by the planning and design professions, and then incorporated into practice. For a community planned around smart work, commercial spaces and facilities within walking distance are necessary to cater for smart workers at home as well as in office areas, including cafés, hot desks, meeting rooms, printing, and postage services. This requires a change to the perception and practice of planning and designing a community for 'residential' land use only; it also requires a change to the design of homes as 'living' space only. However, the traditional land use planning regime remains an impediment to the development of such communities. Simply from a space design perspective, converted or adapted studio space at home is common, but it is not a common approach at the professional design stage yet. The standardised home design remains

living-centric, unless it is a customised design or one where the owner has specifically sought to incorporate or increase workspace.

A futurist approach to community planning and home design needs to be employed to anticipate and respond to the increasing practice of smart work and its requirement for spatial reconfiguration. These implications can be understood in a broader context of transitioning from a ‘functionalist’ to a ‘post-functionalist’ city: most of the current planning approaches and instruments are still based on the concept of the functional city; the post-functionalist city serves major functions for society, but its spaces are increasingly multifunctional, mixed, and changing (Marino and Lapintie 2017). These innovative space uses have already been experimented with in several case studies in this book, such as Boston’s Innovation District and Singapore’s One-north, to attract knowledge workers and stimulate innovation activities. They are also incorporated into our crafting tools for innovative places in Chap. 7.

Artificial Intelligence

Technology advances have always disrupted employment structures and workplaces. This has happened, for example, with the internet, self-driving vehicles, smart phone apps, and self-serve checkouts (Brougham and Haar 2018). Using technology rather than a human service has been making some tasks easier and more convenient for users. Businesses are always seeking new avenues of competitive advantage in workplaces by increasing productivity and reducing costs. AI eliminates the need for workers to do repetitive and routine jobs; at the same time it creates new positions that are more knowledge-intensive and intellectually demanding. The wide application of AI in workplaces may lead to an increase in income, employment, and productivity overall; this can further lead to higher demand for new products for businesses (Arntz et al. 2016). By reducing the need for mundane and repetitive tasks, workers can spend more time developing skills for roles that require creativity, emotion, and intellect (Chui et al. 2015).

While AI provides positive news for the overall business and economy, various groups of workers are at risk of losing their jobs. The positions most at risk to AI include accountants, market research analysts, customer service and office workers (Frey and Osborne 2017). Automation in one position will also lead to knock-on effects on businesses in other sectors. The use of self-driving cars, for example, will mean that the demand for taxi drivers, bus drivers, and driving instructors may decline; insurance assessors

and panel beaters will also suffer a hit due to self-driving cars being less likely to be involved in a crash (Brougham and Haar 2018). Most businesses will implement AI by saving costs for themselves and replacing positions that may previously have been occupied by lower income workers. Unemployment from technology could create a widening gap between the working class and the rich, even more so if low-skilled workers do not have the financial ability to attend university or develop different skills while out of work (Nica 2016). Workers with few qualifications who are at risk of losing jobs to AI will be challenged to train up in new skills to keep themselves part of a changing workforce (Arntz et al. 2016).

The full impact of AI on employment is the subject of debate. It is worth remembering that technology has been changing the workforce for a long period of time, often for the better: automated machinery and technologies have replaced hard work in various sectors. In 1900, 41 per cent of the workforce in the United States was employed in agriculture; this figure had fallen to 2 per cent by 2000 (Autor 2015). In recent times, earth-moving equipment and powerful tools have displaced manual labour in mining and construction. And despite the shift in the workforce from the industrial revolution to the digital revolution that technology has created, many jobs still exist today (Fujita 2018). It may be that relatively few occupations will be lost to AI, but that various activities and roles will be automated (Chui et al. 2015). Automation and technologies have replaced some types of work, but these changes have not destroyed all jobs, and have increased productivity and moved workers into more thoughtful and knowledge-demanding roles.

AI has become easier to use in the workplace due to the falling costs of storage, sensors, memory, and bandwidth (McAfee and Brynjolfsson 2016). The increasing use of and access to technology has increased peoples' knowledge and connections. This will allow future work to feature more innovators, entrepreneurs, and technology-adaptive workers (McAfee and Brynjolfsson 2016). Like any technological revolution in history, the use of AI in the workplace has come with uncertainty and with arguments about pros and cons. Like it or not, accept it or not, AI is coming, and is changing our work at a speed faster than we might expect. We cannot stop or change it; we can only adapt to it and use it in our best interests. Hi-tech giants in both the United States and China are investing massively in developing AI to grasp opportunities in the new round of technological advances. Some early outcomes are being used experimentally, such as autonomous vehicles, delivery drones, and robot deliveries. AI is going to change not only the future of work, but the future of the economy.

Low-Tech Innovation

Our discussion of innovation in this book so far has focused on high technology, or hi-tech, innovation. Innovation, however, is pervasive in both high technology and low technology sectors. While we pursue hi-tech innovation, we should not overlook the importance of low-tech innovation, although it has often been forgotten in innovation policy (Hirsch-Kreinsen 2008). One, albeit simplistic, method of differentiating high- or low-tech innovation industries is based on their expenditures on R&D. Industries with more than four per cent annual revenue invested on R&D, such as information technology and pharmaceuticals, are classified as hi-tech; industries such as textiles and food that spend less than 1 per cent of their turnover on R&D are classified as low-tech (Sandven et al. 2005). Low-tech industries are usually ignored when it comes to innovation, based on an assumption that hi-tech companies are more competitive, more advanced, and will protect jobs and wealth from growing global competition (Hirsch-Kreinsen 2008). This seems particularly true now when industries are turning more to technology to gain a global competitive advantage.

Despite this, innovation does exist within low-tech industries and such industries have some advantages. Low-tech industries face less complex systems than hi-tech industries, and knowledge sharing is more focused and easier (Sáenz et al. 2009). For low-tech industries, once a new idea is created, it becomes easier to implement. The effectiveness of low-tech innovation relies mainly on the ideas themselves rather than the processes involved in making them a reality. Strong management and practical in-house knowledge are the key strengths that low-tech industries need to be innovative (Hirsch-Kreinsen 2008).

Resources are often limited within low-tech industries. In many cases the innovative ability for firms within these industries relies on successful networking with research sectors (Hirsch-Kreinsen 2008). Low-tech industries will sometimes choose to collaborate with universities. Connections with research sectors can be the key for low-tech industries to push their knowledge boundaries to develop new ideas, especially when firms and universities are located in close proximity. These connections lead to strong personal links, shared experiences, and knowledge spillovers that are informal but beneficial to a firm seeking a competitive edge (Maietta 2015). Innovative collaboration can, of course, still occur between firms and universities over distances by sharing knowledge

through more formal methods. Information becomes standardised, planned, and shared through information networks where face-to-face contact is difficult to maintain (Maietta 2015).

Low-tech industries benefit the wealth and stability of a developed nation's economy. A large number of OECD countries have at least 60 per cent of their employment in low to medium tech industries (Hirsch-Kreinsen 2008), despite the slow decline of low-tech industries overall (Sandven et al. 2005). Hi-tech innovation industries are growing due to their increasing importance in driving the global knowledge economy. While hi-tech innovation has been the focus of interest in policy debates and business investment, low-tech innovation also deserves attention since it still dominates our economic base, and especially so in Australia's transition from a resource economy to a knowledge economy. Low-tech innovation will continue to be a pillar of Australia's economy for the foreseeable future. Unlike the smart opportunities of smart work and AI, low-tech innovation is not new. It is old, but we call for a renewed interest in it.

NATIONAL SMART CITIES AGENDA

The Australian government's urban policies have historically been sporadic and inconsistent. They have been affected by constitutional, financial, ideological, and political constraints, and have demonstrated mixed approaches and outcomes. Constitutionally, the major responsibility for providing services and facilities to Australia's cities and regions rests with the states, not with the Commonwealth. However, the Commonwealth has the financial power, which the states do not have, to steer around the constitutional constraint to lever itself into urban projects and policy. The constitutional constraint on one hand, and financial power on the other, have often been used to justify the Commonwealth's intervention or non-intervention into urban affairs, depending on a particular government's ideological stance. As a result, past national urban policies have been pushed and pulled between the Labor Party's interest and the Coalition's disinterest. However, the latest round of national urban policy, centred on 'smart cities', was led by the Coalition Government under the Prime Ministership of Malcolm Turnbull, who came into office in September 2015 and was deposed in August 2018.

When Malcolm Turnbull deposed Tony Abbot to become Prime Minister in September 2015, Turnbull swerved away from his predecessor's disinterest in cities by creating ministerial portfolios for cities and

initiating a ‘smart cities’ plan and programmes. In light of this, we need to go beyond the ideological differences that largely explained the ‘to and fro’ approaches between Labor and Coalition governments in historical national urban policies. Two interwoven macro factors help explain a renewed focus on cities at the federal level. The first factor is economic—the demand for economic growth and the important role played by cities as economic engines. The smart cities agenda was used by the Turnbull government as an economic development plan to drive Australia’s transition towards a knowledge economy, acknowledging that a knowledge economy requires a higher level of agglomeration of economic activities in cities. The second factor is global—Australia’s future prosperity in an increasingly globalised world. Globalisation challenges the way Australian cities are managed in terms of enhancing the global competitiveness of the Australian economy and attracting global talent for the knowledge economy and innovation. The key words—economic transition, global competitiveness, talent—were mentioned or hinted at repeatedly in the plans, speeches, media releases, and debates that comprised Turnbull’s smart cities agenda. These factors called for a reformed and cooperative approach to broader national goals, in particular economic growth, not limited to cities only.

Turnbull appointed several ministers for cities in succession: Jamie Briggs became the Minister for Cities and the Built Environment within the Department Environment on 20 September 2015; Angus Taylor was appointed as the Assistant Minister for Cities and Digital Transformation within the Department of the Prime Minister and Cabinet on 18 February 2016; and Paul Fletcher became Minister for Urban Infrastructure and Cities within the Department of Infrastructure, Regional Development, and Cities on 20 December 2017. After Malcolm Turnbull was replaced by Scott Morrison as Prime Minister as a result of the Liberal Party’s leadership spill, Alan Tudge was appointed as Minister for Cities, Urban Infrastructure, and Population.

In April 2016, the Turnbull government realised the *Smart Cities Plan* (SCP). ‘A plan for supporting productive, accessible, liveable cities that attract talent, encourage innovation and create jobs and growth’ (Australian Government 2018c), the SCP formally announced Malcolm Turnbull’s national smart cities agenda and his vision for Australian cities. The SCP equates smart cities with smart investment, smart policy, and smart technology, and makes commitments for an investment of \$50 million in infrastructure planning, establishing an Infrastructure Financing Unit, and also

initiating City Deals, based on partnerships with state and territory governments (Australian Government 2016). We discuss the City Deals programme and its legacies next.

City Deals

The City Deals programme was the most important part of the smart cities agenda under the Turnbull government, and this programme is continuing under the incumbent Morrison government. The City Deals programme is not a new concept or policy practice. As an urban investment model, it has been in practice in the United Kingdom since 2012. Basically, it is a policy approach in which governments, industries, and communities develop collective plans for growth in cities and commit to the actions, investments, reforms, and governance needed to implement them. The model requires coordinated investment, partnership between three levels of government, and a negotiation-based approach to focus on areas of ‘infrastructure and investment; liveability and sustainability; housing; innovation and digital opportunities; governance, city planning and regulation; and jobs and skills’ (Australian Government 2018a). All the City Deals are arranged under the umbrella SCP, as illustrated by the Western Sydney City Deal (Fig. 8.5).

As of September 2018, City Deals have been signed for three cities—Western Sydney, Launceston, and Townsville—and were under negotiation between the federal government and state and local governments for four cities: Hobart, Geelong, Darwin, and Perth (Table 8.1). Among other things, all the City Deals highlight the importance of innovation and the opportunities of the knowledge economy for these places. In Chap. 6, we discussed the opportunities created by the Western Sydney City Deal for advancing innovation and transitioning from manufacturing to an innovation precinct in the Western Sydney region. Although the major capital cities dominate Australia’s urban system, 31 small cities are home to 4.5 million people and contribute 15 per cent of national economic activities; these small cities should not be left out of the national City Deals programme (Regional Australia Institute 2016). In recognition of the importance of these areas, the smart cities agenda also includes a Smart Cities and Suburbs Programme of \$50 million to support ‘the delivery of innovative smart city projects that improve the liveability, productivity and sustainability of cities and towns across Australia’ (Australian Government 2018b). The first round of the programme awarded 49 projects worth a

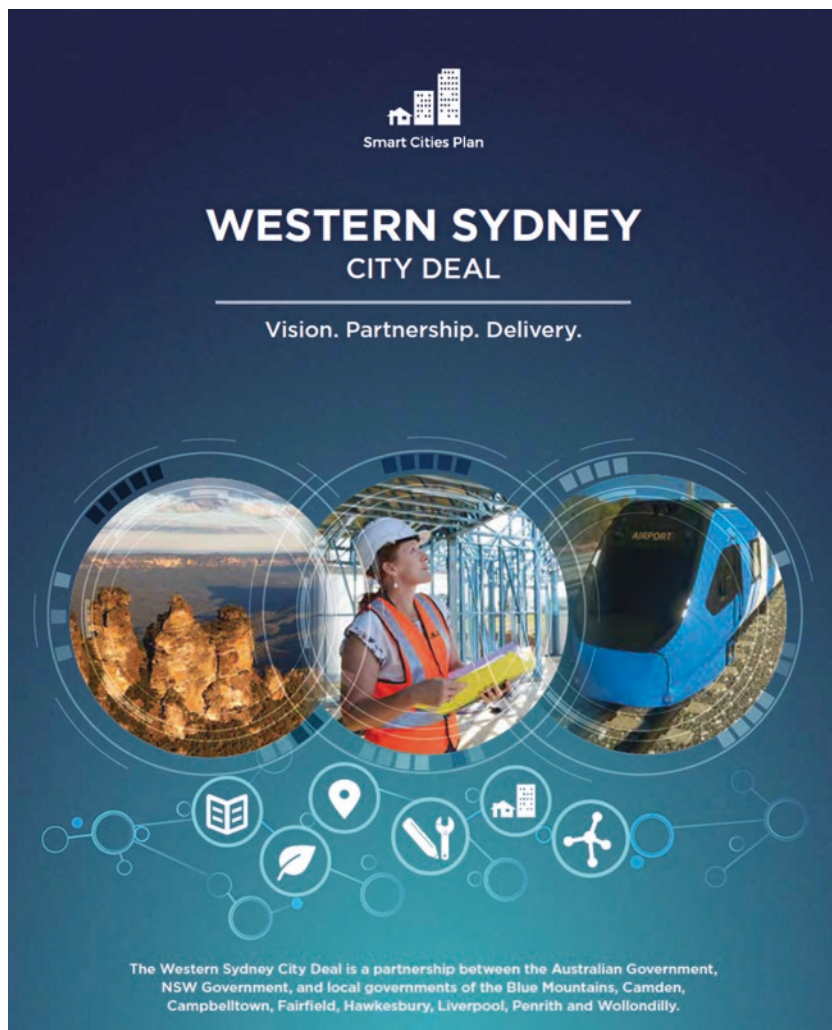


Fig. 8.5 Western Sydney City Deal

Source: Australian Government and NSW Government (2018), licensed to use under Creative Commons

Table 8.1 Australian government's City Deals

<i>The City Deals</i>	<i>Key initiatives and projects</i>	<i>Progress and timeline</i>
The Western Sydney City Deal	Western Sydney Airport: the Australian government's \$5.3 billion investment Western Sydney Rail Deal's priority domains: connectivity; jobs for the future; skills and education; planning and housing; liveability and environment; implementation and governance	2018: Deal signed between Australian and NSW government, and eight local governments on 4 March 2038: end of the 20-year Deal
The Launceston City Deal	Relocation and redevelopment of the University of Tasmania's main Launceston campus City Heart Project Redevelopment of historic Paterson Barracks site Redevelopment of Youngtown Barracks site and a defence Innovation and Design Precinct Deal's priority domains: governance, city planning and regulation; infrastructure and investment; jobs and skills; innovation and digital opportunities; liveability and sustainability; housing Vision for 2022: Launceston one of Australia's most liveable and innovative regional cities by 2022	2017: Deal signed on 20 April 2022: end of five-year plan 2017–22
The Townsville City Deal	Australia's first City Deal Initiatives include: capital of North Queensland; innovative and connected city; Port City; industry powerhouse for the North; defence hub; enabling infrastructure Projects committed include: North Queensland Stadium; Townsville entertainment and convention centre; Development Corporation for Townsville Vision for 2030: Townsville the economic gateway to Asia and Northern Australia; a prosperous and lifestyle-rich city for its community and visitors; a global leader in tropical and marine research and innovation	2016: Deal signed on 9 December 2030: end of the 15-year Deal

(continued)

Table 8.1 (continued)

<i>The City Deals</i>	<i>Key initiatives and projects</i>	<i>Progress and timeline</i>
The Hobart City Deal	Deal to be negotiated Opportunities considered include: Hobart as gateway to East Antarctica and a world leader in Antarctic and Southern Ocean scientific research; innovative economy and STEM disciplines	2016: MoU signed on 29 September 2018: Heads of Agreement signed on 16 January
The Geelong City Deal	Deal to be negotiated Areas of focus include: regional transport; city centre revitalisation; innovation and growth of knowledge industries	2018: MoU signed on 17 January
The Darwin City Deal	Deal to be negotiated Priorities include: Darwin as a world class tropical tourist and cultural destination; city centre improvement, and options to relocate part of Charles Darwin University to the city centre	2017: MoU signed in April
The Perth City Deal	Deal to be negotiated METRONET: investment in a new public transport infrastructure to connect Perth's suburbs, reduce congestion	2018: MoU signed on 27 April

Source: Australian Government (2018b), created by the authors

total of \$27.7 million in November 2017; applications for a second round for a total of \$22 million closed in May 2018 (Australian Government 2018b).

A national approach to cities is not occurring only in Australia. In recent decades, along with the accelerating process of urbanisation, there has been a rediscovery around the globe of the importance of cities and urban policies. What differentiates contemporary cities from their historical counterparts is the interwoven process of urbanisation and globalisation, as argued in Chap. 1. This process is transforming what cities are and the way people perceive and approach them. Urbanisation is no longer a process of converting a rural population to an urban population; urbanisation is a complex process involving multiple systems of change, be they demographic, social, economic, political, or environmental. Globalisation is intensifying integration and interaction around the globe through cities. Cities have become the nodes of a global network, linking

and accommodating the dynamics—economic activities, political impacts, and cultural exchanges—that comprise contemporary globalisation.

Global competition is shifting from a national scale to an urban scale—national competitiveness is largely determined by urban competitiveness. The combination of the complexity of urban transformation and the growing role of cities in globalisation challenges the traditional approach to urban policy, which has mainly been the responsibility of governments at the city or state level. Increasingly, these complexities require policy capacity and resources at a national level to address contemporary urban issues, such as the transition to a knowledge economy, liveability to attract and retain global talent, infrastructure investment, and environmental sustainability. These were the types of issues frequently raised by Malcolm Turnbull and his ministers for cities to justify the national smart cities agenda. Internationally, a national approach to cities is common. The City Deals model, as noted earlier, was borrowed from the United Kingdom; the Chinese government launched a *National New-Type Urbanisation Plan* in 2014 to guide nationwide urban planning and development. The lack of a consistent national government commitment to cities in Australian history represents a rare case. The Turnbull government's interest in cities had an international resonance, and made Australia part of a globalised practice of taking a national approach to cities.

As illustrated in the City Deals programme, the Turnbull government's smart cities agenda stressed coordination between the Commonwealth portfolios, and collaboration and partnership with the states and territories, in a whole-of-government approach. The Commonwealth was not to take over, but to complement, the roles of the states and territories in urban planning and development. Most changes and actions were still required at the state/territory and local levels while the Commonwealth showed the way by leveraging its investment to drive the delivery of the projects. For infrastructure projects of national importance, instead of a direct grant from the Commonwealth, the smart cities agenda preferred joint investment and a performance-based approach to achieve value capture and efficient delivery. This collaborative approach marked a distinct difference from previous direct grants from the Commonwealth to invest in local projects, which sometimes generated Commonwealth–state conflicts and mixed outcomes.

Not a National Urban Policy Yet

On the day of 24 August 2018 when Malcolm Turnbull was deposed as Prime Minister, in his farewell speech he made the following comments on his smart cities agenda, and called the City Deals programme ‘a real innovation’:

But I have taken a different approach as a federal leader, as a federal government, to the way we engage with cities. As you know, historically, federal governments played a limited role, a sort of an ad hoc role, with cities. Very often you had federal governments, state government and local government, often moving in roughly the same direction, but being like ships in the night. The City Deals program has been a real innovation. A very, very welcome reform and working very well, enabling for the first time to see federal government money systematically going into work in partnership with communities, so that you agree on what your vision is and then get on and do it. (Turnbull 2018)

Did Turnbull’s smart cities agenda have a legacy as he claimed? The answer is mixed. The Commonwealth’s renewed interest in cities, first of all, attracted public attention and triggered debates about urban policy. It also gave rise to expectations of the Commonwealth’s commitment to urban development. However, Turnbull’s three years in office was too short a time for the very long-term City Deals projects to achieve any tangible outcome. The impacts of the smart cities agenda in the short term were more about debates and advocacy. So, at least in the sense of nurturing an ‘urban consciousness’ (Freestone 2016), Turnbull’s smart cities agenda did have a legacy.

However, the extent to which Turnbull’s cities agenda led to ‘a new urban age’ (Freestone 2016) is questionable. The urban concepts and ideas advocated by Turnbull and his ministers for cities represented a passionate urbanist’s aspirations for Australian cities. They were more tactical than strategic. The urban ideas, which were interesting and appealing to many, were not knitted into a sophisticated policy framework to achieve a long-term vision. They were not underpinned by rigorous policy capacity and sophisticated operational mechanisms to translate the ideas into actions and desired outcomes. Criticism has been aimed not at the ideas themselves, but at the action (or lack of action) associated with them. The SCP ‘has the appearance more of a think-piece than a substantive policy document’ (Tomlinson 2016). The prevalence of rhetoric over substance

minimises the likelihood of a lasting legacy from Turnbull's cities agenda. The agenda represented the Commonwealth's renewed interest in cities, and interest only. It is too early to judge the several City Deals projects since they involve long-term infrastructure investment. But what Australia needs is a broader national urban policy through developing 'a more comprehensive and coherent national system of towns and cities' (Burton 2018). This, however, is not the legacy of the Turnbull smart cities agenda.

Finally, and probably most importantly, Turnbull's smart cities agenda made no attempt to fix the structural problems that lie beneath the 'to and fro' approaches to Australia's national urban policies historically. New ideas were proposed, but the old problems stayed intact, as vividly commented on by Burton (2016):

On first reading [the Smart Cities Plan] contains all of the right words – smart, innovative, liveability and prosperity. It also advocated some sensible principles – collaboration, cooperation and partnership. But do these nice words and sensible principles add up to a real step change in urban policy thinking, or to a business-as-usual approach wrapped in the latest policy terminology?

The SCP was meant to tackle the longstanding Commonwealth–state relationship over urban management in a 'coordinative' approach only. However, the contradiction between the constitutional responsibility and the vertical fiscal imbalance would continue to determine the way infrastructure is invested in and planned for Australian cities. The contradiction between the short-term politics-based urban initiative and the long-term strategy for sustainable urban development would, under the SCP, continue to determine the way national urban policy is made for Australian cities. Inconsistency and instability have characterised Australian national urban policy in history, including the latest round of initiatives from the Turnbull government. It seems unlikely that a national urban policy framework, based upon bipartisan consensus and able to survive changes in government, is going to be established in the foreseeable future. In this sense, Turnbull's smart cities agenda represents a recurrence of historical national urban policy efforts. And it was not the most impressive of these. However, despite its weaknesses, including the continuing top-down nature of the current approach, the Turnbull government's collaborative national smart cities agenda, in philosophy, is aligned with our proposal, described below, for a co-design and co-creation approach to innovative place making.

CO-DESIGN AND CO-CREATION

As a conclusion for this book, we propose a co-design and co-creation approach to reshaping our urban and regional places into new innovation districts. The rise of innovation districts is ‘perfectly aligned with the disruptive dynamics of our era...[and] represent[s] a clear path forward for cities and metropolitan areas’ (Katz and Wagner 2014, p. 25). Local places matter more in contemporary global competition around innovation and the knowledge economy. Local institutions now act out their roles as assistants, launch pads, facilitators, stimulators, and co-creators of innovation in ways that we will further examine below. Organisations like the Chicago Council on Global Affairs are a fulcrum for knowledge and policy advice, and organise seminars, publications, and events to generate global influence. The role of the nation state in this new system is to provide financial support, set policy direction, and more importantly work with other actors, such as local councils, the business sector, and the community to make places with innovation capacity and knowledge economies. This approach is neither top-down, nor bottom-up; it is collaborative.

Drawing upon the new smart opportunities and the Australian government’s policy focus on smart cities, including its emphasis on a collaborative approach discussed above, we further elaborate on how governments at different levels need to work to co-design and co-create innovative places in a smart age. It is an age defined by smart people, smart work, smart technology, smart economy, smart investment, and smart policy. In the data-rich, borderless, and open twenty-first century, nation states are slowly morphing from project managers and policymakers to enablers and facilitators. This transition is not without its difficulties: the mixing of statecraft with city organisation and governance has produced a difficult milieu for ideas and enterprises to work through. This is due largely to the inherent power struggles between local, state, and federal governments. Each has its own natural domains, but is limited by the others. As local councils and city committees gain more power, state and federal governments are not always willing to cooperate or cede their own influence and resources. This leads to a system in which firms must engage with all levels of government to meet local, state, and federal requirements, communicating with several parties to meet many demands simultaneously.

The inter-governmental complexity is especially problematic for large-scale infrastructure developments, such as new international airports, inter- and intra-city transport systems, and technology parks. However,

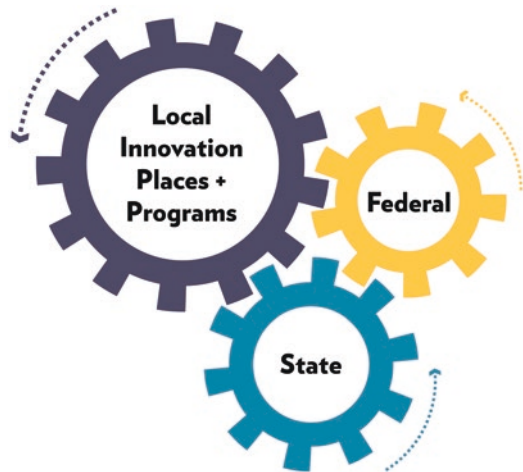
the federal government is implementing several strategies and activities that can be viewed as an effort to create a systems approach to innovation infrastructure. The Western Sydney City Deal, as noted earlier, is a good example. The City Deal builds on the Australian government's investment in the Western Sydney Airport to catalyse investment, development, and job opportunities; it also includes initiatives to maintain and enhance Western Sydney's local character by improving community infrastructure and liveability in partnership with state and local governments, and to open new opportunities for local innovation capacity. In this process, the federal government is shifting from funding to financing; financing is a major crafting tool for innovative places, as discussed in Chap. 7. This new approach to government spending and investment focuses on the returns on spending and the performance of the projects in which investments are made. Government investments are expected to reap returns, not to merely prop up current institutional frameworks.

In the co-design and co-creation structure, the government is an actor, not a manager: federal and state governments fashion appropriate internal institutional structures, promote a culture of creativity and competition, and provide policy direction and financing to enable local innovative places and programmes to incubate and grow (Fig. 8.6). However, for such a system to function efficiently, local and municipal authorities need sufficient autonomy and authority; they should not continue to be subordinate to the state and federal governments in the traditional hierarchical governance structure. Greater collaboration and cooperation among all levels of government is required. Governments must be innovative, forward-thinking, sustainable, and attractive to firms, investors, and talent to thrive in this new environment. Only limited success can be obtained from prescriptively following the methods and formulae of existing innovation districts. These are well established and trafficked zones of innovation, steeped in their respective industries. The aim of crafting a new innovative place is not to directly compete with Silicon Valley, but to complement it and contrast with it. To accomplish this, governments need to fulfil their respective roles, as outlined below.

Federal Government

It is hard to imagine an approach where the federal government acts as a resource pool rather than as a project and programme designer and manager, but this is precisely what we are suggesting. The national government

Fig. 8.6 Co-design and co-creation for innovative places
Source: The authors



would put its resources on the table allowing local entities to amplify these resources into an established vision and its associated strategies. The first building block of such a system is the formation of a cross-cabinet innovation approach led by the relevant minister. Each of the collaborating departments would formulate from its existing programmes and knowledge base a new set of innovation programmes. These would be the base programmes that municipal or local entities could look to for inspiration or ideas when putting together their own internal innovation structures.

In this way these programmes would be designed from the bottom-up rather than top-down. Based on a set of broad guidelines established at the federal level, local and regional entities could submit their programmes into a competitive system for support and funding, similar in some ways to the current Smart Cities and Suburbs Programme. But the projects funded by the Smart Cities and Suburbs Programmes are not focused on innovation capacity: they are technical and piecemeal and do not aim at creating a place-based ecosystem to generate a sustainable innovation capacity. In our approach, the funded innovation programmes should be selective and innovation-centric. The federal government would fund and support projects based on the recommendation of an internal body, creating a competitive funding allocation system to promote innovative practices and programmes. The role of Innovation and Science Australia, the advisory agency within the Department of Industry, Innovation and Science, would

be to review submissions to the programme and determine where federal resources might be most usefully funnelled. This would require the creation of measurable metrics to examine the viability and likely impacts of innovation programmes. In December 2017, the *National Cities Performance Framework* was released to monitor and measure the progress and outcome of the City Deals programme and to assist in the implementation of the SCP (Australian Government 2017a). Similar performance frameworks could form the basis of a set of innovation metrics. Ongoing support and funding might be tied to the inputs and outputs of these innovation projects.

Within this broad framework for innovation, there are many programmes that the federal government could take the lead on, with several suggestions outlined below.

Innovation Capacity-Building

The federal government could construct a programme for Australians working overseas to take leave from their overseas posts for three months to a year to assist in developing new projects in cities or regions that have established innovation platforms. This would be an enormous boost for our communities and could provide seasoned assistance at the front lines of innovative projects. This method helps reclaim the human capital we have lost to our competitors internationally. Another capacity-building option, focused on local government, is the emerging idea of local-to-local international engagement through the facilitation by federal departments. Local governments have had little to do with international exchange, and this initiative would help develop ties between like-minded cities that have complementary skills and interests. Expatriate or other talent exchanges may prove integral to this approach. At home, it is difficult for school teachers to help students understand innovation futures because they have never seen or participated in these activities up close. An innovation programme could encourage school teachers to participate in internships and learning placements overseas, such as in Silicon Valley firms. The teachers would come back from their placements with a new appreciation for rising industries and a desire to engage their students in exploring these new fields. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) could also play a more entrepreneurial role in developing innovation capacity in cities. Bringing science to cities is already an area of interest for CSIRO, though not well known or articulated across the whole of the agency. Several CSIRO divisions (including, for example,

Data 61) could be brought together to work with cities and help build empirical databases and information systems. CSIRO could actively engage in the smart city space and with local entrepreneurs to create a cluster of science-based economic activities. CSIRO has traditionally been Australia's science and technology bedrock, and working with CSIRO would give cities and local entities stronger decision-making potential.

Financing

In the United States the notion of community development finance institutions is well established. One might imagine a community bank working with federal support to provide loans and grants to small innovative firms with promise. Such community financing programmes might be leveraged by Department of Treasury investments to allow banks with local investors to act as the 'first resort' for small-scale innovation financing. A cross-portfolio investment would be required with the local investment in these community institutions. If such banking arrangements were coupled with current federal assistance programmes to provide financial assistance to hi-tech and innovation start-ups, we might have a real surge in local projects incubated and nurtured at home rather than moving overseas.

National Data Platform

This is already well underway, but many communities do not have the know-how to participate. One new approach could be for communities to open 'city hacking centres', similar to the efforts of the Growth Tribe Academy in Amsterdam. This is a collaboration among local entrepreneurs, internet resources such as Facebook, and the University of Amsterdam, to provide a forum for information and training for aspiring entrepreneurs. It has already trained hundreds of engineers, managers, start-up entrepreneurs, and others in the technical skills of business start-up and innovation techniques. Called growth hacking, the technique is delivered both online and through workshops to teach entrepreneurs and investors how to network to achieve their goals. An assortment of public and private data would allow for adventurous students and entrepreneurs to create new apps for general use. A foundation could provide small seed funding to a few start-ups. The federal government has a suite of rich data that can be combined with state and local data for powerful information tool making.

Digital infrastructure is the key to achieve the above data-based opportunities. The national broadband network (NBN) is still a project looking

for a destiny, bogged down in politics and controversy. This powerful connectivity tool has been underutilised because the operators have thought of themselves as building a utility rather than an economic development tool. Those in charge of NBN should be reformers, not conformers. They must see NBN as transformational, not conventional. Revitalisation and refreshing of the NBN could help communities to develop information enterprises and clusters.

State Governments

In Australia, local governments are creatures of the states. The states control the most essential ingredient for innovative place making: land use authority. We have discussed the need for simpler and more adaptive zoning, urban design, and planning systems in Chap. 7. Quality and locality are the bedrock of new urban innovation districts. The states need to work with the local entities and create the basic institutional frameworks for developing innovative places. Here are some things that states and territories can do to enable the growth of this new system.

Integrative City Planning and Management

The economy shapes our organisation of space. It seems incongruous that today we are trying to promote urban and regional planning without an economic development template. In changing the base for planning we can alter the physical space, social system, and built form of our cities. State planning departments and economic or industrial development programmes must be merged into one entity to make municipalities the engines of development. The current system of rules-based planning yields boring monolithic structures that restrict the integration of real commerce within the frame of buildings to spawn new enterprises. Ensuring a building's performance by incentivising the use of solar systems is innovative; but it is more innovative to ensure the building provides the kind of space that stimulates creativity. Outside Perth, a traditional 1960s neighbourhood, White Gum, is being transformed into an interesting communal living space, with complementary enterprise areas, by relying not on zoning but rather on how the buildings and landscaping create walkable, working and living environments. These local advances are highlighting the need for planning reforms at the state level: these have been debated for some time; however, not much has yet been achieved.

Regional Development Governance

Regional development councils should have their roles expanded to act as a new guidance arm to help blend local needs and demands into a more ordered system. Some existing regional development councils are already playing this role. Regional councils could act as proactive contributors to and catalysts of deep and rigorous economic analysis to enable under-skilled and under-staffed localities to collaborate and plan. If a network of localities designing their own visions and strategies is to work, there must be some regional entity to ensure effective development and implementation of the three pillars of vision, strategy, and support contained in the crafting paradigm discussed in Chap. 7.

International Outreach

New localised platforms must be recognised globally. Where possible, regions and cities should reach out and contact sister locations to exchange knowledge and information with the assistance of the federal departments. This could also include participation in conferences or engaging international organisations through civic and business delegations. City regions like Sydney, Melbourne, and Perth need to find companion technology and enterprise places overseas to cultivate economic relationships well beyond the old sister city model, through exchanging technology tours, and developing business centres and joint ventures. Since Australian local councils are smaller than their international counterparts, this international outreach could be initiated and led by the state and territory governments with local government's participation and the federal department's facilitation.

Talent Programme

The states' participation in expatriate programmes and sponsorship of school and university competitions could encourage innovation and develop human capital. Innovation and entrepreneurship should have the same focus and funding in schools as the rugby team. Co-sponsoring education and development programmes, both during and after school, with private business and professional organisations has proved fruitful overseas. The Roxbury Community Technology Centre in Boston links technology students from Massachusetts Institute of Technology (MIT), Harvard, and other universities with high school students not just to learn about new technologies but to create innovations, ranging from solar cells to apps. The Australian states have the resources and capabilities to make these programmes for home-grown talent happen.

Local Institutions

Local institutions are our focus going forward. They play many roles, acting as assistors, launch pads, facilitators, stimulators, and co-creators in making innovative places (Fig. 8.7). Each role helps promote innovation and allows the municipality to compete at different levels. To efficiently act out these roles, however, each institution must meet certain criteria outlined below.

Assistors are any local self-governing entities with the ability to authorise and assist innovative practices and organisations. Some municipalities might designate a division with the mandate of acting as an assistor. Others might incorporate this role into their economic development or service units. Assistors need three qualities for success: permit granting authority, spaces to start, and recognition. Permit granting authority is essential in lubricating the design and development of innovative practices, firms, and environments. Promising ideas cannot wait. Providing fast permits within reasonable monetary and safety limitations gives local institutions the opportunity to directly and indirectly experiment and invest in start-ups and entrepreneurs. The city of Parramatta provides an excellent example of the assistor role. There, local authorities created a system of fast permitting for city-owned properties to be scheduled for demolition two to three years ahead of actual demolition. This system gave the city the ability to attract and promote new firms and developments, transforming the demolition period into an investment and planning period.

However, permit granting authority alone is not enough. No matter how easy and fast permitting is, it is useless without spaces to start. These spaces could be thought of as incubators, and could be city-owned or community-managed facilities prepared for innovation activities. Boston's District Hall is the most obvious example of such a space. The spaces underpin the planning, collaboration, and entrepreneurship that the permit granting authority relies on to succeed. These spaces are also significant contributors to the third criterion of an assistor: recognition. Recognition of the value of innovative spaces by the local community and authorities goes a long way towards encouraging and fostering innovators and entrepreneurs. Recognition by local institutions both promotes a creative culture and provides start-ups with exposure at local, state, national, and international levels. It is important to note that assistors need not be fancy in meeting these criteria. Every local institution need not emulate Boston's Innovation District, and conducive spaces can be provided or



Fig. 8.7 Local institutions' roles in making innovative places
Source: The authors

developed in collaboration with local businesses and educational institutions.

Launch pads are the next role local institutions can play. Some communities have already created innovation launch pads with assistance from state governments or in cooperation with private enterprises. Launch pads consist of a range of strategies that together constitute an environment

which smooths the way for innovators to fund, develop, and disseminate their ideas. This can be accomplished in several ways. The first and most direct method is to provide direct funding using grants, competitions, or the provision of affordable housing and workspaces. Another way is to create a medium for communication with and exposure to investors. This can be accomplished by design competitions, industry forums, showcases, and the provision of collaborative spaces. Finally, a launch pad's success is heavily reliant upon innovators' ability to access soft support services. These services can either be provided directly by the launch pad, or be referred and informed by it. In this way, launch pads can act as an organisational and networking service, increasing collaboration and accessibility between and within innovation industries. In terms of this aspect, launch pads share some similarities with facilitators.

Facilitators most often come in the form of governance committees composed of local entrepreneurs in new market and product spaces. These committees work with government entities to actively promote and advertise their services. The primary role of the facilitator is to help identify and support spaces and talent for innovation activities. This is done through providing internal consulting and industry networking. In doing so, facilitators provide support for entrepreneurs and increase the quality of their pitches to investors.

Stimulators are often anchor institutions such as universities, actively collaborating with and encouraging innovation spaces. This is a direct role based on the organisation of space, provision of support services, and assistance with minimising the difficulties inherent in entrepreneurialism. The University of Washington in Seattle and MIT in Cambridge are both examples of exceptional stimulators. For stimulators to work effectively, an anchor, or multiple anchors, must be directly involved in providing financial and support resources. This role is often closely associated with educational institutions because of the requirement for physical spaces where innovation is promoted and adequate facilities are provided.

The final role is the co-creator. This is a higher risk and higher reward role, requiring direct investment and involvement of local institutions with innovative firms and ideas. It is a combination of direct investment, promotion, development, and marketing. This role can be accomplished by government, research, or educational institutions in collaboration. An excellent example of the co-creator role is the Canberra Innovation Network (CIN) that we introduced in Chap. 6. The founding members are a cohort of Canberra-based institutions led by the Australian Capital



Fig. 8.8 Collaborative Innovation Lab, Canberra Innovation Network
Source: Canberra Innovation Network, used with permission

Territory (ACT) government. Established in 2015 as an initiative to drive Canberra's innovation and knowledge economy and to diversify its economy base, CIN aims to support budding entrepreneurs and innovators. CIN provides a range of services, including instruction on how to access financing for start-ups, how to establish connections with partners and collaborators, and how to move from local into national and international markets. CIN also operates a Collaborative Innovation Lab that brings local entrepreneurs together to solve identified problems (Fig. 8.8), and an Experts in Residence Programme which makes local business and professional advisors available to start-ups and innovators. CIN represents the kind of co-creator role played by collaborative local institutions in developing innovation capacity for local communities.

THE TIMING IS RIGHT

As we were finishing up this book in October 2018, the Australian government released the *Statement for Australian Innovation Precincts*. The Statement resulted from national consultations that 'acknowledged the crucial role of governments at the state and territory level and local level in providing local leadership for innovation precinct development', and

suggested that ‘the Australian Government could play a greater role in coordinating and communicating policy on place-based innovation and collaboration initiatives’ (Australian Government 2018d, p. 2). A seven-page document, the Statement provides ‘non-prescriptive guidance’ and encourages ‘bottom-up leadership’ to drive innovation precinct development. The Statement offers four principles for developing innovation precincts in Australia (Australian Government 2018d, p. 6):

- Local leadership: local leadership should drive precinct development that targets real market opportunities and innovation potential, measured by clear key performance indicators, to promote growth.
- Removing barriers and aligning policy: all stakeholders should work to remove barriers and disincentives to collaboration and precinct development, and promote alignment across existing programmes.
- Building capacity and connections: all stakeholders should encourage the development of capacity and connections for their precinct; including person-to-person connections, and precinct integration into surrounding communities and local, national, and international networks and supply chains.
- Skills development: precinct leaders and partners should coordinate strategy on skills and improve student employability and entrepreneurialism.

We have no intention of pointing out the alignment of these simplistic principles to certain elements of our proposal for a co-design and co-creation approach to innovative place making. But we do want to use the Statement and its basis in national consultations to illustrate a shared understanding of the importance of pursuing place-based innovation in Australia. Awareness precedes action. The challenge is what to do and how to do it. This is where this book’s focus on ‘crafting innovative places’ fits in, with its ‘crafting’ paradigms and tools that have drawn upon examples of international best practices and local experiences. The timing is right, not only for debates, but for actions, to drive place-based innovation and to grow a knowledge economy for Australia’s prosperous future.

CONCLUSION

In many respects, what we are suggesting is simple and straightforward. Australia’s history is one of ingenuity, adaptation, and innovation. Indigenous Australians and the first European settlers are the

human capital on which our nation was built. Our land is a harsh but rich one. Australia has benefited for almost 200 years from its mineral-rich environment. Years of economic success and prosperity have led us to where we are today. However, in the most basic sense we cannot expect to survive into the future dependent on non-renewable resources. In the past several decades, the returns on these mineral resources have diminished and our reliance on them has led us to forget about the people that define our nation. We must use the benefits, both in capital and experience, of our exploitation of non-renewable resources to build a future based on the most renewable of all resources: human capital and human ingenuity. In doing so, we are proposing an institutional environment framework conducive to innovation capacity building.

Australia should not continue to be an innovation taker, but an innovation shaper in the global innovation system. Globalisation will either help us ensure a strong future or leave us behind. By proactively engaging in the global knowledge economy and adapting to the information era, Australia can remain a strong player internationally. The direction we have outlined requires a rethinking of our political economy. It is one where the local institutional environment is nurtured by the larger federal and state systems. It is a husbanding approach rather than a top-down management approach. In this way, it suggests breaking down the silos we currently have and transforming them into collaborative, interconnected institutions working to get the most and best from our municipal base rather than trying to push or pull that base into the new world order.

Many will say we do not have the patience, the social skills, or the management know-how to produce a system built so much on internal trust. But we feel there is already a strong movement afoot at both the national level and at the grassroots of the political system. The end game is to maintain a high quality and high standard of living based on our knowledge capital. The paradigm shifts we propose may act as a catalyst for discussion and debate within both the public and private sectors. We do not have all the answers. This is an open discussion that should be occurring in all communities and at all levels of government. The future of our country is at stake, and we should all be entrusted with building that future.

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