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# Making space for knowledge generation and place for knowledge communities: an analysis of the Australian practice

**Abstract:** In the era of global knowledge economy, urban regions—seeking to increase their competitive edge, become destinations for talent and investment, and provide prosperity and quality of life to their inhabitants—have little chance achieving their development goals without forming effective knowledge-based urban development strategies. This paper aims to shed light on the planning and development processes of the knowledge-based urban development phenomenon with respect to the construction of knowledge community precincts aimed at making space for knowledge generation and place for knowledge communities. Following to a thorough review of the literature on knowledge-based urban development and strategic asset-based planning, the paper undertakes policy and best practice analyses to learn from the planning and development processes of internationally renowned knowledge community precincts—from Copenhagen, Eindhoven and Singapore. In the light of the analyses findings, this paper scrutinises major Australian knowledge community precinct initiatives—from Sydney, Melbourne and Brisbane—to better understand the dynamics of national practices, and benchmark them against the international best practice cases. The paper concludes with a discussion on the study findings and recommendations for successfully establishing space and place for both knowledge economy and society in Australian cities.

**Keywords:** Knowledge economy; knowledge society; knowledge-based urban development; knowledge community precinct; strategic asset-based planning; Australian cities.

## 1. Introduction

The changing and challenging conditions of the 21st century have been significantly impacting our economy, society and built and natural environments (Frane et al., 2005; Malecki, 2007; Claessens et al., 2010). Today generation of knowledge—mostly in the form of science, technology and arts—is seen as a panacea for the adaptation to changes and management of challenges (Asheim, 2007; Yigitcanlar, 2011). Making space and place that concentrate on knowledge generation—to support knowledge economy and society formation—, thus, have become a priority for many nations and cities. Concepts like ‘knowledge city’ and ‘knowledge precinct’ are coined as places where citizenship undertakes a deliberate and systematic initiative for founding its development on the identification and sustainable balance of its shared value system and bases its ability to create wealth on its capacity to generate and leverage its knowledge capabilities (Carrillo, 2010). In recent years, the term knowledge precinct in its most contemporary interpretation evolved into ‘knowledge community precinct’, which is a mix-use post-modern urban setting—e.g., flexible, decontextualized, enclaved, fragmented—including a critical mass of knowledge enterprises and advanced networked infrastructures, developed with the aim of collecting the benefits of blurring the boundaries of living, shopping, recreation and working facilities of knowledge workers and their families—i.e., knowledge community (Yigitcanlar et al., 2008b). In the literature this type of development—a place containing economic prosperity, environmental sustainability, just socio-spatial order and good governance—is referred as a knowledge-based urban development (KBUD) (Yigitcanlar, 2009).

Successful examples of KBUD is generally achieved through strategic asset-based planning, which is a strategic planning approach grounded in focusing on the positive endogenous attributes and assets in order to become competitive, attract new resources and bring about the desired outcomes (Indovina, 2010). Mostly driven by global market forces a KBUD requires a strategic asset-based planning approach that includes flexible planning regulations. Hence, in this paper, we aim to provide a clear understanding on the planning and development processes of the KBUD phenomenon with respect to the construction of knowledge community precincts—particularly in the Australian context. In order to do so, the paper, first reviews the key literature on KBUD and strategic asset-based planning thoroughly. The paper, then, undertakes policy and best practice analyses to shed light on the planning and development processes of knowledge community precincts and learn from the international success stories—i.e., Orestad Copenhagen, Brainport Avenue Eindhoven, One-north Singapore. Based on the learnings from the literature and global best practices, the paper conducts an empirical investigation and places major Australian knowledge community precinct initiatives under the microscope—i.e., Sydney’s Australian Technology Park, Melbourne’s Parkville Knowledge Precinct, Brisbane’s Kelvin Grove Urban Village—to better understand the dynamics of Australian knowledge community precincts in comparison to international best practices.

## 2. Literature review

This section reports the findings of a thorough review of the key literature relating to the planning and development of knowledge community precincts aimed at making space for knowledge generation and place for knowledge communities—i.e., KBUD phenomenon with respect to strategic asset-based planning.

### 2.1. Knowledge-based urban development

The concept of knowledge economy—grounded by endogenous growth theory (Romer, 1990; Aghion & Howitt, 1998)—emerged from an increasing recognition of the requirement for the generation, circulation and use of knowledge within modern economies, however, in recent years, increasing attention has been paid in emerging economies to make the transition to knowledge economy as well. Thus, making the knowledge economy phenomenon a fairly global one (Cooke, 2002; Huggins & Strakova, 2012). In the era of global knowledge economy, the world is increasingly becoming integrated, and knowledge is becoming the driving force for economic growth, societal development, and improvement of the competitiveness of not only industrial system and firms (Konstadakopoulos, 2003), but also urban regions (May & Perry, 2011).

In an empirical study, Lever (2002) demonstrated the correlation between economic growth and the extent of the knowledge base in European cities, suggesting urban regions that are centres of growth are also centres of knowledge. What this means is, the competitive advantages of urban regions are no longer based on their natural resources or cheap labour, but are increasingly viewed in terms of their knowledge resources and exploitation of these knowledge assets (Johnston, 2011). How well an urban region respond to the challenge of knowledge economy depends on how well actors exploit new knowledge in the form of new product or process innovations, making use of their intangible assets, such as skills and creativity (Konstadakopoulos, 2003).

As Asheim (2012) puts forward, since the beginning of the century strong evidence has been presented substantiating an argument for an urban turnaround that is taking place. The traditional focus on urban regions and their development mainly concern of ‘business climate’—launching policy measures intending to attract new business to support the growth of the existing industry—has been changing in recent years towards also providing a strong ‘people climate’ to attract and retain the talent in urban regions to form knowledge bases—i.e., analytical (science-based), synthetic (engineering-based), symbolic (art-based) (Florida, 2002; Asheim, 2007). Furthermore, urban regions are now being viewed as having a specific role to play in creating the prosperous knowledge milieus—hence establishing ‘spatial climate’—and in the management and humanisation of knowledge and setting the scene for enabling conditions—hence establishing ‘governance climate’ (Knight, 2008; Yigitcanlar et al., 2008a; Romein et al., 2011). This broadened perspective, therefore, makes knowledge-based development underpinning the growth trajectories of urban regions (Vazquez-Barquero, 2007; Yigitcanlar, 2011).

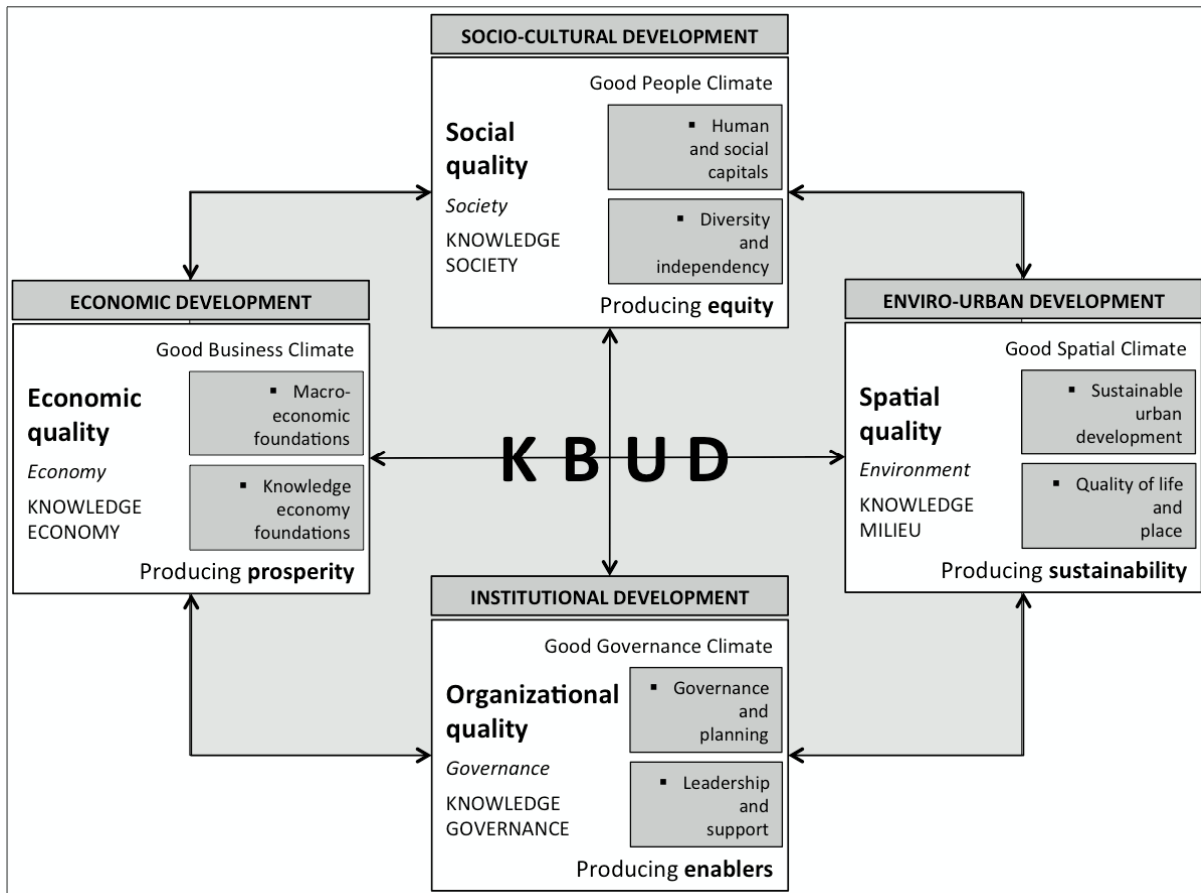
Knight (1995, 2008) sees knowledge-based development of urban regions—also referred as knowledge-based urban development (KBUD)—as the transformation of knowledge resources into local development to provide a basis for sustainable development and also a social learning process as a way for citizens to inform and become informed about the nature of changes occurring in their city. Kunzmann (2008) gives KBUD a more operational perspective as a key planning approach that provides an important collaborative development framework for all parties—i.e., public, private, academic, community—in the development of future strategic and knowledge-intensive urban and regional policies for attracting and retaining knowledge workers and knowledge-intensive industries and also for the nurturing of knowledge cities—and their nucleus of knowledge community precincts.

Perry (2008) points out to the differing perspectives of KBUD as she identifies the three dimensions to KBUD as process, product and acquisition, where in each case the relative importance of knowledge and space alters. In process-driven KBUD, knowledge is central and subject to change as a result of external pressures; whilst in acquisition-driven KBUD, knowledge itself is only a small part of KBUD processes, embedded in a wider set of economic, social, and cultural processes, and; in product-driven KBUD, much like the process-driven KBUD, urban is only implied and peripheral and place is central to the concept of the knowledge city. However, only a combination of all three dimensions into a more holistic KBUD vision can deliver desired outcomes.

Van Wezemael (2012) emphasises on the heterogeneous context of KBUD due to its multidisciplinary and multi-faceted nature—which is a complex and fuzzy concept—limiting its globally widespread inception. He suggests KBUD to reach beyond a neoliberal agenda of economic progress, and be viewed as a multiplicity and offer a rich potential to seek for alternative urban becomings. Further dwelling on the idea of alternative urban becomings and combination of KBUD perspectives, Fernandez-Maldonado and Romein (2010) argue that a sustainable KBUD only rests on a proper balance between: (i) economic quality, which depends on a good business climate to produce prosperity; (ii) socio-spatial quality, which is based on a good people climate for all people, and; (iii) organizational quality, which depends on coherence and consensus in the urban region, as well as a good

interaction between main stakeholders (i.e., government, university, industry) to deliver concrete projects and initiatives.

Inline with Fernandez-Maldonado and Romein's (2010) argument, Yigitcanlar's (2011) defines the KBUD: as the new development paradigm of the knowledge economy era that aims to bring economic prosperity, socio-spatial order, environmental sustainability, and good governance to cities; and produce a city purposefully designed to encourage the generation, circulation and use of knowledge in an economically secure, socially just, environmentally sustained and well-governed human setting—i.e., knowledge city (and its nucleus of knowledge community precincts). Correspondingly, KBUD is concerned of economic, societal and spatial (both built and natural environmental) development along with institutional development as an enabler of the former three. Figure 1 illustrates the conceptual framework of KBUD.



**Figure 1.** Conceptual framework of KBUD (derived from Yigitcanlar, 2011)

KBUD's economic development perspective aims to place endogenous knowledge assets in the heart of economic activities as it sees knowledge as a locally embedded strategic and vital resource rather than exogenous, imported and supplementary (Lever, 2002; Nguyen, 2010), and build a knowledge economy within an urban region producing prosperity achieved through strong 'macro-economic' and 'knowledge economy foundations'. KBUD's socio-cultural development perspective aims to increase skills and knowledge of residents as a mean for individual and communal development and societal high-level of achievements (Ovalle et al., 2004; Frane et al., 2005), and build a knowledge society within an urban region producing social equity achieved through strong 'human and social capitals', and 'diversity and independency'. KBUD's environmental and urban (enviro-urban) development perspective aims to promote conservation, development and integration of both natural and built environments, work towards building a strong spatial network relationship between urban development and knowledge clusters while driving an urban and environmental development that is ecologically friendly, high quality, unique and sustainable (Knight, 1995; Yigitcanlar, 2010), and build a knowledge milieu producing sustainability in an urban region achieved through 'sustainable urban development' and 'quality of life and place'. KBUD's institutional development perspective aims to democratise and humanises knowledge, institutionalises interdisciplinary collective learning processes and knowledge-based organisations, play a critical role in the orchestration of the development by bringing together actors, stakeholders and sources to prepare a civic vision, plan strategically, organise and facilitate necessary knowledge-intensive bases and activities (Knight, 2008; Yigitcanlar, 2011), and build a knowledge governance producing enablers for KBUD in an urban region achieved through strong 'governance and planning' and 'leadership and support'. Subsequently,

these four development perspectives form the main pillars of KBUD—economy, society, environment, governance (see Figure 1).

## 2.2. Strategic asset-based planning

In the urban planning and development context, the term ‘asset’ refers to physical structures, services, accessible resources, even inhabitants’ characteristics, which can be used for welfare and utility of the community (Ford Foundation, 2004). Generally, this term is used together with infrastructure management and involves the community facilities that need to be planned, built and maintained according to the local needs. This generally encompasses education, recreation, culture and health facilities available to the public, and other distribution and transport networks (McShane, 2006). Assets can be categorised as tangible and intangible. While the former is related to the physical structures, such as buildings, land, capital, the latter refers to environmental, social and cultural characteristics and values—tangible assets support intangible assets and in return intangible assets enhance the value of tangible ones (Flipo, 1988).

Within the same context, asset-based planning is put forward in parallel to the communicative rationality and strategic planning approach. In this type of planning, instead of pursuing a traditional need-based planning approach, it purports communities to be planned by considering their endogenous assets and emphasising the strong and positive aspects of their developable assets (Mathie & Cunningham, 2003). One of the most important components of this planning is the community involvement in identification, management and utilisation of the assets. Traditionally, asset-based planning approach has been widely used, particularly, in urban regeneration and poverty alleviation projects. In the global knowledge economy era, this asset-based approach has been also utilised in the strategic planning domain, thus making, ‘strategic asset-based planning’ a planning approach that places its focus on urban assets as the key value to be driven to sustain competitive advantage and prosperity (Velibeyoglu & Yigitcanlar, 2010). This planning approach is now heavily employed in KBUD projects—including planning of knowledge community precincts.

In line with the strategic asset-based planning endeavours, fundamental urban assets are categorised as in Table 1. This capital system and asset categorisation provides some useful insights on the effective asset management planning process and helps to delineate best strategies to endow these assets for the community and the city. In fact, not being much different from the traditional strategic spatial planning approach, it specifically highlights the main constituents of economic, social, cultural, environmental and institutional resources available—in line with KBUD framework—and helps to designate the key stakeholders.

**Table 1.** Capital systems and asset categories (derived from Carrillo, 2002; Friedmann, 2007; Velibeyoglu & Yigitcanlar, 2010)

Capital systems	Asset categories	Assets
Identity capital	Symbolic assets	City brands, geographic trademarks, landmark buildings, endemic plants
Social capital	Social assets	Civic initiatives, community centres and activities, shared value systems
Human capital	Human assets	Individual’s capacity and skills to work, education and training centres, thickness of the labour market
Cultural capital	Heritage and cultural assets	Historical and archaeological sites, handicrafts, cuisine, ethnography, cultural diversity, openness and tolerance
Environmental capital	Natural, environmental and infrastructural assets	Natural and constructed amenities, flora and fauna, technical infrastructure
Financial capital	Financial assets	Financial institutions and resources available to firms and individuals
Knowledge capital	Knowledge assets	Intellectual property rights, brands, research and development centres, universities
Relational capital	Relational assets	Management, governance, institutions and networks that interact and collaborate for orchestration of development

Effective and efficient management of tangible and intangible assets are crucial for successfully achieving the results of KBUD strategies and contributes to the competitiveness of cities. An integrated urban asset management not only facilitate inter-sphere cooperative governance, but also enable strategic urban planning and decision-making. Having adopted this taxonomy, a number of generic steps were defined—these steps start with the identification and valuation of assets, followed by the preparation of management plans, and project implementation, and concludes by monitoring the outcomes. Between the performance monitoring and previous

steps there exists feedback loops due to the iterative nature of this planning and management approach (Figure 2). Details of these steps are specified below (Velibeyoglu & Yigitcanlar, 2010):

- *Asset identification and valuation:* This step involves identification of the asset basis of individuals, associations, institutions and resources in the city, which is also referred as asset mapping. Asset mapping is often conducted by using a participatory approach in which local stakeholders help identify, rank and prioritise different local assets. This step involves assessing opportunities and risks associated with the utilisation of assets. This step also includes variety of qualitative and quantitative assessment methods and helps policy- and decision-makers to evaluate past, current and predicted future conditions and performances of the identified key assets.
- *Asset management plan:* In order to retain and flourish the asset base of a city, sound preservation, development and accumulation strategies need to be prepared covering different scales and periods. Identification of the implementation projects is a critical part of this step to best endow both competitiveness and sustainability of a city according to calculated risks and benefits. This step involves describing budgetary instruments, constraints, and allocation of financial resources.
- *Project implementation:* This step implicates determination of implementation criteria for selected asset-based projects. A set of effective strategies—including area-based approach, bottom-up approach, innovation, networking and cooperation between areas, integration with other plans, projects and initiatives, and capability of creating pool of knowledge resources to share experiences—are vital for success in asset-based project implementation.
- *Performance monitoring:* Progress and results of project implementation, and policy decisions are required monitoring to gain frequent feedback and evaluate the performance of asset management plans. This way, the management plan and policy- and decision-making framework can be easily rectified. This step also contributes to future project selection, directions and determining the implementation criteria.

Figure 2 demonstrates the process of strategic asset-based KBUD planning. Basically strategic asset-based KBUD planning is the marriage of strategic planning with asset management. However, in this process high attention is paid to seven key questions—so-called the 7Ks Checklist—as the accurate answers of these questions crucial for the entire process (for more info see Velibeyoglu & Yigitcanlar, 2010).

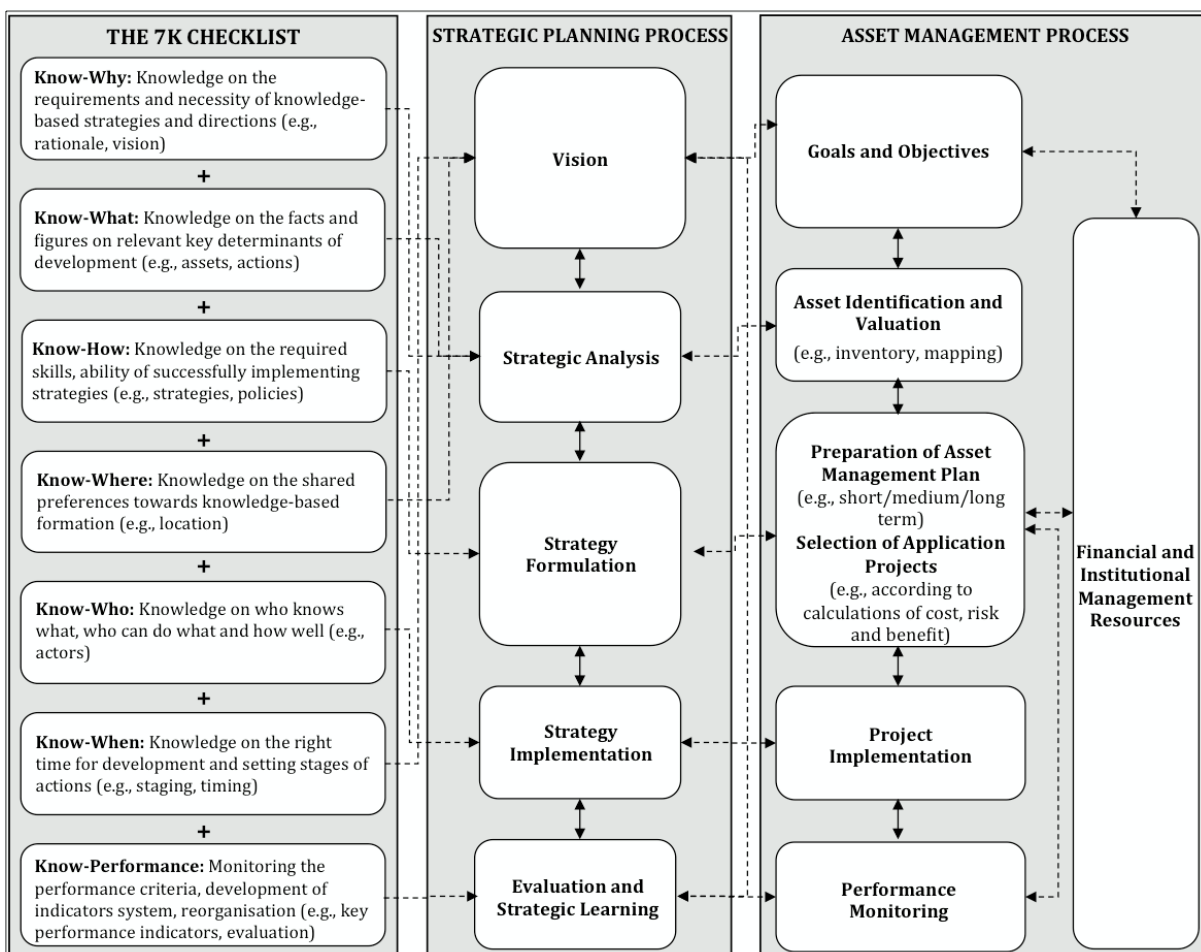


Figure 2. Strategic asset-based KBUD planning process (derived from Velibeyoglu & Yigitcanlar, 2010)



### 3. Global best practices

This section investigates and reveals the significant achievements and common characteristics of three globally renowned knowledge community precinct best practices—i.e., Orestad Copenhagen, Brainport Avenue Eindhoven, One-north Singapore. A simple nevertheless effective investigation framework is developed—in the light of the KBUD and strategic asset-based planning literature—and adopted to this investigation. Principally, with this framework, we, first, scrutinised asset identification and valuation—focusing on asset categories (see Table 1)—then asset management plans, implementation and performance monitoring of the global best practices.

#### 3.1. Orestad, Copenhagen

Orestad KBUD project of Copenhagen—also referred to as crossroads—is part of the new growth-stimulating strategies that state and local governments of Denmark developed owing to economic drawbacks and social unrest of 80s. Having started with construction of Oresund Bridge between Denmark and Sweden after the collapse of Soviet Union, Orestad has become the symbol of adaptation of Denmark to the knowledge economy and urban rejuvenation. The project was initiated following to the lead of the new Law on Orestad in 1992, and the master plan was prepared in 1995. In 1999 the development of Orestad knowledge community precinct was commenced as a new community of students, workers, and residents. Once completed in 2030, it is estimated to host over 80,000 jobs and 20,000 inhabitants in the precinct (Arlund, 2007). Orestad covers 310 ha area and consists of four districts, university and the knowledge industries, urban centre, and low- and high-density residential areas (Figure 3). Development of ICT and biotechnology is proposed as the main knowledge sector for the precinct. Harnessing housing units and student accommodations with universities and designing a public domain consisting recreation, entertainment and cultural uses in and around the precinct are the main spatial objectives of the master plan (Fernández-Ges, 2009).

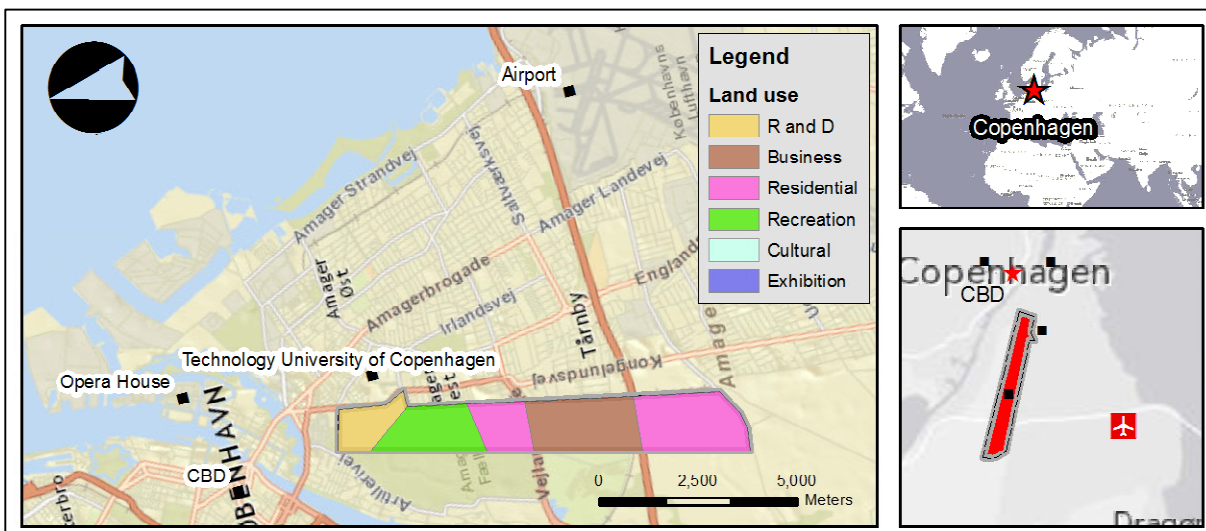


Figure 3. Location of Orestad, Copenhagen

*Asset identification and valuation: Symbolic assets:* Being the capital of Denmark, Copenhagen has been the main attractor for national and international capital. At the regional scale, the Oresund Science Region is a cross-border partnership between Denmark and Sweden in the EU context and Orestad knowledge community precinct is one of the signature initiatives from the region (Garlick et al., 2006). These were the main reasons for the state government at that time to start Orestad development, which aims to take advantage of drastic political and economic changes in Europe in general and Copenhagen in particular.

*Social assets:* As oppose to the bottom-up planning tradition, a welfare state-led development model was adopted in planning and implementation phases of Orestad (Andersen, 2005). Lack of community involvement in the planning process, aggressive public funding policy, gentrification of the area, and deportation of inhabitants are widely criticised (Lund et al., 2001; Majoor, 2008; Book et al., 2010). However, cultural events and exhibits have been used to attract Copenhagen communities to the precinct.

*Human assets:* Copenhagen has a large service sector, which has now been channelled into knowledge sectors. Strongly linked with the city, Orestad knowledge community precinct particularly attracts qualified knowledge workers from the city, region and neighbouring EU countries.

*Heritage and cultural assets:* Even though the precinct did not have any significant heritage structure, easy accessibility to the historical city centre is a prominent advantage of the area—e.g., having Opera House and Royal Library in close proximity. Approximately 20 percent of the urban population is non-Danish—coming mostly from other EU countries. The city has a reputation of tolerance to cultural diversity, and strict immigration policies to only allow entry of the skilled workforce.

*Natural, environmental and infrastructural assets:* Residential and business/industry areas of the precinct cover formerly vacant waterfront site, which is linked to central Copenhagen by a transit line, subway, and to Sweden by Oresund Bridge (AAS, 2012). Parks and canals are built in the precinct integrate water and open space to provide amenities to the wider district. The precinct is planned as a mixed-use development comprising 60 percent businesses—mostly knowledge economy sectors—, 20 percent residential and 20 percent education and R&D institutions (Andersen, 2005).

*Financial assets:* Orestad Development Corporation—founded by the Ministry of Finance and the Ministry of Transport, and Copenhagen Municipality—has developed the precinct through the national and local funds; nonetheless, the power for planning and management was given to the precinct founding groups (Andersen, 2005).

*Knowledge assets:* There are a number of ICT and biotechnology firms—employing talented knowledge workers—located in the precinct. Crossroads—including the Orestad knowledge community precinct—is a partnership project between the University of Copenhagen, the Danish Consumer Agency, the Royal Library, the Danish Broadcasting Corporation and the Information Technology University of Copenhagen.

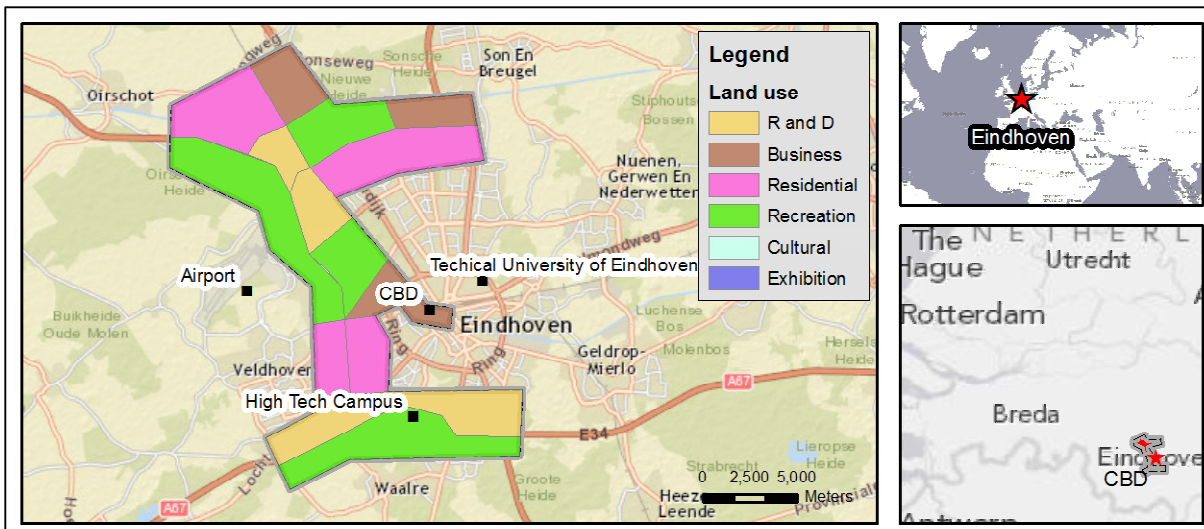
*Relational assets:* Due to economic recession that the region had been experiencing, the Ministry of Finance and Copenhagen Municipality took a bold step to initiate Orestad development considering the areas of knowledge and labour resources, proximity to Sweden and other EU countries. Even though the lack of public involvement to the planning and implementation processes was criticised, the overall economic success of the project has been deflected these criticisms (Arlund, 2007).

*Asset management plan, implementation and performance monitoring:* Crossroads is a cross-boundary development strategy formulated by Danish government bodies (Garlick et al., 2006). Orestad is the most significant project undertaken by this initiative and has created a contrast between old and new faces of Copenhagen. Financing and construction of the Oresund Bridge and subway system were two most critical steps to start structural development of R&D, academic and business clusters in the precinct (Arlund, 2007). Lessons from international case studies were successfully adapted for planning and development of the Orestad project. For example, 1995 master plan clearly reflects these lessons; provision of a wide-spectrum of urban activities together with science and research facilities—e.g., housing options, cultural, entertainment, recreation facilities, visual amenity, easy access to the other urban hubs (Arlund, 2007). The precinct has good transport connections, high residential amenities and is an attractor for local and international talent. Moreover, the Living Lab project, which is specifically designed for non-academic people to test their project ideas, is a useful initiative to integrate general public to the precinct. Since the information related to the strategic plan of the precinct is limited, it was not possible to portray a performance monitoring mechanism for this case. As though there is a long way to finalise its development, the project has been financially so successful, the development is expected to be completed by 2015, which was originally estimated as 2030.

### **3.2. Brainport, Eindhoven**

Having sharply lost its manufacturing sector in 1993, Eindhoven has been looking for initiatives to effectively channel its technical knowledge and R&D infrastructure to new-economy sectors. Brainport KBUD initiative has been put forward as the vision for the Eindhoven region to define cross boundary economic development movement. Brainport has evolved as a triple-helix initiative of local government, academic institutions and businesses model, which has been referred as one of the key best practices learnings of this project (Maldonado & Romein, 2010). Brainport received the award of Intelligent Community of the Year, in 2011, at the Intelligent Community Forum—indicating success of the knowledge community development efforts. Brainport Avenue precinct is a product of the national government project to accommodate growth of Eindhoven in an area close to the R&D facilities with easy access. Implementation of the project started in 2010 and is expected to be completed by 2014. The precinct includes High Tech Campus, Strijp-S, and Technical University of Eindhoven. The precinct has a large repertoire of new economy sector to be developed—to name a few, medical technology, ICT, micro-electronics, nanotechnology, automotive and creative industries—considering the knowledge base inherited from manufacturing era (Figure 4). The precinct covers 3,250 ha area and is planned to more than 100 high tech companies, some of which are international industry leaders. Even though renovation of industrial heritage buildings for mixed-use development is advised as a branding strategy, the main weakness of this precinct is the lack of a metropolitan character.





**Figure 4.** Location of Brainport Avenue, Eindhoven

*Asset identification and valuation: Symbolic assets:* Eindhoven is known as being headquarter and main manufacturing area of Philips. The city has no metropolitan character, but has reputation due to high-quality education in the Technical University of Eindhoven (van Winden & van den Berg, 2004). Brainport Avenue project uses these assets as marketing strategy in the global markets.

*Social assets:* Considering the industrial and commercial history of Eindhoven, the community has strong governance culture. The displacement of the manufacturing industry affected the welfare of the area and the community actively supported the new economic direction towards knowledge sectors—including the development of the precinct.

*Human assets:* Eindhoven has a workforce with high-standard technical knowledge due to the industrial era labour needs and higher standards in tertiary institutions. However, this constraints the area—particularly, in utilising these skills in profitable sectors and making an easy transition to knowledge-based activities (van Winden & van den Berg, 2004; Maldonado & Romein, 2010). Due to specialised tertiary institutions and the medium scale of the city, the study areas are mostly focused on technical expertise areas.

*Heritage and cultural assets:* The precinct consists of an urban form of the industrial era development and contains a number of early 20th century industrial buildings. Nearly 20 percent of the population has foreign descendants, which most of them are from Western Europe. Even though the cultural diversity is limited, social equity is fairly good and unemployment is relatively low (van Winden & van den Berg, 2004).

*Natural, environmental and infrastructural assets:* Even though infrastructures meet the needs of the inhabitants, transport infrastructure limits the accessibility at the regional scale. However, airport and high-speed train infrastructure has been expanding together with the knowledge economy developments in the area. There is a trend of retrofitting and conversion of old industrial buildings to residential, R&D and cultural uses, which provide a renewed image to the city, enhances the quality amenity provision to the existing urban areas and contributes to the appeal of the precinct.

*Financial assets:* The Brainport Avenue is located next to the centre of Eindhoven, and the EU and State government provide financial incentives for investment in the precinct, but its development is still in limited size and highly local (Maldonado & Romein, 2010).

*Knowledge assets:* Technical University of Eindhoven is one of the internationally well-known universities. Embedded Systems Institute and Polymer Institute are the two R&D institutions that reinforce the profile of the area. Approximately 50 percent of the total Dutch R&D expenditure is made within the region—the precinct being a significant contributor—which proves the good connections of entrepreneurs, universities and governments, and clearly indicates a potential for future growth (van Winden & van den Berg, 2004).

*Relational assets:* There is a strong local initiative group forming coalitions with regional and national interest groups to recover the profile of the region. The influential stakeholders of the precinct collaborate with each other and are in close relationship and partnership with the local government. This provides an obvious advantage in supporting economic development strategies and become more competitive in the knowledge economy era (Maldonado & Romein, 2009).

*Asset management plan, implementation and performance monitoring:* Spatial structure plan of Eindhoven region pursues a balanced development approach in the economy, the ecology, recreation, living, and traffic. The Spatial Programme Brainport, which supersedes the regional plan, particularly involves the development of Eindhoven

region together with other Netherland cities and neighbouring Belgium and Germany cities to create a cross-boundary synergy. Due to the lack of metropolitan character, the balanced use of urban and countryside patterns of Eindhoven has been advised as marketing strategy to attract qualified workforce with families. This also highlights the importance of regional accessibility, preservation of green structure and supporting the new development along with the A2 highway. Brainport Avenue particularly focuses on the technology valorisation of strong sectors, such life-tech (life sciences, medical technology), high-tech systems (ICT, micro-electronics, nanotechnology, automotive, mechatronics) and creative industries (Maldonado & Romein, 2010). Retrofitting of old industrial buildings for residential and business uses is another strategy adopted in branding Eindhoven by underlining its industrial heritage. Accessibility, economic infrastructure, ecological infrastructure, education, urbanisation, historical patrimony and spatial pilots are seven main topics that spatial strategy takes into account for knowledge sector development. In the first stage, Brainport Avenue encompassing 13 projects has been started (ERC, 2009). Moreover, Technical University of Eindhoven has developed a strategy plan to draw a clear direction in the new-economy transition and global academic competition. Here, the strengths of the university in science and health fields are boldly highlighted and a set of targets is determined for benchmarking purposes. There is no clear indication of performance monitoring or benchmarking measures for these plans, however, Brainport Avenue project is planned to be completed by the end of 2014.

### 3.3. One-north, Singapore

One-north, the one of the latest new knowledge community precinct initiatives of the Singapore Government, is designed to attract global biotechnology, ICT and media investment and have succeeded in a great extent. Particularly the flexibility of the government in planning and locating the new investment demands, and generous incentives provided are among the main drivers of One-north's KBUD success. One-north precinct is located adjacent to the CBD and well connected via transport infrastructure. (Figure 5). In 2000, the government announced One-north development which is \$8.5 billion science-culture-business park project and expected to be completed within 15-20 years (Han, 2005). The precinct area is about 200 ha and will accommodate 138,000 people. Its master plan was prepared by Zaha Hadid Architects by aiming to integrate offices, residents and other accommodations, retail outlets, sports and recreational facilities with green spaces and heritage sites. The precinct has four functional sub-divisions, Biopolis, Fusionpolis, Mediapolis and VistaXchange, which involves biomedical research, ICT research (including media, science and engineering), creative industries and business-residential uses, respectively.

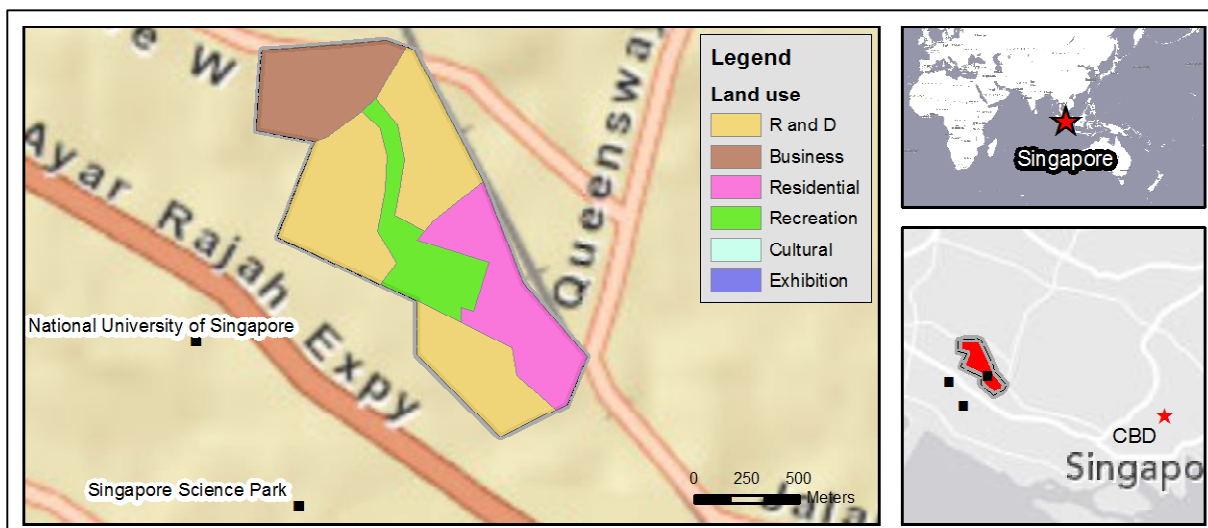


Figure 5. Location of One-north, Singapore

*Asset identification and valuation: Symbolic assets:* Due to the political history and strategic geographic location, Singapore has always been a regional hub for trade with strong international economic connections—i.e., investments of foreign companies, technological exports—in the South East Asia (Wong & Singh, 2008). Singapore uses this image in branding the city-state as a prominent financial player in the global knowledge economy, and its knowledge community precinct, One-north, as a prominent knowledge generator.

*Social assets:* Singapore has a unique cosmopolitan characteristic in the South East Asia region and a long tradition of business contacts at the global scale. Due to strong government domination tradition, the community seems receptive to the top-down planning regime. In contrast to the lack of fully embraced local democracy, a rapid KBUD—which brings wealth to the city-state—is maintained (Koh, 2006)? Old housing areas close to the precinct has housed local and international workers over the years and now these occupants are competing with the new-knowledge workers. JCT revitalises these areas with features tailored to needs of knowledge workers

and aims to prioritise applicants working in the precinct. It is foreseen that this will generate a diverse social fabric in and around the precinct in the next decades (Majoor, 2008).

*Human assets:* The long history of being an ICT export hub has created a spill over effect, which contributes to knowledge economy excellence (Koh & Wong, 2005). Singapore has a developed local and international labour market and competes with other global actors in attracting knowledge workers owing to its financial capacity, which has matured throughout the former industrial era (Koh, 2006). Education system is well integrated with the supportive services of knowledge economy. The precinct houses knowledge workers with diverse ethnic backgrounds.

*Heritage and cultural assets:* In addition to its own cultural assets—particularly the mosaic of Chinese, Indian and British—, Singapore experienced a relatively long colonial era and it is still possible to pursue its tracks in the urban fabric. Singapore has a wide mixture of different cultures when compared to its neighbours. State embraces policies to maintain national identity against the other cultural influences (Wong & Bunnell, 2006). The precinct benefits from the heritage and cultural assets of the city-state as being in close proximity to the historical/cultural sites.

*Natural, environmental and infrastructural assets:* Due to scarcity of land and resulting high population density, it is hard to evaluate quality of its natural amenities, but the city-state is rich in high-quality built environment, which is flexible to meet housing demand of local and international labour (Han, 2005). Singapore has strong and smart transport and ICT infrastructure to upkeep growing demand. The precinct reaps the benefits of having a rich built environment with good urban design and architecture and investing on enriching the natural environment within the precinct.

*Financial assets:* Owing to its vibrant economic structure, Singapore has capacity to support large projects and government still is the biggest player initiating signature projects. Singapore attracts the attention of prominent multinational companies and finance institutions to invest in the growing knowledge sectors (Koh & Wong, 2005; Wong & Bunnell, 2006; Wong & Singh, 2008). Government provides generous financial incentives the small and medium enterprises (SMEs), such as the tax exemptions, R&D grants and training subsidies—where also companies at the precinct benefit from these schemes.

*Knowledge assets:* The precinct has an increasing trajectory in innovation and knowledge transfer and strong R&D institutions supporting its growth. Government is the main player in research. For example a number of buildings built in One-north are occupied by government research institutions and it is expected to grow in the future in parallel to the urban development in and around the precinct. New business district is located next to the existing research facilities such as the National University of Singapore, the National University Hospital and the Singapore Science Park.

*Relational assets:* There is a duality of state and private initiative in the civic area. While still strong and prescriptive, the governmental structure has an ability to adapt changing economic climate—i.e., restructuring public institutions as private firm to initiate specific projects, e.g., Jurong Town Corporation (JTC) for One-north (Koh & Wong, 2005). This also raises the issue of democratic governance and over regulation of the economy (Wong & Bunnell, 2006).

*Asset management plan, implementation and performance monitoring:* Singapore acts as a large multi-sectoral company in generating strategies and plans for economic development, social cohesion, creating attractive urban environments in the framework of sustainability concept. While initiated as a science habitat or business park in a technology corridor concept back in 1991, One-north, named in 2001, has become a milestone for Singapore's journey in new-economy era (Wong & Bunnell, 2006). The most critical—due to its scarcity—resource is land and as a response to this, all planning, development and marketing activities related to One-north have been undertaken by a semi-government firm—JTC. This firm manages the investors to Singapore in a coordinated way to make the best match between firms and research institutions in accordance with the master plan 2008. In master plan, One-north area is designed to enhance residential amenities (i.e., shopping, dining, entertainment, green infrastructure) and urban services (i.e., education, healthcare, public transport) together with the new business and accommodation services (SURA, 2012). Accessibility to biomedical, information and communication, and media research facilities via public transport and pedestrian network has been highlighted in the planning of all phases of One-north (Han, 2005). Sustainable practices in energy, logistics and transport, feedstock, environment and water have been promoted by JTC by innovative infrastructure implementations and small footprint facilities (JTC, 2011). There is no clearly defined performance monitoring mechanism of the master plan. The plan has regular amendments according to the development demands from the government and businesses—current and prospective. While preservation of natural and heritage assets, and cityscape is regulated by the plan in a relatively strict manner, the planning process is formulated to facilitate business investment in the knowledge precincts in Singapore. It seems only relevant criteria to judge the plan success is the volume and value of the new businesses attracted to the city-state and the precinct.

### **3.4. Lessons learned**

Investigated three globally reputable knowledge community precincts have a successful industrial past—in Copenhagen and Eindhoven dating back to post-WWII era and in Singapore to 1980s. Existing financial capital strength in these cities has made the provision of resources for the knowledge community precinct investment possible. Relatively underutilised areas close to CBD/historical city centre were chosen as the physical locations of all precincts—rather than a greenfield, an infill or brownfield development was preferred due to reaping benefits of established social and physical infrastructures. These precincts were strategically planned and developed with the purpose of either regaining the weakened regional/global economic advantage or taking a strong stand for possible prospective economic downturns. Place branding was used as an imperative strategy in the KBUD and planning processes of these precincts.

Triple-helix model is utilised for the development of these knowledge community precincts. While the level of involvement of parties in this model—i.e., government, business, academy—varies for each case, in general public sector has played the major role in initiating the development. The involvement of stakeholders has been in differing degrees depending on the cultural, governance and planning traditions and backgrounds. However, the main motive has been that in the increasing global competition for attracting and retaining global investment and talent, governments wanted to take a strong position in this market immediately for not to bear the heavier costs of late entry in the competition.

Precincts from Copenhagen Eindhoven and Singapore mostly invested on their endogenous assets, even though aimed for attracting exogenous talent and investment. The knowledge community precinct development process highly benefited from the existing industry experiences, market connections, scale and spill over potential of the economy and workforce as the development initiator or facilitator. This was intentionally planned for further building on the advanced technology manufacturing background of these cities. All three cities have strong academic institutions, R&D facilities and business-university partnership at the regional scale, which provided a relatively easy access to skilled-employment. Due to the large populations and manufacturing era social structures, all cities have already developed a good service sector, which has allowed transitioning from neo-classical to knowledge economy easier and helped in the rapid emergence of complementary knowledge sectors.

In all three cities there exists a substantial cultural mixture of workforce, which is inherited from either the geopolitical context (mostly applies to the former British colony Singapore) or previous industrial era—i.e., previous immigration policies to strengthen the service sector. Integration of immigrants with the rest of the society, and reciprocal tolerance of the local inhabitants and immigrants is other highlight that all cases more or less have succeeded, which supports their multicultural agendas.

Financial incentives from governments have been seen as a requirement particularly to attract and/or incubate start-up companies and SMEs considering the local characteristics and risk aversion strategies—e.g., attracting footloose investment and talent. Instead of having a limited number of large multinational companies, these governments prefer to house a large number of start-up companies and SMEs—as most of the innovation happens there—and try to enhance interaction between them through spatial strategies—i.e., proximity, encounters, interaction. In all three cities similar strategies are adopted as they are seen more effective and if succeeds more profitable.

In all cases as a common feature, city authorities have invested in not only physical infrastructures of the area in its confinement, but also provided residential and recreational options, and good accessibility to the urban services, entertainment and cultural facilities. Particularly, all urban development plans of these cities have emphasised the importance of vibrant cultural life and supporting socio-cultural land-uses via activity planning and infrastructure provision in line with the preferences of knowledge workers and their families. Locating development close to existing visual amenities and conversion of old infrastructures to new R&D and residential uses are also common trends in all cases.

Connecting university-airport-CBD with a fast and convenient public transport mean—e.g., high-speed train or people movers—is one of the key strategies adopted. Gentrification and displacement of the original occupants are two main criticisms, which are particularly highlighted for the Singapore and Copenhagen cases.

Even though these precincts were developed in a confined urban area—i.e., in relatively small-scale districts—, there are other supplementary connected projects in all these cities. Since the developable land satisfying the aforementioned conditions—e.g., CBD proximity, airport connection, residential area requirements—are limited and there needs a complementary projects to complete the knowledge economy package, this approach was unavoidable.

In some cases creative, cultural and entertainment sectors are considered as one of the main knowledge sectors, but they also included in the knowledge community precinct repertoire due to the growing demand of the knowledge labour for these services.



Geographic proximity is still the main factor at the regional and local scales, which is exploited successfully in all cases. The regional scale is important for inbound immigration, even though all cities aimed to attract global talent. Migration from the first order neighbour countries—i.e., spatially and culturally closest—constitutes the main multicultural groups in all three cases. The local scale is important for locating similar uses together in precincts to generate a synergy with cooperation and competition, and investing supplementary sectors in and around the city.

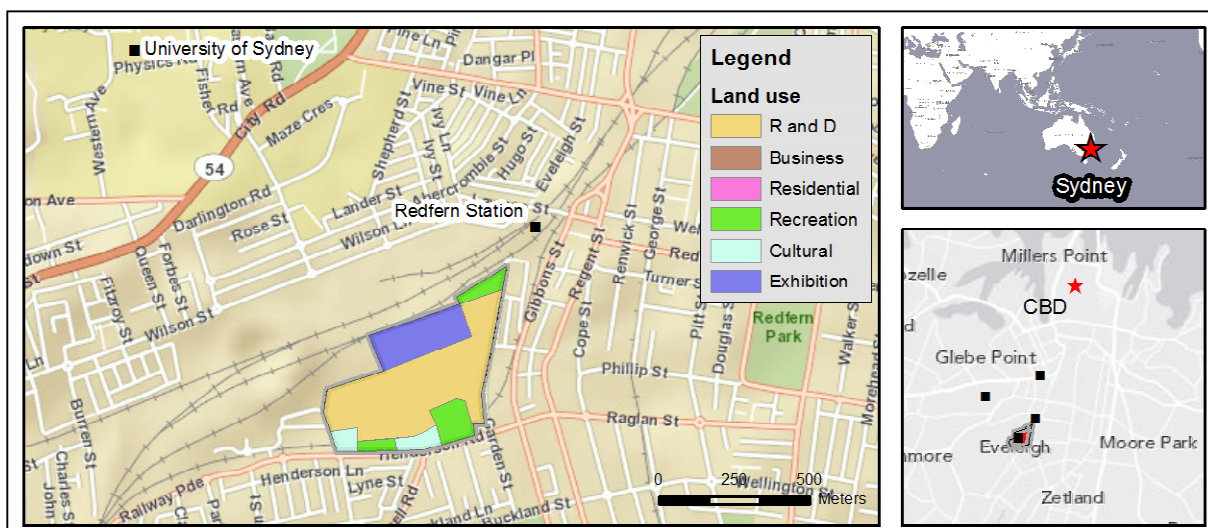
Economical investment areas mainly concentrate on ICT, biotechnologies and creative industries. Additionally, designing the urban spaces to live, work and play—the cliché referring to the temporary demand of the new labour—is another common spatial strategy widely employed for creating attractive spaces with successful urban design.

#### 4. Australian practices

In this section, we scrutinise major Australian knowledge community precincts’ performance and achievements against the findings from the review of the literature and results from the global best practice analysis. In terms of comparator knowledge community precincts one case from the largest three Australian capital cities are selected—i.e., Sydney’s Australian Technology Park, Melbourne’s Parkville Knowledge Precinct, Brisbane’s Kelvin Grove Urban Village. The same analysis approach employed for the global best practice analysis is used for the analysis of Australian knowledge community precinct cases.

##### 4.1. Australian Technology Park, Sydney

Being the largest city in Australia, Sydney—internationally recognised as a Global City—is one of the main actors in the global economy. While, the city is dominated by finance and insurance, business and property services, there are a number of sub-centres specialised in creative industries, health and biotechnology fields. Particularly higher quality of academic and research facilities around these sub-centres have facilitated the emergence of business hubs as a consequence of the KBUD movement. Australian Technology Park (ATP) has been one of the successful examples of knowledge community precinct creation in terms of planning, funding, implementation and operation as a triple helix approach. First ATP master plan was prepared in 1994 and ATP officially opened in 1996. The precinct has developed gradually according to the corporate plan of ATP and in 2005 a new master plan was prepared. The construction works had been continued until 2010 and now it is nearly completed and fully functional. The precinct covers 14 ha area. There are over 100 of ICTs and biomedicine organisations on the site employing over 2,000 people (ATP, 2011). Due to close proximity to Central Spine of Sydney and Redfern neighbourhood, the precinct also has a wide range of business, entertainment, culture and recreation services (Figure 6). Surrounding and nearby dwellings provide various residential options to ATP’s knowledge workers and their families.



**Figure 6.** Location of Australian Technology Park, Sydney

*Asset identification and valuation: Symbolic assets:* Being the largest city in Australia, Sydney—internationally recognised as a Global City—is one of the actors in the global knowledge economy. ATP is located on the southern part of the Central Spine of Sydney and is marked as catalyst for excellence in research and technology

development. This knowledge community precinct is particularly well known in the South East Asia region and has good connection with Asia-Pacific markets (Yigitcanlar, 2010).

*Social assets:* ATP has already had a civic characteristic due to renovated heritage buildings and as being close to the busy Redfern train station. There are plans to develop cultural and exhibition facilities in and around the precinct to attract local and research communities and further develop the precinct as a more vibrant hub.

*Human assets:* Due to the world-class education and research institution of Sydney, there is no significant shortage of qualified workforce in the R&D sector and the city itself also has a tick service sector (COS, 2008). Sydney attracts knowledge workers from all over the world particularly Central and South East Asia regions.

*Heritage and cultural assets:* The precinct was developed on an old manufacturing site—i.e., locomotive workshops and goods stores—and shown as one of the most significant areas for renewal in the Sydney City Strategic Plan (DOP, 2008). There are other important heritage sites around this area, which are being planned for conservation and incorporation with the precinct. ATP has a cosmopolitan urban environment due to significant culture mixture of the inhabitants—particularly areas around the CBD—where community tolerance is quite high. This is one of the reasons for an elevated migration movement.

*Natural, environmental and infrastructural assets:* Sydney is located close to a number of environmentally significant areas, which has been protected by the state and local governments, and has a good infrastructure to support urban services and growing demands of the population. The precinct takes place next to Redfern train station and has a very good public transport and pedestrian network.

*Financial assets:* Federal and state governments fund the R&D endeavours. The incubator facilities are designed for spin off SME technology firms as direct support. Sydney has adopted an economy strategy to develop ICT and biomedical sectors by involvement of the stakeholders. This enables firms to access governmental and private funds from various institutions, which ATP firms also benefit.

*Knowledge assets:* University of Sydney and University of Technology Sydney support a number of SMEs on ICTs and biomedicine in the area (DOP, 2008). However, the marketing strategy for ATP as a prime business real estate limits attracting and growth potential of innovative firms due to higher location costs.

*Relational assets:* ATP has been developed as a mutual initiative of the private sector, government and universities; the current management—i.e., The Redfern–Waterloo Authority, semi-governmental firm—of the precinct has been following proactive approach to further development of the area emphasising the sustainability concept. Particularly, making the precinct sustainable is the virtue governed by the collaboration of the state government, precinct management and the tenants.

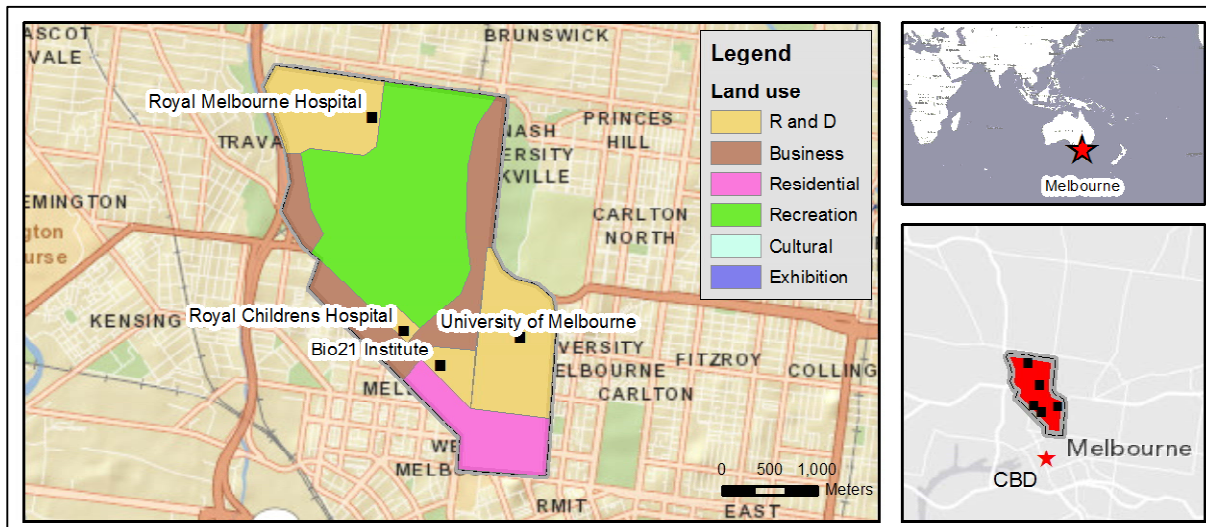
*Asset management plan, implementation and performance monitoring:* In the regional strategy plan, ATP is listed as a knowledge asset and shown as one of the magnet infrastructures considering its proximity to the major transport route and knowledge cluster—R&D facilities and universities—, support to an existing centre, and ability to reduce environmental impact. The main planning theme for this sub-region is to connect ATP precinct to Green Square development site. In the same plan, the Redfern-Waterloo Authority has been authorised for preservation and revitalisation of heritage buildings, implementing residential (including affordable housing) and business development, improvement of public transport network (Redfern station and airport connection), provision of safe and functional civic spaces, and implementing ecologically sustainable development through urban renewal (DOP, 2008). This approach is also adopted for the other sub-regional authorities to support innovation and strengthen the industry clusters. Additionally, the master plan of ATP was amended in 2005, and ATP management published the targets for sustainable practices in the precinct in energy conservation, reducing waste production and water consumption (ATP, 2011). Relocation of one of the national broadcasting companies is expected to foster the media industry presence in/around the area. The regional plan details urban form and function related issues in and around the precincts without specifying any performance criteria. On the other hand, ATP management provides targets for sustainability related information for benchmarking purposes.

#### **4.2. Parkville Knowledge Precinct, Melbourne**

Considering the metropolitan characteristics of Melbourne, a number of specialised activity centres have proliferated particularly around world-class education and research institutions. Parkville knowledge (medical and bioscience) community precinct is an outcome of this trend and of the organic synergy between health research facilities around University of Melbourne. Even though investment and development of the precinct has been ad hoc basis, it has been purported that coordination and integration between other research institutions and industry can bring more effective results for the Parkville knowledge community precinct. Among other initiatives from Melbourne, Parkville comes forward with its organic development as a specialised knowledge sector and the global reputation in cancer research. It is expected that the developments advised in 2005 Parkville Precinct Strategy Plan will be completed by 2016. The precinct covers around 550 ha area (Figure 7). In



2006, there were approximately 1,800 people living in the Parkville precinct and over 23,000 people were involved in health (14,362 ppl.) and education (5,113 ppl.) activities in the precinct (COM, 2008).



**Figure 7.** Location of Parkville Knowledge Precinct, Melbourne

*Asset identification and valuation: Symbolic assets:* Melbourne is the second largest Australian city, famous for arts, culture, sports and entertainment scenes. Parkville is located on the Northern section of Melbourne CBD and has a strong biomedical sector recognised globally. Similar to Sydney, it has good connections with the Asia-Pacific markets.

*Social assets:* Parkville knowledge community precinct has followed a relatively more organic development path to become a learning, healthcare and biomedical hub in the region. The precinct highly benefits from the social and cultural activities of the adjoining University of Melbourne.

*Human assets:* Melbourne has globally recognised education and research institutions and attracts a large number of international tertiary education students (COM, 2008). The opportunity of international university graduates—who completed their minimum two-year studies in Australia—migrating as skill-workers makes accessing to qualified labour force easier. The city itself has a mature service sector. Likewise Sydney, Melbourne—internationally recognised as a Knowledge City—attracts knowledge workers from all over the world particularly from Central and South East Asia regions (Yigitcanlar et al., 2008a).

*Heritage and cultural assets:* The University of Melbourne campus is a heritage site and the precinct also has other heritage sites in the close proximity (COM, 2008). The precinct and its surrounding area inhabit many people with various cultural backgrounds and community tolerance is quite high. Melbourne is one of the most culturally vibrant cities in Australia—in a big competition with Sydney—, where integration of immigrants to the community is highly successful.

*Natural, environmental and infrastructural assets:* The University of Melbourne campus and surrounding urban fabric have provided a unique urban characteristic to the precinct, which enhances the residential amenity as well. Due to its proximity to the city and higher densities around the precinct have also supported a mixed-use development organically (COM, 2008). The precinct has well-connected public transport, pedestrian and cycling networks allowing good accessibility to the area (DOH, 2005).

*Financial assets:* State government promotes the area by providing incentives to the new firms and also maintaining the existing healthcare facilities. The University of Melbourne provides research facility and researcher supply to the businesses, and bridges graduates and firms, which benefits the companies located at the precinct (DOH, 2005).

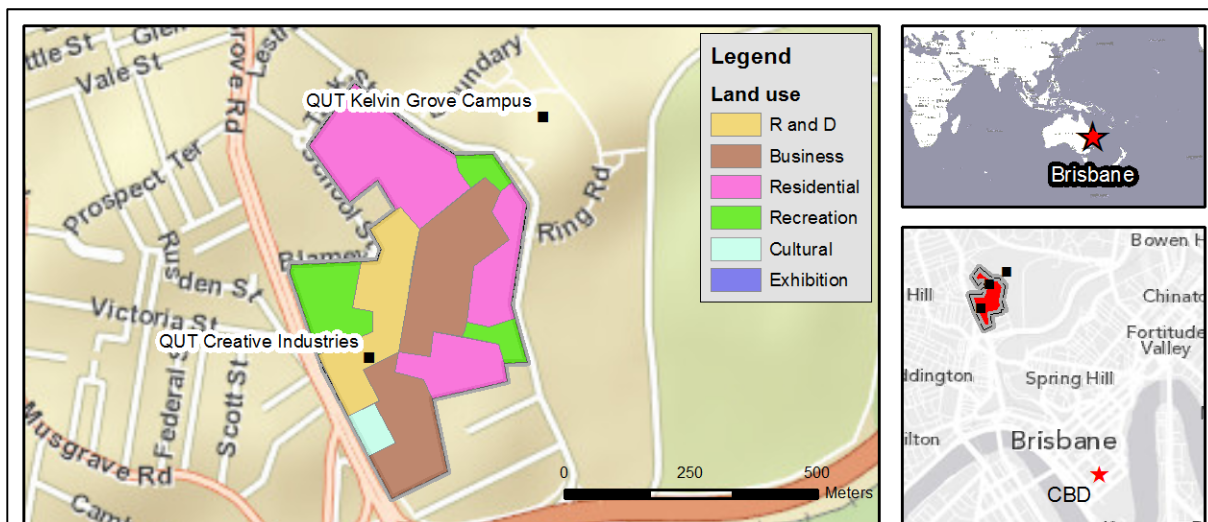
*Knowledge assets:* The University of Melbourne, Bio21 Institute, the Royal Melbourne Hospital and Royal Children's Hospital, relocated the Royal Women's Hospital are prominent institutions that have elevated the growth potential of the precinct (DOH, 2005). There are a number of SMEs located in the precinct having significant number of biomedical patents and producing medicines.

*Relational assets:* With support from the state government, City of Melbourne and the University of Melbourne, Parkville has become one of the successful examples of triple-helix collaboration. Particularly the University of Melbourne and regional hospitals in the area has facilitated a synergy between the university, healthcare facilities and the firms that invest in biosciences R&D (DOH, 2005).

*Asset management plan, implementation and performance monitoring:* The strategy document of the city (COM, 2008) outlines the needs of becoming a world-class knowledge city, role of universities in creating synergies in urban context, and effective ways of collaboration to cultivate city-based learning. In addition to this, Victorian Government prepared a strategic plan for Parkville precinct giving details of policy options and implementation strategies. Plan explains the role of the precinct as the major cluster of medical and biotechnology research, education and healthcare. It clearly states, “collaboration to drive innovation within the Precinct is vital to its ongoing status as a world-class biomedical precinct, and its contribution to high levels of health, social and economic benefits for the State” (DOH, 2005, p.6). The precinct’s connection to CBD, key infrastructure and research facilities has been shown as the prominent competitive advantage in cancer research and these also facilitate a biotechnology precinct in close proximity. In terms of implementation, the growth requirements of the existing research facilities and start-up firms are planned to be met either through rezoning irrelevant uses in the precinct—even though it is hardly possible when highly developed status of the precinct is considered—or encouraging urban development of mixed-use areas in close vicinity (DOH, 2005). City of Melbourne employs several benchmarking tools—including RMIT Global University Cities Index and MACKi’s the Most Admired Knowledge City Awards—to evaluate the performance of the city and its knowledge community precincts (COM, 2008).

### 4.3. Kelvin Grove Urban Village, Brisbane

Kelvin Grove Urban Village (KGV) is a proof of commitment of the Queensland Government and Brisbane City Council to ‘Smart State’ initiative and considered as an alternative solution to sprawling urban form. This is a joint initiative of the Queensland Government and the Queensland University of Technology (QUT). This has also been the foundation of the QUT’s Kelvin Grove Campus This multi-award winning project was planned in 2001 and construction started in 2002. The precinct covers about 16 ha area and is only 5 km distance to Brisbane CBD (Figure 8). Until now more than \$1 billion was spent for this mixed-tenure, medium density, inner city planned knowledge community. As of 2008, KGV inhabits around 4,000 people from all age groups (being mostly young professionals) in approximately 2,000 individual dwelling units.



**Figure 8.** Location of Kelvin Grove Urban Village, Brisbane

*Asset identification and valuation: Symbolic assets:* KGV is located at the inner city of Brisbane with close proximity to the CBD, which is the third largest city in Australia. Even though Brisbane is not as globally famous as Sydney and Melbourne, the city has been recognised as one of the emerging global cities considering the growth in population and economy. The two brands of the state—i.e., Smart State, Sunshine State—reflect the symbolic strengths of the city, which are investing on knowledge and the perfect weather.

*Social assets:* Cultural and performing arts activities attract local inhabitants and tourists to the precinct. There is a mixture of people from different age groups and cultural backgrounds in the precinct considering the international student and researcher flow and local inhabitants.

*Human assets:* Brisbane has a growing skilled workforce considering the contemporary immigration trend. QUT is the only education and research institution facilitating R&D activities and business development in the precinct. However, the other two large universities of the city are within 10 km distance.

*Heritage and cultural assets:* Albeit limited in numbers, the heritage remainings of indigenous people and former military barracks have been preserved in the precinct area. Brisbane has been one of the focal points of

international students and immigrants in Australia; therefore, there is an increasing openness and tolerance between the existing inhabitants and newcomers.

*Natural, environmental and infrastructural assets:* Compact urban development concept—i.e., urban village—is adopted as design principles, which has been recognised with a national design excellence award. KGUV is a master planned community and reflects characteristics of both traditional Queensland style urban fabric and modern research facilities with surrounding amenities. The precinct has a convenient public transport and non-motorised transport network, however, its connection to the CBD has been considered as rather weak (Yigitcanlar et al., 2008b).

*Financial assets:* State government played an important role in initial investment of the precinct and then the management has been handed to a QUT-based firm. There are no direct incentives to the firms at the moment, but state government has been investing in hard and soft infrastructures, and also in branding of the precinct.

*Knowledge assets:* Creative industries and health are the main sectors that are aimed to be located in the precinct. While the former is developing consistently, the latter requires more time, support and effort to grow. No apparent success stories recorded from the precinct yet. However, on paper quality accommodation, recreation, urban design, research facilities and infrastructures make it an ideal knowledge community precinct model.

*Relational assets:* KGUV is a joint initiative of Queensland Government and QUT, with support and involvement of the Brisbane City Council. At the moment, QUT is responsible for development and marketing of the precinct.

*Asset management plan, implementation and performance monitoring:* In the regional plan, adaptation to knowledge economies are covered in support for business centres and employment policy sections, which clearly advocates creation of key knowledge community precincts considering the urban sustainability principles and creating highly skilled jobs and employment diversification opportunities (DSD, 2009). KGUV project is a good example of 'Smart State' of the Queensland Government and is regarded as a social experiment in Australian urban design due to ambitious implementation of the new urbanism principles (Carroll et al., 2007). Quality of the urban space—i.e., medium density, mixed-use development, accessibility to the services by non-automobile means and attractive civic environments—is detailed in the master plan. Housing diversity and provision is another topic highlighted as “a wide range of demographics has been included in the accommodation options including student accommodation, disability support options, aged accommodation, and people living in government assisted housing via the Brisbane Housing Company” (Carroll, et al., 2007, p.10). QUT has provided education and research infrastructure for the creative industries and health, and is responsible for the development and marketing of the KGUV precinct. The health research is local and provides clinic level services. Queensland applies performance based planning on all levels of planning and implementation practices, and measure the success by desired regional and environmental outcomes, which set out a generic achievement statement at the regional scale or a performance indicator at the local scale. While the regional outcomes are very similar to the concerns mentioned in the Smart State initiative, environmental outcomes are related to the building structures and impact assessment of the construction.

#### **4.4. Results and discussion**

Knowledge community precinct cases—that we explored in this paper to better understand the planning and development characteristics and processes—provide us rather interesting findings (Table 2). First of all, even though each case to a certain degree has unique characteristics, there are a lot of similarities observed. For example, all cases include a government-led initiation process. Developing a 'good business climate' is seen as the primary driver of such development. In most of them a triple-helix model partnership is occurred. Central urban areas are chosen as physical locations for the precincts—proving the claims of the literature of knowledge generation is generally being an urban phenomenon. Even if all precincts are aiming to facilitate endogenous assets for knowledge generation and community development, in almost all cases, policies for attracting exogenous talent and investment exist. In most of these developments a great value to the knowledge generators—i.e., knowledge workers—are given. Besides, in some of them forming knowledge communities even comes before generating knowledge—i.e., KGUV—further highlighting the importance of 'good people climate'. In global and Australian cases a special attention is given to the natural and built environments to attract and retain talent from the city/region or abroad—investing on a 'good spatial climate'. Management of KBUD and also knowledge-based activities of the precincts are practiced fairly well all across the case studies—establishing a 'good governance climate'.

**Table 2.** Compared salient characteristics of knowledge community precincts

Precincts	Asset identification		Asset management, implementation, performance control	
	Strengths	Weaknesses	Strengths	Weaknesses
Orestad, Copenhagen	<ul style="list-style-type: none"> <li>Major economic hub in its region and availability of cross-boundary interactions</li> <li>Attractive location, subway accessibility and urban amenities provided</li> <li>Strong research and business</li> <li>Prevailing interest of residents and businesses to take place in the precinct</li> </ul>	<ul style="list-style-type: none"> <li>Gentrification and displacement of the inhabitants</li> <li>The EU based workforce</li> <li>Linear precinct development limiting pedestrian movement</li> </ul>	<ul style="list-style-type: none"> <li>Support of state and local government</li> <li>High turnover of the investment</li> <li>Initiatives to attract local inhabitants and tourists to the area</li> <li>Successful image making activities</li> </ul>	<ul style="list-style-type: none"> <li>High global competition and openness to financial recession</li> <li>High cost of living</li> </ul>
Brainport Avenue, Eindhoven	<ul style="list-style-type: none"> <li>Alliance among local government, academic institutions and businesses</li> <li>Remarkable manufacturing background and existing global brands</li> <li>Strong knowledge base and high quality academic institutions</li> <li>Large investment to R&amp;D and market success of the firms located</li> <li>Mixture of urban and rural characteristics</li> <li>Renovation of heritage structure for place-branding</li> <li>Strategic location and strong logistic network;</li> </ul>	<ul style="list-style-type: none"> <li>Lack of vibrant urban character to attract knowledge workers</li> <li>Weak airway connectivity</li> <li>Over specialised workforce</li> <li>Limited mixed-used development</li> <li>Limited developable land</li> </ul>	<ul style="list-style-type: none"> <li>The state's interest to develop cross-boundary endeavours</li> <li>Ongoing interest of the businesses to new precincts</li> <li>Initiatives to improve accessibility of the city and regional connections</li> <li>Effective use of heritage resource to build an image</li> </ul>	<ul style="list-style-type: none"> <li>Relatively isolated location</li> <li>Footloose industries and inhabitants</li> <li>Attracting qualified workforce with urban amenities and character</li> <li>High cost of living</li> </ul>
One-north, Singapore	<ul style="list-style-type: none"> <li>Lightweight governmental structure to initiate and implement R&amp;D and business investments;</li> <li>Access to qualified workforce</li> <li>High quality residents, residential amenities and urban services;</li> <li>Easy access to the precinct facilities and the CBD</li> </ul>	<ul style="list-style-type: none"> <li>Scarcity of developable land</li> <li>Gentrification and displacement of the inhabitants</li> <li>High population density and lack of environmental amenities</li> <li>Strong top-down governance</li> </ul>	<ul style="list-style-type: none"> <li>Flexible government structuring</li> <li>Global interest of businesses and attractive Incentives for SME</li> <li>Good management of current and prospective customers</li> <li>Urban scale-city-nation</li> <li>Effective city management to enhance urban amenities and Singapore brand</li> <li>Strong logistics web/network</li> <li>Support of the state government</li> <li>The Redfern-Waterloo Authority to increase decision making and implementation flexibility</li> <li>Good international and local connections</li> </ul>	<ul style="list-style-type: none"> <li>Footloose industries and inhabitants</li> <li>High cost of living</li> </ul>
Australian Technology Park, Sydney	<ul style="list-style-type: none"> <li>Proximity and accessibility to the CBD and other R&amp;D facilities</li> <li>Heritage characteristics and governmental support for conservation</li> <li>Successful sustainability practices</li> <li>Tick service and knowledge workforce</li> </ul>	<ul style="list-style-type: none"> <li>Small scale development</li> <li>Lucrative real estate image</li> <li>Limited developable land in and around the area</li> </ul>	<ul style="list-style-type: none"> <li>Support of the state government</li> <li>The Redfern-Waterloo Authority to increase decision making and implementation flexibility</li> <li>Good international and local connections</li> </ul>	<ul style="list-style-type: none"> <li>Locating irrelevant sectors to the area</li> <li>High cost of living</li> </ul>
Parkville Knowledge Precinct, Melbourne	<ul style="list-style-type: none"> <li>Global recognition in biomedical and cancer research</li> <li>Strategic location in city and proximity of supportive R&amp;D, academic institutions and businesses</li> <li>Easy access to knowledge and service workforce</li> <li>Good public and non-motorised transport infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Lack of coordination and integration among research facilities</li> <li>Very limited land to meet growth demand</li> </ul>	<ul style="list-style-type: none"> <li>Growing service and innovation demand in medical and health sectors</li> <li>Synergy between government, academy and business to bring the best benefits</li> <li>Ongoing interest of researchers to Melbourne universities</li> <li>Preservation of high quality urban amenities and characteristics</li> <li>Attractive research environment and social structure</li> <li>Good accessibility</li> </ul>	<ul style="list-style-type: none"> <li>Limited land, which may hamper growth of the sector</li> <li>Over specification</li> <li>High cost of living</li> </ul>
Kelvin Grove Urban Village, Brisbane	<ul style="list-style-type: none"> <li>Strong urban economy and state government support</li> <li>Thriving research and businesses for creative industries</li> <li>High quality urban amenities and accessibility to the key business hubs</li> <li>Successful academic institutions and attractive for international researchers and student</li> </ul>	<ul style="list-style-type: none"> <li>Lack of regional and national sectoral connections</li> <li>Less known globally</li> <li>Immature metropolitan character</li> </ul>	<ul style="list-style-type: none"> <li>Preservation of high quality urban amenities and characteristics</li> <li>Attractive research environment and social structure</li> <li>Good accessibility</li> </ul>	<ul style="list-style-type: none"> <li>Risk of being unknown and lose qualified workforce</li> <li>No clear framework to pursue coalitions in other regions</li> <li>Lack of governmental support</li> <li>High cost of living</li> </ul>



Secondly, in addition to commonalities among the case studies, each precinct has its own unique qualities. In the case of Orestad a top-down model, despite the bottom-up planning tradition, is followed—due to the project having a crossroads effect between Sweden and Denmark. This project was one of the very first global cases with its cross-country focus, and a success story in catching up the opportunities following the aftermath of economic recession with the strong support—and also strong influence—of government. In the Brainport Avenue case, as being a local/regional initiative the development progressed a bit slow when compared to others. The knowledge community precinct was the inner ring of a circle of KBUD initiatives—i.e., second ring is being Eindhoven city and third is Eindhoven region. Even though the city that precinct located not having a strong metropolitan character was a minus, existing rich urban amenities and facilities, along with technical knowledge and skilled labour force of the city created a positive springboard for the development. In the One-north case, the city-state, Singapore, provides the major uniqueness to the precinct. Singapore having a powerful but at the same time effective and efficient top-down planning and development process with an extreme flexible-firm-like government, and the compactness advantage—only one city knowledge corridor—helped One-north to surface as an ambitious knowledge community precinct practice.

Thirdly, in the Australian cases, when compared with European and Asian examples, first thing we notice is the effects of the tyranny of distance, which made international connections—for example in the case of Orestad—not so easily possible. Albeit, the beauty of knowledge economy comes with the advanced ICT that gaps most of the problems caused by the distance, limited proximity and face-to-face knowledge exchange mostly restricts the impact area of the Australian knowledge industry and businesses to the Asia-Pacific region. Another challenge Australian cities and hence knowledge community precincts are facing is the standing of the country in the knowledge economy rankings—being behind the investigated competitors of Denmark, The Netherlands, Singapore—and even worst having a development paradigm shift away from knowledge economy prioritisation—i.e., considerations on the abolishment of Smart State strategy of Queensland and further investing on the traditional sectors of Australia such as mining, agriculture, tourism, construction. In the case of ATP, the planning and development process was top-down, nonetheless, a semi-government firm managing this process. The development was originally planned as a knowledge precinct and not including any residential and recreational/cultural facilities, and now moving towards to be converted into a knowledge community precinct, these facilities are tried to be located either on site or nearby. Focusing on the physical precinct boundary, the precinct is a relatively small scale one, however, when the blurring boundaries—much like the Brainport Avenue—with the surrounding Sydney's rich urban amenities considered, the precinct can be considered quite well integrated with the city centre. Parkville knowledge precinct is contrary to other examples is a bottom-up and organic development, and a natural growth of the University of Melbourne's industry collaboration around the campus. Having plans to further expand and become a globally acknowledged knowledge community precinct, the development is now seeking a more comprehensive approach to coordinate/integrate KBUD endeavours. KGUV is a unique case aimed to develop a true knowledge community with a top-down approach. Started very ambitious project, however, later on due to potential political complications/rivalry strong support behind the development is pulled off, leaving the university to manage and promote the development pretty much by itself. Even there was no creative industry in the region, QUT initiated the research education in the sector at the precinct, which is to surprise becoming one of the strongest in Australia. Urban form related strategies of the precinct are prominent and the design quality of the precinct is widely recognised.

Lastly, we are well aware of the limitations of this study and the analysis, and hence, planning to undertake a more in-depth prospective study. Thus, although the findings of this research revealed useful insights for Australian knowledge community precinct development, the study results should be taken into account by considering the limitations—i.e., case selection, data collection/availability, and potential bias of qualitative analysis.

## **5. Conclusion**

In this paper, we explored the literature and current successful practices to shed light on the planning and development processes of the KBUD phenomenon with respect to the construction of knowledge community precincts. Firstly, the literature has underlined the usefulness of strategic asset-based planning approach for the knowledge-based development of such precincts and provided an analysis framework to qualitatively investigate global successful practices and compare and benchmark Australian practices against them. Secondly, in general, the findings of global best practices, Australian practices and the comparison have revealed that despite to their branding and characteristic differences, knowledge community precincts do provide space for knowledge generation and place for knowledge communities. More specifically, such precincts are initiated with the lead of public sector, but received support from either industry or academy or both down the track—i.e., triple-helix model. The investigated knowledge community precincts cases from Australia and overseas are exemplar initiatives with their salient characteristics showing varying degrees of uniqueness—e.g., Orestad being an

international crossroads, Brainport Avenue being the inner circle of a number of local and regional KBUD rings. All cases highlight the importance of central urban locations as home for such precincts in order to benefit from the rich socio-cultural amenities of the city they are placed in. All cases not only demonstrate the importance of economic, social and spatial measures for a KBUD success, but also underscore the role of governance. The major differences between Australian and overseas cases were, first, the size, second, the degree of maturity of the precinct, and lastly whether being an organic growth or engineered KBUD. Finally, even though the investigated European and Asian best practices are more comprehensive and planned in advance of the development in comparison to Australian cases—excluding KGUV—, Australian cases, with room for development, also have the potential to set standards for other cities seeking such development.

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