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**DESIGNING  
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**Informal Settlements and Placemaking:  
The Case of Caracoli *barrio* in Bogotá**

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## **Abstract**

*Placemaking in the developed world can be understood as a concept where through a social and political process, value and meaning in a particular setting is created. This focus of placemaking revolves around a setting in the urban environment, its role as a unique setting and, importantly, the people that make up this place: all of which is focused on a highly structured and formal participatory planning process.*

*The role of placemaking in Latin America's informal settlements, however, is largely untested. With more than 75% of Latin America's population living in cities since 2001 and over 30% (128 million people) of the urban population estimated to reside in what the United Nations define as slums; these informal settlements can offer alternative ways of thinking about urban space and the transformation of spaces people live in. In essence, informal settlements are, to a large extent, what people make of them through their own initiative and imagination. What they achieve is remarkable considering their limited resources and sometimes nonexistent participation in formal planning.*

*Through empirical data collected in 2013 and 2014, this paper discusses how in the absence of a formal participatory planning process (as the west or developed world may perceive it) and lack of resources the *barrio* of Caracoli, in Bogotá has been able to create value and meaning in their place. This has been possible, despite social and economic difficulties –which are not to be forgotten-, through inventiveness and the richness of community members' lives. In this sense, it can be argued that informal settlements can offer a different path to understanding the concept of placemaking currently dominating the developed world.*

## **Keywords**

Placemaking, Informal Settlements, Development Planning, Participation, Bogotá,

## **Introduction**

Much of the literature revolving around placemaking has embedded within it an assumption that people living within urban environments have the right to direct and influence the creation of public spaces. Built into this assumption is the consideration that urban inhabitants may be called to participate, through an official regularity planning framework, in directing urban outcomes. Informal settlements, however, work

off a different set of assumption or 'rules' when creating urban environments and the public spaces within them. In particular, the creation, preservation and management of public spaces in these settlements can be highly contested (Hernandez-Bonilla, 2008; Hernandez-Garcia, 2013a) as the municipal rules governing these spaces do not officially exist. Rather the decision rules (see Fincher and Iveson, 2008) that govern these spaces are not necessarily created to "deliver[ ] services equitably across spaces and to people in places" (p. 37), as desired in the developed world.

The process to create public spaces in the informal settlement can start from a position of 'formality' where a developer (legally or illegally) allocates these spaces or these spaces are created through appropriation by the individuals and/or residents of an area (e.g. a *barrio* – *barrio* in the Spanish language refers to a neighbourhood). Regardless of which 'process' is used to create public spaces in the informal settlement its residents do realise urban settings that have meaning (Janches, 2012) and "words like beauty, enjoyment, fun and tranquillity" (p. 27) are used to describe these settings. In short, these public spaces can be considered to possess the qualities of what the developed world may consider a great place to be. The process leading to these public spaces is, however, different to 'similar' urban spaces in formal areas of the city (Janches and Rohm, 2012) or developed world.

To address the creation and value of the meaning of public spaces in the *barrio* of Caracoli, Bogotá this paper briefly presents placemaking as constructed in the developed world (e.g. Australia) and examines its attributes in Caracoli. This examination also discusses the concept of placemaking (in an applied sense) and the identification of tangible and intangible attributes that help to establish what one may consider as contributing to the process of placemaking in the developed world (i.e. the USA, United Kingdom (UK) and Australia). These attributes lead to the positioning of what constitutes 'great places' in an urban setting and a presentation of measurable attributes that are used in placemaking efforts in the developed world. The bulk of this paper contextualises the *barrio* of Caracoli through a discussion of value and meaning and placemaking in this *barrio*. The paper ends with a discussion and contrasting of the attributes that have come to represent placemaking in the developed world with those attributes found to contribute to placemaking in the informal settlement.

### ***Placemaking in the Developed World'***

Placemaking maybe argued to have been inspired by Whyte's (1980) work where he regarded the community and their engagement with public spaces an important ingredient in renewal and/or redevelopment efforts in New York city. Whyte's work also revealed a process of engagement that has been refined over the years by the USA based Project for Public Spaces (PPS), an organisation that has become a world leader in placemaking (see PPS, 2013). Placemaking itself can be framed as "a process that capitalizes on a local community's assets, inspiration, and potential" (Placemaking Chicago, 2011, p. 5). The process, however, should always be tailor made to suit the respective community being engaged with; where through a dialogue between stake holders matters and/or aspirations come to light and a process organised to create a trajectory to achieve a desired outcome. An intended urban outcome is argued by the PPS to be achieved by employing a range of 'tools' (see PPS, 2014a, 2014b, 2014c) that generate data to help one understand a setting. For example, through the identification of a setting's key attributes, qualities (tangible and intangible) and measureable data (e.g. uses and activities, cleanliness and (crime) statistics, respectively) a 'picture' of an urban environment can be generated. These data can then be used as a benchmark and to guide efforts in achieving the desired community outcome.

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Placemaking in the UK has gone down a slightly different path than in the USA to establish a strong relationship between urban design and sustainability. In this sense, this relationship revolves around re-establishing a connection and recognising the interdependence (Clarke, 2009) of the urban and natural environment. The strength (or weakness) in translating this connection/interdependence into some type of achievable action revolves around the development of priorities that focus (re)development efforts of public spaces. In terms of the urban design element of this triangular relationship the Commission for Architecture and the Built Environment (CABE) (now disbanded) and the Resources for Urban Design Information (RUDI) were instrumental in establishing economic and environmental sustainable themes to support (re)development efforts. RUDI (2010), in particular, developed five themes (e.g. design and delivery, engaging communities and stakeholders) central "to the value of collaboration, environmental sustainability and social enabling (or inclusion) in place making" (Moloney et al., 2012, p. 44). CABE's (2003) earlier contribution to this relationship was its development of a placemaking praxis accessible to decision makers. Other design and sustainability related works in the UK (see BBE, 2006; Cabinet Office Strategy Unit, 2009; RIBA, 2009) also helped contribute to the development of criteria and/or benchmarks (e.g. social and physical) when (re)developing spaces in this country.

As in the UK, placemaking efforts in Australia have also established criteria for "developing sustainable communities [through identifying measurable urban elements like]: liveability, economic prosperity, environmental quality, place making and urban governance" (Moloney et al., 2012, p. 54). These criteria have been packaged under the term/research field Quality of Place (and is related to benchmarking Quality of Life in a setting, see Andrews, 2011) and allows one to describe the achievement (or not) of a desired urban outcome (see Ayatac and Turk, 2009). To guide the realisation of good public space outcomes, at the state level in Australia, charters have been developed to focus placemaking efforts. In the State of Victoria the Urban Design Charter for Victoria (see UDCV, 2011) links people and holds "urban settlements together" (p. 1) by providing dedicated public (and private) spaces for activities to occur. Alternatively, the charter for Queensland Places (see QBUP, 2011) does revolve around people and also focuses on the State's natural environment to "direct place making efforts" (Moloney et al., 2012, p. 55). Placemaking in this sense draws inspiration from where in the State 'work' is being conducted. That is, placemaking inspiration comes from working in or near one of Queensland's natural environments, such as its: ocean, islands, jungle, arid regions. This Queensland example begins to suggest that a place's unique setting helps create a specific identity and meaning that people connect with and can understand. In turn identity and meaning establish a (positive or negative) perception of that place.

Distilling the above discussion placemaking in these three countries may be regarded as "a concept revolving around planning for the future of an urban setting, its people and the role that the unique individual setting contributes to the urban environment" (Beza, 2012, p. 119). Placemaking is also a highly engaged organisational and community based process where through data gathering, visioning, debate and the creation of a trajectory the process can lead to the realisation of positively perceived urban settings and the development of 'great places'. Moloney et al (2012, p. 94) and Beza (2012, p. 121) have produced a table that summarises what constitutes great places, their physical elements, their attributes and the items to measure when using placemaking in the developed world to (re)develop urban settings, see table 1.

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**Table 1: What constitutes great places.**

<b>Great places</b>			
Great places are vibrant, mixed use and attractive neighbourhoods that provide the opportunity for a diverse range of experiences and activities. Great places improve the quality of life of all those who experience and use them and foster the creation of sustainable communities.			
<b>Physical elements</b>			
Good range and mix of homes, services and amenities Well-designed and maintained buildings and spaces Ample, high quality green space and green infrastructure Sensitive treatment of historic buildings and places			
<b>Attributes</b>			
<b>Access and linkages</b>	<b>Uses and activities</b>	<b>Comfort and image</b>	<b>Sociability</b>
Continuity	Fun	Safe	Diverse
Proximity	Active	Clean	Stewardship
Connected	Vital	Green	Co-operative
Readable	Special	Walkable	Neighbourly
Walkable	Real	Sitable	Pride
Convenient	Useful	Spiritual	Friendly
Accessible	Indigenous	Charming	Interactive
	Celebratory	Attractive	Welcoming
	Sustainable	Historic	
<b>Measures</b>			
Traffic data	Local business ownership	Crime statistics	Number of women, children and elderly
Mode splits	Land-use patterns	Sanitation rating	Social networks
Transit usage	Property values	Building conditions	Volunteerism
Pedestrian activity	Rent levels	Environmental data	Evening use
Parking usage patterns	Retail sales		Street life
Adapted from: PC (2011); PPS (2011a, 2011b, 2011c); Cabinet Office Strategy Unit (2009); Reynolds 2008.			

This framing of what constitutes great places and a placemaking process may work well in the developed world, where all of the data for this section of the paper has been gathered. But how might these elements of great places and the process of placemaking work in the realisation of public spaces in the informal settlement? Embedded within the above material is also a regulatory planning framework that requires public participation in the (re)development of public spaces in the USA, UK and Australia (source). In the *barrio* of Caracoli, Bogotá, however, there is no municipal planning or local government where participation and applying any of the great places attributes or placemaking process is required. The following sections discuss how value and meaning (i.e. placemaking) is created in the *barrio* of Caracoli and ends with a discussion that contrasts the attributes that have come to represent placemaking in the developed world.

## Methodology

Material related to placemaking (in the USA, UK and Australia) and informal settlements relating to the development of public spaces was identified and collected. This investigation was conducted by referencing university libraries, interviewing design practitioners and academics and key on-site community members of the *barrio* of Caracoli and conducting on-site field observations. From these investigations a 'picture'

of placemaking in the informal settlement of Caracoli, Bogotá was pieced together. The attributes that are used to benchmark great public spaces in the informal settlement were developed by contrasting the 'uses and activities' and 'comfort and image' attributes to those in the west. The aesthetic model and expert judgement (described by Daniel and Vining (1983) and Taylor, Zube and Sell (1987), respectively) were used to assess the public spaces of Caracoli.

In Caracoli the observation(s) of public spaces and their use by residents of this informal settlement were undertaken at various times in 2013 and 2014. Notes of observations were made on maps of the spaces, a field-diary and with photographs. Various formal and informal interviews with community members of Caracoli were undertaken and are: 1) Six semi-structured interviews undertaken with residents living in various areas of the *barrio* during January 2013; 2) Focus group discussions in October 2013 ( $n=20$  residents); 3) Interviews with the Caracoli Community Action Group; and 4) Informal conversations with residents of Caracoli. In the following sections the creation of public spaces (i.e. placemaking) is presented through a discussion of the development of informal settlements (mainly in Bogotá), creating value and meaning in Caracoli and placemaking in Caracoli.

## **Latin America Urban Context: The *Barrio* of Caracoli** ***The Development of Informal Settlements***

With more than 75% of Latin America's population living in cities since 2001 and over 30% (128 million people) of the urban population estimated to reside in what the United Nations define as slums (UNCHS, 2003, p. 14), these informal settlements (commonly referred to in Colombia as popular settlements and used in the remainder of this paper) can offer alternative ways of thinking about socio-spatial conditions and the creation of public spaces. Popular settlements are, to a large extent, what people make of them through their own initiative, imagination and, in some cases, through confrontation. What they achieve is remarkable considering their limited resources and participation in a development process outside formal urban planning.

Popular settlements are today a permanent feature of Bogotá (e.g. Caracoli). More than 50% of Bogotá is believed to have grown from some kind of informal pattern (urban and/or housing development), and in the late 1990s nearly 25% of the city's area was covered by land that was occupied informally (Rueda-Garcia, 2000). Although it is possible to find centrally city-based settlements with informal characteristics, popular settlements are normally found in peripheral areas of the city. They are normally defined in urban and housing policies, and to some extent in the academic debate, by what they lack: A shortage of economic and urban resources, urban infrastructure and proper housing and social services. But perhaps their main characteristic is that they have largely developed through self-help practices, with little participation by public or private bodies. Where private and public bodies have been a part of the development process, for example, government sponsored development has tried to provide affordable housing through the provision of land and lots while private developers have built the homes. Yet, through unregulated home extensions and alterations these areas come to look like an informal settlement; which itself possesses an aesthetic revolving around the everyday practices that draw from the various cultural backgrounds of the people living in the settlement. This aesthetic comes from what the people are familiar with and their available resources. It is a very different 'look' to the west's (sub)urban environments.



The origin of popular settlements can usually be related to one of the following factors or any combination of them: 'Pirate' urbanisation (illegal developers who sell plots to poor people at low rural prices but with no individual property ownership and access to public services); land invasion and/or individual plot development from a site-and-services public project or a private scheme. A difference between 'official' and 'unofficial' development in these popular settlements is one's possession of land title. In some instances 'title' to one's land (i.e. a plot) may not be desired by the local residents as that brings with it the obligation of paying taxes (e.g. municipal rates).

### **Creating Value & Meaning in Caracoli**

Caracoli is located in the south periphery of Bogotá, in the Ciudad Bolívar locality (Bogotá is divided into 20 localities, as urban management units). Ciudad Bolívar is one of the biggest localities of the city, with more than 700,000 inhabitants (DANE, 2011); which is nearly the 10% of the population of Bogotá. Almost half of the population in this locality is under 19 years of age (DANE, 2011). The vast majority of urban growth in the locality has been by means of informal development. Today a bit more than half of the area has been legalised through municipal appropriation and incorporated into the city. Being incorporated into the city has brought with it the provision of public services and the obligation to pay taxes. The remaining areas of the locality are still being realised through the informal development process or are just starting this process. Ciudad Bolívar's population at first glance is characterised as being marked by different social stigmas. The locality has among the highest rates of poverty and marginalization, exclusion and insecurity of the city (DANE-SDP, 2007). It is an urban area that generally lacks 'formality' (e.g. services) and imbedded within this area are what the west may consider as a lack of rules (see Fincher and Iveson, 2008) that embody one's right to the city. However, and although formal rules in this locality may not exist there are known codes and 'invisible borders' that influence the use of spaces and the conduct of people in this locality. Knowledge of these comes from total emersion in this area of Bogotá (i.e. living and experiencing).

Caracoli grew from pirate urbanisation and private land invasion by individual residents at the beginning of the 1990s, in steep hill sides. At the moment the *barrio* has 1800 plots with around two thirds being occupied in some way. 'Formality' as a settlement came in 2007 through the implementation of services. However, energy, telephone and gas services were available earlier in Caracoli and mains water connected in 2009 (note a community water service operated prior to 2009 with illegal pipes connected to the mains network). Land ownership in the *barrio* (i.e. land title) is an ongoing process, with less than 30% of the plots achieving this so far. The *barrio* is layed out in a grid pattern making mobility difficult in the steeper sections of Caracoli. Spaces within the *barrio* are developed along two main streets running parallel with the topography and public activity focused in nodes of what is referred to as 'Tres esquinas' (i.e. three corners). These tres esquinas work as small and specialised commercial centres offering Caracoli's residents places for social and community interaction.

There are no official population figures for the *barrio* of Caracoli, but Don Agustin (President of the local Community Action Group (Junta de Accion Comunal (JAC)) estimates that about 10,000 people live in the neighbourhood and the 1800 plots of land are of various parcel sizes. Around 2,500 young people attend school there and attendance numbers suggest that boys and girls on average attend nine years of school, out of the mandated 11 in Colombia (DANE-SDP 2007). In Caracoli there is one school within this *barrio*, and two more in nearby neighbourhoods (a walking distance of between 20-30 minutes each way). The school located in Caracoli, goes until 7<sup>th</sup> grade only and is neither a public endeavour nor private. It was developed and

is run by the police department with men and women constables acting as teachers. The land for the school was acquired through the same formal and informal process described above and the education facility was conceived as a way to keep the *barrio*'s kids off the streets. The school was also planned to be used as a mechanism to introduce positive role models (i.e. the teachers) and the constables (i.e. respect for the police) to the kids.

## **Placemaking in Caracoli**

### ***Public Spaces in Informal Settlements***

Public spaces in popular settlements play an important role in physical and social dynamics, and, as in the case of housing, they are largely developed by local people. Public spaces are the most important social places in the *barrio*; they are also places for cultural exchange and building values (Niño and Chaparro, 1997; Viviescas, 1997; Segovia and Oviedo, 2000; Hernandez-Bonilla, 2001). Often, public spaces in the *barrios* begin life in a context of confrontation. For example, in Mexico if they have been allocated by a developer (legally or illegally), these spaces are sometimes invaded "or somehow privately occupied and likely to disappear" (Hernandez-Bonilla, 2008, p. 394). If the origin of the settlement was through land invasion, the original settlers may plan the location of these public spaces but these spaces may also be subject to potential invasion by other settlers or public or private bodies trying to recover the land. "Conflict is an intrinsic characteristic of low income neighbourhoods as a result of disputes over land. Inhabitants struggle to take full control of the spaces, and protect them against external-internal agents who want to privatise a collective property" (Hernandez-Bonilla, 2008, p. 404).

The relationship and exchange between the dwelling place and the public space is another important characteristic in these settlements. Public space is frequently seen as an extension of the home, which is often small and limited in space for social activities. Doors and windows are the connection points between these spaces, and it is not uncommon to find them open, and functioning as transitional elements through which the public space enters into the house and the house extends into the street. This transitional element is not uncommon as Ontiveros and De Freitas (2006), in their research on public spaces in the *barrios* of Venezuela, found a close relationship between interior and exterior spaces, whereby the façade is not a rigid border between the house and street. In this regard, Riaño (1990) and Hernandez-Garcia (2012) argue that public spaces in popular settlements are more concerned with the relationship between the home's interior and the street outside, than the dichotomy between the privateness of the home and the publicness of the public space.

Public spaces may then be argued in the *barrio* to be neither fully private nor fully public, but rather represent places of transition between these two extremes. In terms of access (see Benn and Gauss, 1983), these spaces are usually physically open to anyone in the sense that there are no material barriers such as gates, walls and so on obstructing ones entrance; thus making these places almost-public. 'Almost' is used here because access to these spaces and the activities, information and resources within them are only open to those living or involved with the *barrio*. In this respect, public spaces are more akin to private areas. The creation, transformation and maintenance of these public spaces comes from the local community member rather than private institutions or agencies and nor are they publically (through a municipality) promoted to the wider urban community. Regarding the attraction of these spaces (see Benn and Gauss, 1983), they tend to attract only the interests of the people who live directly around and nearby them (similar to the west's neighbourhood park but without

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the potential visitation by external members of the public). This local attraction scenario also moves these spaces closer to the realm of private interest rather than the consideration of them as public asset (Madanipur 2003). These spaces and the people that use them come to illustrate a larger exchange between the residential unit and public space. Furthermore, and in terms of modes of social encounter and association with space (see Madanipur, 2003), these public spaces of the *barrio* tend to become transitional zones linking the personal and impersonal environment together.

Public spaces in the *barrios* are also often associated with pedestrian scale (Segovia and Oviedo 2000). The main public space in popular settlements is the footpath and the street (Niño and Chaparro, 1997), with footpaths in the *barrios* not always being clearly defined and sometimes non-existent. Stairs are seen as a type of street, owing to the fact that steep topography is a characteristic found in many popular settlements (as in Caracoli). The footpath is not just a thoroughfare, it is the public space closest to the house and much of the activity of the *barrio*. The street and footpath are a playground for children, a meeting and chatting place for most *barrio* dwellers, a place to celebrate with friends and 'compadres' (a very close non-family member or godparent) and in general a place to socialise. The footpath also takes on private/public roles where shops display their goods outside their 'tiendas' (stores) to increase their visibility to potential customers. For example, people buy beers in tiendas and enjoy them on the footpath as they talk with one another.

The most significant and large public space in the settlement is the '*parque del barrio*' (*barrio* park), also called '*la cancha*' (the sports field), which is similar to the plaza or main square of colonial cities and wherever possible located in a central area of the *barrio*. The *parque del barrio* (see figure 1) accommodates 'traditional' public square activities such as strolling, meeting people, resting as well as, for example, activities like playing football/soccer. These types of parks are more in line with sports pitches and/or playgrounds, including some children's facilities, rather than resembling green/paved areas or resting places. Active recreation activities characterise these areas and distinguish them from other public spaces of the city (Riaño, 1990; Beardsley and Werthmann, 2008). Some of these spaces are also important to the community institutions; which are located normally on their periphery. These public spaces become centres for the community and can be surrounded by the community room, the church, the school and the health facility/service (Niño and Chaparro, 1997). This park is also the place where material objects are located to provide meaning for the community. Some examples of these are easily identifiable such as large statues or know to only certain member of the community such as a painted rock where young people meet.



Figure 1: *Parque del barrio*

### ***Public Space in Caracoli***

Public spaces in the *barrio* of Caracoli are the streets and park (i.e. *parque del barrio*) located in the centre of the settlement (see figure 2). Streets here normally have no footpaths, but this does not prevent the private/public exchange from occurring. The streets that run perpendicular to the topography in the upper part of the *barrio* can not accommodate automobile traffic, instead they are used as stairs. The park itself is half a block in length, while in the other half, the school and the community room are placed. The park is divided in two because of the slope, on one side the 'cancha' is located, and in the other side the incline slope remains, allowing for connecting paths to go through this area and a few children's fixed in place games areas (e.g. climbing structure) to be located here.



Figure 2: Layout of Caracoli, Bogotá with *parque del barrio* at its centre

The current public space is the result of what the 'pirate' developer and the first squatters decided on for the *barrio's* layout, which now also includes spaces for a range of one to four story buildings. The urban morphology follows a rectangular grid,

which is the common feature for most areas in Bogotá. However, in this case and as in many other informal areas of Bogotá, the grid overrides the logic of the topography. This type of planning may be explained as an urban colonial legacy (Hernandez and Kellett 2010) and used with or without conscious awareness of its origins and implications. Gridded urban layouts are now the most common plan for Colombian urban areas, making some streets very steep and the houses around them must accommodate the high slopes during construction and eventually the use of the houses. It is also interesting to see the position and the size left for the park and the community areas. It is not common for an (informal) developer to provide a central area like this, instead of making more plots to sell. At the beginning of the development of Caracoli (22 years ago), the first squatters (possibly with someone's advice) decided to leave a 'free' area in the centre of the *barrio* for the '*parque del barrio*' and for some community facilities. In the first few years of the *barrio*'s development nothing happened with this park area. However, dissimilar to other settlement scenarios there was no conflict with the original land owner (i.e. the municipality, Caja de Vivienda Popular). Some literature also suggests (e.g. Gilbert, Hardoy *et al.* 1982; Gilbert and Ward 1985) the government permitted land invasion to occur and pirate developments to solve people's need of shelter.

A few years later and with the lead of the JAC, the community managed to acquire resources and some interest from the municipality to build the sport field. The next improvement to the park came years later with the construction of the 'salon communal' (community facility building), again as an initiative and management endeavour of the JAC. The fixed in place games area located in the upper part of the park was realized next. And according to Don Agustin, JAC applied to and was awarded by the local municipal development fund (i.e. Fondo de Desarrollo Local) to refurbish the entire park, the games area, the sports-field and develop the upper land adjacent to the park. Maintenance and improvement of these facilities has been achieved with the lead of JAC and (sometimes) the local community, universities and politicians (during election time) (Auyero, 1999; Hataya 2007).

In summary, the public space of Caracoli gradually developed (as is the scenario of housing development in the *barrio*). The urban space is upgraded progressively according to expectations and possibilities of Caracoli's residents. There is no fixed plan, the planning process is to a large extent in the hands of the people, is very much an everyday activity and relative to the available funds and other circumstances that may effected change in the community (e.g. municipal plans) (Hernandez-Garcia, 2013b). However, it can be argued that although the *barrio*'s development is an ongoing process, there is a process and dream to pursue; which is the development of a great public spaces for Caracoli's residents.

## Discussion/Conclusion

The placemaking process in Caracoli started with engagement between the 'pirate' developer and first squatters of the area with the layout of the *barrio*. The process was allowed to occur by the governing municipality and land owner of this popular settlement. Decision rules that lead to this development were decided upon by the developer and squatters realising an urban setting outside of formal planning. Together these groups established a vision for the settlement that revolved around a grid layout and at its core included a central public space (i.e. *parque del barrio*) and smaller intimate spaces (e.g. streets) for the *barrio*'s residents.

The *parque del barrio* works at a number of levels in Caracoli. The park acts as the plaza or main square to provide a space for dynamic activities (e.g. football/soccer) and as a location for community services (e.g. medical facilities, the church) to be centralised. With the realisation of the *parque del barrio* meaning and value for the community is established – it acts as a central focal point for Caracoli's residents. At the smaller public space scale of the *barrio* the unpaved street provides the setting for intimate 'personal' activities to occur. The street itself becomes an extension of the home allowing a private/public exchange to occur. In this sense the public space, outside one's door, links the personal setting (the interior space of one's home) and impersonal environment (the street) together. A transition zone or blurring of boundaries occurs between the two spaces. These blurred edges may contribute a reason why the public spaces are contested (i.e. guarded) by the *barrio's* community members, they are extensions of one's personal space.

Both of these public spaces are the most important social settings of the *barrio* and possess many of the same qualities of great places presented in table 1. These public spaces, however, are only accessible to those *barrio* residents living adjacent to them and not the general public. The community that does use these spaces regards them as an asset and aspires to continuously improve and manage them.

Differences between a placemaking process in the west and that in the *barrio* of Caracoli revolves around aesthetic issues and ways to 'formally' measure the success (or otherwise) of these urban settings. Measuring the success of the *barrio's* public spaces is challenging because there are very limited statistical data sets to draw from when making decisions about these spaces. This lack of data, however, may be more of a concern in the west or with formal decision making bodies (i.e. the local municipality) rather than a concern of the *barrio's* residents. Furthermore, the attributes found in table 1 are used in the west help to support (or not) perceptions of urban spaces. But what has been highlighted in this paper is that Caracoli's residents work off and draw inspiration from a different set of rules in their creation of 'great spaces'. The resident's positive perception of spaces, like that of the *parque del barrio*, result from daily self-help practices, incremental development and one's available resources that work together to produce a particular aesthetic that is different to a look of public spaces in the west.

This notion that difference in an aesthetic exists between public spaces in the west and Caracoli suggests that an alternative set of attributes (see table 1) contribute to the make-up of a great place in this *barrio*. The value and meaning of these public spaces may also be more significant to the residents of Caracoli, than what has been touched on in this paper. The reason this may be so is because there is no obligation for the community of this *barrio* to be consulted in the creation and/or management of these spaces. Value and meaning of the *barrio's* public spaces comes from the continuous work of the residents and the inspiration derived from this local setting. When these two basic ingredients to placemaking are looked at together they support a process that has led to the creation of positive perceptions of the public spaces in the *barrio* of Caracoli, Bogotá.

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<sup>1</sup>The Placemaking in the Developed World section of this paper has been derived from Dr. Beau Beza original contribution to the 2012 Places Victoria/RMIT University applied research initiative. The 2012 document containing this material is not publically available but the intent and spirit of the initiative was to make the data/information produced in the project available to the wider community. The original document is

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titled *Placemaking Applied Research Report 1. Placemaking in urban renewal: Reflections and recommendations on workshop and interviews with three Places Victoria projects*, authored by Susie Moloney, Beau Beza, John Fien, Colin Fudge, Prem Chhetri, Amy Brown and David Trainham.

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**Shaping informality. The role of street-based strategies in revitalizing informal and low-income areas.**

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*Urbanization is a transformative process and as a consequence of cities growth and development, informal settlements and low-income areas arise. This urbanization outcome is mainly taking place in the developing world, where the informal city is a growing phenomenon and is becoming the norm.*

*Recent approaches to the regeneration of informal settlements are evolving into strategies characterized by improving their existing conditions, minimizing relocations of their inhabitants. This on-site approach, together with street-based upgrading, constitutes an effective eviction alternative that facilitates regeneration.*

*This paper argues that street-based upgrading plays an essential role in the regeneration process of low-income and informal areas, since it preserves the social organization network of communities, secures land tenure rights and promotes productivity and economic activity.*

**Keywords:** Urban regeneration, Informal settlements, Street-based upgrading, On-site upgrading, Urban design, Placemaking,

Informal settlements in inner cities are a growing phenomenon in the developing world. According to the estimates of the United Nations, the 32 per cent of the world's population, nearly one billion people, now live in informal conditions, and with no action the number will reach 50 per cent by 2030 (UN-Habitat, 2003).

Particularly in low-income areas and in informal settlements, the overcrowding and high density, together with the small size of housing units and the lack of public spaces, increases the peoples stress and tension. If public space is absent, inadequate or privatized, the city becomes segregated and ghetified (Project for Public Spaces, 2012). For these reasons, the street, the public space of the informal areas, becomes of great importance for people's quality of life. They provide identity and liveable places for the community, offer the opportunity for social, cultural and economic interaction in the daily life of people, and play a fundamental role in the urban structure and the civic pattern of cities.

The provision and investment in streets and public spaces has to be seen as an essential resilient strategy for the urban regeneration of low-income and informal areas. If neighbors have a positive image of the public spaces they use daily, a sense of pride would arise, which is crucial for the community development (Fiori & Brandao, 2007).

**Connecting the divided city. Street-based urbanism in Medellín.**

One of the most important actions to regenerate and to improve the quality of life of low-income and informal neighborhoods is to connect them to the rest of the city by using the streets. With the creation of continuities, sequences and linkages between spaces, it is possible to promote social inclusion, forge identity and reduce the gap between the formal and the informal city. Thus, enhancing urban connectivity implies the continuity of the urban structure, discouraging the perpetuation of the fragmentation of the city and the characteristic lack of urbanity of informal areas.

This is one of the strategies used in Medellín to improve the informal conditions of several of its neighborhoods. In 1993, a new approach for improving informal areas started in response to the failure of policies to eradicate urban informality as the only possible alternative. With the objectives of integrating informal settlements in the "formal" urban fabric, relocate houses, regularize and legalize land tenureship, and for setting up mechanisms for planning, management and participation, the government and local agencies implemented a series of plans and programs<sup>1</sup>.

In 2004, the Urban Development Enterprise (EDU), a public agency created in 1993, began a series of strategic urban projects identified in the Development Plan to improve the neighborhoods with higher rates of poverty and informality and less sense of belonging. The Comprehensive Urban Projects (PUI) (fig 1) or the Library Parks Strategic Project, were created to perform several urban and social inclusion actions, based on a model of urban growth committed to the improvement, consolidation, regeneration, regularization, relocation and upgrading of informal settlements.

Two of the major urban strategies on which is supported the urban regeneration process of Medellín, are mobility and public space.

The first urban strategy seeks to facilitate connectivity. The purpose is to connect and integrate the traditionally marginalized areas, located on the city's steep hillsides, through alternative transport systems linked to the Metro, the main form of public transport in the city. In this case, the proposal of a cable car system, the Metrocable (fig 2), provides to the settlements a fast connection with the rest of the city.

The second urban strategy is committed to the priority of the street and public space, as well as to its generation, consolidation, improvement and social appropriation. In addition, this strategy articulates public spaces with facilities, heritage and mobility systems, where pedestrians and public transport have right of way<sup>2</sup>. This strategy,

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1 Comprehensive Plan for the Improvement of Informal Neighborhoods (PRIMED), Territorial Urban Plan (POT), Development Plans.

2 Alcaldía de Medellín. Acuerdo 46 de 2006. Plan de Ordenamiento Territorial (POT) Artículo 2. Lineamiento 3.

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implemented mainly through the PUI, considers the public space as the essence of the city, and as the main cohesive and regenerator element of the neighborhoods.

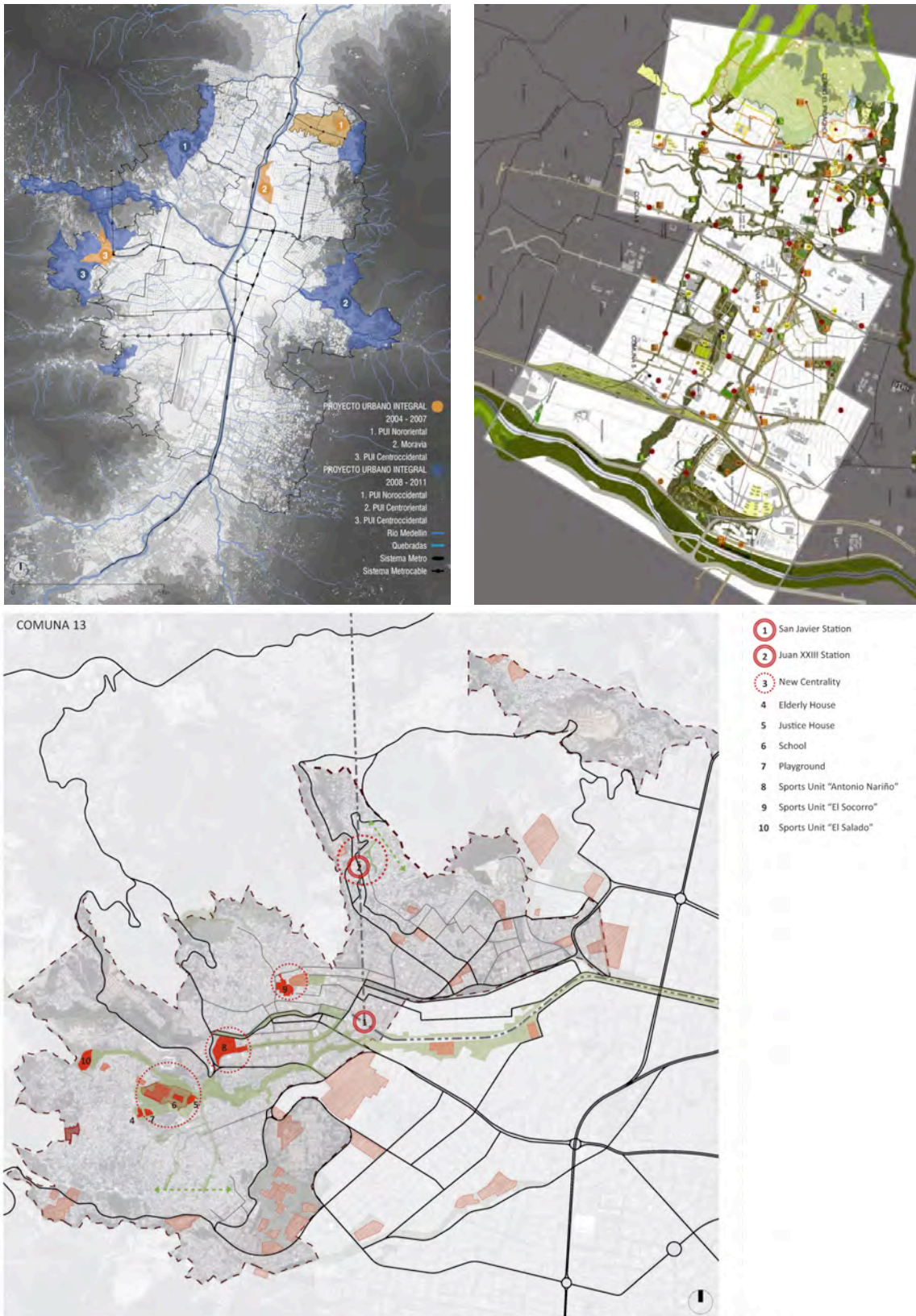


Figure 1. Comprehensive Urban Projects (PUI) 2004-2011 and Northwest PUI. (EDU - urbam EAFIT and Author)

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Figure 2. Metrocable and centrality of La Candelaria. (EDU - urbam EAFIT)

In this sense, when constructing the Metrocable, the city not only invested in the improvement of the accessibility and mobility, but also took advantage of the construction of the stations and the piles to support the cable car to provide the hillside neighborhoods with new public spaces and centralities at their bases as lively and vibrant neighborhood places. The connection between these centralities and the rest of the neighborhood through linear parks, squares, promenades, streets, or pedestrian skywalks (fig 3), created a complex structural network and a civic pattern for the neighbors.

In addition to this street-based network, the Library Parks Strategic Project (fig 4) located five iconic buildings in five strategic positions inside the disadvantaged neighborhoods. Placed together with quality public spaces and with other cultural, recreational and educational buildings, these architectonic devices achieved to trigger processes of transformation and regeneration of the neighborhoods from the inside.

Under this conception of street-based urbanism and architecture as catalysts of physical and social transformations, a total of 4 PUI have been developed since 2004, with an impact on 98 districts and on 40% of the population of Medellín. Taking the pilot project of Juan Bobo in the Northeast PUI as an indicator for the socioeconomic evaluation of the programs and projects, we note that, after its implementation, public space has increased by 1200% per person, and the building footprint has decreased by 15%, being reduced to a total of 55% of the whole area. This increase in public space, carried out residential improvements such as the decrease of the housing density, the relocation of dwellings located in risk areas, the increase by 31% of the average housing living area, or the improvement and legalization of 100% of households. In addition, the implementation of the Metrocable helped to improve the socioeconomic status of the neighborhood residents, integrating them to other districts, and reducing travel time and costs. As a result of reduced spending on travel, families have had an average saving of 4% on the average income, which has represented an improvement

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for almost 95% of the users in the neighborhood (EDU, 2013). Referring to the entire area of the Northeast PUI, a total of 18 parks, 2.8 Km of pedestrian promenades and 4 pedestrian bridges were created, which means more than 125,000 sqm of public space. As a consequence of these improvements on the public space, trade increased by 300%, and 10 corporate events were made, which generated sales of US\$ 80,000. Furthermore, it should be noted that, for the execution of these projects, 92% of the hired workforce were neighbors, which stimulated the local economy and reduced unemployment.

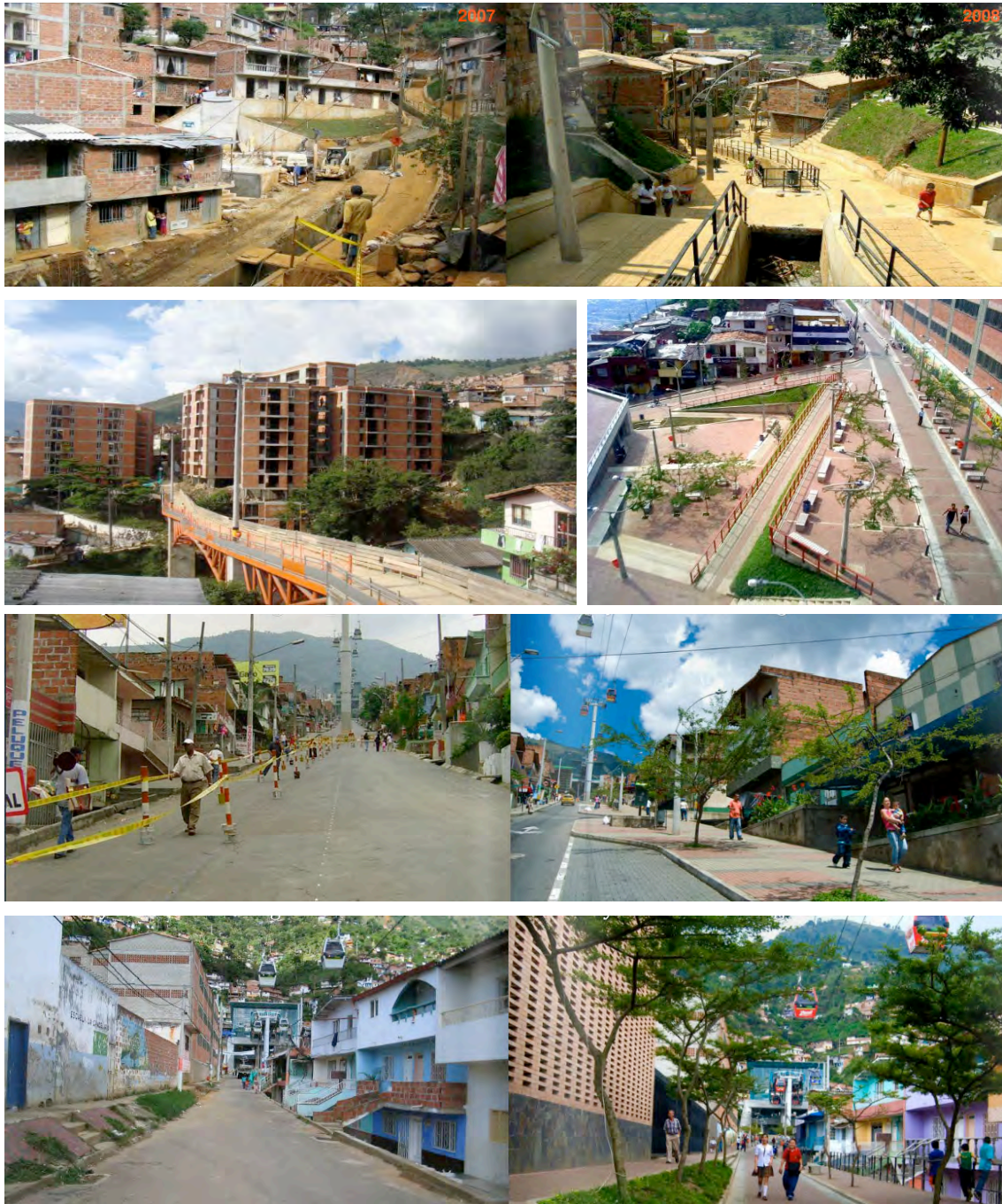


Figure 3. Civic pattern of linear parks, squares, promenades, streets and pedestrian skywalks. Before and after. (EDU - urban EAFIT)



Figure 4. Library Parks Strategic Project. Library La Ladera and Library Spain before and after. (EDU - urban EAFIT)

### **'Monumentalizing the periphery'. Regeneration of the informal areas of Barcelona.**

One of the references used by Medellín to set its intervention strategies was the experience of Barcelona in the regeneration of informal and low-income areas. During the 50s and 60s, neighborhoods arising from migration set up a 'self-built informal urbanism' without a clear relationship between public and private space. Although a great number of these neighborhoods were demolished in the late 60s and 70s, and their residents were relocated in housing estates, many other neighborhoods continued developing, especially those located on slopes and away from the city center (fig 5).

It is in the 80s when Oriol Bohigas, director of the Urban Planning Department of the city of Barcelona, initiates the "monumentalization of the periphery" (O. Bohigas, 1985) as an urban strategy to regenerate these marginalized housing areas of the city (fig 6).

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Figure 5. Informal areas and precarious infrastructure in the sloppy informal settlements. El Carmel and Somorrostro, today Barcelona's Olympic Village (Ajuntament de Barcelona).

Housing estates relocation sites. La Guineuta and Montbau. (Ajuntament de Barcelona / Manuel Guàrdia)



Figure 6. 'Monumentalizing the periphery'. The paradigmatic case of Via Julia. (Bernardo de Sola)

This policy, which extends during the 90s, over the pre and post-Olympic periods, is based on a deep analysis and assessment of the characteristics of urban informal settlements. The challenges of this strategic commitment lies in the effort to keep the



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existing housing as far as possible, and in connecting the marginal sectors with the rest of the city. But, above all, the main challenge lies in the use of streets and public spaces as essential elements of the vitality of the informal city that, together with the provision of facilities, must be the catalyst to regenerate the neighborhoods.

However, the most innovative aspect is the introduction of art works (fig 7) as a new concept for the urban regeneration of neighborhoods, linking them to public spaces as a strategy to strengthen the sense of identity and belonging to the place. Although in most of the cases the art sculptures were not created for the specific context in which they were located, they constituted a formal element in the transformation of public space itself, and acted as a reference point for the regeneration of the neighborhood.

In conclusion, a successfully tested strategy and methodology, that has been also applied in Medellín (Echeverri & Orsini, 2010) looking for a similar urban effect, but in this case using the iconic role of architecture.



Figure 7. Art as an urban regeneration strategy. (Raymond Elstad, Naggy Judit, Enric Vision)

### **A change of scale and complexity. The Asian experience.**

Based on prior knowledge of these experiences, the projects for the neighborhoods of Karet Tengsin in Jakarta, and Baseco in Manila, also rely on street-based strategies for their future regeneration incorporating, however, some innovative aspects.

Karet Tengsin is a high-dense mid-city kampung located in the 'Golden Triangle' of the CBD of Jakarta (fig 8). This strategic position together with the pressure of commercial developments around it has caused the shrinkage of the village to its current size, isolating it from the rest of the district (fig 9). However, despite this enormous pressure, and due to the high land value, the area has not been completely gentrified, and is still largely occupied by low-income households with different cultures, ethnic origins and social strata, with a high attachment to the place.

One significant factor is that most of the land in Karet Tengsin is owned by the people living there, which hold different types of tenure. Most of the people are unwilling to move out arguing that the existing site location is very strategic, accessible and close to the places they usually frequent to go to (work place, children school, relative's

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house, daily needs...), so that they do not need to spend more on transportation cost and time in order to reach such places (Asdra Rudwiarti, 1999). It can be stated that, in this case, informality is not due to property issues, but to the lack of urbanization, utilities and facilities, as a result of the disconnection from the city.



Figure 8. Karet Tengsin (H. Octavianus)



Figure 9. Shrinking of Karet Tengsin 1979-2013 (H. Octavianus)

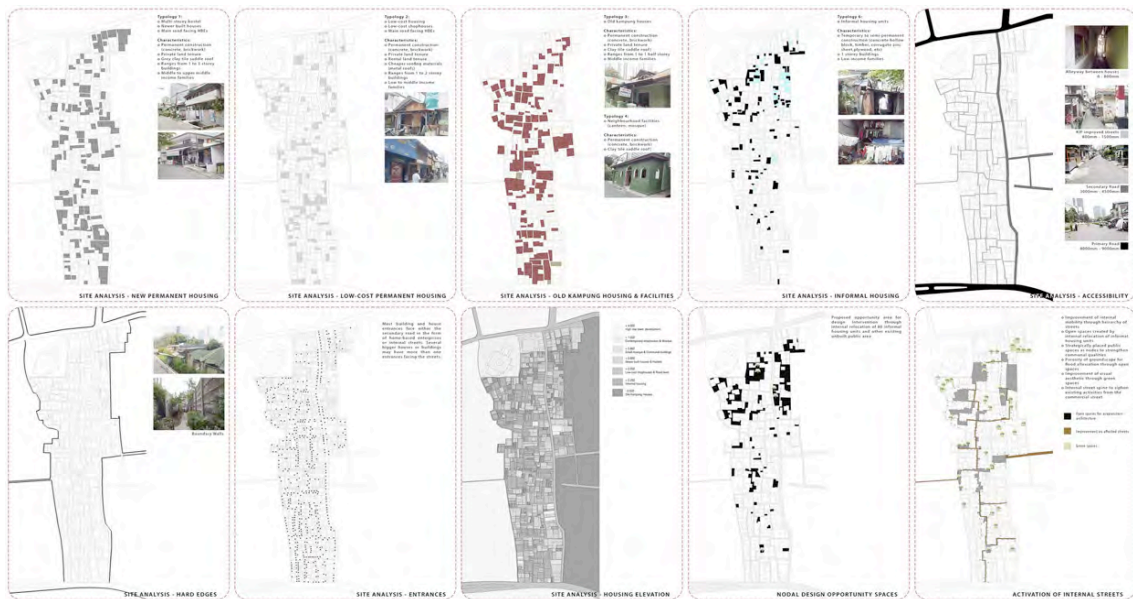


Figure 10. Site analysis: New housing, low-cost housing, old kampung housing, Informal housing, Accessibility, Hard edges, Entrances, Elevation of housing, Opportunity spaces, Activation of internal streets (H. Octavianus)

The proposal aims to promote the urban village as an asset to the district by means of economic symbiosis (Octavanus, 2014). Through detailed analysis of the neighborhood (fig 10), the project detects potential continuities within the district and towards its surroundings, as well as opportunity places arising from the relocation of houses in worse conditions. By proposing the continuity of a pedestrian street connecting the existing Dukuh Atas bus station and the Kali Krukut River, the project enhances the city scale connectivity and recovers the old east-west relationship the neighborhood once had (fig 11).

At the neighborhood scale, the project creates openness and porosity through a network of small streets and alleyways connected to the main commercial artery of the neighborhood, Karet Pasar Baru Street (fig 12). This street network, punctuated by strategic nodes, creates an activity and economic pattern inside the neighborhood, complementing the commercial activities of Karet Pasar Baru St and of the CBD.

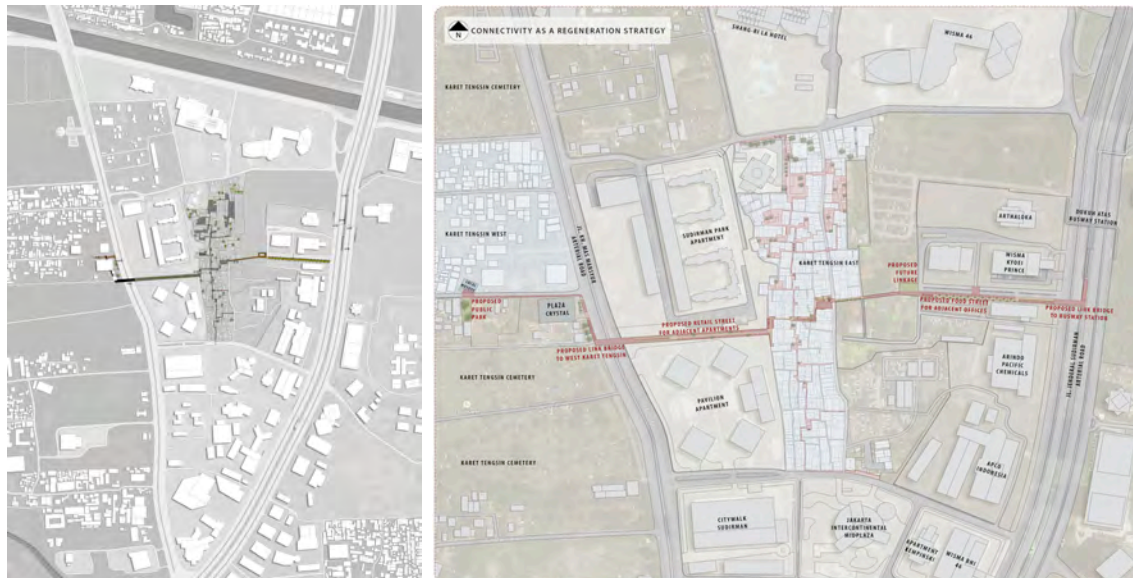


Figure 11. Connecting Karet Tengsin with the city (H. Octavanus)

Located in the opportunity spaces detected in the analysis, and taking advantage of the existing structures, the local nodes constitute the catalysts and main driving forces of the internal neighborhood regeneration process. Formed by pocket public spaces and small-scale architectural devices to support local industries and activities, the nodes positively regenerate and reorganize the urban structure of Karet Tengsin, creating identity places for social interaction and daily activities. Two primary and twelve secondary nodes are identified for implementing the different public spaces and devices. Rather than determining specific solutions, through a catalogue of urban solutions for functions, tectonics or space, the project suggests a flexible tool system using local construction techniques (fig 13).

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Figure 12. Openness and porosity. A network of small streets and alleyways connecting nodes, public spaces and productive devices. (H. Octavus)

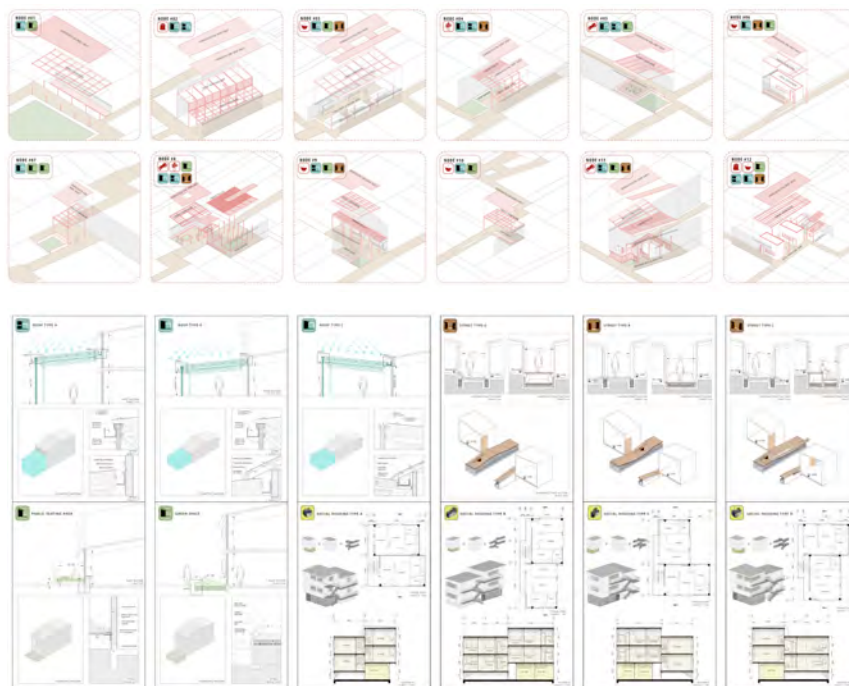


Figure 13. Street-based catalogue of solutions (H. Octavus)

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In the case of Baseco in Manila (fig 14), the strategy consists in transforming the streets into arteries of the community's social interaction and daily activities, as well as into an infrastructural strategy for water (Ee Xinmei, 2014).

Barangay 649, Baseco<sup>3</sup>, is the formal name of the district located at the mouth of the Pasig River. In 1990 Baseco became the government's official relocation site for evicted slum-dwellers from different parts of the city, leading to an accelerated growth of the area. The space between the two breakwaters was reclaimed with land filling materials and garbage to create enough room to house all the families, becoming the largest informal community in Manila with more than 6.000 families, 70.000 inhabitants and 13.000 housing units stacked in 52-hectares (fig 15). In 2002, the area was proclaimed as a socialized housing site by the President, and the land was awarded to its inhabitants. However, today, none of its inhabitants has received any property title. Other than some public structures provided by the government, the Baseco compound has been left relatively forgotten and cut off from the city of Manila.



Figure 14. Baseco site (MLA-NUS, Google maps)

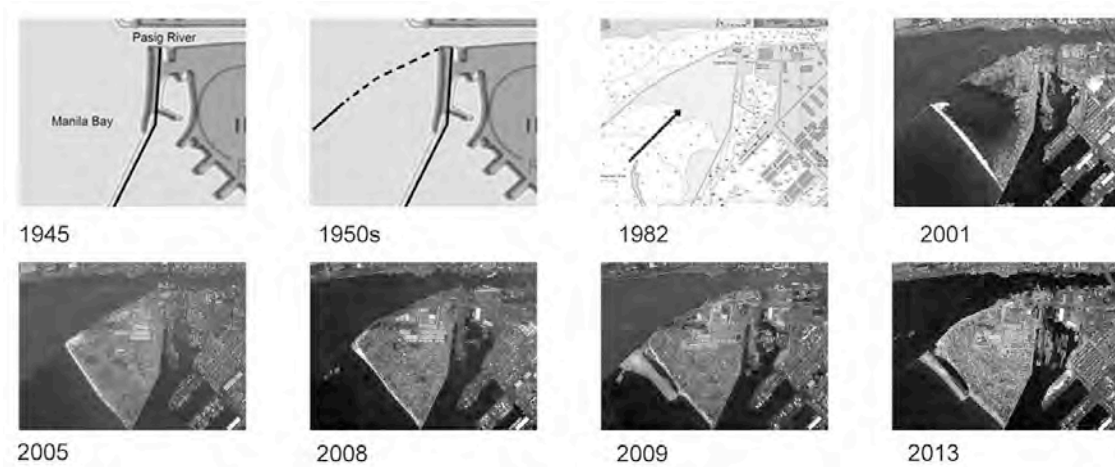


Figure 15. Land reclamation with filling materials and garbage (MLA-NUS)

<sup>3</sup> The area is named after the owner, the company Batann Shipping and Engineering Company (BASECO). Before its abandonment it was used as a ship loading and unloading site.

In contrast to the current role of the streets in Baseco as simply the remnant empty space for people and vehicles (fig 16), the proposal understands the potential of streets to become spaces for social interaction and daily activities, as well as community-managed infrastructures that can help to relieve the pressures of flooding.



Figure 16. Existing street pattern and infrastructural spines (A. Ee Xinmei)

Due to the high density at which the settlement is currently built-up to, and with the aim of minimizing the relocation of families, the proposal utilizes the existing streets as the available space for a series of infrastructural spines that will create room for the excess water during rainstorms (fig 16). Through this street-based approach, the proposal identifies five streets that will act as flood channels to drain the rainwater off into the sea. At the same time, these streets will be a sequence of interconnected public spaces and activity nodes along them to positively transform and improve the quality of the neighborhood. By selecting one of the five proposed flood channels as a representative site, the project further explores the potential of implanting a catalogue of solutions for the street cross-section depending on the urban context, suggesting different possibilities for gathering, productive, environmental and water spaces (fig 17).

By extending the existing streets, the proposal offers the potential to connect and extend the infrastructure, the public spaces, and the economic activities towards the coastline.

With these street-based interventions, it is expected that the five streets will have an impact in the urban regeneration of the neighborhood, as they will constitute urban structure elements and connection for the neighborhood and the city; they will generate productive spaces for the local economy; they will be enhanced as a collective spaces for social gathering and to strengthen the sense of community and security among neighbors; and lastly, they will play the role of green-infrastructure for the environmental improvement of the neighborhood.

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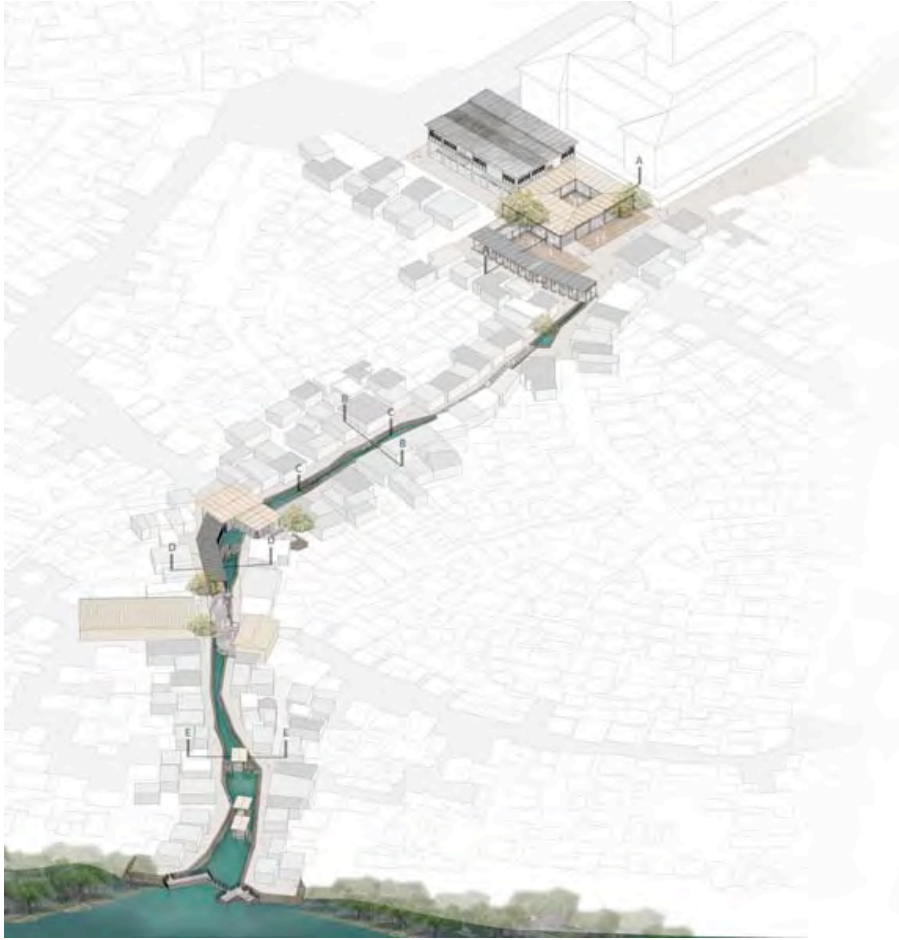


Figure 17. Public space and Green-infrastructure. Productive nodes and street-based catalog solutions along a spine (A. Ee Xinmei)

**From plan, to projects. Large urban projects and small-scale tactical urbanism.**

Even though all the cases explained show how the street-based upgrading strategy work as a catalyst for the revitalization and transformation of low-income and informal areas, generating productive spaces for economy and creating sense of community, we can observe a slight change in the trend of the projects.

Thus, while in the first two cases we observe that from comprehensive policies, programs and plans, derive large urban interventions of infrastructure, facilities and public space, in Manila and Jakarta is noticeable a change of scale. These two proposals focus more on the scale of the neighborhood, exploring potential methodologies and innovative strategies for regenerating these informal areas through small-scale interventions, and taking advantage of the existing reality and detecting latent opportunities in the neighborhood. This change of scale, closer to tactical urbanism projects with specific actions and small projects, shows a transition from the plan to the project, allowing for a more bottom-up approach and not depending so much on the development of projects coming from bigger plans.

However, this approach has the risk of resulting in a host of small actions disconnected from each other without a global overview. It should be added that most of these small interventions also depend on political decisions and, without a regulatory framework or a powerful neighborhood initiative, can become very difficult to implement.

Finally, it is important to note how the proposals for Manila and Jakarta incorporate contemporary concerns regarding environmental aspects. In these cases, the reflection on the street as a public space as well as a green-infrastructure, provides an added value to the street-based strategies, transforming the streets into public spaces and infrastructural devices capable to solve environmental issues while public life and productivity are also enhanced.



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**Living Small?  
An Architectural Exploration of Occupant Behaviours and Community  
Preferences to Medium Density Compact Housing Precincts in Canberra**

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**ABSTRACT**

*This paper presents an architectural method which seeks to improve the user-centred design of medium density compact housing (medium density). The research explores occupant (user) satisfaction of in-progress and completed Canberra housing projects, including those designed by the author. Canberra, Australia's national capital presents a microcosm of the challenges faced by cities, and like many, Canberra is now shifting its attention to various forms of medium density in order to contain the outward expansion of city boundaries. As a housing typology, however, medium density in large sectors of Australia's cities remains persistently contentious. In particular, a gap exists between findings on occupant satisfaction, environmental performance and the design outcomes of medium density (Hurlimann, 2010, Vischer, 2008, Sarkissian, 2004, Marcus et al 1986). Discussed are early-indicator user satisfaction findings of a Canberra housing precinct built in the 1970s. Among the techniques are semi-structured interviews, photographic tours and spatial mapping with household occupants. Later stages of this research emphasize the use of design to analyse and synthesize the data. Such an approach has the potential to offer the practicing architect beneficial user-centred design techniques and in-turn improved compact house design.*

**Keywords:** compact house size, user-centred design, sustainability

**INTRODUCTION**

In 2010, Canberra had the largest houses in Australia (per capita average), with household occupant numbers declining (ABS, 2010). Reasons for growing house size are complex, and current planning and building design practices, along with "green" technologies, are not substantially reversing consumption and emission trends (Horne et al., 2009). Compact houses represent one measurable aspect of sustainable architecture, with substantial empirical research on associated resource, energy and land use reductions (Pullen et al., 2009, Metzler, 2005, Williams, 2005, Horne et al., 2009, ASBEC, 2010). A gap however appears to exist between medium density compact house design, user satisfaction, and market demand. A wide body of research has identified occupant and community concerns with medium density and while there are many documented social and design advantages, researchers also describe recurring design deficiencies in developments (Howley, 2009 et

al).<sup>i</sup> These are among the complexities facing an urbanising Canberra.

The recent census reported substantial growth in the Canberra medium density compact housing market (ABS, 2011). At a century old in 2013, Canberra is in the early stages of urbanising with various forms of attached compact housing increasing in number (SOAC, 2013). The demolition of single lot detached “suburban” houses, to make way for increased medium density compact housing development, risks a deepening of community resistance to this housing form (Sarkissian, 2004). De Botton talks of a fear, not of development, but of what is being developed. *“It has been prone to disappoint rather than inspire”* (De Botton, 2008). An improved understanding of design fit is essential to avoid further community expressions of “loss” (Elton Consulting, 2011, Sarkissian, 2004).

In what is a mature medium density housing market in Australia, a belief that all the lessons have been learnt is a risk (Sarkissian, 2004). While the subjectivity of design and use is acknowledged, it is difficult to *“...comprehend the reasons why contemporary systems of delivering the built environment appear to have lost touch with the user experience”* (Vischer, 2008, Barrett, 2007). In medium density housing, a failure by architects and building designers to incorporate and implement existing user satisfaction research, a lack of access to the end user and an over-reliance on design experience or opinion to speculate on user needs, has seen recurring systemic design errors occur (Marcus et al, 1986, Sarkissian, 2004). Examples raised include noise, loss of visual privacy, poor positioning of front doors, lack of space for children to play, insufficient storage and publicly visible washing lines (Howley, 2009 et al).<sup>ii</sup> In describing a gap between compact housing liveability research and design practice, Marcus argues that *“the problem is not that designers are lacking for creative ideas, but [there is a need to seek] out appropriate people-based research.”* To take this a step further, *“research based recommendation cannot substitute for public participation”* (Marcus, 2014).

A greater understanding of user needs and preferences can be ascertained and fed in to any stage of the design process and improved design fit potentially derived. The research seeks to inform the architectural design of medium density through a greater understanding of resident living preferences and experiences across several case studies. Observation, interview, spatial mapping, photo diary and survey techniques are used to understand how people live in compact houses. Architectural design response and reflection in-turn, form part of the research.

Compact house design absolutes are not sought; instead sought is improved user-centred

design techniques, with a case study approach taken. Indeed “home” is a highly personal idea and compact house liveability is a relative and subjective concept. The research focuses on low-rise, medium density (15-40 dwellings per hectare (dw/ha)), semi-detached compact houses (average 80 - 120sqm in size) in cluster precinct formations. This spectrum has relevance to both the literature and to the authors own work.

### **MEDIUM DENSITY COMPACT HOUSES IN CANBERRA AFTER 1960**

Sarkissian argues that the influence of a body of literature on residential environmental psychology and behaviour studies has shrunk in recent decades and extends a challenge to design professionals to remedy this by recovering their understanding of this research and its application (Sarkissian, 2013). For the architect seeking to become more user-centred, exploration of the theory, planning and implementation of Canberra medium density housing over this period provides design context and insight, as well as a case study setting for some of the fieldwork.

Recognising the need to curtail suburban sprawl and minimise wasteful use of land resources, the National Capital Development Commission (NCDC) pursued medium-density housing from the 1960s through to the early 1980s, experimenting with alternate suburban forms in Canberra (Freestone, 2010).<sup>iii</sup> It was a time of policy, research, design and development support for medium density housing, with many advocates acknowledging benefits (McKay, 1971, Judd et al, 1993, Marcus et al, 1986).<sup>iv</sup> Projects involved notable Australian architects of that era, and followed a pattern of smaller house experimentation elsewhere in Australia which included the Royal Australian Institute of Architects recurring Small Home Service (OCallaghan and Pickett, 2012).

Working with site features and contours, communal landscape space was prioritised. Precinct cohesiveness, household privacy and individual expression of typically semi-detached terrace and courtyard houses, were among the design considerations. Densities ranged between 15-40 dw/ha compared with their suburban equivalents at around 5 dw/ha.<sup>v</sup> Projects incorporated elements of cohousing theory and *Social Contact Design*:

- parking is frequently limited to the precinct perimeter
- communal facilities are located off central paths and landscape commons
- the layout supports passive surveillance of communal areas from private dwellings
- dwellings are smaller than average (Metzler, 2005, Williams, 2005).

Housing precincts demonstrating suburban alternatives can play a role in shaping societal expectations - in seeking social license (Hal, 2000). Notable demonstration projects included Swinger Hill by Ian McKay Architects, Fisher Housing by Cameron Chisholm Nichol, and

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Jerilderie Court Housing, Reid by Cox Architects. The Campbell and Garran Housing Groups are further examples of medium density cluster housing designed for the Australian National University by Harry Seidler and Associates (ACT Heritage, 2011). Wybalena Grove and Urambi Village Housing Cooperative were both designed by Michael Dysart, the latter for a group of public servants within Whitlam's Department of Urban and Regional Development (DURD). The DURD group sought a medium density alternative which might provide better amenity than the single lot detached residential dwelling. Among the themes were shared space, shared household goods, and vehicle access subordinated to pedestrian access.

In considering alternatives to the suburban single lot detached dwelling, challenges emerge around tenure mix, construction delivery and the on-going management of medium density communities. Certainly developer-led models exist, but resident-led models variously involve demanding development, management and maintenance activities. Conflict, power bases, and peer pressure can challenge communities, as can the administration of the body corporate, strata title and community title structures. Implementation of untested notions about the desirability of communal space in medium density require caution (Woodward, 1989).

Early urban consolidation policies in Australian cities became controversial; as established residential suburbs, characterised by low density housing, became interspersed with various forms of medium and high density dwellings, perceptions arose of negative impacts on neighbourhood character and over development. Traffic congestion, loss of landscape, and increased energy usage are highlighted as possible design issues associated with consolidation. Troy has suggested that many urban consolidation policies preceded research to understand the benefits, asserting that spaciousness is part of Australian culture, a by-product of seemingly abundant land availability and, until recent decades, supported by transport infrastructure (Troy, 1995).

Support for sustainable urban development patterns with an emphasis on increased housing density is now widespread among the policy and design community. Empirical research includes significant space, energy, resource and goods reductions. In a study by Metzler, houses were smaller on average, with 31% space savings; 57% electricity savings and 8% goods savings achieved (Metzler, 2005, Williams, 2005). Research also found that ownership of cars, laundry appliances, and gardening tools was reduced through pooling of resources in housing clusters (Metzler, 2005).

## **USER-CENTRED DESIGN OF MEDIUM DENSITY HOUSING**

Post Occupancy Evaluation (POE) research of medium density housing user satisfaction has been diminishing in popularity in recent decades (Sarkissian, 2004). Reasons for research decline can include the large volumes of POE data generated, the challenges of disseminating / incorporating key findings, the relevance of findings and managing, what at times, can be *“unwanted news”* (Vischer cited in Dodson, 2011). Sensitivities with studying participants in such a private setting along with a gradual withdrawal of the funding for national housing research programs have also contributed to the decline (Sarkissian, 2004).

According to social researchers Marcus and Sarkissian, well designed medium density compact houses *“...can serve the needs of many segments of the population better than...”* some low and high density housing solutions (Marcus and Sarkissian, 1986 et al). However, there is a gap in the conversation between design professionals, the community and the end-user on housing. A *“...lack of input from the people who must live with their designs”* leaves architects to *“...fall back on their own experience and perceptions of future tenant needs”* (Sarkissian, 2004, Marcus et al, 1986, Steen, 2011). A lack of available research or a failure by the architect to draw upon existing research, can result in common recurring mistakes (Sarkissian, 2004).

That the architectural profession designs in a variety of ways; some of them user-centred, is understood (RAIA, 2014).<sup>vi</sup> Indeed it is not the task of this research to evaluate the profession more broadly, but rather a practitioner might undertake a reflexive design research journey, seeking to become more user-centred, with a range of techniques explored (Schön, 1983). User-centred design methods seek to locate the intended users at the centre of the design process, employing techniques to reveal their needs, wants, and restrictions (Hayes, 2014, Wevera et al., 2008). Furthermore, if the built environment mediates between the occupants and the activities they are to perform, then support for these activities can be seen as a measure of built environment effectiveness (Vischer, 2008). Through a multi-stage data gathering and problem-solving process, the architect / researcher analyses how spaces are experienced and utilized. Iterative in nature, the design process can be repeated until a projects usability objectives have been attained, and importantly to test the validity of design assumptions about user behaviour (Abrams et al., 2004). An improved understanding of usability at pre-occupancy feeds into the briefing and design stages of a project, while at post-occupancy it supports corrective action and feeds into future projects (Vischer, 2008).

## **METHOD**

Resident (user) satisfaction fieldwork is underway at medium density housing precinct, *Forth Village*, built in Canberra in the 1970s.<sup>vii</sup> Compact terrace and courtyard houses and their private gardens are linked by a shared linear park and pedestrian routes. Vehicle access is separated to the south perimeter of the precinct, with hill views to the north. Centrally, there is a communal swimming pool, dining area, lounge area and studio / workshop building.

A number of *Forth Village* householders have lived there since project inception, with many others for several decades. Like Canberra, a “*baby boomer*” demographic predominates, with a mix of couples and single person households; many with adult children. They describe themselves as “*superannuated hippies*”; some retired, and some have health or mobility issues.<sup>viii</sup> Families with young children represent a smaller proportion of householders. There are more home owners than renters living in the village however the renting cohort is steadily increasing.

Through in-depth semi-structured interview, residents offer perspectives on their compact house and living experiences. When combined with observation, interview allows the researcher to understand the meanings that everyday activities hold for people (Ut, 2013). Spatial mapping allows participants to move from “*description to depiction*” and to offer explanation for this (Emmel, 2008).

Interviews of ten households have been conducted to date, guided by an interview protocol comprising spatial, experiential, functional and social questions about aspects of their house, house and garden, and surrounds. Interviews are conducted in the residents own home, with one or more household occupants participating, and guiding a tour of their house. Photographs of design features taken offer a visual accompaniment to their narrative.

## **EARLY-INDICATOR FINDINGS**

In seeking a greater understanding of aspects of small living through research and design, it becomes helpful to describe participant responses by room, house and garden size, within the communal village context. This paper focusses on recorded interviews with householders who have lived in the village since its inception. Their recollections span nearly three decades with changing household compositions over the period described. Interviews were accompanied by spatial mapping and photographic tours with the participants, and while the fieldwork continues, some emerging themes of note follow.

Satisfaction with room size was described as a function of the number household occupants



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and the intensity of associated activities, or the degree to which occupants sought space to undertake independent activity:

*The house is fine for us now, but the rooms for the children are very little...And it was fine for me with no nappies ... having the laundry in the bathroom but if I had babies then I would have been annoyed about that .....(Helen)<sup>ix</sup>*

Several participants described the flexibility of rooms to take on multiple uses over the life of the house. A willingness to adapt spaces within the house for improved access and mobility was also expressed if it meant prolonging time in one's "home" <sup>x</sup>. A well-designed small room was described as offering thermal comfort, access to daylight and access to sunlight, with some participants attributing these characteristics to their favourite part of the house.

Some participants weighed up house size, numbers of rooms offered, location and available views when making their house purchase:

*....more floor area and this house had an extra room so this is basically 4 bedrooms and a study ..... but the [single level living was] more practical.....and the location a bit away from the road... (Darren)<sup>xi</sup>*

House size seemed to be at its most challenging for families with teenage children.

Participants described a return to "ideal" size once the children had left home.

For some participants, open plan was favoured; others a more cellular layout, with the ability to close off rooms for heating or acoustic privacy purposes. For some, a compact house presented the challenge of noise transfer, where multiple occupants, and therefore activities, occurred simultaneously. A space to "retreat" to for work, recreation, hobbies or for visiting family and guests was desirable. By contrast, social interaction was seen as the key benefit of an open plan layout:

*...there were two drivers for the renovations – one was...having a larger kitchen and being able to talk to guests while we were doing things...(Matthew)<sup>xii</sup>*

On garden size, there is a visual borrowing of the landscape space itself, with private gardens frequently extended into communal landscape areas. The villagers call this their "sphere of influence", describing a practice of extending their garden into the landscape commons, as offering more advantage than disadvantage over time.<sup>xiii</sup> Private gardens are viewed from various parts of the house, more than they are inhabited. In that way landscape, including distant views, contribute to a sense of spaciousness within the house itself:

*...we do use them visually because for years I used to get up and have my first two cups of tea looking out toward the mountains... (Julie)<sup>xiv</sup>*

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This visual and physical borrowing from the commons is aided by soft landscape edges such as berms, low shrubs, a level change, pergola or arbour. Physical barriers such as fences and courtyard walls rarely feature. This blurring of private garden with communal space is seen as an advantage, however unwanted intruders and dogs were also described as an intermittent problem. The placement of “wing walls” and courtyards between neighbouring houses attracted praise for the privacy it offered, however for some unwanted views remained:

*I always found when the children were there and their bedroom faced onto the courtyard and even now when we have guests that's a bad design – if I get up and the guest has got curtain open we can look at each other (laughing) .... (Helen)<sup>xv</sup>*

The village took advantage of the Yarralumla Nursery tree program (offered to Canberra home owners), adopting a predominantly native tree planting program. However tree species that may have proved suitable in a low density suburban setting proved too large for smaller townhouse and courtyard gardens, with a costly recurring maintenance and subsequent oversized tree removal program required.

At village or precinct scale, housing density and size provides an important context for design decisions about the cohesiveness of a streetscape balanced against the individual expression of houses. The architecture of *Forth Village* has a cohesiveness derived from the palette of materials, the expressive roof forms and staggered / repeated wall elements across the village. Within this cohesive framework, personalisation of houses has been successfully achieved over time; loft rooms added within an extended roofline, sheds and external stores disguised by pergolas, and landscape screening. The individual character of the houses and the ability to personalise is highly valued<sup>xvi</sup>:

*...isn't it surprising you go into these houses with the same basic design and there all a completely different feel .... (Darren)<sup>xvii</sup>*

The physical environment of the village was perceived as intensifying neighbour relations, be they positive or negative relations. The proximity of neighbours to one another, along with the *Social Contact Design* (SCD) features of the village, such as shared paths and communal garages, were offered as factors. Interaction was perceived as more intense than that of a typical “suburban” street comprising detached dwellings on individual blocks. A desire to maintain privacy and social distance beyond that made possible by physical proximity was at times expressed:

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*I find it later difficult to accept that we were living in a townhouse and not just a single house by itself where I could identify myself just with that single house – I [have] had to accept a lot of messy gardens and some invasion of privacy (Helen)<sup>xviii</sup>*

The SCD features of the village translated into the sharing of some spaces and household goods, and the fostering of positive community interaction, and mutual support:

*...there was rent-a-friend so when your two year old was being completely objectionable you'd ring up someone and say could we borrow so-and-so [to play]...and there would be peace and quiet and the mothers would have a cup of tea... (Julie)<sup>xix</sup>*

## **CONCLUSION AND NEXT STEPS**

Housing design is a complex topic which includes socio-cultural and environmental factors, location and landscape context (McKay, 1971, Judd et al, 1983, Judd et al, 1993, Paterson et al., 1967, Marcus et al, 1986). Themes such as personalisation, territory, way-finding, flexibility, comfort, delight, and the meaning of “home” need to be sensitively addressed through the design (Sarkissian, 2013, Zeisel, 2006). A deeper understanding of compact housing occupant living experiences can be sought through description, depiction and observation, with findings applied to different stages of the design process. Design is used to analyse and synthesize the data, with upcoming research stages including the design of a “small living” kits of parts, where compact housing design elements are explored. An iterative data gathering and problem-solving process for the architect / researcher explores how spaces are experienced and utilized and is repeated until the project's “small living” usability objectives have been attained (Abrams et al., 2004). Later data gathering project stages include both spatial mapping workshops and photographic tours of communal spaces, along with a survey of prospective and actual purchasers of medium density housing, including the work of the author.

At its best, the architectural design process skilfully uses design, and indeed elegant design solutions, to navigate the challenges of the user brief and to derive opportunities from it. For the architect / researcher perhaps user-centred design means more rigorous user brief development, accompanied by a more in-depth review of actual usability as the design develops and is ultimately implemented. *“If the evaluation of the suitability of the completed dwelling does not occur, then it remains an untested prototype” (Vischer, 2008).*

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<sup>i</sup> Howley, 2009, Downton, 2008, Andrea Young Planning Consultants, 2012, Vischer, 2008, Williams, 2005, Sarkissian, 2004, Metzler, 2005, Troy, 1995, Judd and Dean, 1983, Judd and Gamble, 1993, Marcus and Sarkissian, 1986, Cox, 1983, Newman, 1983, Gunn, 1971

<sup>ii</sup> IBID i.

<sup>iii</sup> The Land Development Agency (LDA) has been a primary agency responsible for the advancement of Canberra medium density housing, since ACT self-government. Following self-government the NCDC re-emerged as the National Capital Authority.

<sup>iv</sup> During this period building industry professional variously researched, theorised, planned and designed medium density housing. Influences include the work of Californian social researchers and Scandinavian architects.

<sup>v</sup> Dwellings per hectare density definitions drawn from the Planning and Land Authority – Territory Plan

<sup>vi</sup> The Australian Institute of Architects awards judging criteria considers conceptual framework, public and cultural benefits, built form context, program resolution, integration of allied disciplines, cost/value outcome, sustainability, and response to client and user needs.

<sup>vii</sup> The pseudonym of *Forth Village* has been adopted for de-identification purposes. Participant pseudonyms are similarly adopted.

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viii Recorded interview 01 May 2014, retired couple living in the village since its inception. Adult children have moved away from home.

ix IBID viii

x Recorded interview 28 April 2014, retired couple living in the village since its inception. Adult children have moved away from home.

xi IBID viii

xii IBID x

xiii *Forth Village* committee meeting observed by the researcher on 8 April 2014.

xiv IBID x

xv IBID viii

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# Interchanging: Responsive transport infrastructures for twenty-first century urban digital culture

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## ABSTRACT

*What if a bus stop could save your life? This 'what if' example is just one of the provocative ideas posed as part of the design studio competition 'Interchange of the Future'. This paper will outline the interdisciplinary framework, design thinking and soft-systems methodologies employed in this design studio to open the public transport design space to new and innovative possibilities. Drawing on the project outcomes, the paper will further argue that in re-thinking normative understandings of public transport environments through the frame of twenty-first century urban digital culture, including the integration of new, and emerging urban digital media and sustainable technologies, design possibilities can extend to encompass alternate business and revenue models, new functions, and overall enhanced customer experience.*

## Keywords:

public transport, design thinking, digital technologies, responsive environments

What if a bus stop could save your life? This is an example of a question that has been instrumental in leading the way to envisioning new scenarios for public transport environments. William J Mitchell (1999) raised similar questions around the relationships between emerging digital technologies, everyday practices, and urban space in his provocatively written 'eulogies' for the Western city. Chiefly, he argued, that the pervasiveness of digital technologies necessitated a re-conceptualisation of the role of "public places, towns and cities for the twenty-first century" (1999, p.4). In setting the scene for this discussion, he drew attention to a form of infrastructure, namely, the pre-industrial village water-well (1999, p.3). This example is conceptually significant to this paper in several key ways. Primarily, this example emphasises that everyday infrastructures can extend beyond their intended functions to assume other roles and meanings. In the case of the water-well this pertained to how it served to create a central meeting space, and was thus socio-spatially significant. Furthermore, in describing the obsolescence of the water-well by a new piped water system, Mitchell pointed to how *new* technologies can influence shifts in social and spatial practices, but also provoke, new questions, ideas, and uses of urban space.

Of significance here then, are the ways Mitchell's example presents an alternate perspective to often-dominant utilitarian conceptions that frame infrastructures – but also technologies – as neutral in a cultural and social sense. Seen from this alternate perspective, a range of infrastructure(s) can be understood to be integral to social and cultural processes and practices, and subsequently, the production of meanings. This is an approach that has underscored the objectives of re-imagining public transport environments to better suit the conditions of twenty-first century urban digital culture as envisioned by the University of New South Wales, (UNSW) Faculty of the Built Environment Interdisciplinary Learning (BEIL) studio and design competition *Interchange of the Future*. This project required



interdisciplinary teams to consider and integrate a range of new, and emerging urban digital media and sustainable technologies into innovative public transport environment concepts and designs.

Drawing on the organisational framework and outcomes of the *Interchange of the Future* studio, this paper will argue that by re-thinking normative understandings of public transport environments through the frame of twenty-first century urban digital culture, the design possibilities can extend beyond material limits to address alternate business and revenue models, new functions, and enhanced customer experiences. This will be developed here in three key sections; the first section will establish the context and objectives of the *Interchange of the Future* design studio competition. The second section will outline the interdisciplinary studio framework and design strategies and processes, including the design thinking and soft-systems methodologies that were employed to open the public transport design space to new and innovative possibilities. Finally, the concluding section will present and discuss the key project outcomes and future implications.

### **Context**

The argument that will be advanced here is that public transport environments, and by extension urban environments more generally, can benefit from adopting different ways to conceptualise a host of influencing conditions and their relationships. This ranges from how public transport infrastructures such as bus stops can relate to the wider urban environment and everyday practices, to the complex relationships between multiple stakeholders and public transport services, functions, design, and management. That we should consider alternate design approaches to public transport environments and infrastructure it is argued here, is ever more compelling in view of the so-called pervasiveness of digital information and communications technologies in everyday life. In particular this concerns the large-scale adoption and use of Internet-enabled portable communication and computing devices, also known as 'smart-devices'. While a key attribute of Internet access has long emphasised global-scale connections and information flows, the more recent developments in micro and mobile computing have brought greater focus to 'everyday' mobility practices at a local-scale. More specifically this relates to the possibilities afforded by the integration of global positioning system technologies (GPS) with mobile smart devices, and namely, the development of location-based-services (LBS) that allow the device, and subsequently the user, to be both locatable, and 'location-aware'. Many scholars argue, therefore, that the pervasive (mobile) computing era has heralded a renewed interest in, and, attention to, the significance of physical places, and 'locations' (Humphrey 2010; Gazzard 2011; de Souza e Silva & Frith 2012; Farman 2012, 2012a). Moreover, it is argued that forms of mobile computing have enabled urban mobilities to be practiced in new ways, and for mobile interface theorist Jason Farman, this constitutes the "emergence of mobility *through* mobile computing" (2012, p.11 our emphasis).

In the context of public transport environments and infrastructure design, mobile and embedded digital computing technologies, in addition to robotic sensing and cognition programs that can, for example, track and analyse movement, represent a range of opportunities. Particularly, this relates to the ways that such technologies can contribute to reconfiguring the "information supply system" (Mitchell 1999, p.4). This is significant, as new and more efficient and convenient ways to access, create, and interact with (digital) information can offer commuters, but also others, potentially additional and new services and

a greater range of control. In turn, this also presents opportunities to generate alternate and new spatial uses, social interactions, and activities. Necessarily, this requires a design approach that considers how a range of people have, and can, adopt and integrate such 'informational opportunities', and thus interactions, into their behaviours, experiences, and everyday practices, in spatial, but also social and cultural terms. And this understands, as Mizuko Ito notes, "... that technology does not stand apart as an external force that impacts society and culture. Rather, technologies are embodiments of social and cultural structures..." (2008, p.4). Given this, it is argued here that a more nuanced understanding of the emerging urban digital culture, and its relation to public transport journeys and public transport environments, can further empower designers, transport operators, and commuters alike.

### ***Interchange of the Future Design Studio Framework***

To further explore these issues, a design studio competition was run as part of the UNSW Faculty of Built Environment Interdisciplinary Learning program (BEIL) in the 2014 summer session. More specifically the design studio competition brief *Interchange of the Future* centred on urban public transport issues as defined by the industry partners of the *Encircle*: Australian Research Council (ARC) Responsive Transport Environments project (LP110200708). Drawing from the ARC project research that is currently investigating a 'digital information layer' to improve the delivery of information in, and around public transport environments and infrastructures, such as stations and bus stops, the brief called for design concepts that would not only consider twenty-first century digital technologies, but also their relationship to modes of twenty-first urban living such as, social networking, online shopping, multi modal travel, recycling, active lifestyles, and sustainability. While the context, and therefore the site, to test the design outcomes, was notionally the proposed Light Rail site in front of the UNSW campus on Anzac Parade, the brief required a modular design approach that would allow adaptation to suit varying functional requirements, scales, and contexts across Sydney.

Given the broad range of issues, disciplines, skills, and stakeholders, involved in public transport environment and infrastructure design, an interdisciplinary framework provided a suitable model for a public transport-based design studio competition. Structured as a two-week intensive studio that included a public lecture series, the *Interchange of the Future* design studio brought together Faculty of Built Environment (BE) students from the schools of Industrial Design, Interior Architecture, Landscape Architecture, Architecture, and Construction Management. The public lecture series included academics and professionals from the fields of transport planning, architecture, urban planning, policy, industrial design, and interaction design. The participants formed interdisciplinary teams and while they were required to design and consult on behalf of their discipline, and also with the visiting professional and academic lecturers, they were also encouraged to "...operate between and at the edge of their discipline/s and in so doing question the ways in which they usually work (Rendell 2013, p. 129). This is a design approach that Professor Jane Rendell, with reference to Julia Kristeva's (1998) notion of the "diagonal axis", has referred to as a mode of working and thinking between that can productively cut across disciplinary boundaries, and in doing so, can call into question "the [extant] way we do things" (2013, p.130).

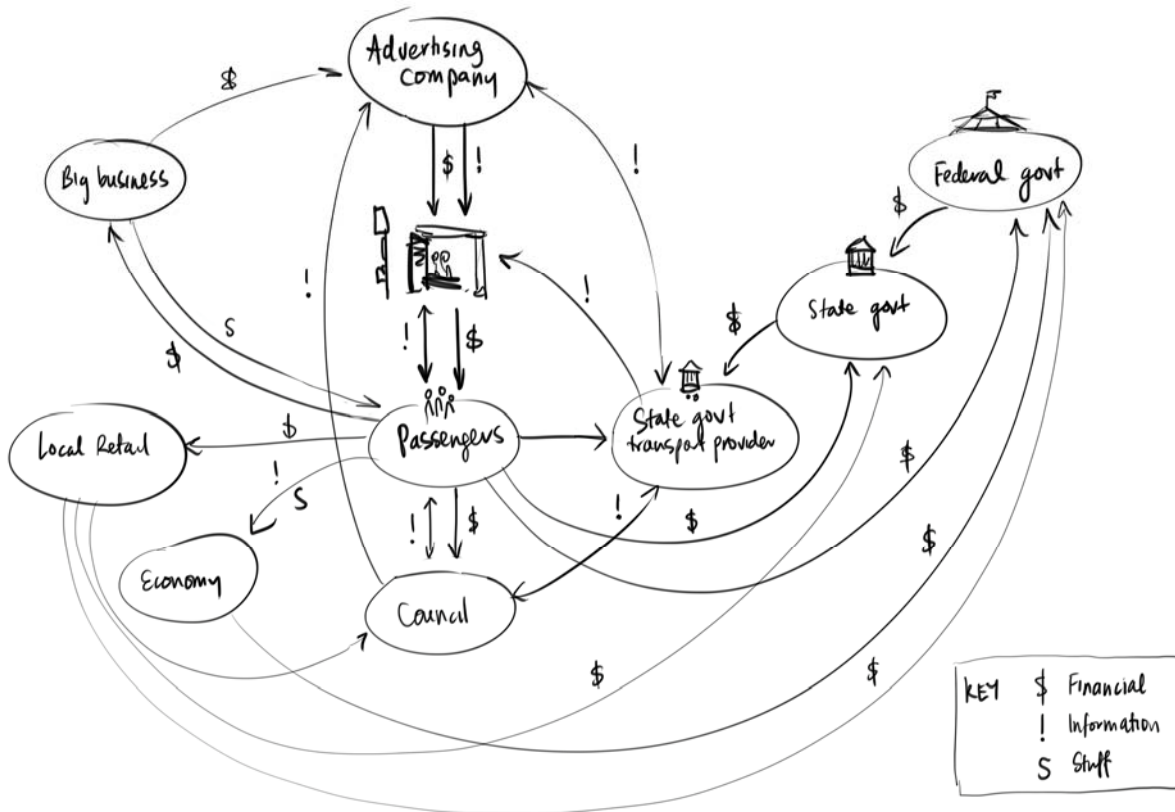
This interdisciplinary approach was further complemented by a series of conceptual exercises intended to deconstruct the existing paradigm of what constitutes public transport

environments and more specifically bus stop and shelter design. Recognising how public transport environments are significant to, and are influenced by, a wide variety of stakeholders, the approach adopted here drew from design thinking theory such as the concept of the 'wicked' problem (Churchman 1967; Rittel 1972; Buchanan 1992). Countering a commonly held view of design processes and problems as linear, step-by-step, and determinate, Rittel (1972) argued that designers often face what he termed as 'wicked problems'. He defined these 'messy' problems as a "class of social system problems which are ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing" (Rittel quoted in Buchanan 1992, p.97).

A key property of the wicked problem is the 'no stopping rule'. This suggests a fundamental indeterminacy in what can be defined as inside or outside the 'problem', "because there are no ends to the causal chains that link interacting open systems" (Rittel & Webber 1973, p.162). What is defined as inside and outside the problem is a matter of framing. Given this, the BEIL studio teams undertook a series of tasks aimed at exploring and expanding the design problem space of public transport infrastructure. In rethinking and resituating the priorities, but also perspectives, of a range of stakeholders from the commuters, to the community, and infrastructure management bodies, in different ways, the teams considered, what alternative amenities or affordances might be possible?

Within a workshop setting this included producing a Functional Decomposition Diagram (Kitamura & Mizoguchi 2003), a Customer Value Chain Analysis diagram (CVCA) (Donaldson, Ishii & Sheppard 2006), and a Rich Picture visualisation, which is a tool drawn from soft systems methodology (Checkland & Scholes 1999). The Functional Decomposition Diagram served to establish a benchmark of existing bus stop functions in relation to a range of stakeholders. As shown in Figure 01, the CVCA diagram then made visible the flows of finance, information, and services between the various stakeholders and in relation to the physical infrastructure of a bus stop. A Rich Picture exercise provided a way to identify urban issues and opportunities. Drawing from each of these exercises, the teams then produced a series of 'what if' scenarios, and more specifically 'What if a bus stop was ... ?' to develop a range of new propositions [Figure 02]. Each team then selected a 'What if' scenario as the basis for their ongoing design development. Following this each team also compiled User Scenario profiles (Nardi 1992; Carroll 1999) and a Day in the Life of a Bus Stop timeline that

served as reflective tools to further develop and refine their design concepts.



[Figure 01: Customer Value Chain Analysis Diagram]

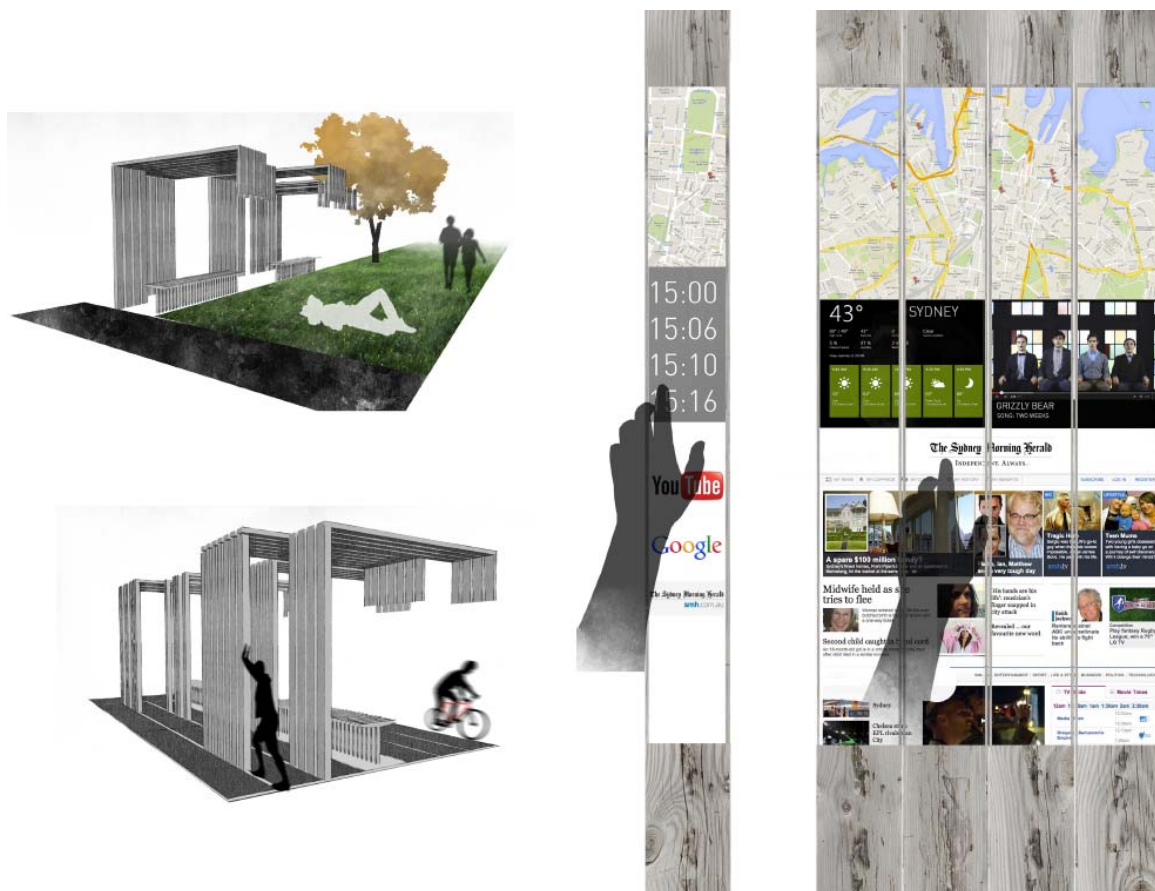


[Figure 02: 'What if a bus stop ...?' Propositions]

## Interchange of the Future Design Studio Outcomes

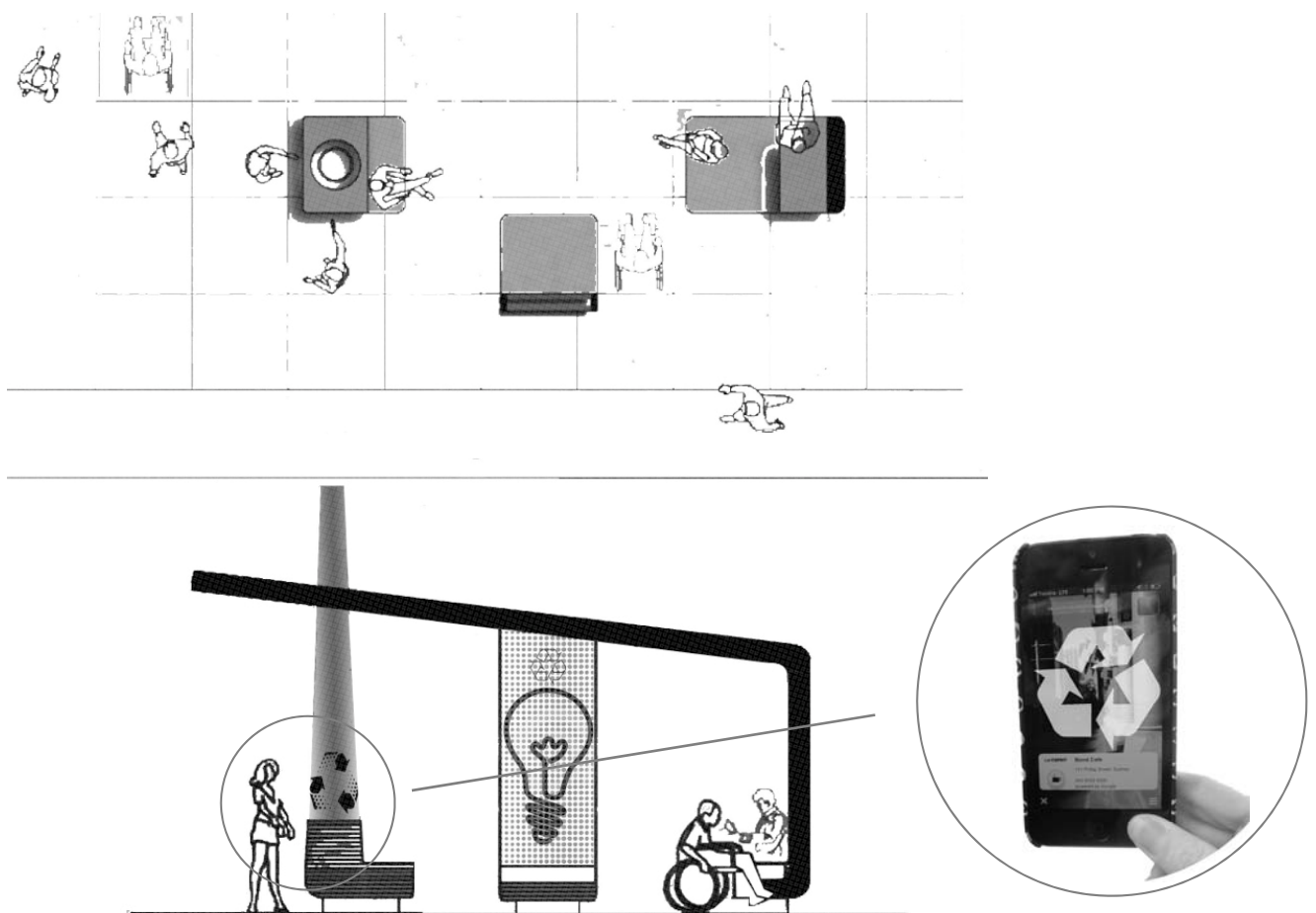
By re-framing the design ‘problems’ of public transport environments, together with research into urban digital culture and emerging technologies, a range of project proposals were developed to address commuter needs, in addition to ideas for new business models, design and maintenance considerations. The following section will outline three of these proposals in further detail.

Team NEXUS adopted a position in opposition to the common notions that public transport environments are simply transitional spaces, which constitute ‘non-places’ (Augé 1995), or perpetuate a sense of *placelessness*. In challenging this perception, the project team sought to find new ways to design people back into the situation. This included empowering people with a sense of control over their public transport journeys, providing them with incentives to wait and dwell in the space, and encouraging interaction with others while waiting. The key design strategy adopted here was to craft a place of refuge, or a ‘room’ in the city through material choice, spatial enclosure, but also significantly by providing an opportunity for commuters to define and curate their own informational surface, a digital media surface that can potentially remember them. The result is a modular and adaptive design that has approached information, including public transport service and wayfinding information, and dynamic digital content, as a material and spatial element, and as an organisational device. In this way the project productively conflates the material with the immaterial [Figure 03].



[Figure 03 – The NEXUS concept of digital informational-media surfaces]

The GIVETAKEGIVE team explored the potential for public transport environments to be, not only playful, but also productive and environmentally responsive. Specifically this project considered how public transport environments such as bus or tram stops could additionally provide a place to deposit e-waste recycling, and moreover, could incentivise commuters, but also others, to engage in sustainable practices such as recycling. Research into other models of e-waste recycling and digital technology systems, confirmed the viability of this 'what if' for public transport environments. The outcome is a modular design that incorporates a receptacle for items such as batteries and light bulbs, and is also one that could be easily adapted to suit alternate items. Detailed spatial organisation has considered how the design would accommodate recycling activities, together with alighting, boarding, general and accessible pedestrian movements. The integration of a digital informational surface/totem operates as an iconic public transport node, provides public transport service and wayfinding information, and also functions to sense, register, and display information about recycled items. Registered recyclers would be 'sensed' by the digital totem through by swiping their smart transport card, or via a downloadable corresponding software app for their mobile device. By depositing recyclable items they would then accumulate points per item, which, for example, could be used to redeem a coffee at a nearby participating café [Figure 04].

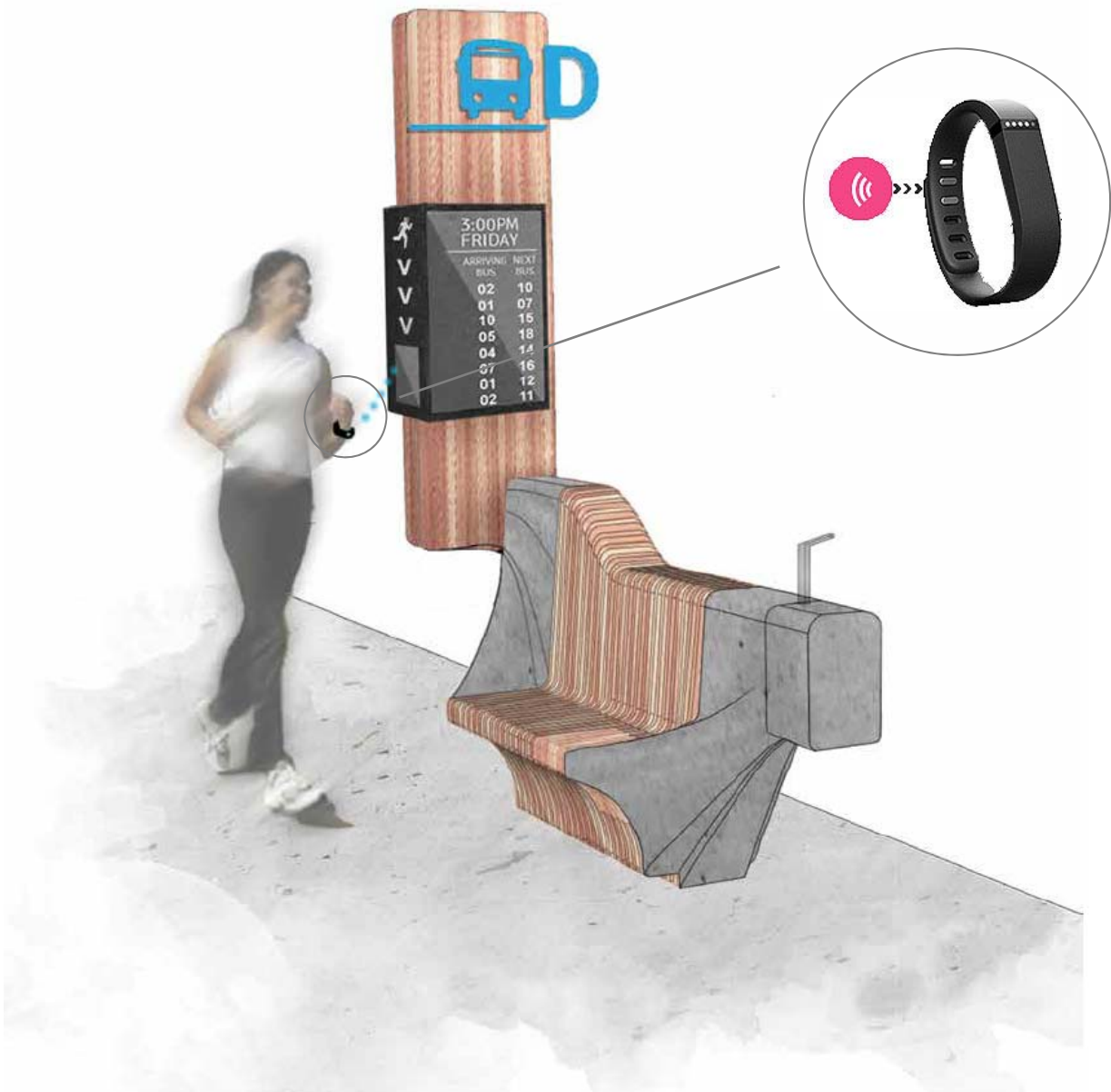


[Figure 04 – The GIVETAKEGIVE concept of e-waste recycling at bus stop]

At a time when health research and policy is shifting to forms of preventative action, the ACTIVE team asked, what if a bus stop could save your life? This explored the additional roles that the public transport network, in conjunction with the wearable, mobile, and embedded digital technologies could assume. This intended to *dynamically* re-interpret the public transport bus/tram stop or interchange waiting space, and provide the opportunity for physical activity to be promoted as an integral extension to the public transport experience. The concept takes inspiration from, and combines, movement studies, with an organisational strategy that considers a type and hierarchy of information aligned to activities, from the idle or hurried commuter, the meandering passer-by, the early-morning jogger, to the super-enthusiastic runner. As shown in Figure 05 and 06, the concept proposes a strong design language that translates across a range of bus stop scales to create a recognisable, yet adaptable 'family of forms'. While a range of integrated fitness-check services and displays can address a range of user-types, the provision of public transport service and wayfinding information is prioritised. Fitness or activity related displays could include self-check up information, such as a heart-rate monitor or blood pressure check, to checkpoint fitness tracking that can talk to or interact with those with wearable technologies [Figure 06]. Importantly this extends the function of the bus/tram stop from being simply a place for commuters to wait or arrive, to being beneficial to a wider spectrum of the community, and a public transport network that actively contributes to advancing a healthier city



[Figure 05 – ACTIVE concept larger-scale bus stop that integrates a range of real-time service information and wayfinding digital displays, as well as fitness and health tracking]



[Figure 06 – The ACTIVE ‘dynamic’ concept shown here as a smaller scale bus stop that integrates ‘check-point’ fitness tracking and digital displays and a drink fountain]



## **Discussion**

A key feature of the speculative design concepts presented here include how each of these has explored ways to extend and augment the functionality of public transport environments, to not only enhance the commuter experience, but also address the needs of a wider spectrum of the community. By targeting larger issues such as social and informational connectivity, incentivising sustainable practices, and health awareness, the public transport environment assumes a wider role within urban life. In short, it becomes more than simply a place to catch the bus or train. Additionally, these concepts recognise that a single bus stop can form part of many systems, and not only the public transport system. Ideas such as the ACTIVE's jogging checkpoints exploit this network characteristic by viewing a series of bus stops as also a series of fitness checkpoints. The GIVETAKEGIVE team also considered how public transport environments can connect into other systems, such as business networks, through incentivised recycling practices at bus stops that offer rewards at local businesses.

Importantly these ideas are made possible by re-thinking the possibilities of the humble bus stop through the lens of digital culture and the ways a host of digital technologies, including the use of mobile devices, are changing the ways people move, socialise and communicate. This perspective has provided the impetus to imagine how the designed integration of a range of emerging digital technologies can improve existing functions and services, but also extend beyond them. As a result the physical infrastructure of the public transport environment – the architecture – operates as a framework to support *adaptability*. This understands adaptability not necessarily in the physical sense, but in terms of informational services and interactions, and as realised through an integrated 'digital information layer' that is inherently flexible and updatable.

Broadly speaking, the *Interchanging* studio represents a systems-led design approach to public transport environments that purposely connects the spatial, formal, and aesthetic resolution with experiential, informational, operational, managerial, and financial considerations. In this way, these schemes propose not only formal concepts, but also interactional, responsive, and operational *scenarios*.

## **Conclusion**

The *Interchanging* studio structure and selected project outcomes described here attest to the expanded opportunities possible in the design of public transport environments. Importantly, in many ways, these projects extend the brief beyond the specificity of public transport environments to address broader conditions of the urban environment. In doing so, these projects do not simply adopt technology for technology's sake, or in the image of progress, but rather, meaningfully and productively integrate digital and sustainable technologies to address a range of issues and opportunities often considered peripheral to public transport environment design. This has included promoting health-awareness, enhancing social opportunities and connectedness, incentivising everyday sustainable practices such as recycling, and responding to the specificity of local contexts.

Additionally, the different ways each of these projects has integrated screens, sensors, and computing technologies indicates the range of potential for *responsive* public transport environments to become key players in two emerging business models, the Internet of

Things and Big Data. Cisco Systems describes the Internet of Things as a network of physical objects accessed through the Internet, whereas Big Data refers to high-volume, high-velocity, and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making (Gartner 2014). Where public transport environments can additionally function as, for example, responsive urban data hubs, this represents the potential for additional, or even alternate, revenue streams to support their construction and maintenance. And these ideas are already gaining traction, such as for example the City of Sydney who are trialling the installation of 'recycling machines' for bottles and cans at selected bus stops, where recyclers are rewarded in the form of bus tickets and various vouchers<sup>1</sup>.

This paper has emphasised that the potential for innovation lies not simply in proposing a solution to a *pre*-defined problem, but rather in fundamentally re-framing the problem(s) itself. Further the project examples highlight that bringing public transport environments together with urban digital culture in the design space is a complementary and productive merging of multiple scales and materialities of infrastructures, to generate new forms of urban 'infostructures' (Gardner, Haeusler & Tomitsch 2010). Overall, this demonstrates that in fundamentally challenging and re-thinking public transport environments, particularly at the outset of the design process, preconceptions can be stood aside, and the design space can be opened to new possibilities, including alternate business models, functionalities, and management strategies.

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<sup>1</sup> <http://www.cityofsydney.nsw.gov.au/live/waste-and-recycling/clean-streets/envirobank-reverse-vending-machines>

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## **Becoming Urban: Residential Planning on the Edge of Chinese Cities**

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### **ABSTRACT**

*This paper examines the planning and urban design of new residential districts for relocated peasants in the peri-urban areas of Chinese cities. Based on research in three provinces, this paper provides an analysis of how peasants' material frames of daily lives (space, time and culture) have been radically restructured in this process. Living in walk-up tenements, it shows, peasants lose space to continue their usual courtyard economy, the sense of community is diluted, and radical changes take place in production and consumption patterns. The paper provides a unique angle to view the process of becoming urban in the context of rapid Chinese urbanisation. It calls forth more sensitive neighbourhood and residential design to enhance the quality of life in new villages.*

### **Keywords:**

China, peri-urban, residential planning, new villages

### **PAPER TEXT**

Under China's extraordinary economic boom, urban activities are continuously spread into rural hinterlands in the forms of industrial and residential developments, which have turned the city fringe into the 'restless urban frontier' – a most dynamic sphere in terms of social and spatial changes (Ma and Wu, 2005). Land has increasingly become the new scarcity after three decades' rapid urban expansion (Hsing, 2010). China is facing the double crisis. On the one hand, there is deep worry about the loss of arable land to urban development, which is considered to affect national food security (Cartier, 2001). On the other hand, while most local governments heavily depend on land revenue to balance their finance, they have exhausted their existing land stock and thus faced the deadlock of economic growth (Zhang & Hu, 2009). It is against this context that the policy of linking the increase with decrease in land used for urban and rural construction (chengxiang jianshe yongdi zengjian guagou) was introduced in 2004 (Ren and Zhou, 2013). The new policy allowed local governments to convert the land currently occupied by peasants for residential purpose to arable land, and use the increased arable land to receive the same size of land quota for urban construction. Meanwhile, 'building a new socialist countryside' was set up as the main target on the nation's modernization agenda. Its goals were to advance production, improve livelihood, build a civilized social atmosphere, and achieve efficient management (Pan,

2007). Together these policies gave rise to intensive local initiatives to carry out large-scale projects of rural relocation and combination (*qiancun bingju*) (Fang, 2012). As a result, many villages with age-long histories have been razed to the ground and redeveloped into cultivable land. Villagers are moved from vernacular dwellings to modern apartment flats in newly constructed residential districts.

This paper will examine the planning and urban design of these new residential districts for relocated peasants in the peri-urban areas of Chinese cities. Based on the findings from 120 interviews and surveys conducted in peri-urban areas of Hubei Province (Jiangxia District, Wuhan), Hebei Province (Yongqing County, Langfang) and Jiangsu Province (Nanjing, Nantong, Xuzhou, Jiangyin, Yancheng, Wuxi, Xuzhou, Changzhou, Taizhou, Yangzhou, Suzhou) conducted in 2013, this paper provides an analysis of how peasants' material frames of daily lives (space, place, time, and culture) have been radically restructured in this process [1]. By looking into the planning and design of the new villages, their effects on everyday life, and residents' perceptions on these effects, the paper provides a unique angle to view the process of becoming urban in the context of rapid Chinese urbanisation.

### **Mapping the New Village**

The planning of new rural settlements, in many ways, follows the same microdistrict (*xiaoqu*) schema as urban residential districts, although the scale is often much smaller than the latter. Main planning principles include: scattered villages are reordered into concentrated residential districts, housing and facilities (shops, parks, etc.) are integrated in each district, through traffic is discouraged, and the provision of community facilities is determined by the number of residents they served (Lu, 2011 [2006], Chapter 2). The master plan for Yijiyuan Village (Tongzhou, Jiansu Province), for example, integrates dwellings, public facilities and greenery for 182 households in one residential district (Fig. 1). The circulation system discourages through traffic and groups dwellings into seven clusters. Each cluster has a small park for entertaining and exercises. Located near the intersection of main roads, facilities such as the community centre and the convenience store are within walking distance.

Ironically, the spatial planning and design strategies adopted in new rural settlements are quite similar to those adopted in the people's commune movement in 1958–60. As my earlier study has shown, during the commune movement, concurrent with sweeping

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institutional changes, architects and planners boldly experimented with modernist design in rural China (Lu, 2011 [2006]). Yet as little state funding was available for rural construction, their proposals rarely progressed from paper. In contrast, today, driven by high land revenue, local governments take active initiatives to implement fast resettlement. The design of new rural settlements features modernist apartment buildings with rationalist façades and layouts, without resorting to vernacular architectural styles and construction techniques. Most dwellings are walk-ups with up to six floors, but townhouses and detached single-family houses are not uncommon. In new villages near the city, high-rise apartment buildings are adopted, whose design is similar to that of urban residential districts.

37% of interviewees indicated that before the relocation, their houses were newly built, while 24% had redeveloped houses and 25% had houses inherited from their ancestors. 82% of the interviewees indicated that their new villages were planned and constructed integrally, while 17% indicated that the villages were planned as a whole but dwellings were constructed by individual families. Many interviewees indicated that their new village had open area for exercises (63%), clinic (55%), public greenery (48%), the bank (29%), and post office (29%). In comparison, much fewer interviewees indicated that their old village had these facilities: open area for exercises (10%), clinic (24%), public greenery (6%), the bank (5%), and post office (8%). In terms of community services, 57% of interviewees indicated that their village has owners' committee, while only 26% indicated its existence before the resettlement. In addition, garbage collecting service and security service have increased from 33% and 31% before resettlement to 79% and 58% after resettlement respectively. The improvements in social provision are evident. Most agreed that the new village and its related services are much better managed. Certainly, some aspects remain unsatisfying, notably transportation connections to nearby town or city (52%), residence layout (40%), and the provision of greenery (31%), fitness facilities (28%) and library (24%) (Table 1).

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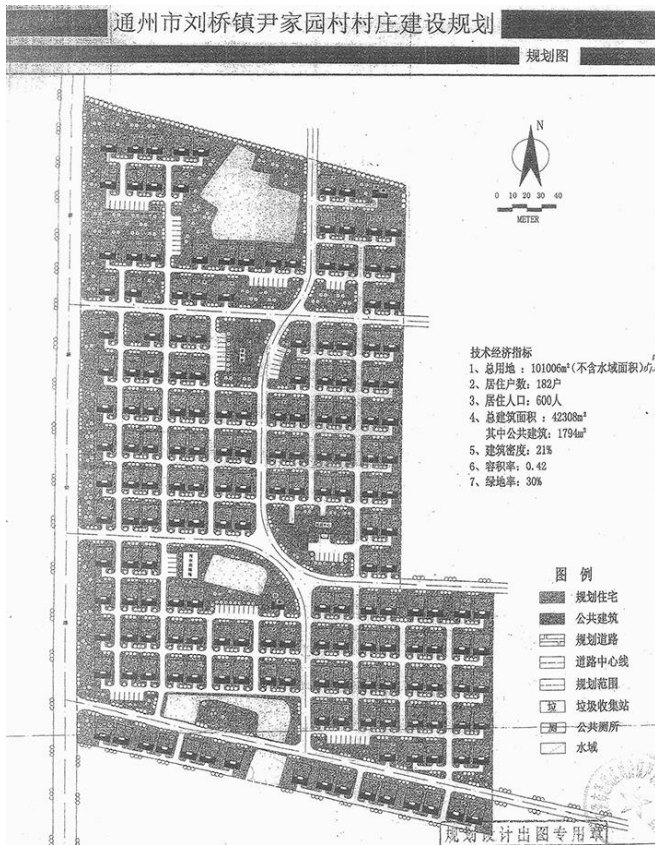


Figure 1. Village Plan, Yijiyuan Village, Liuqiao, Tongzhou

Table 1. Unsatisfying Aspects of New Village Planning

Unsatisfying Aspects of New Village Planning	Percentage of interviewees
Residence layout	40.00%
Transport connections	51.67%
Greenery	30.83%
Library	24.17%
Fitness facilities	27.50%
Siting	13.33%
Other	5.83%

74% of the interviewees were satisfied with the resettlement program. Among those who were unsatisfied, 39% disliked the fact that they were forced to live in walk-ups (*bei shanglou*), 32% disliked the fact that they had to leave their homestead, 16% could



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not adapt to the new residence, and 35% were unsatisfied for other reasons. The unsatisfying aspects of new residence and new village life differ in people (Tables 2&3). The least satisfying aspects of new residence are lack of courtyard and storage space. Also, 15% of people were unsatisfied with their roof. The interviews with residents of Dongjiawu Village revealed that poor design and construction quality was an acute issue for villagers. Without enough insulation in the roofs and walls, residents experienced severe thermal discomfort. Extremely hot in the summer and cold in the winter, the top level was inhabitable in those seasons. The thermal comfort of the ground level was also far from ideal. Some older people added *kang*, the traditional heated bed, to the bedroom, which provided a more energy-efficient way of heating the room in the winter. Spatial elements like this are a result of accumulation of local design knowledge over time. They may not look modern but they work. Their absence in housing design for the new village has resulted in higher level of energy consumption, higher operational costs, and lower level of thermal comfort.

Traditionally, rural residence performs a variety of production-related functions apart from living. Modelled after urban housing, the new apartment buildings in most new villages do not provide adequate space for production and storage. While apartment residents enjoy better lighting and hygiene conditions, they lose space to continue courtyard economy. In face of decreased income, peasants use space to generate extra income in creative ways whenever possible. In Dongjiawu Village (Langfang, Hebei Province), for example, the front yard play varied roles in residents' everyday life. Some residents use it to grow vegetable, some raise chicken, pigeons and sheep, some use it to dry agricultural products, and others construct storage space (Fig. 2&3). A household even developed a small furniture factory in the yard. With these alterations and additions, the front yards in Dongjiawu Village no longer appear homogenous; they display a wide range of personal preferences.



Figures 2&3. The use of the front yard, Dongjiawu Village, Langfang, Hebei Province

**Table 2. Unsatisfying Aspects of Residence**

Unsatisfying Aspects of Residence	Percentage of interviewees
Courtyard	25.00%
Distance to farmland	10.00%
Kitchen	9.17%
Toilet	3.33%
Livestock raising space	7.50%
Roof	15.83%
Storage	19.17%
Other	8.33%
None	25.00%

**Table 3. Unsatisfying Aspects of New Village Life**

Unsatisfying Aspects of New Village Life	Percentage of interviewees
Cannot adapt to life in walk-ups	24.17%
No storage space for production tools	29.17%
Inconvenient to raise livestock	34.17%
No storage space for corps	21.67%
Far away from farmland	13.33%
Inconvenient to go elsewhere	6.67%
Other	14.17%
None	24.17%

### **Living the New Life**

The study shows that radical changes have taken place in various aspects of village life after relocation: transportation, modes of production, living costs, consumption patterns, lifestyle, and local culture.

*Transportation.* The survey shows that the resettlement program has greatly increased the distance from residence to farmland (Table 4). Before resettlement, 67% of

interviewees' main method of going to farmland was walking, but this number has reduced to 22% after resettlement. While the distance to farmland has increased, the transport connections with nearby towns and cities have been improved after resettlement. 70% of interviewees considered it more convenient to go to the city after moving to the new village, and 50% maintained that their children have better access to education now.

**Table 4. Distance from Residence to Farmland**

<b>Distance to farmland</b>	<b>Percentage of interviewees before relocation</b>	<b>Percentage of interviewees after relocation</b>
≤1km	74.17%	24.17%
1-2km	12.50%	8.33%
2-3km	4.17%	8.33%
≥3km	3.33%	10.83%
NA	5.83%	48.33%

*Production.* Notably, 48% of the interviewees lost their farmland after resettlement, who had to seek other ways to make a living: running small business, going to work in nearby factories, establishing small workshops and so on. Before resettlement, most households grew vegetables near their residence or on farmland, part for the consumption of the family and part for market exchange. They also raised chicken and livestock in the courtyard. The average number of pigs they raised was three. After resettlement, most villagers had much smaller or no space to grow vegetables or raise livestock. Only very few new villages, such as the aforementioned Dongjiawu Village, would provide adequate areas for livestock raising. The younger generation adapted to new village life relatively well, as many of them currently worked in non-agriculture sectors with higher salaries. Before resettlement, the average monthly household income was 3860.19 RMB Yuan, which increased to 4347.96 RMB Yuan after resettlement.

*Living costs.* 91% of interviewees considered that living costs had increased since resettlement. Among others, enlarged bills for electricity, water, cable TV, gas and broadband service were most notable (Table 5). Before resettlement, most villages had wells, so water supply was free. In contrast, residents now had to pay for tap water.

Quite a few of them mentioned that because gas was so expensive that they used traditional stoves instead of using gas for heating in the winter.

**Table 5. Increased Living Costs**

Increased Living Costs	Percentage of interviewees
Water	80.73%
Electricity	83.49%
Gas	42.20%
Heating	13.76%
Transport	16.51%
Education	8.26%
Health	5.50%
Cable TV	44.04%
Broadband	32.11%
Strata management	11.01%
Phone	3.67%
Food	4.59%
Other	7.34%

*Consumption patterns.* The study shows that 69% of interviewees considered their consumption desires enhanced after resettlement. While most families already owned a variety of household appliances, many added new items when they moved to new residence (Table 6). Also, 33% indicated that they replaced all the furniture when they moved, and 45% replaced half of it. 25% of interviewees indicated that they had the online shopping experience.

**Table 6. Ownership of Household Appliances**

Types of household appliances	Ownership before resettlement	Newly purchased household appliances after resettlement
TV	96.67%	39.17%
Camera	15.83%	10.00%

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Video Recorder	0.83%	0.00%
Microwave oven	34.17%	26.67%
Washing machine	70.83%	27.50%
Dryer	0.00%	2.50%
Computer	28.33%	31.67%
Printer	7.50%	11.67%
Stereo system	35.00%	34.17%
Hot water system	28.33%	45.00%
Water dispenser	29.17%	20.00%
Soy milk maker	11.67%	11.67%
Refrigerator	28.33%	22.50%
Air conditioning unit	15.83%	29.17%

**Lifestyle.** 79% of interviewees considered their ways of living had changed since resettlement. Notably, 82% experienced reduced time in agricultural production, which might be due to the fact that many lost their farmland (Table 7). 33% of interviewees had used the Internet, among whom 80% considered their online time had increased after resettlement. 88% of interviewees knew their neighbours, but 66% indicated that they visited their neighbours less frequently than before.

**Table 7. Changes in Lifestyle**

Changes in Lifestyle	Percentage of interviewees
Reduced time in agricultural production	82.11%
Better playtime	42.11%
Decreased entertaining space	45.26%
Increased trips to nearby towns or cities	21.05%
Increased time to work away from hometown	13.68%

*Local culture.* The survey shows decreased participation in traditional cultural activities such as ancestor worship, seeking advice from Master Fengshui and traditional handicraft production, while participation in folk and other local cultural activities has increased slightly (Table 8). The chances of using traditional techniques to build houses were greatly reduced, given the fact that most new developments adopted

modern construction methods. 46% of interviewees believed that resettlement would affect the development of local culture, among whom 72% held that traditional cultures would disappear gradually.

**Table 8. Changes in Local Cultural Activities**

Local cultural activities	Before resettlement	After resettlement
Local folk cultural activities	27.50%	28.33%
Ancestor worship	60.00%	55.00%
Seeking advice from Master Fengshui	20.00%	12.50%
Building houses with traditional techniques	28.33%	5.00%
Traditional handicraft production	9.17%	4.17%
Other activities	0.83%	3.33%
None	23.33%	29.17%

**Conclusion: Becoming Urban**

To conclude, while many residents adapt the new village life fairly well, their quality of life could be further improved if a more sensible approach to village planning and design is adopted. This research shows that as new villages are modelled after urban residential districts, the special spatial needs of relocated peasants are often ignored. Improvements can be made in key aspects of village planning and design including transport connections, dwelling layout, and the provision of storage space, greenery and public facilities. The new residence is designed to support urban lifestyle, providing little space for rural production. On the one hand, lacking in space to develop their traditional courtyard economy, the agricultural income of peasants has decreased. On the other hand, radical changes take place in patterns of consumption and leisure, which requires a higher level of financial capacity. As a result, many younger-generation residents now work in non-agricultural sections in nearby towns and cities for better income to support their new lifestyle. The sense of local community is diluted, while the connections with cities have become stronger. The empirical evidence on changes in production, travel and consumption patterns, lifestyle and cultural attitudes indicates that peasants have become increasingly urbanised through the relocation program.

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### Endnotes

[1] Due to the imposed page limit, only a small part of the research is presented in this paper.

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## **Valuing form and function: Perspectives from practitioners about the costs and benefits of good apartment design**

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### **Abstract**

*Methods for placing values on good design are under-researched in Australia. Without a rigorous evidence base, costs are anticipated and benefits unrecognised. This paper presents an overview of the current state of the value of good design research for the built environment, and reports upon a series of interviews with experienced building industry stakeholders in Australia and the UK. The research finds that while the benefits of good design are recognised by building practitioners, these are not being consistently translated into exchange value and are therefore not being picked up in mainstreaming best practice. In order to raise the quality of design there is a need to develop ways to measure and articulate these benefits to housing producers and consumers.*

**Keywords:** Value; good design; apartments; building industry;

### **Introduction**

The built environment has value (CABE, 2002; Carmona, 2013). Typically this value is determined via capital costs, property values or other formal economic measures from a limited range of tangible considerations; location, function, aesthetics, return on investment and quality (Abdul-Samad & Macmillan, 2004; Cole, 2000). Designers, urban researchers and policy makers in the UK and the USA have also identified elements of value that are harder to quantify or are rarely considered (Brown, 2013; CABE, 2001).

Within the wider literature there is general agreement that 'good' design is that which improves value outcomes (Carmona, 2013; City of Melbourne, 2013b; Keck, 2013; Macmillan, 2006). The Commission on Architecture and the Built Environment (CABE) championed a range of research and policy development across the late 1990s and 2000s in the UK (CABE, 2001, 2002, 2003, 2007, 2010). This revealed that many good design elements are cost neutral, particularly if considered early in projects (Places Matter!, 2009). A range of benefits of good design have been identified in the literature and from case studies (CABE, 2001; Carmona, De Magalhães, & Edwards, 2002; City of Melbourne, 2013a; Macmillan, 2006; Places Matter!, 2009). These include increased sale/resale value, improved return on investment, lower maintenance costs, reduced

running costs, quicker planning approval, increased public support, happier and healthier occupants, improved sense of place and reduced crime.

Some research has led to values placed on elements of good design. For example, Bourassa, Hoesli, and Sun (2004) analysed nearly 5,000 house sales from Auckland, New Zealand, to determine the value of a view. The authors found that with the right combination of elements, an additional resale value of 59% could be expected from an unobstructed view of the natural environment. The value decreases as the quality of the element decreases (e.g. less of a view) and/or the distance from the view increases. Others (CABE, 2003; Kong, Yin, & Nakagoshi, 2007) have found similar results for nearby amenities. Conversely it has also been found that a view of something undesirable (e.g. another building) can decrease resale value (CABE, 2003). However, despite the progress CABE and others have made, the perception of the cost impost of good design has persisted, and there still is a dearth of robust evidence supporting the benefits of good design (Macmillan, 2006). Key challenges remain how to measure value in an uncontroversial and robust way and how to capture the value of good design (Abdul-Samad & Macmillan, 2004; Bole & Reed, 2009; Gann, Salter, & Whyte, 2003).

Poor design – an absence of ‘good’ design - locks in owners, the local community and cities to substandard urban environments, often for considerable time periods (City of Melbourne, 2013b). This is a real concern for policy makers (City of Melbourne, 2013a): Simmons (2012) argues that the structure of the residential development and construction industry encourages builders, owners and users to primarily think about their own requirements, with little consideration given to the wider urban environment, but that buildings and public space become part of the whole community’s habitat. *Prima facie*, there is market failure in the inability of the supply side of the market to accommodate (public) good design elements. This is only partly moderated by government planning and building regulations. Compared to many other OECD countries, Australia’s regulatory regimes are arguably more permissive of suboptimal outcomes than most (Beer, Kearins, & Pieters, 2006; Burke & Hulse, 2010).

Without a rigorous evidence base, the arguments for good design are too easily dismissed as part of an architectural discipline-based ‘belief’ system. As Brown (2013, p. 6) states ‘if we can establish the financial value of urban design, and find ways to make the non-financial value relevant to developers, then we can start to influence

behaviour' in decision making processes. This paper builds upon the value of good design research, from the UK and USA in particular, an initial literature review (Horne, London, Moore, Martel, & Alves, 2014) and presents initial findings from a pilot project looking at how to value the elements which are difficult to measure about good design in the built environment in Australia. The following section provides an overview of the research methods, and then analysis from interviews designed to explore the concept of value and good design in the Australian context. The analysis is discussed across four key themes: defining value, value in good design, design guidelines and design review panels.

## Method

Semi-structured interviews with 15 key building industry stakeholders from Australia and the UK were conducted over April-July 2014, with respondents in Victoria, New South Wales and South Australia, and two from the UK. Table 1 presents general characteristics of the stakeholders. An interview schedule was developed and interviews analysed to (a) inform an understanding of how value and good design is considered and measured across the building industry and consumers, and (b) inform approaches to improving value and design outcomes, such as through the use of design review panels or urban design guidelines. The occupant perspective on these issues is proposed for the next phase of the project.

**Table 1: General characteristics of the 15 stakeholders interviewed.**

Analysis Code	Area	Role	Location
<b>Vic-1</b>	Advisory body	General Manager	Victoria
<b>Vic-2</b>	Developer	Design Manager	Victoria
<b>Vic-3</b>	Developer	Project General Manager	Victoria
<b>Vic-4</b>	Architect	Director	Victoria
<b>SA-1</b>	Government	Principle Urban Designer	South Australia
<b>SA-2</b>	Government	Project Director	South Australia
<b>SA-3</b>	Landscape Architect	Director	South Australia
<b>SA-4</b>	Developer	Director	South Australia
<b>NSW-1</b>	Industry group	CEO	NSW
<b>NSW-2</b>	Architect	Director	NSW
<b>NSW-3</b>	Architect	Director	NSW
<b>NSW-4</b>	Architect	Director	NSW
<b>NSW-5</b>	Architect	Director	NSW
<b>UK-1</b>	Research	Professor	UK
<b>UK-2</b>	Research	Course Director	UK

## Results/discussion

This section presents analysis from the interviews across four main themes: defining value, value in good design, design guidelines and design review panels. Space limitations of this paper necessitate that only limited analysis can be presented here. A more detailed analysis and discussion from the project will be published in late 2014.

Defining value – Diverse views were expressed defining value in the case of the built environment. Some (e.g. Vic-3) defined value in terms of a more measurable quantum such as maximising return on investment while others (e.g. NSW-3) talked about value from a more qualitative/public good perspective when the outcome is ‘memorable spaces such that people want to return to them’. Even the two researchers from the UK who have been in this research space for a number of years found it hard to provide a concise definition of value. UK-2 said ‘There is no single definition of value, there’s just lots of different values’. Some respondents discussed wider values beyond those of the building industry or consumers. There was a general view that there is a need to further educate both the building industry and consumers about the value of good design. NSW-2 argued that in their 30 years of practice, not much has changed ‘in terms of appreciation of design as a commodity’.

Others (e.g. Vic-2 and NSW-1) believed the market was increasingly reflecting the appropriate level of value for good design and that consumers were aware about these elements. NSW-1 states ‘I think the market is probably providing the appropriate level of value reflective to the market place...so my belief is the market place is determining those market value propositions that they can afford and that they want to pay for’.

Value in good design - As with defining value, respondents expressed diverse views on good design. As NSW-3 summarised, ‘there’s this desire to create good design but no-one really knows what it is’. The stakeholders all spoke of various elements which they engaged with in their roles to indicate what good design outcomes looked like. One stakeholder (SA-3) spoke about how there has been a shift in public understanding of ‘good’ design in housing, reflected in a range of reality TV shows like Grand Designs and the Block – although they were cautious about the efficacy of this shift.

More broadly, the stakeholders felt that there were many other considerations for potential owners/renters which came before a discussion of good design. Location,

size, room numbers and cost were the overwhelming elements considered when making purchasing or renting decisions. Good design was either an afterthought, or it was assumed to be inherent. Respondents strongly referred back to the requirement for education in valuing good design. The needs for this education ranged from general awareness of public goods in the built environment, to cost/benefit implications of housing choices over time and beyond mortgage/rent, extending to housing as a service (e.g. operating and maintenance costs, mobility costs and time).

Design guidelines - Mechanisms to improve design outcomes were sought from respondents, including specifically their views of the use of design guidelines (e.g. SEPP 65 in NSW). These questions were placed at the end of the interviews and in the majority of cases, design guidelines were raised as important contributors to good design by the participant before the interviewer asked. The general feedback was that design guidelines have an important role to play to ensure good design outcomes. The feedback from NSW and SA, where SEPP 65 or similar guidelines are currently applied, is that it has helped to lift to bottom of the market and lift wider design and quality standards. However there was concern that such guidelines can become prescriptive and limit innovation. NSW-1 states 'There is no doubt that the quality of design for apartment building has gone up in NSW since SEPP 65 came in ...[however] good design comes from innovation rather than from regulation'. Vic-1 felt SEPP 65 was an 'extraordinary driver, it's simplistic and blunt ...you've got to have an architect on every project'. They were concerned about costs and impact on consumers.

Design review panels - Like design guidelines, review panels were introduced later in the interviews, and respondents in NSW and SA felt that they played an important role in improving design outcomes, particularly in conjunction with design guidelines. It was deemed generally a beneficial process to receive external expert advice. While there has been criticism in the literature that this expert feedback often comes too late in the design process, stakeholders in this project found that they were able to present to design review panels early enough to influence design outcomes, and some stakeholders said that they were actively encouraged to do so as early as possible. UK-1 said 'Its problem is the schemes don't go to design review until they're a very long way down the track...and at that stage it's more difficult to make changes.' While the design review panels were generally well received, there was a concern expressed

that design review panellists may 'promote their own aesthetic rather than people who are more objective to support the design of a designer' (NSW-1). Another concern was that the language of design review panels (architects) did not always align with that of developers, and clarity of advice was important for effective outcomes (SA-2).

## **Conclusion**

Measuring the value of good design is not well developed methodologically and, since the passing of CAFE, there is a gap opening up in knowledge of good design and how to encourage it. This study reveals that, while property markets reflect some elements of good design come of the time, for many reasons these markets are not 'perfect' and do not reflect good value to the public nor to a wide range of urban stakeholders. In the short term at least, interventions aimed at the development industry are likely to be most effective, and a logical starting point for this is a design review process in conjunction with guidelines. Design review panels can tackle less visible 'good' design such as ventilation, orientation, insulation and quality spaces around buildings. Across the building industry and consumers, such mechanisms can potentially bridge some of the market failures associated with an increasingly investor-based housing stock, where renters have little say up front, but have to live with consequences in a crowded, location driven housing market. While such interventions hold the possibility of reducing the worst excesses of 'bad' design, further work is needed to develop metrics for good design and to develop innovative mechanisms to encourage good design across multiple stakeholders in the built environment, and to explore alternative mechanisms to achieving good design outcomes.

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# Good Design as Professional Discretion: Planning Practice Perspectives

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**Abstract:** *An integrative Theory of Urban Design acknowledges the significance of substantive urban forms, emphasising the need to consider 'person-environment' relationships. Notwithstanding this theory's relevance, relatively little is known of how it is interpreted and delivered in practical ways by urban planning professionals. In interpreting what 'good design' means, our findings highlight that circumstances exist where successful use of planners' professional discretion seems to deliver better outcomes, functioning as one of their 'creative design tools'. Thus, to establish understandings of how cities are managed over time, and how particular good quality urban forms are actually delivered through or alongside planning, we demonstrate how links between site-based concerns are made with wider analyses of planning professionals' experiences during the interpretation of urban design policies.*

**Keyword:** Planning Professionalism, Good Design, Professional Discretion, Situated Judgment

## 1. INTRODUCTION

Major cities all over the world are experiencing a series of transformations, seeking to adapt to the current complexities of urban conditions. In this respect, the relevance of urban design as one of the important sub-fields of urban planning continues to be under debate. This is particularly relevant to the issue of upon 'whose values should aesthetic judgments be based?' (Hubbard 1994, p.271). At the centre of these confrontations are urban planning professionals, often blamed for their inability to refuse planning permission on grounds of poor design and their apparently ill-informed interference with the integrity of proposed designs. It is further noted that intended short term benefits envisaged from market-oriented urban development or planning often clash with the long term objectives of 'ideal' qualities of places (Kloosterman and Trip 2011). Due to these complexities of professionalism, some authors propose the progressive differentiation between urban design and urban planning (e.g. Dagenhart and Sawicki, 1992 and 1994; Frey, 1999 cited in Gunder 2011). Others continue to advocate strongly for the similarities between these two sub-fields, acknowledging the significant contributions of urban design dimensions in the maintenance of urban planning values that serve the *public interest* with respect to *social equity, democratic civil society* and *ecologically sustainable futures* (Gunder 2011). Our paper shares a perspective similar to the latter view, highlighting the significance of establishing understandings about how particular urban design policies are interpreted and delivered in practical



ways by urban planning professionals in their work. We suggest that the environment within which particular urban design policies are formulated and subsequently implemented is complex in nature. To respond to this complexity, a series of 'coping and adapting' strategies are articulated by planning professionals, enabling their use of relevant urban design policies to find solutions to planning issues. Our findings highlight that many instances exist whereby successful use of planners' professional discretion apparently delivers better outcomes, functioning as one of their 'creative design tools'.

The conceptual framework used in this paper to identify and understand how *discretionary* decision instances by professional decision making processes occur, draws on conceptions from social science scholars, adapted for the urban planning context. In his *Street Level Bureaucracy* framework, Lipsky (1980, p.3) defines Street Level Bureaucrats as 'public service workers who interact directly with citizens in the course of their jobs, and who have substantial discretion in the execution of their work'. He characterises these types of discretionary decision making processes as 'coping and adapting strategies' to complex policy implementation conditions. From the perspective of professionalism, Evetts (2002, p.345) considers professional discretion as an enabling tool that allows the professional 'to assess and evaluate cases and conditions, and to reassert their professional judgement regarding performance and treatment'. She suggests for this type of discretion to be used effectively, it requires all factors and requirements to be taken into decision equations, as a 'decision not solely based on the needs of individual client but on clients' needs in the wider corporate, organizational and economic context'.

The paper will firstly explore the key features of what constitutes 'good design' drawn from the perspective of *Integrated Urban Design* theory. The review into the relevant literature reveals that little evidence is currently available to illustrate how these design strategies are interpreted and delivered in practical terms by planning professionals in diverse statutory planning contexts. This gap situates the direction to which this paper aims to contribute. To guide our exploration, the second part of the paper discusses a conceptual application of Lipsky's Street Level Bureaucracy framework, attributing discretion as a critical dimension of public workers who regularly interact with citizens in the execution of their jobs. Next, the core element of this paper, the findings from our research inquiry into the English and Dutch

planning practice, will be discussed. Drawn from our exploratory interviews with fourteen planning professionals from these planning systems, decision instances exist where *discretionary* approaches have been adopted, particularly in interpreting relevant urban design policies, as well as in making sure multiple interests are taken into consideration appropriately and consistently. These particular discretionary decision processes involve a series of weighing and balancing up of various evidences to fit in into planning issues they were related with. Thus, it is argued here that establishment of understandings of how cities are managed over time, and how particular good quality urban forms are actually delivered through or alongside planning, is central to professionalism. To this end, we demonstrate how links between site-based concerns are made with wider analyses of planning professionals' experiences during the interpretation of urban design policies.

## **2. WHAT CONSTITUTES GOOD DESIGN?**

Integrative Urban Design theory acknowledges the significance of substantive urban forms, emphasising the significance of 'person-environment' relationships (Larice and MacDonald 2006). Sternberg (2000) conceptualises four key features that constitute 'good quality' design principles, which take into consideration the 'human experience of built form across property boundaries'. The first key feature is *good form*, defining desirable urban form and public spaces which take into considerations the relationship of buildings across space both aesthetically and integrity in terms of uses and functionalities between buildings. The second key feature is *legibility*, focussing on the significance of interconnectivities between parts of the city (e.g rivers, train tracks and distinctive buildings) to give the sense of "bearings" to its users. Urban *vitality* signifies the need to consider diversity during the design process, emphasising the prominent importance of coexistence and close proximity uses of spaces, creative forms of urban density and permeable building designs. The fourth key feature is *meaning*, promoting the significance of considering the different values people attach to particular places.

Many authors have contributed in taking into consideration this 'person-environment' relationship to conceptualise the key features of the 'ideal' good qualities of a place (e.g. Carmona, Tiesdell, Heath and OC, 2010; Carmona and Tiesdell, 2007). Notwithstanding Integrative Design Theory's relevance, at least to academics, relatively little is known about the experience of how these design principles are interpreted and delivered in practical ways by urban planning professionals during

development management processes within diverse statutory planning contexts. Our exploratory findings drawn from the context of the English and Dutch statutory planning systems contribute to this gap.

Building from renewed interest in planning professionalism that reasserts the significance of professional discretion in dealing with complex urban management issues relating to space and place (Vigar 2012), our main focus is to explore planners' exercise of professional discretion by examining the circumstances whereby this type of discretion seems to 'work well'. 'Successful' execution of discretion in this sense refers to the circumstances where the use of professional discretion results in productive balances between the need to align planning decisions with particular planning objectives, and the need to take into account considerations of related multiple interests (March, 2007; 2012). Further, good judgement is attributed to the diversity and quality of inputs into decisions which are made *deliberatively*, as opposed to individual intuition (Thiele, 2006; Forester, 1999).

### **3. LIPSKY'S STREET LEVEL BUREAUCRACY: BOTTOM-UP POLICY IMPLEMENTATION, PROFESSIONALISM AND DISCRETION**

'I maintain that public policy is not best understood as made in legislatures or top-floor suites of high ranking administrators. ... They do not represent the complete picture. ... I point out that policy conflict is not only expressed as the contention of interest groups, as we have come to expect. It is also located in the struggles between individual workers and citizens who challenge or submit to client processing.' (Lipsky 2010, p. xiii)

The central thesis of Lipsky's Street Level Bureaucracy (SLB) is the search for the place of the *individual* within the above complex public services environment. He refers to this *individual* as the street level bureaucrat: 'teachers, social workers, police officers and other public workers who regularly interact with citizens and have to capability to exercise discretion in the course of their jobs' (Lipsky 1980, p. xi). He discusses the complexities that these bureaucrats have to deal with, involving conflicts over the 'scope and substance of public services', 'limited availability of resources' and 'interaction of citizens' (Lipsky 2010,p. 3-23). Within this complex policy environment context, the exercise of discretion is considered as a defining feature of SLB, regarded as a critical dimension of much of the work of street level bureaucrats. With the limited availability of time, information and other decision resources necessary to respond properly to individual cases, discretionary decision instances by the street level bureaucrat are grounded in the '*routines* and the

*devices they invent* as their '*coping and adapting*' decision strategies to uncertainties and work pressure, effectively will become the public policies they carry out' (Lipsky 2010, p. xiii).

In current perspective however, there is emerging evidence suggesting a need to revisit Lipsky's SLB, challenging the applicability of the freedom afforded to street level bureaucrats in exercising discretion, particularly in light of a series of managerial controls brought forward by New Public management regime approaches. By focusing on public sector reforms in the UK since the 1980s, and drawing on their empirical studies from teachers and social workers' literature, Taylor and Kelly (2006) highlight the implications of an array of legislative and managerial prescriptions such as *inspection, target setting* and accountability to top-line management. They highlight the importance of democratic decision obligations to incorporate localised forms of governance that continue to constrict the space allowed for the exercise of discretion. They argue that the freedom for street level bureaucrats to devise their own rules and decision routines to cope with uncertainties and dilemmas of complex policy environment is no longer applicable, as these forms of discretion have been compromised by the work obligations and series of managerial prescriptions required by these respective public sector reforms. The street level bureaucrat has to meet respective managerial targets, or is the subject of close scrutiny, in order to ensure the legitimacy and accountability of their actions .

We argue that Lipsky's thesis of street level bureaucracy provides significant concepts that continue to have relevance for the study of micro-decision processes by street level bureaucrats, particularly in highlighting the freedom afforded to street level bureaucrats in exercising discretion, attributed as '*adapting and coping*' decision strategies to complex policy environments. In recent perspectives however, the applicability of this thesis seems to be challenged. The literature such as Taylor and Kelly(2006) suggests that the freedom afforded in keeping with Lipsky's SLB is no longer applicable in light of the managerial controls brought forward by New Public Management Regime. This inherently raises our research concern, is discretion really dead?

The following section suggests that the role of professional discretion remains and is relevant to good urban planning and design, attributed as *judgement and balancing of evidence and qualification for collective actions*.

## 4. INTERPRETING 'GOOD DESIGN' AS PROFESSIONAL DISCRETION

### 4.1. Methodology

The key arguments made in this paper are grounded in data drawn from an exploratory study aiming to establish understandings of the role and different types of discretion that professional urban planners exercise during development management processes. This study focussed on planning professionals working in public planning agencies, as it is through these planners the existing planning statute and government planning policy is enacted (Clifford and Tewdr-Jones 2013). The exploratory interviews took place in May to June 2013, involving nine English urban planners (five senior planning officers and four junior planning officers with more than ten working years and less than five working years in development management processes respectively) and five urban planners from the Netherlands (four senior planning professionals and one junior planning professional). The urban planning professionals from the English planning practice were identified and selected by a focal person from each of three local planning agencies in England. For the case of the Dutch urban planning professionals, the selection process was undertaken by a focal person from one of the local planning agency in the Netherlands.

During the exploratory interviews, the urban planning professionals were asked to discuss their current planning roles and responsibilities, interpretation of discretion in the context of professional decision making processes and examples of successful and failed exercise of discretion. A heuristic theory development approach was developed to explain the role of discretion in planners' professional decision making. The examples of 'successful' and 'failed' attempts using professional discretion discussed during these interviews were further examined to develop our knowledge of what might constitute 'success' and 'failure' in these discretionary decision instances.

The findings presented and discussed in this paper are *exploratory* in nature, so are not intended as generalizable to all types of discretion exercised in English and Dutch statutory planning systems. Rather, the decision circumstances explored are a snapshot of planners' discretion being exercised. Nevertheless, the selection of the urban planners involved in our

exploratory study was carefully determined to provide reliable insights into the role of discretion in their professional decision making processes. Further, the examples of successful discretionary decision instances will be discussed in the form of short vignettes. The use of vignettes is a common practice in planning research, used as a device to 'sensitise planning theory to the value of listening to practitioners' voices (Inch 2010, p.365; Forester 2010). To protect the privacy of these planners, they will be referred to in this paper by their respective case study subject identifier codes, assigned prior to the interviews, in accordance with ethics requirements.

#### 4.2. Evidence from English and Dutch Planning Practice Perspectives

The following case studies are used to illuminate the complexity of the environment within which a particular urban design policy is defined and implemented in practical ways by urban planning professionals. In these policy circumstances, it is suggested that there exist instances in which they are still expected to exercise their professional discretion in dealing with the unexpected and complex situations, during the management of development processes.

##### ***Managing Different Interests, Planner as 'Creative Negotiator': Historical value and Local Amenity vs. Personal Circumstances***

The first case study is quoted by E\_JP01 (case study subject identifier code; English Urban Planning professional with less than five years planning working experience) as an example of her recent successful exercise of discretion. She defined her professional discretion in this particular discretionary decision instance as '*the act of balancing different interests*' and '*as an exercise of judgement*' to assess relevant impacts in order to determine relevant evidence to be considered as 'material' to the development application under consideration. These definitions are clearly reflected in her Development Assessment Report, particularly the way she synthesised evidence and used it to determine the application fairly based on its merit.

The proposal involved a rear extension to a two storey mid-terrace property within a conservation area in the south-east of London. According to the Design and Access statement submitted by the applicant, the need for the

additional space is to accommodate a special needs child where the additional space would be used as a bedroom.

The planning regulations stipulate that the development site is affected by the directive of Article 4, whereby the permitted development rights on a site are removed due to heritage values. The building in question is listed by the local authority as having architectural and historical values. The existing planning policy framework sets constraints in terms of the type and scope of proposed development. New development is not permitted to alter the architectural and historical character of the site. Development allowed is normally only that which contributes towards the preservation or enhancement of character and appearance of the conservation area in which it is located. The scope of development is limited to a scale and design that is appropriate to the existing building and locality. The protection of the amenity of adjoining buildings is also 'material' to development decisions. In considering an application involving a rear extension, consideration needs to be given to minimization of impacts with potential for reduction of daylight, sunlight, privacy or a possibly interference to a pleasant outlook of the adjoining occupiers. Other relevant policy also relates to the potential relaxation of planning policies for residential extensions enabling disabled people to continue living in their own home.

While space does not permit full explication of the process, the application was determined by the planning officer, E\_JP01 under the relevant delegated power. The consultations and information gathering, including site visits and references made to previous planning decision cases, were coordinated by the planner. It is also important to consider how E\_JP01 manoeuvred within the discretionary space allowed to her to balance different interests, while at the same time aligning her decision with the existing planning policy objectives of the authority. On the one hand, she aligned her decision with existing policy objectives that aimed to deliver good quality of environment in a conservation area. On the other hand, she took into consideration the personal circumstances of the applicant, oriented to accommodating extra space for a disabled child. In doing so, E\_JP01 widened her scope not only to consider the development plan as the primary point of reference during the determination of application, but she also took into consideration other factors such as previous decision cases and the personal circumstances to the

applicant. She operationalized her discretionary space to hold an internal consultation with the applicant, advised the applicant to reduce the scope of the rear extension to the scale not only in compliance with the existing planning policy framework of the authority but also a scale that would not jeopardise the character of the host building and the amenity of the neighbouring occupants.

### ***Managing Conflicts, Planner as 'Mediator of Place': Developer's interest vs Public Interest***

The second case study is provided by D\_SP03 (case study subject identifier code for Dutch Urban Planning professional with more than ten years planning working experience). He attributes his successful exercise of professional discretion in this particular decision instance as 'an act of balancing different interests' in order to deliver collective outcomes, beneficial to the public at large. This act of balancing is reflected in the way the most appropriate development on the site is decided upon.

The proposed development was situated on one of the plots of the land formally occupied by an old post office. The council bought the land, which it later sold on to respective developers as part of the regeneration programme of the City of Amsterdam. Conflicts arose when one of the developers proposed to construct a mall, affecting part of the street which has cultural significance to the local community.

It is important to note in this discretionary decision instance, D\_SP03 uses his professional discretion in determining what is the most appropriate development on this particular site. He had to assess the benefit, *good for money vs good for the quality of the place*. In the end, he decided the *good for the quality of the place* outweighed *the good for money*. If the development was given approval to proceed, it would have meant that the council will benefit from the development approval fees however it also meant the street will be affected. In this particular instance, D\_SP03 chose to save the street, meaning that the quality of the place was considered more important, 'urban quality for the interest of all'. He uses his professional discretion to convince his manager that it was not a good idea to close the street because of the urban quality reason.



## **5. THE VALUE OF PROFESSIONAL DISCRETION AS A CREATIVE DESIGN TOOL IN PLANNING AND DESIGN**

The two case studies illustrate the complexity of the environment within which particular urban design policy is structured and implemented. Our results suggest that the exercise of professional discretion by urban planning professionals allows general conceptions of good quality urban design principles to be adapted to specific case by case planning decision contexts. Our exploratory observations into these cases illustrate that the successful exercise of professional discretion did indeed deliver better outcomes in these instances, resulting in productive balances between the need to align planning decisions with respective urban design policy goals and the need to take into considerations relevant multiple interests (March 2004; 2012).

In light of these results, the question arises: “is discretion really dead?” The results suggest that it is not, but also that it has changed in its nature. Although the character of the freedom advocated in Lipsky’s SLB is no longer the same as the freedom afforded to professionals to exercise their discretion in our two cases (bounded freedom), it does not mean that Lipsky’s SLB thesis is no longer applicable. Our results suggest that to implement planning policy in a complex policy environment, urban planning professionals must still be able to balance decision strategies that use and interpret multiple respective urban design policies that respond to the decision contexts they are dealing with. In professional terms, these rules do not emerge in a vacuum, nor do they represent personal values. As the results illustrate, the rules and the decisions they lead to are subject to the institutional setting within which their particular urban design decisions are framed, bounded in the context of respective urban design policy frameworks, and the relevant multiple interests they oblige to serve.

Hawkins (1992, p.3) suggests that ‘the use of rules involves a considerable degree of discretion, while the exercise of discretion is to a substantial extent guided by rules, though not necessarily by legal rules’. This point is highly relevant to the main aim of the paper: it is argued that, to establish understandings of how cities are managed over time and how particular good quality of urban forms are actually delivered through or alongside planning, it is necessary to refocus our attention to the micro decisions of urban planning professionals during the interpretation and

implementation of respective urban design policies. Our exploratory results demonstrate how links between site based concerns are made with wider analysis of planning professionals' experiences during the interpretation of urban design policies. Accordingly, professional discretion articulated by these professionals should not be treated as static. The bounded freedom afforded to these professionals should be seen as 'evolving according to the vagaries of public policy, changes in the organisations implementing policy and the expectation of service users' (Taylor and Kelly, 2006 p. 640). This statement however does not mean to imply the delivery of good quality of urban design should always be achieved via discretion as an improper use of discretion may affect the wellbeing and liveability of current and future generations. We argue that it is important to explore how discretion is actually interpreted and exercised in the actual context of professional decision making processes. It might even be said that too much focus on managerial prescriptions and control upon professionals tends to obscure our attentions on exploring the circumstances of when and where these types of discretion seem to work well or otherwise, and how the act of balancing is optimised to deliver collective outcomes.

## **6. CONCLUSIONS**

This paper focusses on reporting of findings drawn from exploratory interviews with urban planning professionals from English and Dutch planning practice perspectives. It provides a snapshot of the complexities within which respective urban design policies are formulated and delivered in practical ways. It is further suggested that the application of these policies is not a 'straight forward' exercise for the urban planning professionals involved during development management processes. Accordingly, a series of 'coping and adaptation strategies' were articulated by these professionals as a way to enable them to interpret and use relevant design policies to find solutions for the planning issues they are involved in (Lipsky 1980;2010,p.xvii). One of their creative design tools is the use of professional discretion, grounded in how relevant objectives of urban design policies are interpreted, balanced and weighed against the need to incorporate multiple interests during the planning decision processes (Evetts 2002). Our findings highlight decision instances where urban planning professionals have achieved success by incorporating diverse considerations and sets of evidence, to establish better understanding of the planning issues they were dealing with (Thiele 2006). In

these deliberative decision instances, it is further suggested that effective use of professional discretion opens up opportunities for better urban outcomes to be achieved. Thus, to establish understandings of how cities are managed over time, and how particular good quality urban forms are actually delivered through or alongside planning, we demonstrate how links between site-based concerns are made with wider analyses of planning professionals' experiences during the interpretation of urban design policies. This social science perspective, directing examination to a 'judgment centric' approach, enables better understandings of this type of discretionary decision-making in the ways they are actually exercised in institutional and regulatory settings. Having said that, by focusing attention to judgment-centric discretion (Hawkins 1992; 1992a), it does not mean we are detaching ourselves from 'power centric' understanding views (Booth 1996). This perspective is equally important. It is necessary to understand planners' intentions, the policy context, and decision circumstances in exercising discretion in their professional decision making processes.

It is intended the main outcome of this discussion is to open up opportunities for ongoing research and discussion, to inform the ways that 'better', 'worse' or other measures of professional discretion might be understood and measured. Thus, it is important to establish a clear understanding of the different types of discretion being exercised by planning professionals within diverse statutory planning contexts (development-led and planning-led statutory planning types) before a framework can be developed to consider discretion, how to deploy discretion in the most beneficial way, and the many variations and perspectives this might involve. An evaluative framework can be built to identify what might constitute improved use of professional discretionary decisions, including the circumstances of where and when these different types of discretion are exercised, and the ways that this can be encouraged, particularly in institutional settings towards.

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**Selecting quality ingredients for the urban consolidation recipe:  
user design of medium-density housing**

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**ABSTRACT**

*In the promotion of urban consolidation recent and current metropolitan plans for Australia's capital cities call for universal increases in the provision of medium-density housing as an essential ingredient for a more sustainable urban future. When metropolitan plans call for medium-density housing little guidance is provided beyond suggested heights and densities. While minimum standards for quality and design are either enforced or suggested in a range of jurisdictions, planning documents arguably need to provide more attention to the variety of medium-density housing types possible and how they impact consolidation outcomes. Given this lack of specificity in metropolitan plans, who decides what to build? How is the design brief determined? Is there an alternative?*

**Keywords:** medium-density housing, design, metropolitan plan, development risk, Australia

**INTRODUCTION**

To successfully prepare good food one requires quality ingredients and a plan for how to put them together. So too does a good city, activity centre, node or neighbourhood. When a cake or biscuit recipe calls for flour it deliberately specifies the grain, texture and degree of refinement required to achieve the desired outcome. When ordering a cooked breakfast on a lazy Sunday morning wait staff will undoubtedly enquire as to what cooking method you prefer for your eggs. Without this information clarifying both the practical effectiveness of ingredients and consumers personal preferences it is highly unlikely the plated outcome will make best use of the ingredients/resources at hand or meet the needs/desires of the intended consumer. In contrast, the typical recipe for urban consolidation seldom provides guidance to the qualities of ingredients or their method of production (see text box).

**Typical Urban Consolidation Recipe:**

1. Mix together all 'grounded' ingredients: medium -density housing, quality public spaces, retail spaces, offices, and community and health services.
2. Shake well and distribute liberally adjacent to public transport corridors, interchanges and stations.
3. Ensure the mix is mounded highest at its centre and tapers gradually to the edges.
4. Cook continuously (avoiding stirring) until a resilient, sustainable and cohesive community develops with a unique local identity.
5. Cool on cooling rack and enjoy your new TOD/Activity Centre/ Livable Neighbourhood with lashings of locally produced cream and lemonade.

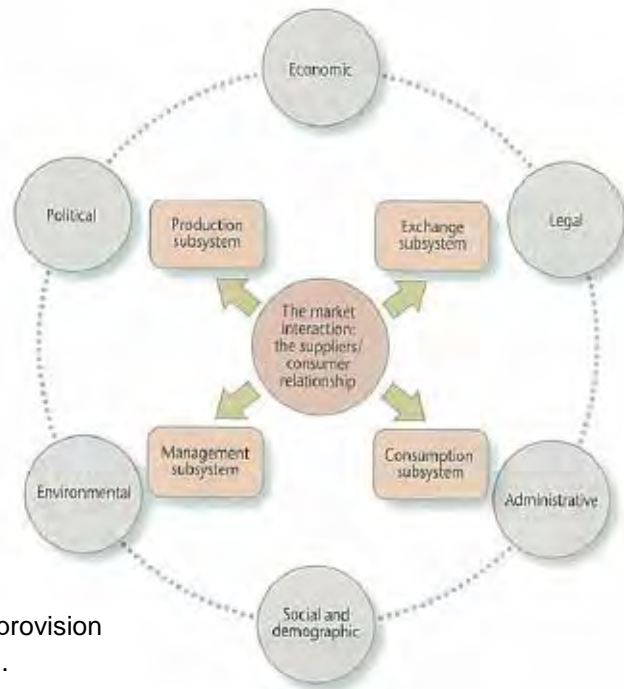
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Whilst all recent and current Australian Metropolitan Plans place emphasis on the increased provision of higher-density housing in existing urban areas over the coming decades, they generally fail to suggest desirable qualities beyond the measures of maximum height and number of dwelling units per hectare. Depending on one's previous residential experiences higher-density housing may conjure images of exploitative workers tenements of the Industrial Revolution, opulent apartment hotels of early 20<sup>th</sup> Century New York, Le Corbusier's communally minded Unité d'Habitation buildings, the 3-5 storey walk-up buildings which define the active urban streets of many thriving European cities, or the social failures of now demolished public housing tower projects in the US and UK over the past 50 years. This brief list of typologies is by no means an inclusive higher-density housing history, yet even these few examples demonstrate a diversity of design processes, built outcomes, social amenities and tenures. Hence, when The 30-Year Plan for Greater Adelaide (as just one example of an Australian Metropolitan Plan) calls for "a new urban form"<sup>i</sup> featuring a "mixture of dwelling types, with an emphasis on medium-density dwellings"<sup>ii</sup> to meet the challenges and opportunities of our common urban future how is the type of flour selected and who decides how the future occupants would like their eggs? This paper reviews existing literature and current Australian medium-density housing (MDH) provision systems to respond to these questions. It then introduces some alternative methods which re-combine the MDH ingredients to enhance the consolidation recipe.

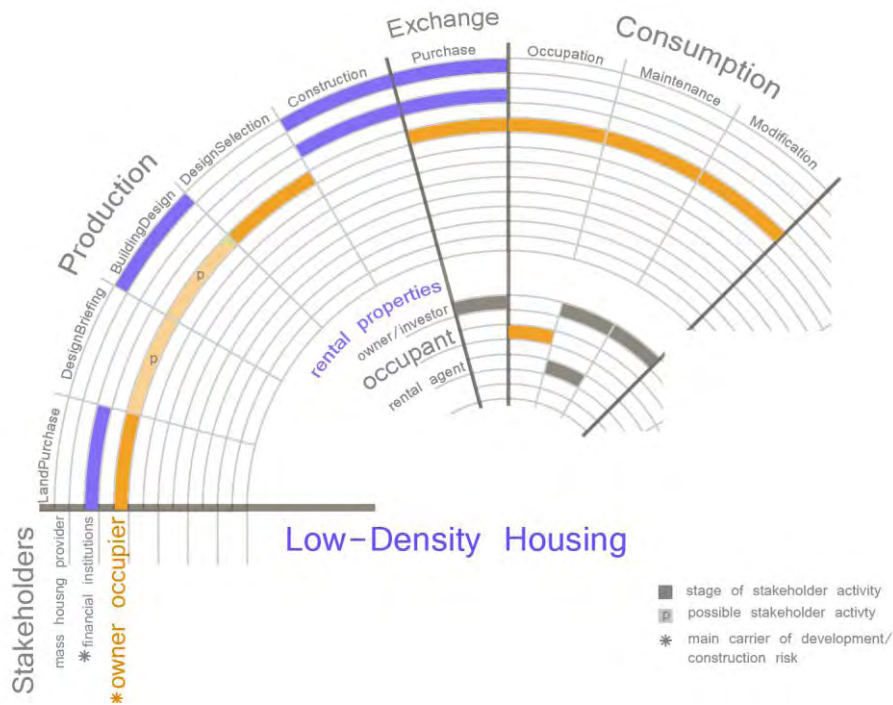
### **THE CURRENT INGREDIENTS– EXISTING MDH PROVISION**

As a nation dominated by owner-occupied dwellings, Australians are relatively familiar with the provision processes for low-density free-standing dwellings. Created primarily through contract based construction, rather than speculative construction more common in the UK and US, low-density housing provision in Australia allows the owner-occupier to engage with site selection, dwelling design and fitting specifications. The contracting owner becomes responsible for financial risks associated with the project and, in the case of owner-occupiers, place initial importance on use value. The resultant dwellings frequently feature a high level of similarity with contemporary neighbours but nonetheless allow households to express their individuality as they 'wrap'<sup>iii</sup> their lifestyle around the dwelling over time. Through this process owners are actively engaged with three of the four sub-systems of housing provision described by Burke and Hulse<sup>iv</sup>, namely the *production, exchange and consumption sub-systems*. See Figures 1 and 2.

In contrast, current MDH provision is a more complicated process with less transparency from the perspective of the dwelling owner or occupier. The craft-based construction systems of low-density housing is replaced by more commercial/industrialised<sup>v</sup> construction



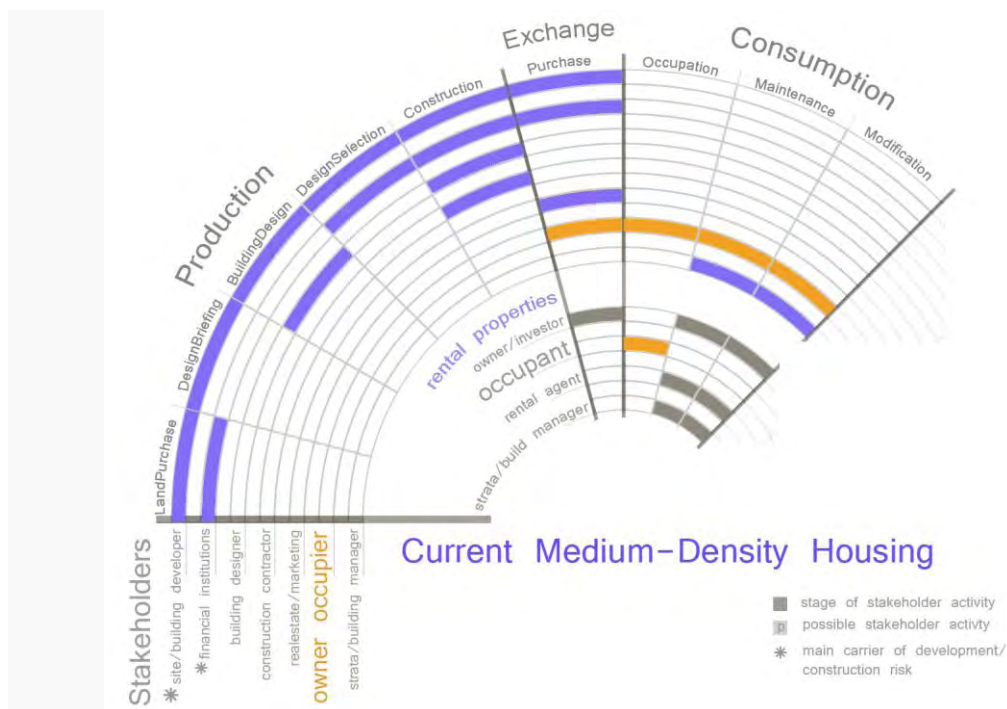
**Figure 1:** Sub-systems of Australian housing provision as described by Burke and Hulse (2012, p.36).



**Figure 2:** Stages of involvement of primary stakeholders in LOW-DENSITY 'Contract Based' Housing Provision (Post greenfield land development)

systems and the contract-based (demand led) provision replaced by speculative investment (supply led) provision. Hence, MDH owners and occupants are not able to engage with housing production decisions and are invited to participate in the *exchange* and *consumption* subsystems only (see Figure 3).





**Figure 3:** Stages of involvement of primary stakeholders in exiting MEDIUM-DENSITY Housing Provision

The term ‘Medium Density Housing’ unfortunately does not benefit from a consistent definition across jurisdictions, nor is density information identified in Australian Bureau of Statistics housing data. The Planning Strategy for Metropolitan Adelaide defines MDH by net density only (35-70 dwelling units per hectare du/h).<sup>vi</sup> For the purposes of this project this definition is ineffective as the measure of du/h alone does not provide sufficient information as to housing outcomes. This project is also interested in housing attributes beyond density such as ownership and title types, provision methods, development size, location etc. The medium density housing (MDH) relevant to this research project is that which is (1) located in areas of our cities designated for urban consolidation, (2) in strata or community titled buildings of 4-60 dwellings, (3) three storey or higher and (4) with a land use of 75-150square metres per dwelling (net density of 65-130 du/h). In the existing provision system, housing of this type is typically constructed by small to medium scale speculative developers via the process shown in Figure 3.

The absence of owners and occupiers from the MDH *production sub-system* leaves control of dwelling design in the hands of developers and financiers whose primary objective is to maximise development profits. Given the direct relationship between project size and risk (planning, project and market risk<sup>vii</sup>) this means fundamental decisions about housing design, amenity, typology and usability are made via a risk adverse lens privileging

market/exchange value over use value. Hence profit and risk can be seen to have greater influence on MDH than the preferences of the occupant households. It is estimated that 70 percent of new medium and high density dwellings are purchased by investors rather than occupiers<sup>viii</sup>. This further exaggerates the role of MDH as a product of exchange, promoting the construction of smaller dwellings able to provide ideal rental returns.<sup>ix</sup>

Perceptions of risk and risk avoidance by developers and financial institutions lead to repetition of proven designs and discourage innovation or deviations from the norm<sup>x</sup>. Risk avoidance therefore limits the ability of MDH to evolve over time and meet the desires and needs of our urban future. Whilst MDH provision continues to repeat past models it will inevitably reinforce the existing MDH experience, which statistically includes:

- low owner-occupation rates of around 30% compared to 77% in low-density housing<sup>xi</sup>
- high rates of occupant relocation compromising community networks<sup>xii</sup>
- perception of MDH as a stepping stone toward the attainment of ‘the great Australian dream’ rather than as housing equally able to accommodate that dream<sup>xiii</sup>

This existing MDH experience falls short of the intentions of the Metropolitan Plans in relation to the desirable qualities of MDH environments for Transit Oriented Developments (TODS), Activity Centres, Transit Corridors etc. Past studies<sup>xiv</sup> have demonstrated significant segments of the populations of Melbourne, Sydney and Adelaide seek to participate in urban consolidation as owner-occupiers but do not view the existing MDH product as meeting their needs due to its investment driven design and lack of flexibility.<sup>xv</sup> More than adequate skills exist within the design and construction industries to address the needs of individual households in MDH environments, including the design of flexible spaces which enable the familiar ‘wrapping’ of one’s life style about the home. However, the ability to implement such a demand-led process is limited by the *management sub-system* described by Burke and Hulse as “housing and housing related policy at all levels of government”.<sup>xvi</sup> So, whilst we can design it, design cannot solve these challenges alone.<sup>xvii</sup> If MDH environments sought by Metropolitan Plans are to be achieved a greater diversity of MDH provision methods need to be enabled through modifications to the *management sub-system*; modifications which encourage user input in design, prioritise use value, increase dwelling mix and promote design innovation.

## **INTERNATIONAL RECIPE TRENDS: ENABLING USER INPUT IN DESIGN**

International examples of non-speculative MDH development provide insights about user-input into MDH design. One well established example is the Baugruppen (or Baugemeinschaft) movement in Germany. Baugruppen (building groups) are formed by a group of households who work together to design and realise their own dwellings.<sup>xviii</sup> They

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are often based around common interest groups such as retirees, families, gardeners, eco-living enthusiasts etc. Over the decades since the instigation of Baugruppen building groups various jurisdictions across Germany have proactively created administrative structures to support occupier-designed group projects<sup>xix</sup> and financial institutions have developed products to support multi-household private developments<sup>xx</sup>. Numerous architectural and building firms have also specialised in providing services to Baugruppen and many groups have produced innovative buildings which would likely have been perceived as risky by conventional developers and financiers. Each Baugruppen project expresses a degree of individuality and whether the group chooses to construct entirely privatised spaces or co-housing environments they all aim to meet the known needs of the known inhabitants, rather than the generic desires of an unknown household. As development risk is relocated to the owners costs are reduced, market risk is reduced from the perspective of the financiers, and marketing costs are eliminated. Baugruppen projects are typically delivered at a financial saving of approximately 25% in comparison to an equivalent market product,<sup>xxi</sup> effectively lowering the threshold for participation in home ownership.

As a city with many potential sites for urban infill Berlin has one of the highest rates of Baugruppen constructions, which are spread across the city on individual sites. Perhaps the most well-known examples of larger Baugruppen development occurred in Tübingen and Vauban commencing in the 1990's, where individual building groups realised the large scale urban development of entire neighbourhoods over time. As each building group constructed their individual projects, governed by overarching municipal masterplans, the neighbourhoods evolved. City governments supported the process by facilitating group formation and provided appropriately long settlement periods on land options, enabling groups to finalise their internal processes before final commitment to land purchase.

The success of an alternative MDH provision system is inevitably related to the housing *management sub-system* within which it exists. In this case the *management sub-system* has adapted over time to support a housing movement which grew from bottom-up urban concerns in the 1970's<sup>xxii</sup> and has evolved into a successful system of collaboration between individuals and industry to ensure desirable housing outcomes.

Similar governmental support is currently on offer to Collective Custom build projects in the United Kingdom. The UK housing market has a long history of speculative provision across a range of densities, with large-scale development companies dominating the industry. At the same time as Australian Metropolitan Plans are promoting a decrease in user involvement in housing design by encouraging an increase in speculative development, the UK Department for Communities and Local Government is introducing programs to move

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away from speculative construction. The aim is to reconfigure the *management sub-system* to increase rates of 'custom build' housing<sup>xxiii</sup> in the interests of increased dwelling diversity and affordability. In 2011 a short-term finance fund of 30 million pounds was announced to support group custom build schemes by covering costs such as land acquisition, site preparation, construction and professional fees. The fund is solely for multi-unit group projects "with the objective of bringing forward sufficient numbers of successful schemes to demonstrate to commercial funders that the lending model is a viable and sustainable business which can be taken forward by industry."<sup>xxiv</sup> In addition government owned sites are being actively identified and released exclusively for custom build development.<sup>xxv</sup> One such urban consolidation site is MiddleHaven, where collective custom build groups are currently being invited to become 'pioneers' and catalyse the redevelopment of an underutilised urban precinct currently viewed as economically unviable for mainstream development. With a masterplan in place, there are many similarities between the process proposed here and that undertaken in Tübingen and Vauban.

Reflecting upon a history of speculative housing production Architect and Strategic Designer Alistair Parvin suggests it:

*led to a tendency for the design of houses to prioritise supply-side economy and short-term asset value over long term sustainability or actual use value. Housebuilders were operating on a build-to-sell basis in a market where almost anything sold: often to buyers who themselves were more interested in properties as capital investments rather than as places to live.....In reality what we were constructing were not dwellings, but monopoly houses: financial assets made into thin replicas of human dwellings.*<sup>xxvi</sup>

Australian scholars<sup>xxvii</sup> agree that when a small number of development firms operate in a market a loss of diversity of housing types and tenure types occurs together with reduced affordability. Current UK policies aim to reconfigure the *management sub-system* to facilitate self-provided housing, "making it easier for ordinary people to produce things for themselves."<sup>xxviii</sup> These top-down policies enable opportunities for bottom-up innovation, supporting a 'prosumer'<sup>xxix</sup> revolution across both low and medium-densities.

Both the UK and German models (one in infancy and the other well matured) eliminate the developer and relocate risk to the owner, keeping financial costs down for participants at the same time as returning the primary value of housing to that of *use*. Both also lower the economic threshold for participation through risk and profit cost reduction, enabling home ownership for households who would be excluded from the equivalent market product.

Alternative procurement models without pro-active government support also exist. They are most common in places of volatile or insecure financial markets. In these markets they enable groups to assume risk on projects where developers are unwilling. These

procurement models are forced to exist within the confines of a developer based management system and in recent years minor legal changes to mainstream development systems in both Argentina and Israel have had the unintended consequence of reducing the ability of alternative provision to occur and hence reducing user input in design. Proactive support from government authorities and non-government actors in the housing management sub-system is essential for both the launch and the on-going viability of alternative procurement methods.

### **ALTERNATIVE INGREDIENTS ARE POSSIBLE: USER DESIGN IN AUSTRALIA**

A small number of innovative examples of MDH provision are being pursued in Australia by individuals and groups seeking to navigate an alternative housing pathway to that offered by the existing system and enable owner-occupier input in design. Four examples have been investigated through document reviews and interviews with instigating parties.<sup>xxx</sup> Each of these projects has been instigated by individuals and professionals frustrated by the existing MDH provision methods and the restrictions it places on future residents. Whilst no one example purposes to provide a universal solution for all, collectively they illustrate that options do exist for user input in design and development in Australian MHD. Four examples, both built and in progress, are described in Table 1 with an emphasis on how they differ from existing MDH provision, the degree of design input enabled, and the relocation of risk. Each of these examples varies the extent and location of risk in the development process, which offers the potential for significant financial savings. Importantly, they eliminate the greatest risk – that of not knowing who will be the building occupants. Each example takes a different approach to occupant engagement in provision and requires different levels of individual time commitment ranging from relatively minor in examples 1 and 2 to a high level of personal investment in examples 3 and 4.

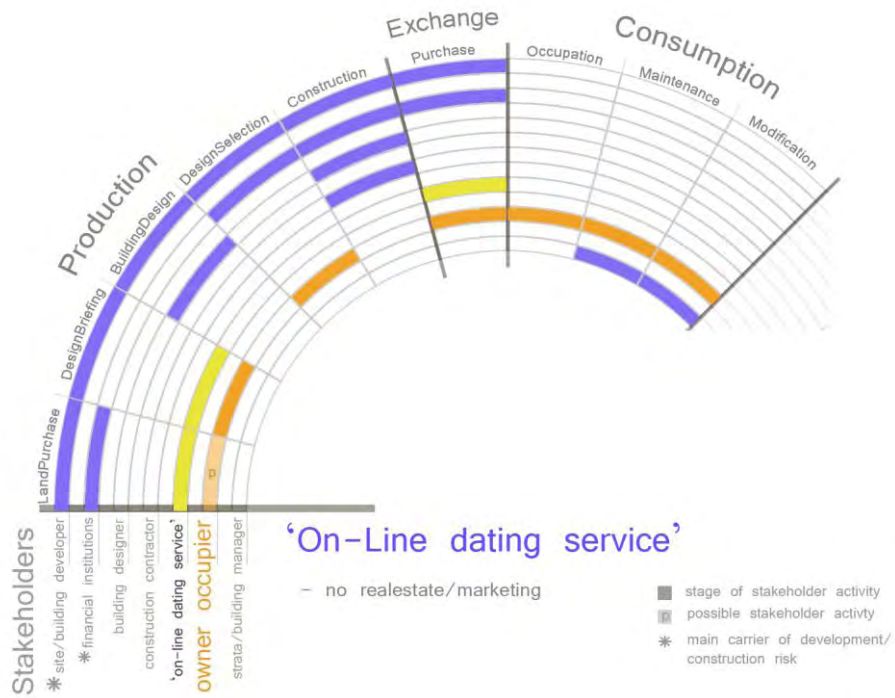
Figures 4-7 show how the four examples differ from existing MDH provision in relation to primary stakeholders' involvement in the *sub-systems of production, exchange and consumption*. Comparing these to Figures 2 and 3 it can be seen that owner involvement in design is increased in all cases and becomes similar to that of traditional low-density housing provision. Additionally, examples 3 and 4 extend the role of both 'developer' and 'owner' over the life time of the project as the former is constituted of the later. This is in contrast to the typical system (repeated in examples 1 and 2) in which the developer and builder's relationship with the project is terminated at the completion of construction and arguably encourages lower quality outcomes due to lack of ongoing investment.

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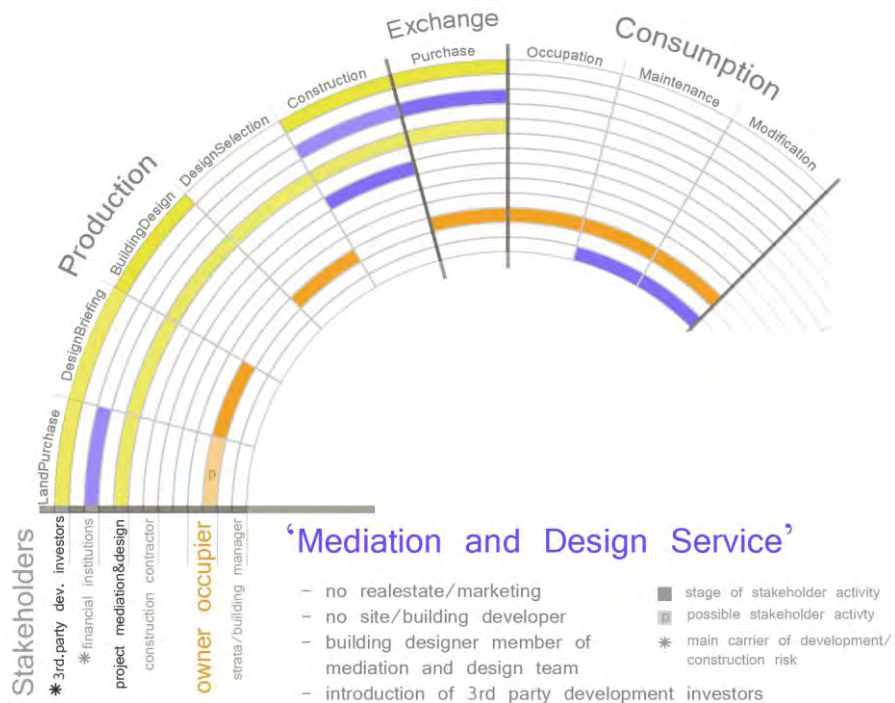
**Table 1:** A comparison of Australian alternative MDH provision projects under investigation

<b>Example 1. 'On-Line dating service' Commenced 2013. Groups being formed.</b>	
Differences	Combines crowd sourcing and smart marketing in on-line platform to form groups of likeminded households. Groups formed are paired with an architect and developer to realise the project.
Extent of design input by owners	Moderate. Interested parties indicate personal preferences via on-line platform. The group formed meets with designers 3 times during design development. Some personal choices in finishes. The instigator's intention is to avoid excessive input or 'design by committee' due to possible time delays resulting
Risk & Cost	Risk to financial institutions and developers reduced as purchasers are pre-committed, effectively representing adequate pre-sales for financial approval for development. This should represent a saving through reduced marketing and financing costs. Additional costs incurred to utilise the service.
Instigators Motivation	Experienced Architect seeking a means of enabling innovation in the medium-high density housing market by side stepping the restrictive developer driven brief.
<b>Example 2. 'Mediation and Design' Commenced 2013. Early project stages.</b>	
Differences	A client group is formed through registration of interest prior to site selection. Client group formulates project brief. Design team acts as 'mediator' between the client group and the financing developers.
Extent of design input	Moderate. Client group formulates project brief. Designers provide a range of options or possibilities within the budget. Group selects common options. Individual selection of interior finishes.
Risk & Cost	The usual developer model of finance is not significantly altered. The risk normally associated with atypical design is avoided through pre-sales. Use of independent project manager proposed to limit construction risks. Marketing costs removed.
Instigators Motivation	Young architects and property specialists seeking more collaborative living environments. Focus on 'good design', small living spaces and the inclusion of shared facilities.
<b>Example 3. 'Collective Development' Initial Project completed 2013. <sup>xxxxi</sup></b>	
Differences	A group of individuals form a company which purchases land and acts as a private developer. At completion of project the company is dissolved and individual dwellings sold to members.
Design input	Highest level of design input into brief, site design, building and individual interiors.
Risk & Cost	Company, composed of the individual members, takes 100% risk. Owners personally realise the profit usually paid to developer. No marketing costs. No stamp duty tax payable. Resultant property values in the initial project greatly exceeded costs, realising a significant profit (or saving) for members.
Instigators Motivation	25-35 yr old professional individuals and relatives previously known to each other. The intent was to build properties for rent as part of personal property portfolios. Unexpectedly, all units were occupied by owners after completion of construction.
<b>Example 4. 'Cohousing collective partnered with community housing provider.' In design.</b>	
Differences	Group formed well in advance of site selection. Community Housing Provider (CHP) acts as developer, accessing finance through existin portfolio. Rental community housing combined on site with owner-occupied residences. Cohousing members contribute an equal share of land purchase expenses at time of purchase. At completion individual units sold to group members except those retained by CHP.
Design input	High, including group design of shared external facilities and gardening spaces.
Risk & Cost	CHP provides access to cheaper finance. Developer and marketing costs avoided.
Instigators Motivation	A group of mid aged professionals seeking an alternative to the developer designed model of city living, including collaborative use of space and gardens.

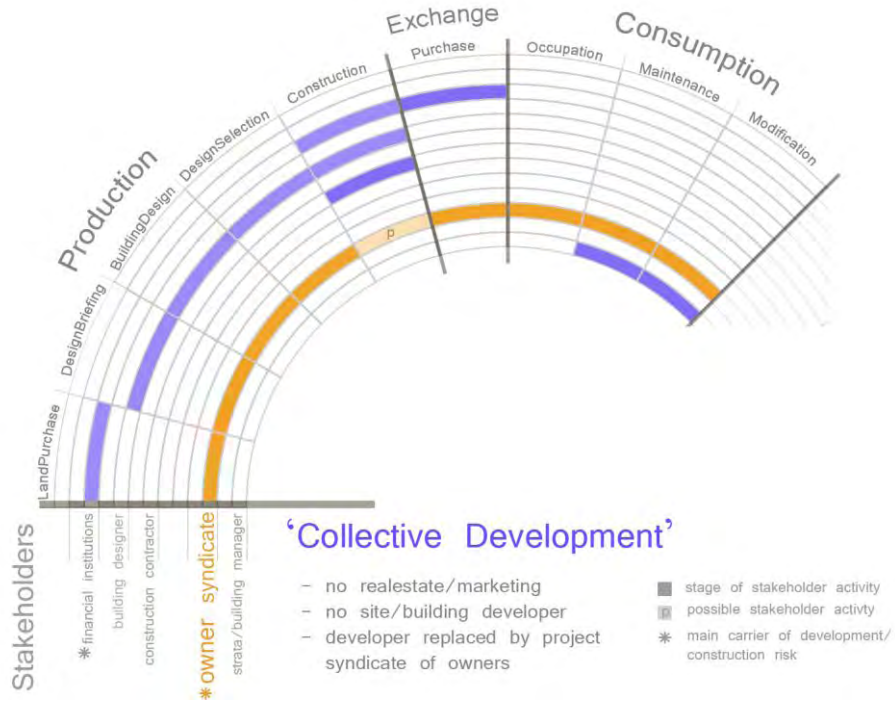
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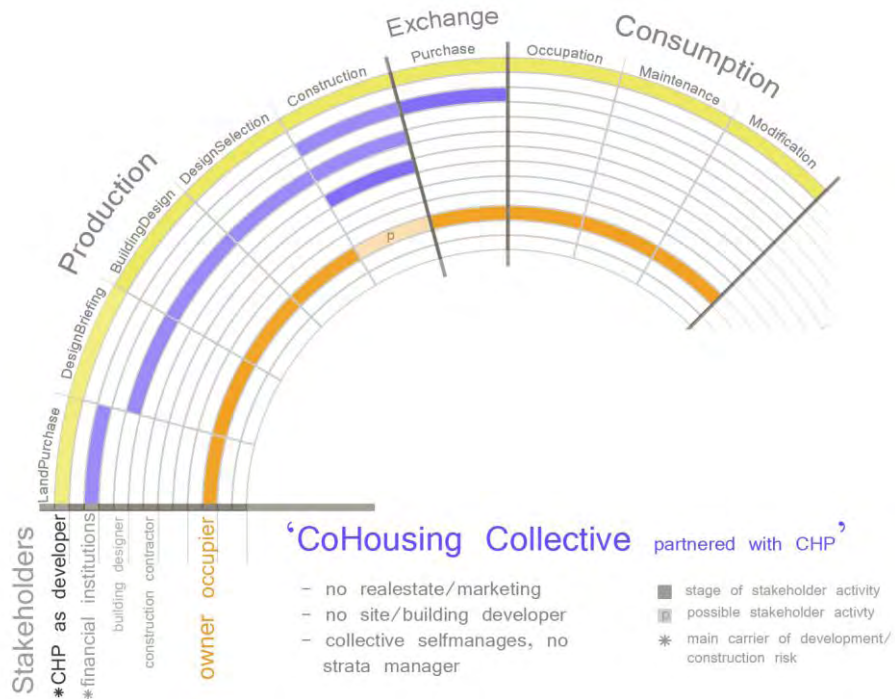
**Figure 4:** Stages of involvement of primary stakeholders in Example 1: ‘On-line Dating Service’



**Figure 5:** Stages of involvement of primary stakeholders in Example 2: ‘Mediation and Design Service’



**Figure 6:** Stages of involvement of primary stakeholders in Example 3: 'Collective Development'



**Figure 7:** Stages of involvement of primary stakeholders in Example 4: 'CoHousing Collective partnered with Community Housing Provider'



One attribute these four examples have in common is that they exist within the established *management sub-system* (policy, planning, financial, institutional and contractual systems of development). They seek alternative outcomes within boundaries which have evolved to meet the needs of the existing developer led system of MDH provision. Each project has been required to negotiate challenges created by existent boundaries, including contractual restrictions and the lack of suitable financial products.<sup>xxxii</sup> These projects are pushing the existing system boundaries and over time will provide guidance both for similar future projects and for an understanding of how the *management sub-system* might evolve to facilitate ongoing MDH innovation in urban consolidation.

### **COOKING METHODS – STIR THE POT**

As a prospective MDH owner-occupier of an urban consolidation project in an Australian city it is likely that a banker and a developer will decide how I like my eggs cooked – and they will do so assuming I am the purchaser of the eggs but not the end consumer. International examples and recent Australian projects show us this does not need to be the case. The one-size-fits-all result of risk adverse design decisions is not appropriate for the diverse range of households attracted to living in the vibrant urban consolidation areas promised by Metropolitan Plans. If MDH is to become an accepted alternative to the free-standing Australian dream for a portion of the population, as required to effectively increase urban density and sustainability over time, a degree of disruption of the existing *management sub-system* is required to enable a more innovative approach, including increased owner input in design. Reflecting on decades of experience in UK housing development and policy Nabeel Hamdi observes:

*In the old days, when it came to expanding supply – whether of goods, services, utilities or housing – and doing it equitably and effectively, we thought it best to centralize decision making and production so that resources could be concentrated and focused where need was greatest ..... Big was beautiful, small was difficult and not very efficient..... The fewer people and organizations involved, the easier and quicker it would all be. We now know the truth is somewhere between large organizations and small ones, centralized and decentralized..”<sup>xxxiii</sup>*

Current Australian housing provision systems are arguably entrenched in Hamdi’s ‘old days’, continuing to support the centralisation of provision of urban consolidation projects. The use of Precinct Plans under the 30 Year plan for Greater Adelaide, for example, encourages large scale precinct redevelopment by developers, fast tracking planning applications for the *big* and promoting repetition of existing MDH provision without making equivalent pathways of opportunity for the *small* and the innovative. Without a disruption to this system MDH options remain limited and metropolitan plans continue to prop-up the existing developer and investor led system of MDH provision with its less than desirable outcomes.

## CONCLUSION: *SMALL* ENHANCES THE URBAN CONSOLIDATION RECIPE

Whilst the *big* is essential to focus on long term urban progress and maintain large scale strategies, a suitable disruption to the existing *management sub-system* would be to encourage effective layering of the *big* and the *small*; promoting the development of small sites by alternative provision methods (such as those group projects described above) within the larger context of precinct wide consolidation plans. Designating a portion of MDH in each consolidation area to be designed and constructed outside of the existing provision system will increase housing options and reduce the excessive financialisation of the city currently occurring in areas of consolidation.<sup>xxxiv</sup> This will provide alternative MDH ingredients to the consolidation recipe, ingredients with greater variation in grain, texture and degree of refinement. The new MDH ingredients produced with owner input in design can provide greater variety than possible within the existing *big* profit-driven approach. Variety in design amenity, material realization, social fabric, tenure and urban texture assist in achieving “opportunities for denser, healthier and more liveable urban projects through greater infill opportunities and renewal of existing suburbs.”<sup>xxxv</sup> Such user-designed MDH projects are arguably higher quality ingredients for urban consolidation than existing MDH as they are able to make best use of the resources at hand to meet the needs/desires of the intended consumer into the future.

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<sup>i</sup> Government of South Australia Department of Planning and Local Government (2010). The 30-Year Plan for Greater Adelaide: A volume of the South Australian Planning Strategy. Adelaide, p. 53.

<sup>ii</sup> *ibid*, p.46

<sup>iii</sup> Burke and Hulse describe Australian low-density housing as providing a “wrap-around housing tenure’ because it is the form of tenure that enables households to add on, or wrap around it, the aspirational lifestyle that individualistic Australians value.” “Unless you own the dwelling and have the external space, you cannot wrap these things around the dwelling.” Burke, T. and K. Hulse (2010). "The Institutional Structure of Housing and the Sub-prime Crisis: An Australian Case Study." *Housing Studies* 25(6): 821-838.

<sup>iv</sup> Burke and Hulse describe the Australian housing system as comprised of four subsystems: Production, Exchange, Consumption and Management, all of which are influenced by economic, legal, political, environmental, administrative, and social and demographic factors. Burke, T. (2012). The Australian residential housing market: institutions and actors. *Australia's unintended cities*. R. Tomlinson. Collingwood, CSIRO: 35-49.

<sup>v</sup> Discussing housing provision in developing countries Turner outlines the negative impact of industrialised scale construction which alienates the user from both production and effective maintenance. Turner, J. F. C. (1976). *Housing by people : towards autonomy in building environments*. London: Marion Boyars.

<sup>vi</sup> The Planning Strategy for Metropolitan Adelaide defines MDH by net density only (35-70 dwelling units per hectare du/h), correlating it approximately to construction of 4-10 stories. The Government of SA ‘Understanding Residential Densities Handbook (updated October 2011 to reflect changes in the planning strategy) however, provides examples of ‘medium density housing’ within the defined density range varying from single storey semi-detached dwellings to two storey town houses. Three storey town houses are included in the handbook as examples of high density housing (not medium) together with single storey row cottages and high rise apartments as they all have densities over 70 du/h. The exclusive use of density is not effective to define housing types.

<sup>vii</sup> Parvin, A., D. Saxby, C. Cerulli and T. Schneider (2011). A right to build. *The next mass-housing industry*. Sheffield, University of Sheffield School of Architecture.

<sup>viii</sup> Keck, S. (2013). The Value of Good Design. *Charter Insight*, July 2013, Melbourne.

<sup>ix</sup> Charter Keck Cramer (2013), *Charter Insight* October 2013, Melbourne.

City of Melbourne (2013). *Understanding the Social Outcomes of Housing*, SGS Economics and Planning and AHURI, Melbourne.

Property Council of Australia (2012) *Making the Numbers Stack Up. A Study into Major Residential Urban Renewal In Melbourne*, Charter Keck Cramer, Melbourne.

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<sup>x</sup> City of Melbourne (2014) op.cit. p.30.

<sup>xi</sup> Troy, P. N. (2012). Accommodating Australians : Commonwealth government involvement in housing. Annandale, N.S.W., Annandale, N.S.W. : Federation Press.

<sup>xii</sup> only 13% of people in rental housing likely to reside at the same address as they did five years prior compared to 71% of owner-occupiers. Australian Bureau of Statistics. (2010). Australian Social Trends December 2010: Moving house.

<sup>xiii</sup> Fischer and Ayturk (2011) op cit. p.6, 20,101

<sup>xiv</sup> Kelly, J.-F., B. Weidmann and M. Walsh. (2011). "The Housing We'd Choose."

Fischer, H. and D. G. Ayturk (2011). Residential Density (Liveable Communities) Market Perceptions. Adelaide, Adelaide Thinkers in Residence program.

<sup>xv</sup> Fischer and Ayturk (2011) op cit. p.18-21

<sup>xvi</sup> Burke (2010) op cit, p.36.

<sup>xvii</sup> Gleeson, B., J. Dodson and M. Spiller (2012). Governance, metropolitan planning and city-building: the case for reform. Australia's Unintended Cities: The Impact of Housing on Urban Development. R. Tomlinson. Melbourne, CSIRO Publishing: 117-134.

<sup>xviii</sup> Baugruppen can be constituted in a variety of ways and offer residents numerous forms of tenure. For detailed discussion of the various ownership types possible see Ring, K. (2013). Self Made City. Berlin, jovis. The baugruppen of interest to this project are those which are primarily constituted of households seeking to construct and own property for personal occupation (owner occupiers).

<sup>xix</sup> See Planning policies for Vauban, Freiberg and Tuebingen which actively encourage building groups.

<sup>xx</sup> See discussion of the role of financial institutions in supporting Building Groups in Ring (2013) op.cit.

<sup>xxi</sup> Alee Denham (2012) How Freiburg Ended up with Utopian Green Districts in Planning Observer. Available on line at <http://www.planningobserver.com/index.php/how-freiburg-ended-up-with-utopian-green-districts-more/> Accessed 29 July 2013.

<sup>xxii</sup> Chan, W. y.-p. (2010). The Phenomenon of Building Group (Baugruppe) in Berlin M.Arch, Anhalt University of Applied Sciences. p.19

<sup>xxiii</sup> "Custom build housing is where a builder is contracted by a home owner to create a 'custom built' home or where a private individual builds their home as a DIY 'self build' project. This form of housing can include single detached homes on small plots in rural areas, larger scale sites with hundreds of homes, community self build projects, blocks of apartments commissioned by a group of people in an urban area"  
<https://www.gov.uk/government/policies/increasing-the-number-of-available-homes/supporting-pages/self-builders> accessed 18 July 2013

<sup>xxiv</sup> <https://www.homesandcommunities.co.uk/ourwork/custom-build>

<sup>xxv</sup> Department of Communities and Local Government 16 May 2014

<https://www.gov.uk/government/policies/increasing-the-number-of-available-homes/supporting-pages/self-builders>. Accessed 20 June 2014

<sup>xxvi</sup> Parvin et al (2011) op cit. p.15.

<sup>xxvii</sup> Charter Keck Cramer (2012), Birrell et al (2012), Burke and Hulse (2010)

<sup>xxviii</sup> Parvin et al (2011) op cit, p.8.

<sup>xxix</sup> The term 'prosumer' was coined by Futurist Alvin Toffler in his 1970 book *Future Shock* and further expanded in his 1980 book *The Third Wave*. Toffler's described the "proactive consumer" as individuals or groups who actively engage in the improvement of goods and services to alter both the good/service provided and the role of the consumer. The term 'prosumer' is also used to describe the "producing consumer" who produces goods for personal consumption, redefining the market separation between producers and consumers.

<sup>xxx</sup> The four examples of alternative housing provision introduced here will be the subject of more detailed interviews with primary stakeholders as part of research to be undertaken as part of PhD studies by the author. The overview of cases presented here represent a preliminary scoping study for comparison.

<sup>xxxi</sup> Examples 3 and 4 require a high level of active involvement by prospective owners. This level of engagement directly reflects the degree of design input and cost savings realized. It is also notable that in examples where high levels of design input are achieved the group has benefitted from access to relevant personal capabilities, with professional members such as architects, planners and property consultants working in the interests of the project. If such processes for owner input in design are to be main-streamed it is not realistic for all owner groups to have access to such expertise and implementation programs would be needed to support participation.

<sup>xxxiii</sup> Hamdi, N. (2004) Small Change: About the art of practice and the limits of planning in cities Routledge.p.139

<sup>xxxiv</sup> Theurillat et al. (2014) discuss the layers of market systems experienced as real estate markets evolve over time. Financialisation of the city refers to the highest level of exploitation of urban rents through the development of 'Major Multi-Purpose complexes' such as sites of urban consolidation. Financialisation of the city places emphasis on market value over use value. Theurillat, T., P. Rerat and O. Crevoisier (2014). "The real estate markets : Players, institutions and territories." Urban Studies. published on line 28 May 2014

<sup>xxxv</sup> Department of Planning, Transport and Infrastructure South Australia (2014) Policy Paper Planning Reform- a driver of economic growth. [dpti.sa.gov.au/planning/planning\\_reform\\_paper\\_feb\\_2014](http://dpti.sa.gov.au/planning/planning_reform_paper_feb_2014)

## Foster + Partners' SkyCycle and the technological sublime

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### ABSTRACT

*This paper investigates the proposal for the SkyCycle bicycle network in London and its relationship to how we think about cities and transportation today. We draw upon the concept of the technological sublime as a way of analyzing city form and the role of contemporary urban cycling. The continued fascination with the technological sublime, and the intertwined social and economic systems that valorize it, influence how we see cycling today, and how we expect cyclists to behave. We attempt to uncover the unspoken values that underlie the SkyCycle proposal in order to understand the range of reactions to the proposal.*

### Keywords

Cycling culture; cycling infrastructure; urban design; London; technology



*Image from Foster + Partners*

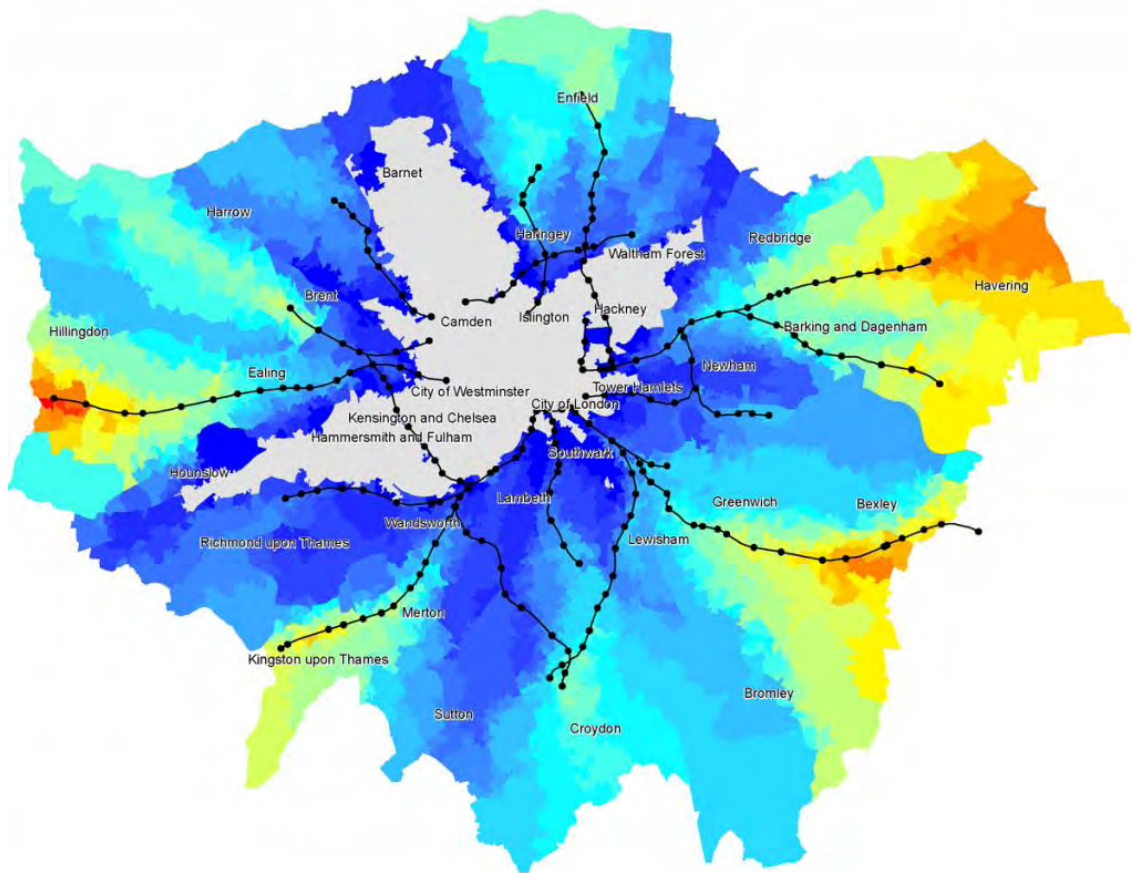
In December 2013, the firm of Sir Norman Foster, in collaboration with Exterior Architecture and Space Syntax, introduced an updated concept for SkyCycle, a network of elevated bicycle superhighways. The proposed 220-kilometer network would provide safe, fast cycling routes above existing railway lines to connect London's downtown core to its suburbs (Frearson, 2014). While conceived of primarily as a freeway system for bicycle commuters, complete with on-ramps and multiple travel lanes, the designers have also discussed direct connections into train stations, elevated shops and services, and social space at the level of the SkyCycle deck, although these were never illustrated or explained in a substantial way in public (Space Syntax, 2013).



Early concept image for the SkyCycle. Image from Exterior Architecture.

Earlier iterations by Exterior Architecture, before the other two firms came onboard with amendments, showed the riding deck enclosed in a space frame tube with transparent panels. The rendering style was somewhat whimsical, focusing on the expression of the space frame and the experience of the cyclists. In contrast, the revised SkyCycle was considerably larger in scale and better developed in terms of routing and connections to the street below (see title page image above). Space Syntax performed analysis of potential routes and population density for the network, which covers the approximate area of greater London to the M25 motorway (an orbital motorway about fifty kilometers in diameter). Their analysis indicated that six million

people lived within the catchment area of the network, half of which lived within a ten-minute bike ride of one of the more than 200 entrance points on the network.



SkyCycle network and catchment area. Image from Space Syntax.

London's leaders recognize the need to provide for bicycling transport, both for reasons of transportation efficiency (space and time) but also personal and environmental health. Given that London's road infrastructure is already at or beyond capacity, the city is faced with three options: 1. Reallocate road space from cars to bikes (which is politically risky); 2. Move cars to new elevated or underground routes (which is prohibitively expensive) or; 3. Move bikes to new infrastructure. SkyCycle attempts to find the middle ground between cost and political peril.

The need to provide safe travel for cyclists and minimize space conflicts between cars and bikes has become urgent. Casualty rates for cyclists in Britain have continually risen over the last decade in contrast to the downward trend for all other modes (Department for Transport, 2013, p. 11). As in many cities, the automobile's domination of urban public space has forced a diverse set of responses among cyclists (other than the most common response: to not cycle at all).

## Reaction to the SkyCycle Proposal

Responses to the SkyCycle cover a broad gamut from enthusiasm to scorn. Enthusiastic responses mainly came from urbanism blogs, architects, and mainstream media, while cycling advocates were more often dismissive or hostile to the concept. Positive responses focused on the increased safety, speed, and capacity of the separated system, the complementarity of rail lines with their gentle slopes and curves, and the large portion of London's population living within a close distance of the system (See for instance Bjørsted, 2014; Lavrinc, 2014; E. Smith, 2012).

Negative responses focused on the cost of the system, with comparisons made to the amount of conventional bicycle infrastructure that could be built for the same cost. The designers estimate that an initial 6.5-kilometer section would cost £220 million (AU\$390 million), or AU\$60 million per kilometer. In comparison, London's Cycle Superhighway system, although far from ideal as implemented, has been estimated at AU\$2 to 4 million per kilometer.

Some critics worried about the lack of passive surveillance, or "eyes on the street", at the SkyCycle deck level, but also how the loss of cyclists on the street would affect safety and vitality. Others were concerned that the SkyCycle would draw attention from more mundane but more important infrastructure improvements, and that exposure to weather while biking the SkyCycle would turn off casual riders (See for instance; S. Smith, 2014; Thayne, 2014).

But many bicycling advocates weren't just responding to the proposal on its technical or rational merits, but were scornful of the ideas and the design team. In a blog post in Copenhagenize.com, an influential bike culture and infrastructure blog, Foster and his team were criticized for misunderstanding or ignoring the needs of everyday cyclists in favor of business commuters:

This is classic Magpie Architecture - attempting to attract people to big shiny things that dazzle but that have little functional value in the development of a city. Then again, Foster is a master of building big shiny things...Funny how the rising stars of bicycle urbanism...haven't bothered with lofty starchitect visions. They just rolled up their sleeves, dusted off their rationality and started tackling their urban problems with infrastructure and traffic calming measures. (Colville-Anderson, 2014)

Of course, Norman Foster isn't the only one proposing technological fixes and grand infrastructure to solve urban problems. Architects and urban designers exercise significant power in shaping our urban environments and the relationships between design and technology are often romanticized or unexamined. The range of reactions

to SkyCycle can be analyzed as different responses to the use of technology as a mechanism of power in mainstream society.

### **The Technological Sublime**

The Industrial Revolution – with its startling advances in water and steam power, replacement of human power by rapidly evolving machines, development of new transportation technologies, and the stark imposition of industry on the natural landscape – was both disorienting and stimulating. In England and Europe, the Industrial Revolution brought with it great promise, but also great disruption in existing cities and ways of life (Vogel, 2005). In places like Ironbridge, England, early blast furnaces to smelt iron created scenes of chaos that inspired comparisons to Bedlam asylum in London (Klingender & Elton, 1970, p. 89-101).



*Coalbrookdale by Night*, by Philip James de Loutherbourg, 1801. Retrieved from [wikimedia.org](https://www.wikimedia.org).

The term *technological sublime* has been used to describe these early industrial processes and technologies, extending Edmund Burke's idea of the sublime into the realm of the human-made (See for example Nye, 1994, pp. xiii-xvii). Sublime describes our emotional response to a scene or a place that is profound beyond our understanding, where superhuman scale or overwhelming power is made visible. The sublime inspires awe – that mixture of wonder and fear – as if one is witnessing the acts of an almighty God. The technological sublime, then, describes structures,



machines, and other creations that are similarly awesome, beyond the power of any individual, possessed of greatness that seem derived from something beyond humanity.

In countries such as the United States, Australia, New Zealand, and Canada, where European ideas of urbanity and society were newly imposed and still developing, the industrial revolution was often embraced as a symbol of a brighter future (Tucker, 1978, pp. 1-2). In these places, technological progress was seen as marching in lockstep with and supporting parallel social and spiritual progress. Machines were seen as freeing mankind from endless physical labor, allowing time and energy to pursue higher aims and social refinement (Marx, 1964, p. 189-190). Steam power allowed society to cast off the shackles of history and become truly modern.

Railways and steamships had a significant impact on the national psyche of these young nations and colonies of the early and mid-19th Century. Many writers of the era were struck by how railways were rapidly transforming wild nature into orderly and productive space. In some cases this was seen as an imposition, the shattering of the tranquility and peace of rural life with the insistent claxon of industry and the “noisy world” of the steam engine and the city (Hawthorne, 1844, as quoted in Marx, p. 13). But in the imagination of many early thinkers, the railway (and the general application of steam power in transportation and industry) was ushering in a new renaissance.

It is important to note that this view of machines and technological progress was not universally praised. There were many thinkers who worried about the replacement of human effort by unthinking machines and the replacement of rural life, with its straightforward morality and its healthy connections to land and nature, by an urban life defined by machinery, inequality, and alienation (Klingender & Elton, pp. 104-133; see Starostina, 2003 for the fear of the reverse - that rural peasants would overrun the genteel city.) Thus we see boosterism in influential 19th Century writing stating, for example,

...the outstretched plains and the earth's deep caverns...are become parcel of [man's] domain and yield freely of their treasures to his researches and toils...He has almost annihilated space and time...He yokes to his car fire and water, those unappeasable foes...He constrains a simple contexture of wood and iron to do the tasks of a hundred men. ("Our Times," 1845, as quoted in Marx, p. 194)

These writers were not merely exalting in progress, but also waging a public relations battle for the national psyche and the ideal relationship to technology. They used the imagery of the technological sublime to make the case that society had advanced to the point of mastery over the wild world, and that a truly modern man had

nothing to fear from machines. In the US, it was this combination of the technological sublime, national pride, and prosaic economic development that cemented technological progress into the national ethos. Meanwhile, the desire for wealth, and the social and political power that accompanies it, drove those who stood to gain from technological progress to trumpet its patriotic and social benefits, while ignoring or belittling the attendant costs.

### **Dominance of Technology Today**

As we look at urban environments today, the domination of the automobile and machines is clear. New expressions of the technological sublime (the freeway interchange, the deep bore tunnel, bullet trains, and skyscrapers) surround us, thrill us, and overpower us. As in the early decades of the Industrial Revolution, images of transportation technologies and urban development reinforce the now globally promoted ideas of technological progress as equal to human progress. Criticism of these images and these technologies also remain, however.



"Viaduct in Puxi, Shanghai" by Alex Needham. Licensed under public domain via Wikimedia Commons

While perspectives on machines, physical labor, and power have evolved since the 19<sup>th</sup> century, and the dirty underbelly of the Machine Era has become clearer, the technological sublime, with its the promised power of machines to ease our struggles and allow us the luxuries of time, is still very persuasive. The car, the freeway, the airplane, and the supercomputer are today's emblematic images of the technological sublime, with their triumphs over natural limits and their undercurrents of danger. In contrast, a bicycle seems simple and backward. Within a typical city, among its towering buildings and rushing traffic, a bicycle seems puny, fragile and out of place. Its movement does not exist without the sweat of a cyclist's brow. At best, a typical cyclist might be perceived as hardworking and resourceful, but rarely powerful. More typically, bicyclists are seen a menace to civilized society, middle-aged men attempting to reclaim their lost virility, non-productive hipsters, or overgrown children (Furness, 2010, p. 108).

A great deal has been written about how the bicycle has been a force for emancipation, from freeing women from the constraints of social norms and male-dominated society (Bly, 1896, as quoted in Price, 2013, p. 4) to providing the working-class with inexpensive access to work (Oldenziel & de la Bruhèze, 2011). For a short while the bicycle was seen as a technological marvel in its own right ("The winged heel," 1879). While the bicycle was an important stage in the development of personal mobility, in popular perception it has been superseded by more powerful and convenient forms of transportation. So where does the bicycle belong in the city of the technological sublime?

### **SkyCycle in a Realm of Competition**

The SkyCycle proposal, and the responses to it, represents points on a broad spectrum of answers to that question. The design of the SkyCycle reflects a longstanding trend in infrastructure development. Reflecting the strong pattern of the rail lines below it, and echoing the forms and impacts of elevated automobile freeways, the SkyCycle asserts the right of cyclists to the same super-scaled infrastructure of other modes of transportation. The design continues, or at least takes advantage of, our current development mindset that says bigger is better, that celebrates our power over the bonds of the ground plane, and that privileges high-speed transportation over other land uses.

While simultaneously lending them collective power, the SkyCycle dwarfs its users and nearby buildings and landscapes. In this way, the SkyCycle can be seen as

positioning cyclists as competitive equals in the power dynamics of the contemporary city. Whereas infrastructure, as an expression of the power of the technological sublime, has previously been associated with automobile and rail transportation, the SkyCycle team has asserted that cyclists are equally deserving of a place within the dominant technology-driven economy.

Rather than challenging the appropriateness of the current patterns of urban development, or giving more of the carriageway to bikes, the SkyCycle team is adding structure to support an additional form of transportation within the urban fabric. The design does not challenge or change existing development patterns or urban power structures, but perpetuates them. The SkyCycle system is explicitly imagined as a commute path for workers in London's suburbs to reach the CBD. In form and intent, it replicates the freeway systems that connect many cities with their residential hinterlands.

A good deal of the criticism of the SkyCycle was focused on this seemingly uncritical attitude towards the role of transportation in the city. While bicycle advocates and planners are cognizant of the need for longer-distance commute routes, the criticism of the SkyCycle was that it removed cyclists (and funding) from surface street routes that are more critical in encouraging general cycling.

In addition, critics honed in on the likely users of the SkyCycle system. As a long-distance network, raised above grade and exposed to wind and weather, the SkyCycle seemed to be aimed at strong, determined cyclists who would likely be riding even without separated infrastructure. The concern was that the SkyCycle was once again reinforcing patterns of power rather than confronting them. Strong and fearless riders – a term popularized by Roger Geller (Geller, 2009) – or riders who seek physical or mental challenges, are often seen as dominating cycling culture. And it is often assumed that these cyclists are also in positions of economic power when off their bikes. This group of cyclists, disparagingly called MAMILs (or “middle-aged men in Lycra”), is seen as predominantly white, middle-class men, and part of the dominant economic and social group. They are seen as using cycling as another arena in which they compete with each other and with other social and economic groups. Often the target of scorn from “utilitarian” or “everyday” bicycling advocates (see for instance Colville-Anderson, 2010), this group is perceived as using bicycle technology and accessories to compete with each other and as a way to reinforce their position as separate from, and above, other types of cyclists. Quoting again from the [copenhagenize.com](http://copenhagenize.com) blog post:

“...Foster and too many others are obsessed with commuting instead of bicycle culture...The Sky Cycle seems to focus on the 1%. The spandexian demographic. Bicycles belong at street level. Bicycle users are just pedestrians on wheels, not to be confused with motorised traffic.” (Colville-Anderson, 2014)

This last sentence highlights an important difference between groups of cyclists. The group of cyclists who are strong and confident, able and willing to ride in traffic with cars, has been powerful in the setting of cycling policy. *Vehicular cycling*, which promotes treating the bicycle as a vehicle with the same rights and responsibilities as cars, was for a long time a dominant force in bicycle advocacy in the US and Canada. According to John Forester, the leading proponent of vehicular cycling, bicyclists can only enjoy safe and pleasant travel if they accept and assert their full right as a vehicle equal to cars and motorcycles on a shared street system (Forester, 2008). Of course, there is a large group of cyclists or prospective cyclists who are not strong enough or confident enough to be well served by this approach.

As with the SkyCycle proposal, we can see in the vehicular cycling philosophy an unexamined affinity for existing power structures. Forester and his supporters see no inherent issue in our current development patterns that focus on the car. Instead, they suggest that all road users, regardless of age or ability, should adapt to those patterns, should recognize our current automobile infrastructure as the proper organizing element of our cities, and either compete or get out of the way. While the influence of vehicular cycling may be waning, the conception of the bike as just a slower and weaker version of a car – just another machine for transportation - is still powerful. It is this positioning of cycling as part of our machine world that seems to be at the core of much of the criticism of the SkyCycle.

## **Conclusion**

As some in the cycling community have noted, SkyCycle is not intended as a standalone system that singlehandedly solves all the problems of cycling in London. Instead, it is meant to complement surface bicycle lanes throughout the city, creating a network similar to the freeway and surface street systems for automobiles. And it is clear that, if elevated rights-of-way are necessary, it is more cost-effective to elevate relatively lightweight bicycle infrastructure than that of other transportation modes.

The proposal for the SkyCycle suggests that the technological sublime is still operative in our contemporary world and that we are still encouraged to see large-scale technological fixes as the best way forward. The SkyCycle proposal seems tailored to

appeal to the aesthetic and aspirational goals of the city of London – to create a bicycle-oriented technological sublime. SkyCycle asserts a new, highly visible, role for cyclists in the city and a place for London at the forefront of bicycle planning. However, It is reasonable to ask which cyclists would benefit from this type of infrastructure, and whether benefits to everyday cyclists would trickle down from the elevation of the commuters on the SkyCycle above. Whatever the practical value of technological solutions for the problems of our time, it is possible to critique the economic and value systems that underlie them. Cycling infrastructure, and ways of cycling in cities, can be seen as reinforcing or challenging those long-dominant systems.

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## **An objective approach to place identity: exploring Melbourne's capacity for more productive established suburbs**

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**ABSTRACT:** The Victorian State Government recently forecast that Melbourne would almost double its population by 2051 [Green & Donnelly, 2014]. With 60% of this growth expected to be accommodated within established suburbs [Dowling, 2014], a new approach to urban design is critical to manage the increased density within Melbourne's predominantly suburban morphology. This paper explores the latent capacity for more productive suburban centres by analysing two of Melbourne's established suburbs; Coburg and Camberwell. The synthesis of quantitative and qualitative analysis provides a holistic portrait of each suburban centre, interacting with fiercely defended perceived place identities. The findings reveal significant capacity for increased density within established suburbs facilitating the escalating demand for a more productive Melbourne.

**Keywords:** place identity, Coburg, Camberwell, urban renewal.

**INTRODUCTION:** Melbourne's population at June 2013 was growing by 95,500 people annually, the fastest of any Australia capital city [Martin, 2014]. The Victorian state government acknowledged this in its Plan Melbourne policy in May 2014, projecting Melbourne's population will almost double to 7.7 million by 2051 [Green & Donnelly, 2014]. The document outlines its strategy to deal with this unprecedented growth, and whilst central city growth has been a policy focus, it has been argued that 38 – 60% of this population growth will be accommodated within established suburbs [Johnson, 2014 & Dowling 2014]. There is a growing body of research into increased density within the heart of quarter-acre-block filled suburbia [Newton et al, 2011, Hayball 2011, Ramirez-Lovering and Murray, 2011, Bamford, 2011]. This paper builds on this to investigate the latent capacity of Melbourne's established suburbs to accommodate increased density and how this might contribute to a more productive Melbourne.

The paper uses the case study analysis of two of Melbourne's established suburbs; Coburg and Camberwell. These suburbs have been specifically selected due to their contrasting socio-economic and demographic profiles representing Melbourne's so-called 'working-class north' and 'affluent east'. The paper hypothesises that their contrasting place identities conceal fundamental similarities that broadly apply to comparable established suburbs. The research methodology presents a more objective appreciation of

their place identity by first undertaking spatial data analysis. Each space within the suburban centres is measured and categorized into built, green, vacant or transit spaces for comparative analysis. In counterpoint a qualitative socio-cultural analysis of each suburban centre is also carried out. ABS data provides suburb profiling coupled with discourse analysis that navigates the complex and messy perceptions of place identity. The combined findings provide a more holistic portrait of each suburban centre, aiming to interact with the urban narratives of such places, challenging pre-existing perceptions of place identity. The paper concludes by arguing that latent capacity exists within established suburban centres, enabling increased urban density and more productive cities.

**EXISTING SPATIAL ANALYSIS:** The existing spatial analysis documents a matrix of the current make-up, use, and typology of all spaces within each suburban centre. The central activity centre of Coburg and Camberwell as defined by their local municipalities form the subject sites. Classification of every space within each subject site was carried out through multiple detailed on-site investigations supplemented with a desktop study to clarify usage and ownership structures. Specificity of documented spaces avoided vague swathes of mono-tone characterisation, not reflective of the complexity of these activity centres. Each space is categorized into broad spatial use categories and more detailed sub-categories allowing comparison at both levels. By utilising a more objective data-driven approach to defining the complex nature of established suburban centres, socio-cultural claims over specific sites and perceived place identities are negotiated and mitigated. The adopted methodology does not consider the verticality of spatial usage patterns due to the relatively low scale built form of the centres. This results in a 'base-case' appreciation providing a conservative foundation for speculating the latent potential for increased density. This potential has already been considered in existing research [City of Melbourne & Victorian DoT, 2009, Woodcock et al, 2010, Newton et al, 2011], as well as being the subject for future research.

**COBURG AND CAMBERWELL SPATIAL ALLOCATION:** The existing spatial analysis findings indicate both notable similarities and significant differences with regards to space allocation between the two case study suburban centres summarised in table 1 and figure 1 below. These highlight challenges and opportunities that extend beyond these two suburban centres to other established Melbourne suburbs.

<b>Coburg Vs Camberwell existing COMBINED spaces matrix</b>		
<b>COMBINED SPACE TYPE</b>	<b>% OF COBURG</b>	<b>% OF CAMBERWELL</b>
BUILT SPACE - Retail / Commercial	12.3%	22.7%
BUILTSPACE - Public	7.5%	5.6%
BUILT SPACE - Residential	2.5%	5.3%
PUBLIC GREEN SPACE - Open & Accessible	11.9%	11.4%
PUBLIC GREEN SPACE - Gated	13.4%	2.3%
VACANT SPACE - Privately Owned	13.1%	12.3%
VACANT SPACE - Publicly Owned	14.0%	11.2%
TRANSIT SPACE - Cars	14.9%	17.7%
TRANSIT SPACE - Sustainable Alternatives	10.4%	11.5%
<b>TOTAL COMBINED SPACE</b>	<b>100.0%</b>	<b>100.0%</b>

Table 1 [above] – Matrix of Coburg and Camberwell Combined space findings.

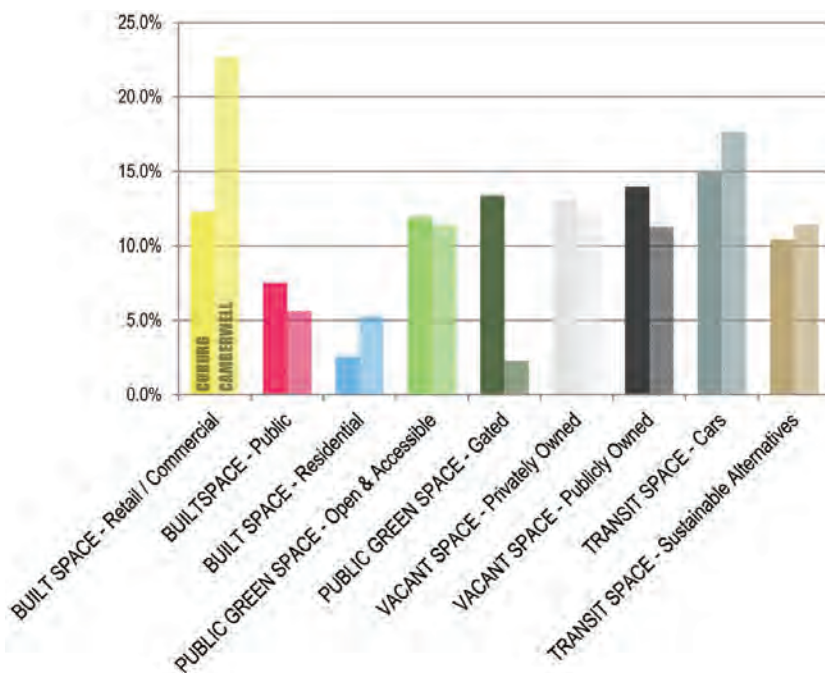


Figure 1 [left] – Column chart of Coburg and Camberwell Combined space findings.

There is a significant difference in the proportion of built space with Camberwell having twice the built space area of Coburg, or 33.6% and 22.5% of total area respectively. The difference is largely attributable to the higher proportion of retail/commercial built space, specifically office built space in Camberwell (7.3%) compared to Coburg (1.2%). This is reflected by the City of Moreland being Coburg's largest local employer [Colic-Peisker et al, 2013, pp.42]. The slightly higher proportion of

other retail built spaces in Camberwell indicate that the level of office space may positively correlate with other elements of commercial/retail built space. Whilst both suburbs have low residential built space proportions, Camberwell (3.2%) has a slightly higher proportion of apartment and mixed-use housing than Coburg (1%). These two elements present significant opportunity for future medium-density housing within established suburban centres, making cities more functional, in response to growing demand for smaller households from students, young professionals and Australia's ageing population [IAMCU, 2010, pp.43]. Given this opportunity for increased density in suburban centres, the surrounding residential precincts could remain undisturbed.

Camberwell's built spaces are contrasted by a relatively low amount of green space (13.7%) compared to Coburg (25.5%). However, open public green spaces are comparable and the difference is due to Coburg's large amount of gated public green space at 13.5% of the total precinct and more than half of all green space. This is mostly attributable to two sites, being the Coburg City Oval (7.2%) and Coburg Primary School (3.2%). Creatively managing barriers to increasing access offers an opportunity to support and sustain increased density. During a public workshop for the Coburg Initiative held in August 2009, potential options were discussed to increase public usage of gated green spaces and these should be investigated where possible in future planning processes.

Approximately 25% of both suburban centres are vacant space, almost evenly split between public and privately owned. Publicly owned and commercial unused vacant spaces, largely consisting of open car-parks, are a significant proportion of both central Coburg (27.1%) and Camberwell (23.5%). With such parallel spatial allocations, it is reasonable to assume these figures are comparable in other established suburbs in Melbourne. Camberwell has slightly less vacant space, likely due to the increased housing market demand within blue-chip Camberwell, which supports the increase to apartment built space discussed above. However, at 23.5%, vacant space still represents more than one fifth of central Camberwell, demonstrating significant capacity for increased density.

Vacant spaces in both central Coburg and Camberwell, largely controlled by Councils and a few private owners, present the largest opportunity to facilitate increased density in such established suburbs. They also represent the varied challenges with the consolidation of established suburbs including de-industrialisation of the workforce, the dominance of the car and provision of car parking, and the sale of public assets such as the former Coburg High School which has been demolished and lies vacant, awaiting

private development. The Coburg Initiative example of partnering with a private developer to investigate more productive re-allocation of such 'vacant' land parcels and the planning approval of apartment developments on the former Kodak factory and Coburg High School sites indicates the Moreland City Council's desire to leverage this opportunity. Camberwell has been more resistant, relying on determinations from the Victorian Civil and Administrative Tribunal [VCAT] to overrule council refusal of development applications, which is explored further in the socio-cultural analysis.

The proportion of transit space is also comparable in Coburg (25.5%) and Camberwell (29.1%), indicating potential similarity in comparable established suburbs. In both suburban centres, nearly 60% of this transit space is defined as car transit space, which forms the largest and second largest spatial category allocation for Coburg (14.9%) and Camberwell (17.7%) respectively. Whilst partly due to the classification of shared road space as car transit space, this is reflective of the over-population of established suburbs with cars and the struggle to accommodate them within urban-structures that pre-date their existence [Newman & Kenworthy, 2000]. There is a clear opportunity to increase bicycle transit space, particularly in Camberwell which has only a small dedicated bicycle path near the Burwood/Burke Road intersection. Given high traffic congestion and evolving demographic trends such as the increasing popularity of non-car commuting options and car-share schemes [Wellings, 2012], Councils must be more progressive in managing car transit spaces and increase utilisation of sustainable alternatives.

The findings of the existing spatial analysis for central Coburg and Camberwell are presented below in figures 2 and 3 and the associated tables represented in tables 2 and 3 respectively. The findings from each spatial category, Built, Green, Vacant and Transit space are contained in the appendix for completeness.



Figure 2 [left] – map of the central Coburg combined space findings.

Figure 3 [right] – map of the central Camberwell combined space findings.

<b>Central Coburg existing COMBINED spaces matrix</b>		
<b>COMBINED SPACE TYPE</b>	<b>AREA</b>	<b>% OF TCI</b>
BUILT SPACE - Retail / Commercial	5.25	12.3%
BUILTSPACE - Public	3.22	7.5%
BUILT SPACE - Residential	1.09	2.5%
PUBLIC GREEN SPACE - Open & Accessible	5.10	11.9%
PUBLIC GREEN SPACE - Gated	5.72	13.4%
VACANT SPACE - Privately Owned	5.60	13.1%
VACANT SPACE - Publicly Owned	5.98	14.0%
TRANSIT SPACE - Cars	6.38	14.9%
TRANSIT SPACE - Sustainable Alternatives	4.46	10.4%
<b>TOTAL COMBINED SPACE</b>	<b>42.80</b>	<b>100.7%</b>
The Coburg Initiative Site Area - Total	42.5	

Table 2 [above] – matrix of the central Coburg combined space findings. TCI denotes The Coburg Initiative; the central Coburg area as defined by the City of Moreland, and subject site of this research. Measured total TCI area is noted at the base of the table, all areas in hectares.

<b>Central Camberwell existing COMBINED spaces</b>		
<b>COMBINED SPACE TYPE</b>	<b>AREA</b>	<b>% OF CC</b>
BUILT SPACE - Retail / Commercial	12.58	22.7%
BUILTSPACE - Public	3.13	5.6%
BUILT SPACE - Residential	2.96	5.3%
PUBLIC GREEN SPACE - Open & Accessible	6.34	11.4%
PUBLIC GREEN SPACE - Gated	1.26	2.3%
VACANT SPACE - Privately Owned	6.83	12.3%
VACANT SPACE - Publicly Owned	6.24	11.2%
TRANSIT SPACE - Cars	9.82	17.7%
TRANSIT SPACE - Sustainable Alternatives	6.37	11.5%
<b>TOTAL COMBINED SPACE</b>	<b>55.53</b>	<b>100.0%</b>
Central Camberwell Site Area - Total	55.6	

Table 3 [above] – matrix of the central Camberwell combined space findings. CC denotes Central Camberwell as defined by the City of Boroondara, areas in hectares.

**EXISTING SOCIO-CULTURAL ANALYSIS| COBURG:** Coburg’s history since British settlement is characterized by pastoral beginnings, the consolidation of Sydney Road through the gold rush period, the population boom of the 1880’s and waves of migration from post-war Europeans, post-White Australia policy Turkish and Lebanese, and more recently African and South-East Asian communities [Broome, 1987, Burchell, 1995]. In addition, the de-industrialisation of Melbourne’s working-class ‘rust-belt’ is exemplified in Coburg with its textiles, footwear, food and manufacturing sectors now all but gone leaving behind its culturally diverse workforce [Colic-Peisker et al, 2013, pp.2]. Coburg has been described by Woodcock and Smitheram as a contested place, ‘whose identity is the product of competing claims’ [Woodcock & Smitheram, 2008, pp1]. Significant in such contests is the concept of ‘White’ space which their research identifies as ‘a middle-class White suburban mindset that imposes its fear of difference and disorder onto urban design’ [ibid, pp.2]. 40% of Coburg’s population was born outside Australia and 47.2% of households speak languages other than English [ABS, 2011a] reflecting a high level of diversity, contributing to differing requirements and *the need to negotiate their place in the street*’ [Woodcock & Smitheram, 2008, pp.11].

This challenge is manifested in Coburg’s high proportion of ‘gated green space’ for sporting activity. The existing spatial analysis shows that the Coburg City Oval, Lawn Bowls Club and fenced portions of the Coburg Aquatic and Leisure Centre make up 31.5% of the total public green space of central Coburg. These areas are fenced and locked to

facilitate controlled and ticketed access by associations such as the Victorian Football League [VFL] and Coburg Cricket Club [CCC], both celebrated codes of Australian sporting culture. In an analysis of the privatisation of public parklands such as these during the late twentieth century, Nankervis states that *'it must be recognised that the use of the parklands for these purposes [sporting] is perfectly consistent with their role. The problem is one of the degree of selective control'* [Nankervis, 1996, pp.330]. As communities become more diverse, it is increasingly important to recognise such gated green spaces as community assets, open to all to be enjoyed in a variety of ways. Examples of unlocking gated green spaces include the conversion of the EJ Whitten Oval in Footscray to a mixed-use community hub or the development of Waverly Park (former AFL suburban ground) into a publicly accessible park surrounded by medium density housing.

**EXISTING SOCIO-CULTURAL ANALYSIS\_ CAMBERWELL:** Although Camberwell's history includes a similar pastoral heritage followed by the population and railway expansion booms of the 1880's [Blainey, 1980], the class and ethnic social structure bears stark contrast to Coburg. Camberwell residents *'with few exceptions... are upper middle-class with a relatively low level of ethnic diversity'* [Woodcock et al, 2004]. Table 4 supports these claims with Camberwell having almost 50% higher average personal income than Coburg and greater Melbourne residents, and stronger higher education levels and home ownership rates [ABS, 2011b]. Also, only 29% of the population was born overseas and 23.5% speak languages other than English at home [ABS, 2011b].

Camberwell, is also a contested place that has evolved to exemplify the ideals of 'White' space; as Dovey claims, Camberwell displays *'a certain anxiety about fitting in... and a vigilance to ensure that others do likewise'* [Dovey, 2005, pp.13]. Dovey's concept of 'fitting in' in the case of Camberwell's urban narrative (a traditional, Edwardian and/or Victorian village that needs to be protected) relies heavily on the community's collective memory of the past. Rather than accepting change, the community actively promotes 'fitting in' with this perceived place identity, manifesting in highly publicised battles between the push for urban consolidation via development proposals and local action groups such as Save Our Suburbs [S.O.S.] and the Boroondara Residents Action Group [BRAG] [Lewis, 1999, Winkler, 2009].



<b>SOCIO-CULTURAL HOUSING MATRIX</b>	<b>COBURG</b>	<b>CAMBERWELL</b>	<b>GREATER MELBOURNE</b>
Statistical Area [km <sup>2</sup> ]	6.9	7.3	9,990.5
Total dwelling number	10,234	7,632	1,636,167
Total Population	24,977	20,029	3,999,982
Population Density [people / km <sup>2</sup> ]	3,620	2,744	400
Average resident age	35	41	36
Average weekly individual income	\$548	\$792	\$591
Median monthly mortgage repayments	\$1,954	\$2,500	\$1,810
Median weekly rent	\$330	\$388	\$300
Average Household Size [no. per household]	2.6	2.7	2.6
Average motor vehicles per dwelling	1.4	1.7	1.7
% of Population over 15 University Educated	33%	42%	29%
% of Population over 15 Post-Graduate University Educated	17%	21%	12%
% of Population over 15 Post-Secondary Educated only	32%	25%	41%
Language other than English spoken at home	47.2%	23.5%	32.4%
Cantonese / Mandarin spoken at home [% of total local population]	1.8%	5.2%	4.3%
Italian / Greek spoken at home [% of total local population]	18.3%	4.7%	5.6%
Arabic spoken at home [% of total local population]	7.3%	-	-
Turkish spoken at home [% of total local population]	2.4%	-	-
Dwellings owned outright [% of total]	34.3%	45.0%	32.7%
Dwellings owned with a mortgaged [% of total]	31.5%	31.3%	36.8%
Dwellings rented [% of total]	30.4%	21.8%	27.2%
Detached housing [% of total]	72.6%	73.0%	72.6
Semi-detached / terrace housing [% of total]	13.9%	12.1%	11.6
Flat / apartment / unit [% of total]	13.1%	14.6%	15.3
Apartment height [1 or 2 / 3 / 4+ storeys as a % of total]	66 / 14 / 19	91 / 4 / 5	58 / 18 / 23
Average Number of Bedrooms per dwelling	2.8	3.2	3.0

*Table 4 – The socio-cultural composition of Coburg, Camberwell and Greater Melbourne represented via ABS statistics from the 2011 census [ABS, 2011a, 2011b & 2011c].*

The conflict between the actual place identity of contemporary Camberwell, and that which is perceived and defended by vocal and organized local action groups is central to this paper's research. Woodcock et al acknowledged that although *'the 'character' of the suburbs is seen as under threat from multi-unit development, different housing styles... and the densification of... development... it is sometimes recognised as more ideal than real'* [Woodcock et al, 2004, pp.547]. This idea of the place identity as under threat raises the concept of urban fears that is central to their defence of place. Urban fears include fear of crime and ethnic diversity [Dovey, 2005, pp.2] and the fear of inverse-gentrification, or reduction in property value due to the devaluation of Camberwell's place identity.



Figure 4 – This photo of the initial rally of around two thousand people in April 2004 against development of the Camberwell Station site shows the immediate urban context of the site under perceived threat; ‘an ugly 4-storey [sic] office building that had long dominated the site’ [Dovey, 2005, pp.2-3].  
Image source: Dovey, 20015, pp.2-3.

The irony of the defence of place identity is that it often occurs at sites that do not pose a threat to the urban fabric of Camberwell that is so fiercely defended; the leafy wide streets of large traditional detached homes. It is the perceived challenge to this urban fabric that drives S.O.S and BRAG to oppose multi-storey developments, which are located within the central retail core as seen in figure 4 above [Dovey, 2005, pp.1]. The recently completed Aerial development at Camberwell Junction, as seen in figure 5 below, reflects what a more urban Camberwell might look like, with retail frontages activating street edges, the historic former bank retained and refurbished into a now popular restaurant, and increased density within the central area with the amenity of surrounding detached homes not impacted.



Figure 5 – Aerial at Camberwell Junction, Photography by Glenn Hester. Source: <<http://www.saphirealuminium.com.au/cmsAdmin/uploads/exterior1.jpg>> retrieved 26.04.14.

**CONTRIBUTING TO MORE PRODUCTIVE SUBURBAN CENTRES:** So what does this objective place identity analysis of Coburg and Camberwell imply for increased density and more productive established suburbs? Whilst one is from the working-class north, and the other the affluent east, both suburban centres share remarkable similarities in existing spatial composition. Despite the socio-cultural divergence between Coburg's ethnically diverse middle class and Camberwell's protective upper-middle-class, both represent contested places. Given such varied established suburbs conceal fundamental compatibilities; it stands to reason that the findings of this research are likely relevant for other comparable established suburbs in Melbourne, if not Australia.

There is significant latent capacity within established suburban centres to accommodate increased urban density and providing opportunities to make cities more productive. This capacity can be leveraged through increasing office space and medium-density housing, unlocking gated green space, developing vacant space and increasing non-car transport amenity. Importantly, increasing local employment opportunity and medium-density housing, and providing more sustainable transport options contributes to increasingly functional cities, aligning with evolving demographic trends.

The idea that place identity represents the heterogeneity and complexity of urban places is at odds with the perceived stability of place identity so vehemently defended in Camberwell and other such established suburbs. In such places, often the place identity is understood through themes such as 'consistency' and 'comfort' and 'uniformity' [Dovey, 2009]. Dovey considers an open and unfixed *'progressive sense of place... defined by multiple identities and histories, its character comes from connections and interactions rather than... enclosing boundaries'* [Dovey, 2009, pp.5]. This idea of an open place identity begins to acknowledge that the complex array of individual memories and meanings of place can and should form the basis of a collective urban future, and one that is open to evolving through time. The physical and social complexity of contemporary cities should be celebrated rather than opposed, enabling diverse and exciting futures where an increased density can participate with established communities and place identities.

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## APPENDIX

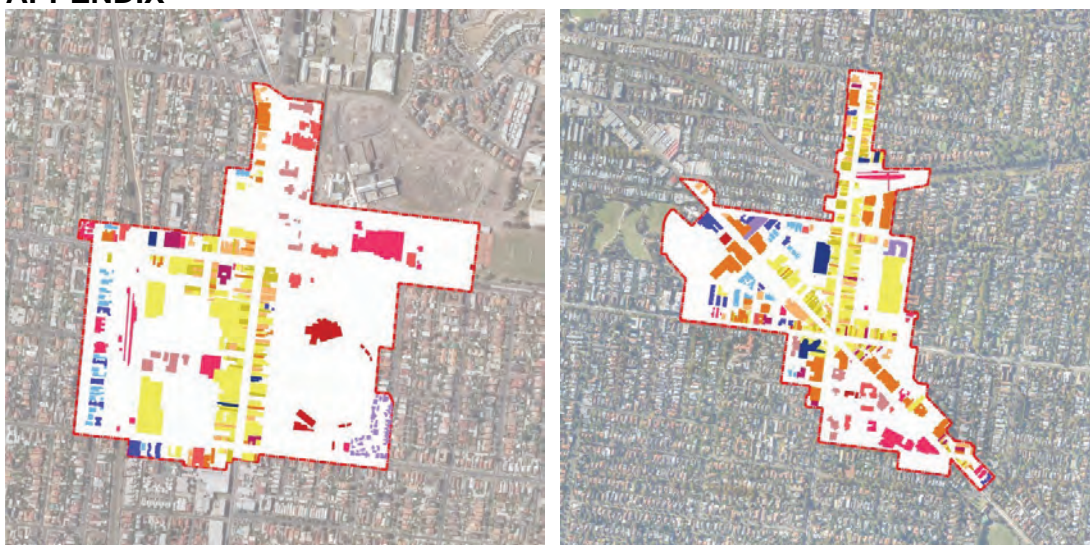


Figure 6 [left] – map of the central Coburg built space findings.

Figure 7 [right] – map of the central Camberwell built space findings.

<b>Central Coburg existing BUILT spaces matrix</b>			
<b>BUILT SPACE TYPE</b>	<b>AREA</b>	<b>% OF TOTAL</b>	<b>% OF TCI</b>
<b>Retail / Commercial BUILT Space - TOTAL</b>	<b>5.25</b>	<b>54.9%</b>	<b>12.4%</b>
RETAIL BUILT SPACE	3.38	35.4%	8.0%
CAFÉ / BAR / RESTAURANT BUILT SPACE	0.56	5.9%	1.3%
SERVICES RETAIL BUILT SPACE	0.82	8.6%	1.9%
OFFICE BUILT SPACE	0.49	5.1%	1.2%
<b>Public BUILT Space - TOTAL</b>	<b>3.22</b>	<b>33.7%</b>	<b>7.6%</b>
RELIGIOUS BUILT SPACE	0.54	5.6%	1.3%
EDUCATIONAL BUILT SPACE	0.71	7.4%	1.7%
CIVIC / COMMUNITY BUILT SPACE	1.28	13.4%	3.0%
SPORTING BUILT SPACE	0.45	4.7%	1.1%
HEALTH & WELLBEING BUILT SPACE	0.24	2.5%	0.6%
<b>Residential BUILT Space - TOTAL</b>	<b>1.09</b>	<b>11.4%</b>	<b>2.6%</b>
AGED CARE HOUSING	0.32	3.3%	0.8%
DETACHED HOUSING	0.35	3.7%	0.8%
UNIT / APARTMENT HOUSING	0.31	3.2%	0.7%
MIXED USE HOUSING	0.11	1.2%	0.3%
<b>TOTAL BUILT SPACE</b>	<b>9.56</b>	<b>22.5%</b>	
The Coburg Initiative Site Area - Total	42.5		

Table 5 [above] – matrix of the central Coburg built space findings, areas in hectares.

<b>Central Camberwell existing BUILT spaces matrix</b>			
<b>BUILT SPACE TYPE</b>	<b>AREA</b>	<b>% OF TOTAL</b>	<b>% OF CC</b>
<b>Retail / Commercial BUILT Space - TOTAL</b>	<b>12.58</b>	<b>67.4%</b>	<b>22.6%</b>
RETAIL BUILT SPACE	5.23	28.0%	9.4%
CAFÉ / BAR / RESTAURANT BUILT SPACE	1.36	7.3%	2.4%
SERVICES RETAIL BUILT SPACE	1.92	10.3%	3.5%
OFFICE BUILT SPACE	4.07	21.8%	7.3%
<b>Public BUILT Space - TOTAL</b>	<b>3.13</b>	<b>16.8%</b>	<b>5.6%</b>
RELIGIOUS BUILT SPACE	0.61	3.3%	1.1%
EDUCATIONAL BUILT SPACE	0.47	2.5%	0.8%
CIVIC / COMMUNITY BUILT SPACE	1.43	7.7%	2.6%
SPORTING BUILT SPACE	0.16	0.9%	0.3%
HEALTH & WELLBEING BUILT SPACE	0.46	2.5%	0.8%
<b>Residential BUILT Space - TOTAL</b>	<b>2.96</b>	<b>15.9%</b>	<b>5.3%</b>
AGED CARE HOUSING	0.54	2.9%	1.0%
DETACHED HOUSING	0.62	3.3%	1.1%
UNIT / APARTMENT HOUSING	0.90	4.8%	1.6%
MIXED USE HOUSING	0.90	4.8%	1.6%
<b>TOTAL BUILT SPACE</b>	<b>18.67</b>	<b>33.6%</b>	
Central Camberwell Site Area - Total	55.6		

Table 6 [above] – matrix of the central Camberwell built space findings, areas in hectares.



Figure 8 [left] – map of the central Coburg green space findings.

Figure 9 [right] – map of the central Camberwell green space findings.

<b>Central Coburg existing GREEN spaces matrix</b>			
<b>GREEN SPACE TYPE</b>	<b>AREA</b>	<b>% OF TOTAL</b>	<b>% OF TCI</b>
<b>Gated Public Green Space - TOTAL</b>	<b>5.72</b>	<b>52.9%</b>	<b>13.5%</b>
Gated Public Green Space - SPORTING Total	3.41	31.5%	8.0%
Gated Public Green Space - SPORTING Coburg City Oval	3.04	28.1%	7.2%
Gated Public Green Space - SPORTING Coburg Moreland Bowls	0.37	3.4%	0.9%
Gated Public Green Space - EDUCATIONAL	2.31	21.3%	5.4%
Gated Public Green Space - EDUCATIONAL Coburg Primary School	1.36	12.6%	3.2%
<b>Open Public Green Space - TOTAL</b>	<b>5.10</b>	<b>47.1%</b>	<b>12.0%</b>
Open Public Green Space - PUBLIC / CIVIC SPACE	2.85	26.3%	6.7%
Open Public Green Space - PUBLIC / CIVIC SPACE Bridges Reserve	1.03	9.5%	2.4%
Open Public Green Space - TRANSIT SPACE	1.32	12.2%	3.1%
Open Public Green Space - RELIGIOUS SPACE	0.80	7.4%	1.9%
Open Public Green Space - PRIVATE OPEN SPACE	0.13	1.2%	0.3%
<b>TOTAL PUBLIC OPEN GREEN SPACE</b>	<b>10.82</b>	<b>25.5%</b>	
The Coburg Initiative Site Area - Total	42.5		

Table 7 [above] – matrix of the central Coburg green space findings, areas in ha.



<b>Central Camberwell existing GREEN spaces matrix</b>			
<b>GREEN SPACE TYPE</b>	<b>AREA</b>	<b>% OF TOTAL</b>	<b>% OF CC</b>
<b>Gated Public Green Space - TOTAL</b>	<b>1.26</b>	<b>16.6%</b>	<b>2.3%</b>
Gated Public Green Space - SPORTING Total	0.59	7.8%	1.1%
Gated Public Green Space - EDUCATIONAL	0.67	8.8%	1.2%
Gated Public Green Space - EDUCATIONAL Camberwell Primary School	0.48	6.3%	0.9%
<b>Open Public Green Space - TOTAL</b>	<b>6.34</b>	<b>83.4%</b>	<b>11.4%</b>
Open Public Green Space - PUBLIC / CIVIC SPACE	4.18	55.0%	7.5%
Open Public Green Space - TRANSIT SPACE	1.14	15.0%	2.1%
Open Public Green Space - RELIGIOUS SPACE	0.59	7.8%	1.1%
Open Public Green Space - PRIVATE OPEN SPACE	0.43	5.7%	0.8%
<b>TOTAL PUBLIC OPEN GREEN SPACE</b>	<b>7.60</b>	<b>13.7%</b>	
Central Camberwell Site Area - Total	55.6		

Table 8 [above] – matrix of the central Camberwell green space findings, areas in ha.



Figure 10 [left] – map of the central Coburg vacant space findings.

Figure 11 [right] – map of the central Camberwell vacant space findings.

### Central Coburg existing VACANT spaces matrix

VACANT SPACE TYPE	AREA	% OF TOTAL	% OF TCI
<b>Privately owned VACANT Space - TOTAL</b>	<b>5.60</b>	<b>48.4%</b>	<b>13.2%</b>
RESIDENTIAL VACANT SPACE	1.29	11.1%	3.0%
COMMERCIAL 'inbetween' VACANT SPACE	1.41	12.2%	3.3%
COMMERCIAL 'unused' VACANT SPACE	2.90	25.0%	6.8%
<b>Publicly owned VACANT Space - TOTAL</b>	<b>5.98</b>	<b>51.6%</b>	<b>14.1%</b>
INSTITUTIONAL VACANT SPACE	1.71	14.8%	4.0%
COUNCIL OWNED VACANT SPACE	4.27	36.9%	10.0%
<b>TOTAL VACANT SPACE</b>	<b>11.58</b>	<b>27.2%</b>	
The Coburg Initiative Site Area - Total	42.5		

Table 9 [above] – matrix of the central Coburg vacant space findings, areas in hectares.

### Central Camberwell existing VACANT spaces matrix

VACANT SPACE TYPE	AREA	% OF TOTAL	% OF CC
<b>Privately owned VACANT Space - TOTAL</b>	<b>6.83</b>	<b>52.3%</b>	<b>12.3%</b>
RESIDENTIAL VACANT SPACE	1.28	9.8%	2.3%
COMMERCIAL 'inbetween' VACANT SPACE	2.73	20.9%	4.9%
COMMERCIAL 'unused' VACANT SPACE	2.82	21.6%	5.1%
<b>Publicly owned VACANT Space - TOTAL</b>	<b>6.24</b>	<b>47.7%</b>	<b>11.2%</b>
INSTITUTIONAL VACANT SPACE	1.98	15.1%	3.6%
COUNCIL OWNED VACANT SPACE	4.26	32.6%	7.7%
<b>TOTAL VACANT SPACE</b>	<b>13.07</b>	<b>23.5%</b>	
Central Camberwell Site Area - Total	55.6		

Table 10 [above] – matrix of the central Camberwell vacant space findings, areas in hectares.



Figure 12 [left] – map of the central Coburg transit space findings.

Figure 13 [right] – map of the central Camberwell transit space findings.

<b>Central Coburg existing TRANSIT spaces matrix</b>			
<b>TRANSIT SPACE TYPE</b>	<b>AREA</b>	<b>% OF TOTAL</b>	<b>% OF TCI</b>
CAR TRANSIT SPACE	6.38	58.9%	15.0%
CAR TRANSIT SPACE	6.38	58.9%	15.0%
<b>SUSTAINABLE ALTERNATIVE TRANSIT SPACE</b>	<b>4.46</b>	<b>41.1%</b>	<b>10.5%</b>
PUBLIC TRANSPORT TRANSIT SPACE	1.00	9.2%	2.4%
BICYCLE TRANSIT SPACE	0.36	3.3%	0.8%
PEDESTRIAN TRANSIT SPACE	3.10	28.6%	7.3%
<b>TOTAL TRANSIT SPACE</b>	<b>10.84</b>	<b>25.5%</b>	
The Coburg Initiative Site Area - Total	42.5		

Table 11 [above] – matrix of the central Coburg transit space findings, areas in hectares.

<b>Central Camberwell existing TRANSIT spaces</b>			
<b>TRANSIT SPACE TYPE</b>	<b>AREA</b>	<b>% OF TOTAL</b>	<b>% OF CC</b>
CAR TRANSIT SPACE	9.82	60.7%	17.7%
CAR TRANSIT SPACE	9.82	60.7%	17.7%
<b>SUSTAINABLE ALTERNATIVE TRANSIT SPACE</b>	<b>6.37</b>	<b>39.3%</b>	<b>11.5%</b>
PUBLIC TRANSPORT TRANSIT SPACE	2.08	12.8%	3.7%
BICYCLE TRANSIT SPACE	0.01	0.1%	0.0%
PEDESTRIAN TRANSIT SPACE	4.28	26.4%	7.7%
<b>TOTAL TRANSIT SPACE</b>	<b>16.19</b>	<b>29.1%</b>	
Central Camberwell Site Area - Total	55.6		

Table 12 [above] – matrix of the central Camberwell transit space findings, areas in hectares.

## **GRID: A new governance mechanism for financing eco-infrastructure at the district scale.**

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### **ABSTRACT**

*The combined challenges of climate change, finite resources, population growth and aging infrastructure demand a shift toward more resource-efficient, low-carbon sustainable cities. This may be achieved through new forms of eco-infrastructure delivered at the district scale. Despite considerable success in numerous demonstration projects globally, such development has not yet become mainstream. Finance remains a key obstacle preventing wide-spread implementation.*

*This paper suggests that new funding models are needed that can help spread the costs of the infrastructure over a longer time period and across different land titles. It highlights a range of possible funding options and introduces the concept of Green Regenerative Improvement Districts, or 'GRID', as a possible new governance mechanism that could assist with financing and managing precinct scale eco-infrastructure.*

Keywords: Sustainable urbanism, infrastructure financing, eco-infrastructure, precincts, funding models.

## **INTRODUCTION**

Key findings from the latest IPCC Assessment Report (AR5) stress the vulnerability of cities to climate change and highlight the need to build greater resilience and adaptive capacity within cities through improved infrastructure provision, (van Staden, 2014; IPCC 2014).

In the Australian context, aging infrastructure and insufficient investment in upgrades (Pickering 2014) is creating an 'infrastructure deficit' (Kohler 2014). New resource efficient, low carbon eco-infrastructure is urgently required within Australian cities to reduce consumption, while maintaining or improving the liveability and resilience of our cities (Girardet 1992, Newman and Kenworthy, 1999).

Despite the existence of many promising demonstration projects, uptake of sustainable development remains slow and is far from mainstream. While there are various reasons for this, the authors suggest that key inhibitors include a lack of financing and governance processes that promote sustainability.

Given competing budgetary demands at higher levels of government, innovative governance and financing at the local level may be able to unlock the potential delivery of district scale eco-infrastructure to help transform the built environment in Australia.

This paper begins by describing why the precinct or neighbourhood district is the optimal level for implementing eco-infrastructure, before exploring a range of existing and emerging funding models and mechanisms that could assist in its delivery. Many of these funding options may require additional governance structures to facilitate and manage the process over time and tenure.

## **WHAT IS A DISTRICT OR PRECINCT?**

The terms district, precinct and neighbourhood are used interchangeably within this paper and are defined as a collection of buildings that use shared infrastructure, such as roads, energy, water and waste management systems. It can be a new development or a re-development and, while it can be purely residential or commercial, ideally it will incorporate mixed uses, thus providing a hub or agglomeration of activities and multiple stakeholders.

## **WHY DISTRICT-SCALE ECO-INFRASTRUCTURE?**

The authors define eco-infrastructure as being alternative options for delivering urban services to help achieve sustainable outcomes and reduce a city's carbon footprint (Rauland 2013). While this includes biological infrastructure, it also incorporates alternative sustainable infrastructure options for supplying power, water, and waste services. Delivering these services at a local, decentralised scale, can help provide greater integration between technologies, systems and planning. It also provides economic and environmental benefits and efficiencies that can be "an order of

magnitude greater than when they are pursued in isolation” (The Climate Group, 2010, p. 9) by being small enough to innovate quickly yet big enough to have a meaningful impact (EcoDistricts Protocol, 2014).

### **EXAMPLES OF LOW CARBON, ECO-DISTRICTS**

Globally, many well-known eco-cities, districts and low carbon communities, such as BedZED (UK), Vauban (Germany), Hammerby Sjostad and Bo01 (Sweden), and Masdar City (UAE) have demonstrated various elements of precinct-scale carbon reduction (Ewing et al., 2008; Joss, 2011; Newman et al., 2009; Roseland, 2012; Williams 2012). It is important to note, however, that, most of these have received some form of subsidy or assistance (Thomson, Matan, Newman 2013), indicating that in many cases this type of development is not yet commercially viable.

Regulatory and financial barriers, in particular, have inhibited greater adoption of low carbon and energy efficiency built environment development (more information on barriers can be found in Rauland 2013).

### **EXISTING FUNDING MODELS**

Various funding models have emerged in recent years to deal with barriers to widespread sustainable development such as high upfront capital costs and split incentives<sup>1</sup> Some of these funding solutions have been tailored to assist sustainable investment in single ownership buildings, however, many of these could potentially be expanded to enable district-scale eco-infrastructure delivery. To do so effectively is likely to require new governance processes. A range of existing funding options, and a potential new governance model to manage development at the precinct scale (GRID), are discussed briefly below.

### **VALUE CAPTURE**

Value capture has traditionally been used to finance transport infrastructure. The model essentially captures a percentage of the land value uplift resulting from adjacent public transit infrastructure construction. The mechanism for collection is typically some form of land tax (cf. Tax Increment Financing [TIF]), which is then put toward paying off the infrastructure over a set time period (eg. 25 years).

McIntosh (2011) observes that long-term trend analysis in Brisbane demonstrates a 22% increase in property value in suburbs with high transit amenity. The value capture model could be repurposed to pay for other types of eco-infrastructure where the additional infrastructure can be demonstrated to increase

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<sup>1</sup> ‘Split incentives’ refers to a situation where property developers/owners are reluctant to invest in sustainability improvements that primarily benefit building occupants and provide little or no financial return on their investment, while building occupants are reluctant to invest in upgrades that increase the value of the property for the owner.

value (e.g. by reducing living and business operation costs through improved energy, water and waste management).

## **ENERGY SERVICE COMPANY**

An Energy Service Company (ESCO) can be used to implement energy efficiency upgrades to buildings or precincts, as well as providing decentralised renewable or low carbon energy generation projects. It is particularly useful in dealing with the high upfront capital costs associated with energy-related projects by removing the risk associated with uncertain energy payback periods.

ESCOs function predominantly at the small, decentralised level and can often offer lower cost energy generation options as they avoid many of the charges associated with large-scale operations. The ESCo model is particularly appealing at the precinct scale and could be used in combination with a variety of other measures and models.

## **LEASING ARRANGEMENTS**

Leasing arrangements function similarly to an ESCo in that they require no upfront capital, as lease repayments are usually covered by the energy savings. While the company leasing the equipment do not usually own it (unlike with some ESCos), the leasing arrangement allows the company to regularly upgrade to the most efficient equipment. An example was Low Carbon Australia<sup>2</sup>, an independent public company funded by the Federal Government, who joined together with Alleasing in 2010 to develop a unique leasing arrangement for energy efficient equipment called E3 Lease.

In addition, various new leasing arrangements for solar panels, are transforming the solar market by eliminating the upfront capital costs associated with solar panels while offering a fixed lower electricity price for customers over a set time period.

## **COMMUNITY-OWNED RENEWABLE ENERGY**

Community-owned renewable energy projects have become increasingly common in recent years, and countless projects now exist which use a variety of technologies including solar, wind, small scale hydro, biodiesel and biomass. Numerous studies have documented the barriers, opportunities and importance of community-owned energy (Rae & Bradley 2012; Bunning 2014; Walker 2008; Middlemiss & Parish 2009). Key advantages of community ownership include: creating a secure and reliable source of local energy; increasing local autonomy and control; lowering long term energy costs; creating a local income stream; demonstrating

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<sup>2</sup> Low Carbon Australia was absorbed by the Clean Energy Finance Corporation in 2013.

environmental commitments and ethical considerations; increasing local resilience and avoiding costly infrastructure upgrades (Walker 2008; Li et al 2013).

While there are currently only a handful of community-owned energy projects in Australia (such as Hepburn Wind and Denmark Community Wind), there is significant potential and scope for expansion. If the current barriers can be overcome, community-owned low carbon energy generation could assist significantly with eco-infrastructure delivery at the district level (Bunning 2014). Brixton Energy Company in London presents a useful urban model for the integration of community owned solar in medium to high-density inner city environments.<sup>3</sup>

### **PROPERTY ASSESSED CLEAN ENERGY**

In 2008 the City of Berkeley, California, introduced the Property Assessed Clean Energy (PACE) model, an innovative financing tool that assists building owners to fund sustainability measures (e.g. energy efficiency or integrated renewables) (City of Berkeley, 2008). PACE loans are repaid via a local government or state property tax tied to the property over a specified period (e.g. 20 years). This model gives building owners access to funds to meet the large upfront costs associated with sustainable technology investment (e.g. PV cells or trigeneration) that can be repaid over a longer time period. The financial savings from reduced energy costs can also be directed toward loan repayments.

PACE allows the building owner to pass on the costs associated with their upgrade to the next buyer if the loan has not been fully repaid by the time of sale. This helps to remove the risk associated with expensive upgrades with long-term returns on investment.

### **ON-BILL REPAYMENT**

While PACE works well for single owner-occupied buildings, is not so useful for rental and multi-family buildings. A 2013 pilot project overcomes the split incentive barrier through On-Bill Repayments (OBR), which allows owners to recoup sustainability investments through monthly utilities bills (Kim et al. 2012).

### **ENVIRONMENTAL UPGRADE AGREEMENTS**

EUA's are a recent Australian adaptation of the PACE financing mechanism, however, EUAs focus on commercial buildings. They are currently available in Sydney and Melbourne, and are being discussed in Perth.

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<sup>3</sup> For more on Brixton Energy Company see: <https://brixtonenergy.co.uk/>



While, PACE, EUA and OBR models were all aimed for individual buildings, the concepts provide useful financial templates that lend themselves to a next generation model that could be expanded to the precinct scale.

## **GREEN BONDS**

Green Bonds were first established in 2007 by Skandinaviska Enskilda Banken (SEB) together the World Bank (SEB 2014). The bonds were initially developed to meet an increasing demand for climate friendly investment opportunities, though they are now used to fund a range of environmental and sustainable, as well as climate related projects. The triple-A rated-fixed bonds are comparable to other World Bank bonds (World Bank 2014).

Green Bonds were only introduced to the Australian market in April 2014, though have been readily embraced by various superannuation funds, asset managers, insurance companies and banks (The Australian 2014), thus highlighting the demand for such products in the Australian context. This opens up funding opportunities, helping to unlock investment in precinct-scale eco-infrastructure projects.

## **BUSINESS IMPROVEMENT DISTRICTS**

Business Improvement Districts (BIDs) are organisations created and funded by local businesses and property owners within a defined district of a city, to manage the improvement of that district. They are generally funded by an increase in tax or a levy applied to businesses and property owners within the specified BID area (Levy 2001).

The role and function of BIDs vary considerably between different districts, cities and countries, depending on the needs of the local area. Various BIDs currently exist in Australia (e.g. Brisbane SCIPs, City of Fremantle and Gosford city).

BIDs are thus an alternative, privately funded, independent and participatory governance mechanism that allows stakeholders help to develop the BID plan and decide how funds will be managed. To date BIDs have not focused specifically on environmental improvements, however, using the concept of a BID to facilitate the implementation of green eco-infrastructure at a precinct level is discussed below.

## **A NEW MODEL – GRIDSs**

Rauland (2013) identifies a GRID or 'Greening, Revitalisation and Improvement District', as 'a mechanism that helps to deliver the basic green urban infrastructure needed at the local precinct level.

A GRID could be established in a similar manner to a BID but with a mandate to ensure the provision of sustainability improvements. A GRID plan would need to be

developed with goals and objectives, including environmental targets, identification of suitable options for eco-infrastructure provision and on-going maintenance.

Each GRID would develop its own business case for projects to determine costs, benefits and levy amount and how it will be collected and administered.

Once established a GRID would increase value through:

- Environmental efficiencies to reduce operating costs for owners and tenants, and;
- Placemaking and liveability improvements that attract people to use and spend in the area.

Prior to establishment, community buy-in and regulatory amendments in some jurisdictions would be required. However, once established, a GRID would ideally pick and choose from a range of financial mechanisms such as those discussed in this paper. For example a GRID may acquire a precinct scale PACE style loan and recoup costs via an OBR type scheme. Technical maintenance of specialist eco-infrastructure such as District energy or Water Sensitive Urban Design (WSUD), could be managed by an ESCO or leasing agent with funding provided through a GRID levy, or for larger projects, value capture.

## **CONCLUSION**

This paper has discussed the need for, and potential opportunities available to create, new financing arrangements that can enable low carbon, green infrastructure to be implemented at the precinct scale. However, this is likely to require new forms of governance. The concept of a GRID was proposed, which would function as a formal governance structure, to facilitate precinct-scale eco-infrastructure financing and ongoing management of the precinct. Spreading the cost over multiple properties and over longer payback periods, through a GRID governance structure, would reduce the often-prohibitive burden of high upfront costs associated with this type infrastructure, thus helping to mainstream precinct-scale low carbon and sustainability improvements within the built environment.

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**Impact assessment of street trees in the City of Melbourne using temporal high  
polygon 3D canopy modelling**

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**Abstract**

*As Australia experiences record heat waves there is a critical need to better understand the potential of Urban Forestry in mitigating heat retention in cities. Melbourne's street trees continue to feel the impact of the 'millennium-drought' (1998-2007) with many irreversibly damaged and several historic boulevard plantings requiring removal over the next five years.*

*This paper examines a new approach to street tree modelling for visualization and shade impact by bringing together advances in botanically accurate parametric L-System tree models; GIS based distribution, species and life expectancy mapping; parametric proxy-object modelling; and photometric solar analysis.*

*The results of this study demonstrate that it is now possible to produce high quality three dimensional studies at different time intervals that are visually compelling and shows great potential as performative design decision making tools for shade, walkability and comfort.*

**Keywords:** Key words: tree modelling; urban modelling; livability; urban forest

**Introduction:**

Street trees can have a tremendous impact on the quality of public spaces relative to cost (Moore 2009) and the choice of street tree species, their arrangement and spacing is an integral part of street design in any city.

In cities with large seasonal temperature variation such as Melbourne, the arrangement and choice of street trees needs to be considered multi seasonally. Large dense evergreen trees might seem a good choice for the summer months when we are experiencing heat waves of 40°C for stretches of four or five days at a time (BOM 2013) but this choice might also make the street seem dark and oppressive in winter when the temperature is nine or ten degrees and overcast skies are common.

As a result of climate change, heat waves are likely to increase in frequency, intensity and duration (Akompab et al. 2013) and Australia is particularly susceptible with increasing extreme weather events (Patz et al. 2005). The micro climatic benefits of street trees in heat mitigation of urban environments (Oke 1988) are thus becoming increasingly important as is the need to be able to model these environmental impacts.

Maximizing the health and productivity of Urban Forests is becoming an accountable activity (McPherson et al. 2012). In cities facing great change such as Melbourne with its high number of trees nearing the end of their useful life expectancy councils will need to visually represent to the community why replacing 'like with like' (Shears 2009) will not always be appropriate.

**The aim:**

The aim of this paper is to demonstrate a new, rapid, integrated approach for precinct scaled streetscape modelling with highly detailed 3D trees. The approach is aimed at providing landscape architects and urban designers a swift method for quantitative solar/shade impact assessment; visual assessment; impact of tree development over time; impact of species selection; spacing; and positioning so that street trees are a more integral part of the street design process resulting in higher quality, resilient and more comfortable urban spaces.

**Method:**

In this paper we provide a brief background of how street trees have traditionally been selected, how they have been modelled and discuss how recent advances in both software and hardware may potentially impact how we model street trees in the future.

We go on to describe our method of bringing together important aspects of previous street tree modelling along with some of the new hardware and software such as parametric proxy-object tree modelling with photometric daylight system modelling.

We test our new modelling approach on a case study area within Arden-Macaulay area north of Melbourne, Australia and continue with a brief discussion and conclusion based on our findings.

**Background:**

***How street tree species have traditionally been selected.***

In the previous decade, when selecting tree species for streets, a designer would refer to the 'council preferred species lists'. The lists were based mainly on the civic image of that a shire or council (Ely 2009). For example, a high proportion of native and indigenous species in Moreland (MCC 2000) or a higher proportion of deciduous boulevard species in City of Melbourne (COM 1998).

In current practice, aesthetic values such as symmetry still play a greater role in street scape design than do ecosystem benefits (Ely 2009). It is common that the same species and spacing is used on either side of the street regardless of orientation and the overshadowing impacts of dwellings in winter (Jim & Chen 2003). The spacing between trees dramatically effects the qualities of the street environment. Poorly considered tree spacing can result in an inhospitable low thermal comfort environment for cyclists and pedestrians during the summer months (Norton et al. 2013).

In recent years there has been a growing recognition of the ecosystem benefit trees provide in cities (Ely 2009; Young 2010). Their contributions include; mitigation of the Urban Heat Island Effect (Lindberg & Grimmond 2011), air temperature cooling through shade and evapotranspiration (Shashua-Bar et al. 2010), grey water filtration (Gómez-Baggethun & Barton 2013) pollution filtration (Maher 2013) noise attenuation, reduction of pedestrian UV exposure and thermal comfort (Parisi et al. 2000; Parisi et al. 2001). The understanding of urban trees as vital green infrastructure has led to large scale research projects which begin to quantify tree requirements for survival in complex urban environments (McPherson et al. 2012).

***Tree model quality in precinct scale modelling***

While it has been possible to model complex geometries such as trees, shrubs and grass with realistic results for over a decade there have been issues with balancing the level of realism with the speed of rendering times (Weber & Penn 1995) for precinct scaled modelling. Trees

have either been highly abstracted or left out altogether (Radford et al. 1997). Photographic collages are more commonly used than 3D models to discuss the role of street trees in the urban environment (COM 2012; COM 1998; DCC 2012; MCC 2000) but this lack of three dimensional modelling means that the effects and requirements of trees may not be considered in an integrated manner (Ely 2009).

In traditional planning documents, streets are represented in 2D cross sections and small portions of plan. These types of representation are primarily designed to show pavement and roadway widths, parking provision and building setbacks and are not capable of expressing the 3D quality of the street environment through the seasons or through the duration of the growth of the tree (Radford et al. 1997) or common pruning subtractions regularly made from urban trees to allow for building facades, power lines (Figure 1).

In 2006 *Itree*<sup>™</sup> was released by the USDA Forest Service. It is an open source, GIS database program and it allows for the creation an abstract model tree. This program has been used by the USDA Forest Service since 2005 to establish an accessible International tree growth database (McPherson et al. 2012) and by Melbourne City Council to catalogue and assess their urban forest. The database can output a height over time predictive data model for specific tree species under differing climatic, management and environmental conditions. This is ground-breaking for the management and selection of trees for the urban forest. The output is a very sophisticated data-rich abstract model, though does not assess complex three dimensional formal aspects of the trees.

Another method of modelling trees is commonly referred to as the 'lollypop tree' or 'ball on a stick' model (Voris et al. 1993). This is a very efficient modelling method for large scale but cannot be used to assess 3D quantities of shade or aesthetic nuances between a deciduous or evergreen tree or represent individual tree species form.

The need for realistic visualisations to garner community support for tree species selection based on empirical evidence of that species long term ability to survive or thrive in highly specific climatic and environmental conditions is well recognised by urban designers and planners globally (Pettit et al. 2009; Shears 2009).

High polygon, detailed 3D tree and plant modelling has been developed for vastly differing purposes in a wide range of disciplines since the late 1960's. In computational botany (Prusinkiewicz & Runions 2012; Reffye et al. 1988) the aim of the model is high botanical accuracy. In computer science the aim of the model has been to capture morphological



aspects of plants in the most computationally efficient manner for realistic looking vegetation for real-time rendering, gaming or other virtual environments (Rebollo et al. 2006).

Trees are broadly modelled in three ways: Rule-based procedural models the most well-known of which is L-systems developed in 1968 by Aristid Lindenmayer and Przemyslaw Prusinkiewicz (1968; 1990); image-based models using photographs of existing trees either mapped onto billboards or a partially image based canopy mapped over a modelled trunk and branches (Neubert et al. 2007) and more recently; Sketch based models for touch screens (Longay et al. 2012). Many programs hybridize between the three approaches.

### ***Improvements in hardware and software***

Processing power and graphics cards have substantially improved in the past fifteen years in affordable personal computers. Computer hardware is developing roughly in accordance with Moore's law (Schaller 1997), as a result modelling with thousands or even millions of polygons is now becoming possible.

In addition to improvements in hardware, modelling software has also developed rapidly. 'Proxy-object' modelling is now commonly available within architecture and animation industry software such as Autodesk's Maya™ and 3ds Max™. Taking full advantage of this modelling method is a parametric tree placement plugin by ITOO software™. This plugin allows thousands of trees to be included in a scene before the model begins to slow down prohibitively. Tree placement is managed through the plugin either by bitmap, surface or polyline meaning that the tree model species or growth stage can be replaced parametrically across the precinct in rapid succession.

Also now available in animation software such as 3dsMax™, are the algorithms for daylight rendering which have been improved with photographic quality rendering possible (O'Connor 2010). There have also been improvements in light modelling for energy rating requirements such as 'Green Star' or 'LEED' rating (Reinhart & Breton 2009). It is now possible to calculate a grid of lux levels in a digital model based on daylight expected at a given time of day, for a given day of the year that takes into account direct sunlight, indirect ambient light from the sky and reflected light from surrounding buildings. These light meter grids are designed for internal use (to assess task lighting etc.) but here we are using them externally to assess light and shade levels of streets.

The software also allows 'camera clipping' so that the shade of the tree(s) can be assessed without the visual obstruction of the canopy or structure of the tree itself (Figure 2) and data grid exported for further analysis in spread sheet form (Figure 3).

**High-polygon parametric 'proxy-object' and daylight assessment approach:**

The new urban street tree modelling approach we describe here brings together aforementioned developments in botanically-accurate algorithm tree modelling; increasing processing power in affordable personal computers; improvements in render engines with photometric daylight analysis; and efficient parametric 'proxy-objects' which allow large numbers of highly detailed three-dimensional representations of trees to be rendered.

We demonstrate this new approach to street tree modelling with a simple case study – modelling a precinct within Arden Macaulay a suburb within the City of Melbourne.

**Case study application: Arden Macaulay:**

Arden Macaulay is a precinct within the City of Melbourne which will be rezoned from industrial use to residential. By 2030 this precinct, which currently houses two to three thousand people is expected to house twenty five thousand (COM 2012). The structure of the precinct will undergo great change from predominantly low rise one and two story buildings to multi story buildings between four and ten stories high putting pressure on public open space amenity. The green infrastructure of this precinct will be provided predominantly on the streets and the council is currently formulating a 40% canopy coverage strategy which means that this particular renewal area is set for dramatic change.

We built a simple 3D model of the precinct using a mix of the council's cadastral data and Urban Forestry Visual, Lidar contour data and 3D textured buildings using Google Building Maker™.

The individual tree models we used for this test combined the empirical modelling techniques of L-systems with parameter based controls (Lintermann & Deussen 1999). The tree models combine high level botanical detail and potentially photo-realistic material qualities and high quality shadows (Figure 2), the accuracy of which is the topic of concurrent ongoing research.

The parametric L-system trees were converted proxy objects and then parametrically arrayed along footpaths so as to allow rapid adjustment of tree spacing or tree size and species. A variety of tree species were tested as well as different spacing's and different times of the year (Figure 4 to Figure 12).

As the model was parametric, simple parameters were able to be adjusted and the model would update immediately. To change the species of tree was just a matter of clicking to substitute the original high-poly tree model with another.

A lux meter grid was also set up to measure light levels on the street and footpath, with readings taken for each of the different scenarios (see examples Figure 13 and Figure 14). The lux meter grid was calculated with a few seconds and was exported to Microsoft Excel via a .CSV exchange file for further processing which allowed qualitative comparisons of the data.

### **Discussion and conclusion:**

This modelling approach allows for several hundred trees to be included in a scene without making the model untenably slow to regenerate or render. The models are accurate enough to measure canopy projections under zenith angle when rendered with the photometric sun producing realistic images of quantities and qualities of shade in urban design scale projects. In this study we were only looking at shade and accurate iterative visualisation, but there is scope to develop the method to output eco-system benefit and micro climate mapping (including leaf area volume and rates of evapotranspiration).

This new approach to modelling street trees could potentially be used by urban designers and landscape architects working with councils to supplement GIS/database for strategic decision making and presentation making a powerful design and advocacy tool.

Our research allows further analysis of the impact of large scale tree planting or replacements. It makes a contribution to an iterative street design process where multiple scenarios and multiple species can be tested and assessed quickly at different stages of growth with a reasonable level of accuracy, using detailed three-dimensional representations of trees at various growth stages in a spatial environment which provides accurate sun positioning and therefore shade qualities through its photometric daylight system. This method raises potential further investigation of the three dimensional street qualities with the additional dimension of time – looking at how the movement of the sun over different times of the day and different angles throughout the year might influence the design of north-south or east-west streets.

Our initial results of using this new approach to street tree modelling demonstrate that it is now feasible to use high quality three dimensional polygon street trees in urban models with photometric daylight analysis. We are now able to assess the solar amenity and shade impact of a variety of tree species at different seasonal and time intervals with an iterative design process allowing multiple scenarios to be tested effectively in short periods of time.



Figure 1: LHS - Photograph showing impact of pruning around power lines (Arden Street in North Melbourne). RHS shows potential of 3D tree models to be pruned to test potential visual and shading impacts.

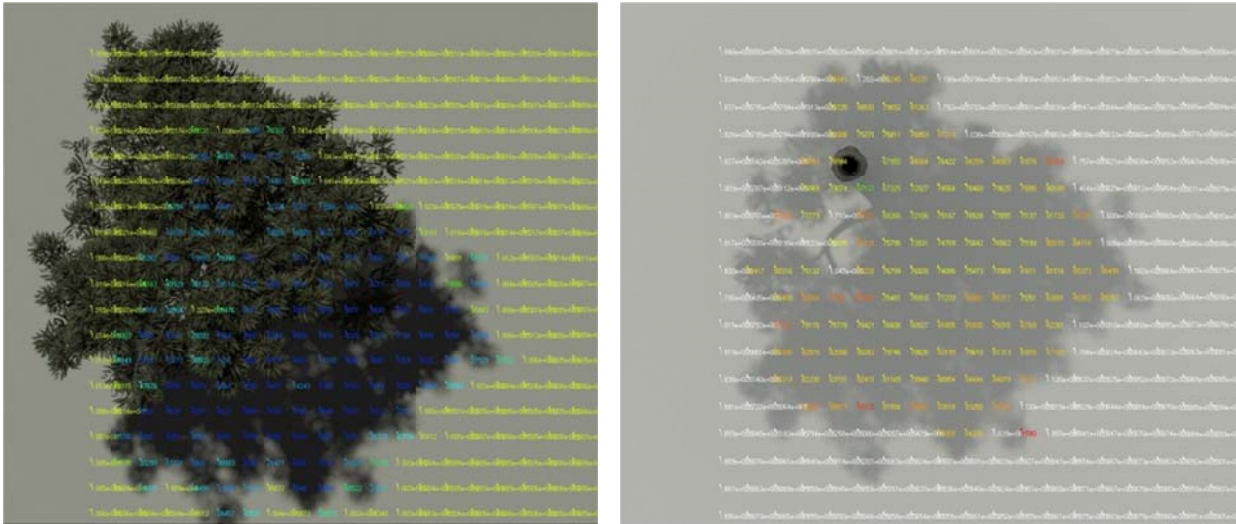


Figure 2: Rendered plan view of tree showing lux meter grid. LHS showing top of canopy, RHS showing the tree 'hidden' but still casting shadows.

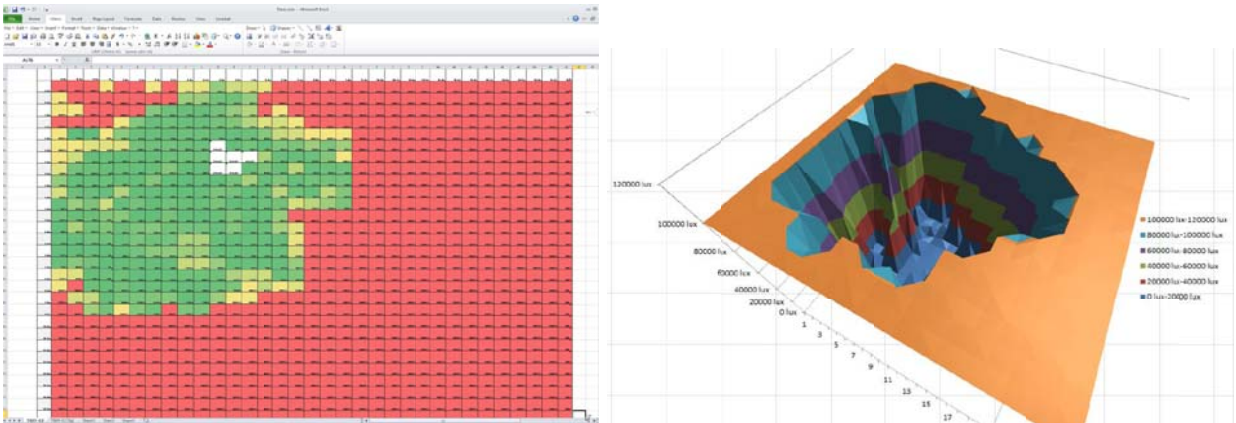


Figure 3: Lux meter grid exported to MS Excel for further analysis.



Figure 4: Aerial rendered view of Arden Macaulay area showing planting of: - *Corymbia maculata*.



Figure 5: Render of *Platanus orientalis* tree at three ages – 5, 10 and 20 years.



Figure 6: Aerial rendered view of Arden Macaulay area showing planting of: - *Corymbia maculata*, 20m spacing.



Figure 7: Aerial rendered view of Arden Macaulay area showing planting of *Corymbia maculata* 7m spacing, summer



Figure 8: Aerial rendered view of Arden Macaulay area showing planting of *Platanus orientalis* 7m spacing, summer

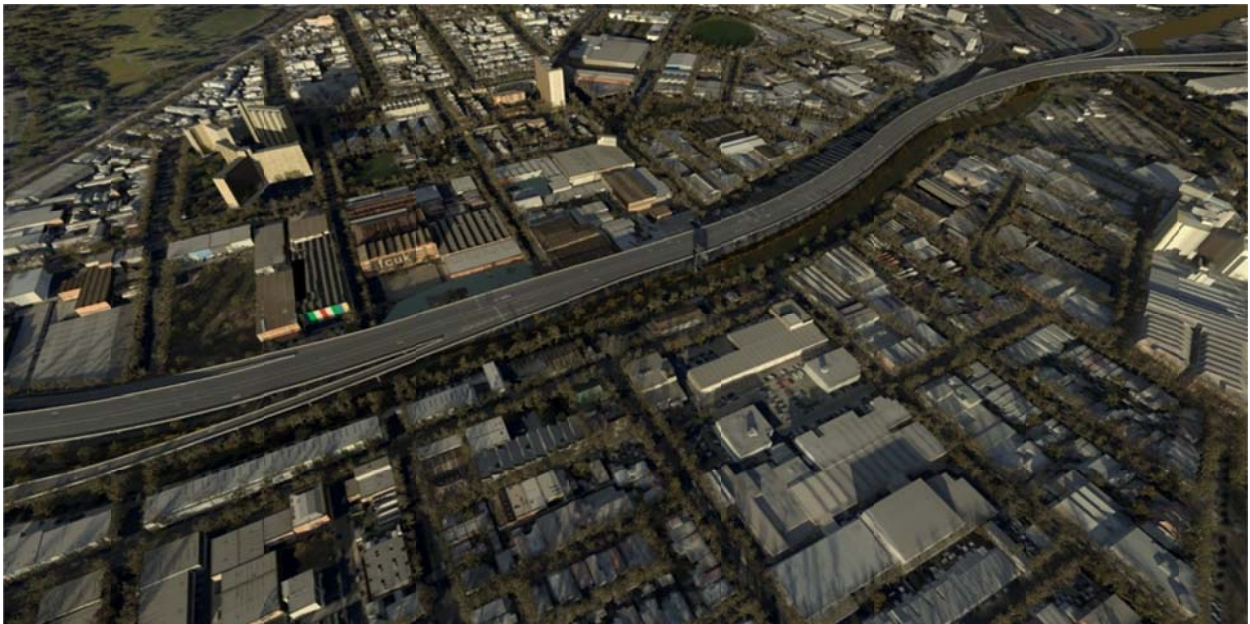


Figure 9: Aerial rendered view of Arden Macaulay area showing planting of *Platanus orientalis*, 7m spacing, winter



Figure 10: Aerial rendered view of Arden Macaulay area showing planting of *Platanus orientalis*, 20m spacing, autumn.



Figure 11: Aerial rendered view of Arden Macaulay area showing planting of *Platanus orientalis*, 20m spacing, summer.





Figure 12: Aerial rendered view of Arden Macaulay area showing planting of *Platanus orientalis*, 20m spacing, winter.

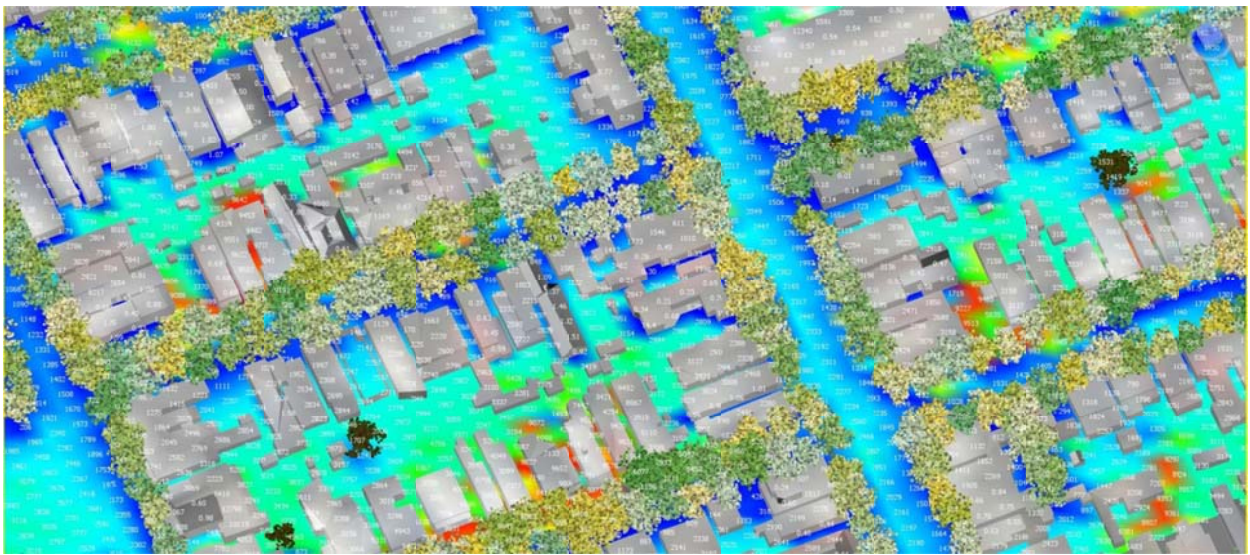


Figure 13: Aerial view of lux meter analysis of the Arden Macaulay area of Melbourne assessing light levels of the street taking into account tree shade and light reflected from building forms for 4pm 21<sup>st</sup> of June.



Figure 14: Plan view of lux meter analysis set to higher resolution for the Arden Macaulay area of Melbourne assessing light levels of the street taking into account tree shade and light reflected from building forms for 4pm 21<sup>st</sup> of June.

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