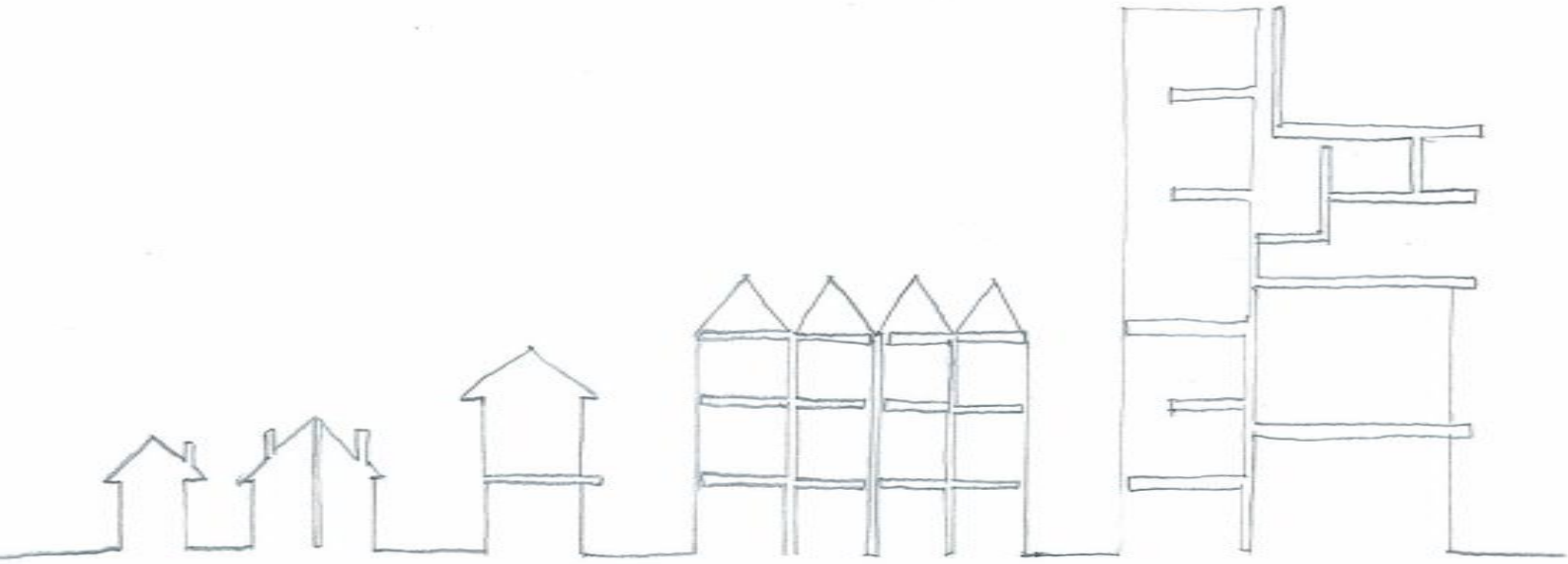
Consolidating the Australian Dream: Reconfiguring the Multi-Unit Housing Network



JASMINE SAMANTHA PALMER

B.A. (Arch.), Deakin University
B.Arch. (Hons.), University of Adelaide
M. Design Science (Sustainable Development), University of Sydney

CENTRE FOR HOUSING, URBAN AND REGIONAL PLANNING
DEPARTMENT OF GEOGRAPHY, ENVIRONMENT AND POPULATION
SCHOOL OF SOCIAL SCIENCES
FACULTY OF ARTS
UNIVERSITY OF ADELAIDE

SUBMITTED FOR THE DEGREE OF DOCTOR OF PHILOSOPHY, AUGUST 2016

Thesis Abstract

In promoting urban consolidation, Australia's strategic urban plans have the unintended consequence of reducing, if not eliminating, an individual household's capacity to directly engage with new dwelling production. Contrasts exist between the production processes of a free-standing home, typically constructed to contract, and that of a multi-unit building, typically speculatively designed and sold off-the-plan; with the latter removing the capacity for future occupants to directly influence dwelling function or design.

Hence, in providing a vision of higher-density urban communities, Australia's strategic urban plans arguably contribute to a disjunction between the function of higher-density dwellings and the individual households who seek to call them home. In response, a small number of Australian households and industry professionals have proposed alternative production processes to realise multi-unit housing suited to future occupants' collective needs.

This thesis examines the relational network of social and technical actors in existing multi-unit housing development. Structures of housing provision are visualised through an actor-network lens, and network relations are analysed to identify which (or what) network actors (or actants) influence design decisions, particularly regarding dwelling function and cost. The existing actor-network is compared with those of four alternative Australian cases. Employing both network analysis and primary interview data, impediments to collective self-organised housing in Australia are identified. Comparison of the actor-networks of the alternative cases recognises different types of network change in each case, reflecting participants' motivations and resources, with associated variation in outcomes. Means of addressing the impediments identified in the Australian cases are drawn from two international cases, building groups in Berlin, Germany and collective custom build in the United Kingdom.

The thesis argues successful consolidation of the Australian Dream advocated by contemporary urban planning policies requires that future residents be provided with greater capacity to influence design decision-making within the multi-unit structure of housing provision. Drawing lessons from the alternative cases, it proposes reconfiguring the actor-network of multi-unit housing to enable this to occur. The comparison of Australian and international case studies builds knowledge applicable to the development of policies and programs promoting collective self-organised housing in Australia, with relevance also to other dwelling densities.

The actor-network visualisations developed to represent the structures of housing provision under examination in this thesis provide unique insights in these cases and, with further development, may prove equally useful to other research examining the complex web of social and technical actors in housing systems.

Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide.

I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968. I also give permission for the digital version of my thesis to be made available on the web, via the University's digital research repository, the Library catalogue and also through web search engines.

Jasmine S. Palmer

Acknowledgements

This research was supported by an Australian Postgraduate Award (APA) through the University of Adelaide and a Postgraduate Scholarship from the Australian Housing and Urban Research Institute (AHURI).

Primary Supervisor: Adjunct Professor Andrew Beer.

Secondary Supervisor: Associate Professor Emma Baker.

Editing assistance: Dr Cecile Cutler.

Appreciation is extended to all research participants and colleagues who have contributed time and support.

The greatest thanks go to my partner, Robbie, and our daughter, Tia, without whose sustenance and encouragement this thesis would not have been possible.

List of Figures

Enlarged copies of Figures marked ^ are included in Appendix G for clarity. Additionally, they are accessible by clicking the figure in the digital document.

List of Tables

Enlarged copies of images contained in tables marked ^ are included in Appendix G. Additionally, they are directly accessible by clicking the image in the digital document.

List of Acronyms

ABS	Australian Bureau of Statistics
ANT	Actor-Network Theory
APRA	Australian Prudential Regulation Authority
ASIC	Australian Securities and Investment Commission
BG	Building Group/s
CCB	Collective Custom Build
CHCA	Commonwealth Housing Commission Authority (Australia)
CSO	Collective Self-Organised (Housing)
DCLG	Department of Communities and Local Government (UK)
DTPLI	Department of Transport Planning and Local Infrastructure (Victoria, Australia)
du/ha	Dwelling units per Hectare
ETHA	East Thames Housing Association (UK)
GbR	Gesellschaft des bürgerlichen Rechts/Civil Law Association or Partnership (Germany)
GFC	Global Financial Crisis
GLA	Greater London Authority
GmbH	Gesellschaft mit beschränkter Haftung/Company with Limited Liability (Germany)
GSW	Gemeinnützige Siedlungs-und Wohnungsbaugesellschaft/Former City of Berlin housing company
HA	Housing Association
HCA	Homes and Communities Agency (UK)
IPD	Integrated Property Developer
IFD	Industrial Flexible Demountable (Housing Construction Programme, The Netherlands)
IS	Information Systems
KfW	Kreditanstalt fur Wiederaufbau/Reconstruction Loan Company (Germany)
LVR	Loan-to-Value Ratio
MDH	Medium-Density Housing
NaCSBA	National Custom and Self Build Association (UK-formerly NaSBA)
NaSBA	National Self Build Association (UK)
NBBA	Netzwerk Berliner Baugruppen Architekten/Berlin Network of Baugruppen Architects
NCDC	National Capital Development Commission (Australia)
NGW	Netzwerkagentur GenerationenWohnen/Network Agency for Generational Living (Berlin)
ODASA	Office for Design and Architecture South Australia
OECD	The Organisation for Economic Cooperation and Development
OPP	Obligatory Passage Point
ROI	Return-on-Investment
SGA	State Government Architect
SNA	Social Network Analysis
SoP	Structure of Provision
STG	Socio-Technical Graphs
TPD	Traditional Property Developer
UK	United Kingdom
UKCH	The United Kingdom Cohousing Network
UTATUT	Unified Theory of Acceptance and Use of Technology
VAT	Value Added Tax
WEG	Wohnungseigentumsgesetz/Condominium Act (Germany)
WPI	Women's Property Initiative (Australia)

Introduction

Australian urban policies and plans recognise the necessity to increase residential densities in strategic areas of our cities to accommodate population growth, increase sustainability, and provide alternatives to low-density suburbs. In recent decades all major Australian cities have adopted urban planning strategies promoting consolidation, with most setting targets for the proportion of new dwellings to be constructed within existing urban areas.[1] As one example, the 30-Year Plan for Greater Adelaide (Government of South Australia 2010) aims to construct 70% of all new dwellings in existing urban areas by 2040, a significant increase from approximately 20% in 2003 (Australian Bureau of Statistics (ABS) 2015). This approach is not new for Australia, having first emerged in the 1944 Commonwealth Housing Commission Report (CHCA 1944) which promoted medium-rise development on transport corridors, and reappearing in 1970 plans for Canberra and Perth, based around public transport feeders and transport corridors (MRPA 1970; NCDC 1970). What is different in these more recent strategies is the move away from structure planning, fundamental to the earlier plans, to a conceptual and visionary ideal based on urban form and density.

Current consolidation plans are motivated by the social, economic, and environmental challenges of persistent suburban expansion and have a collective ambition to generate more accessible, sustainable, equitable, and liveable future urban environments (Goodman et al. 2013). Densification and intensification at activity centres, transit-oriented developments, and transport corridors represent a shift away from the dominant free-standing home to a multi-unit building typology. In this shift, the implementation of current urban planning strategies is not only reconfiguring the built form of our cities over time but also the relationship between individual households and housing provision.

Most frequently employing the term *medium-density housing*[2] the plans place great importance on the role of multi-unit housing in achieving their consolidation objectives. For example, The 30-Year Plan for Greater Adelaide suggests medium-density housing "represent[s] the critical land use arrangements to achieve a more compact, efficient and

[1] Strategic urban plans promoting consolidation include: Brisbane City Council (2014 Brisbane City Plan 2014); Department of Transport Planning and Local Infrastructure (2013 Plan Melbourne Metropolitan Planning Strategy); Government (2013 Your Future Sydney: Metropolitan Strategy for Sydney to 2031); Government of South Australia (2010 The 30-Year Plan for Greater Adelaide: A Volume of the South Australian Planning Strategy; 2012 Inner Metro Rim Structure Plan); Government of Western Australia (2010 Directions 2031 and Beyond); Queensland Government (2009 South East Queensland Regional Plan 2009 - 2031)

[2] While employed in all strategic plans, the term medium-density has no consistent definition. This issue, along with the preference to employ the term multi-unit housing, is discussed in Appendix AC.

liveable region" (Government of South Australia 2010, p. 71). It further emphasises the critical role of medium-density housing in providing easy access to jobs and services, creating walkable, safe, and connected neighbourhoods of diverse housing types with reduced reliance on cars, and increased urban efficiency and sustainability.

Commentators have criticised these plans as "confusing physical phenomena with social relations" (Dodson 2012, p. 28), and resulting in two parallel urban universes: that of the planning authorities and that of "the increasingly complex, dispersed, residentially differentiated suburban metropolitan areas most Australians live in" (Forster 2006, p. 180). Discussing urban consolidation in Brisbane in relation to liveability, McCrea and Walters conclude that while plans tend to "include local ideas about urban liveability, these ideas are difficult to encode in planning regulations" (2012, p. 204), thus leaving the realisation of strategic urban planning ambitions associated with medium-density or multi-unit housing in the hands of the market. Similarly, Tomlinson argued Plan Melbourne assumes a neo-liberal confidence that "market-led urban development will provide the 'cities Australian's want'" (Tomlinson 2013, p. 10), warning housing outcomes under the plan will be informed by politics and profit rather than the ambition to achieve a more social or environmentally equitable city.

Both structural and social barriers impede effective implementation of the plans, contributing to the observed divisions between strategic urban policy intent and urban reality. Several commentators highlight a lack of comprehensive policies or programs for their implementation, with local governments not ready or able to implement metropolitan scale plans (Buxton et al. 2012; Dodson 2010; Gleeson et al. 2012; Kelly et al. 2011a). Others emphasise the economic challenges of delivering higher density housing able to provide desirable lifestyle attributes in a market dominated by free-standing dwellings (Birrell & Healy 2013; Gurran & Phibbs 2013; Rowley & Phibbs 2012). The ongoing community perception of higher density housing as a compromised or temporary living solution is seen to influence community acceptance of the ambitions of strategic plans (Fischer & Ayturk 2011), along with "the highly dispersed nature of residential property ownership, and the conflict this engenders around the competing development and use rights that accompany an interest in property" (Alves 2006, p. 22).

Building projects undertaken today in the name of urban consolidation define the living environments and neighbourhoods of both current and future residents for many decades. In pursuing more sustainable urban futures through consolidation it is critical the design and function of dwellings and their surroundings respond to the lifestyles of residents and meet the expectations of our home-owning society.

Current strategic urban plans suggest a rational transition from unsustainable cities to an urban future with potential for greater resilience. However, as citywide proposals integrating complex systems of transport, servicing, and community infrastructure, they show a tendency to oversimplify the complex context of housing provision. J.M.Jacobs

argues that traditional geographies have black-boxed the building as an immutable artefact:

> *…they do not interrogate the socio-technical processes by which that thereness materializes: the process of construction and use of the building, the various modes of authorship and ownership, the day-to-day complexities of maintenance and servicing. (Jacobs 2006, p. 11)*

Similarly, current urban plans tend to black-box housing types, including multi-unit housing. The existing systems of multi-unit housing provision have become sufficiently complex that urban plans "draw a little box about which they need to know nothing but its input and output" (Latour 1987, pp. 2–3). Black-boxing restricts knowledge and influence to existing actors and existing market-led provision becomes locked-in (Lovell & Smith 2010). Black-boxing of housing systems perpetuates repetition of the status-quo by limiting controversies essential to the development of alternatives, thereby reinforcing the perception of multi-unit housing as an inferior housing alternative.

To overcome identified barriers to implementing these strategic visions, propositions have been made for the introduction of "metropolitan commissions" (Gleeson et al. 2012) and "neighbourhood development corporations" (Kelly et al. 2011a). Both these proposals aim to empower local communities to enact change within the scope of the larger metropolitan plans.

Newton suggests a more radical "multilevel (actor) involvement in urban development" (2013, p. 586) is required to avoid fragmented and piecemeal infill. He promotes enabling property owners and community members to become partners in redevelopment, addressing Tomlinson's concerns regarding the excessive influence of politics and profit. Such partnerships offer a mechanism to achieve urban regeneration while aligning the ambitions of the strategic plans with the interests of current residents, and the lifestyles of future residents.

This thesis seeks such multi-level innovation in housing consolidation, to unlock the black-box, and disrupt the reliance on market-led development. It proposes future resident participation in infill housing development to reconfigure the relationship between households and multi-unit provision: to Consolidate the Australian Dream through collective self-organisation.

Research Questions

Focusing on the complex networks of actors and information flows which constitute the existing housing provision system, this thesis identifies the determinants of multi-unit dwelling designs and examines the role of occupants in the existing provision process. It then examines Australian and international examples of households collectively engaging in multi-unit housing provision for their own use as alternatives to the existing system.

The research aims to:

- Describe the existing system of multi-unit housing provision in Australia with a particular focus on design briefing and the determinants of dwelling function.
- Investigate current examples of Australian multi-unit urban infill projects which seek an alternative to existing provision systems, with particular reference to stakeholder motivations.
- Observe international housing sub-markets which enable user participation in the provision of multi-unit urban infill housing projects.
- Draw together information from both the international and Australian examples to identify opportunities for reconfiguring the existing multi-unit housing provision system in Australia; redefining the role of occupants/owners in the housing provision and urban consolidation processes.

In the interests of developing knowledge to support collective self-organised groups, this research asks the primary research question:

What are the impediments to collective self-organised housing provision in Australian urban consolidation?

Four sub-questions reflecting the above aims divide the research into three distinct stages.

The Existing	1. What influences the design and function of multi-unit infill housing currently being constructed in Australia?
	2. What are the impediments to occupant involvement in multi-unit infill housing provision?
The Alternatives	3. What alternative multi-unit infill housing provision methods have been employed in Australia and internationally that facilitate owner-occupier involvement in provision through collective self-organisation?

The Future	4. What lessons can be learnt from these alternative provision methods to diversify multi-unit infill housing outcomes in Australia in the future and support collective self-organised development?

Contribution

In relation to Australian urban regeneration, Rowley and Phibbs (2012) provide a checklist of barriers to infill development at various stages of project development, coupling this with parallel suggestions for overcoming these to deliver diverse and affordable housing. Like recommendations made by other studies (e.g. Newton et al. 2011), the suggestions remain bounded by the context of existing developer-driven provision and the black-box of Australian multi-unit housing remains closed.

> *Confronted with a black box, we take a series of decisions. Do we take it up? Do we reject it? Do we reopen it? Do we let it drop through lack of interest? Do we make it more solid by grasping it without any further discussion? Do we transform it beyond recognition? (Latour 1987, p29)*

J.M.Jacobs (2007) asserts black-boxes form and become locked-in when it is too difficult or expensive for alternatives to generate controversies that force change. Viewing multi-unit housing through the lens of actor-network theory, this research rejects the existing black-box. It seeks to reopen the box; to reassemble existing knowledge and generate the required controversies for transformation.

Current and previous research challenging the existing black-box has been undertaken in Australia, including: the proposal of a 4th sector housing model involving future residents to improve design in Western Australian urban consolidation areas (Dolin et al. 1992), the application of market design theory to apartment development with the ambition of improved affordability (Sharam & Bryant 2016; Sharam et al. 2015a; Sharam et al. 2012), the pursuit of more diverse multi-unit housing to reflect community needs (Martel et al. 2013a; 2013b), the proposal of the "deliberative development" of multi-unit buildings (Sharam et al. 2015c), and investigations into de-risking multi-unit development to reduce the dominance of financial institutions and speculative developers (Sharam et al. 2015a, 2015b). This research builds on these foundations and converses with its contemporaries. To this active research domain, it offers an unconventional view of existing housing provision and a unique means of observing alternatives.

Research outcomes will:

- Contribute to the existing and ongoing multi-unit housing debate in Australia.
- Demonstrate a unique method for observing and comparing housing provision networks adaptable for use across international contexts.

- Elucidate alternative(s) to the existing 'locked-in' method of multi-unit housing provision in Australia to reduce the mismatch between housing preferences and available products.
- Contribute to the international knowledge on how current multi-unit housing provision limits housing outcomes and means for increasing subsequent household choice.

Thesis Outline

The Thesis comprises four Parts, each consisting of two or more chapters.

Part One sets the research context (Chapter 1), introduces the theoretical frameworks engaged in the research (Chapter 2), and details research methods (Chapter 3).

Part Two: The Existing presents existing Australian multi-unit provision over three chapters divided into a review of secondary data (Chapter 4), the introduction of primary data (Chapter 5), and subsequent analysis (Chapter 6). Part Two concludes having provided a unique view of the existing multi-unit housing network and identifying key design decision-making influences.

Part Three: The Australian Multi-Unit Innovators comprises three chapters. Chapter 7 introduces the Australian Multi-Unit Innovators, Chapter 8 presents the experiences of stakeholders to date, and Chapter 9 compares the individual projects, observing differences in their capacity to reconfigure the black-box via network analysis. Part Three concludes by identifying impediments to alternative multi-unit housing provision.

Part Four: International Multi-Unit Innovators comprises two chapters. First, Chapter 10 introduces the international cases, detailing their selection and relevant locational features. It also identifies variables amongst international self-organised housing sectors which facilitate initial comparisons between the two cases. Chapter 11 then draws lessons from the international cases in response to the impediments identified at the conclusion of Part Three.

The Thesis then concludes with response to the initial aims and research questions.

Part One: Context

Part One of the Thesis sets the research context (Chapter 1), introduces the theoretical frameworks engaged (Chapter 2), and establishes research methods (Chapter 3).

Chapter 1. Context

In parallel with post-World War Two increases in personal mobility and rapid urban expansion, the low-density single-family home became the dominant housing form in Australian cities. The national home ownership rate increased from approximately 50% in the early twentieth century to 70% post-World War II and remains one of the highest among OECD countries (Andrews & Sanchez 2011).

The free-standing single-family home maintains its market dominance and continues to embody the Great Australian Dream to the majority of the population, despite research showing middle ring and outer suburbs: are heavily reliant on private transport and lack resilience (Dodson & Sipe 2008); are increasingly unaffordable to occupy (Pullen et al. 1999), require high energy consumption in use (Stephan et al. 2013); contribute to social isolation (Engels & Liu 2011); and reinforce spatial mismatches between locations of housing and employment (Li et al. 2012).

As a highly individualistic society (Burke & Hulse 2010), Australians overwhelmingly view ownership as the preferred housing tenure (Badcock & Beer 2000). Some 35 years ago, Kemeny (1981) suggested this results, in part, from a lack of comparable alternatives. His view continues to be relevant today as taxation measures and residential tenancies legislation together preference ownership over rental tenure (Easthope 2014). Such differential treatment perpetuates the desire for home ownership despite increasing unaffordability challenges,[3] which for many households shifts the free-standing home from being the Great Australian Dream to the "Great Australian Nightmare" (Kemeny 1983), an unaffordable vision which, if obtained, "result[s] in escalating trajectories of consumption" (Maller et al. 2013, p. 1).

1.1 Two Provision Structures

Australian homeowners have a tendency to personalise their domestic environments through construction, renovation, remodelling, and extension. Individualisation of free-standing dwellings commences with the owner directly engaging in the contract-based provision of individual dwellings for individual households. This is an entrenched system with which Australians are relatively familiar and which

> *…reflects Australia's distinctive form of ownership as it carries individualism to greater lengths than in other ownership societies. Every Australian*

[3] The major market mean multiple ratio of house price to income increased from approximately 3.0 in 1981 to 6.4 in 2015. In Sydney and Melbourne, this ratio reaches 12.2 and 9.7 respectively, compared with an average of 4.6 for the UK and 8.5 in Greater London (Cox & Pavletich 2016).

> *purchaser of a new detached dwelling has the ability to mould it to their individual needs and tastes in a way that only the very affluent can do in other societies. (Burke & Hulse 2010, p. 828)*

A household initiating construction of a new, free-standing dwelling makes decisions regarding the type of home to be constructed, its functionality, and aesthetic appearance. Whilst generic appearing 'project home' designs dominate new suburbs, a household is free to design and build to their own desires, limited only by planning regulations, construction codes and personal finances. Even in relatively low-cost project home designs, householders select a range of fixtures, finishes, and fittings and may alter generic floor plans. The contracting household purchases the serviced plot before construction, make staged payments through the construction period and carry the financial risk of development.

In contrast, multi-unit provision is supply-led, involves more complex relationships between larger numbers of stakeholders, and seldom offers an opportunity for individualisation. The "long-time specialisation in the simple to build detached dwelling" (Burke & Hulse 2010, p. 829) is replaced by more industrialised construction and development systems (Burke & Hulse 2010; Turner 1976). Easthope et al. (2014) identify the design of multi-unit dwellings for anonymous residents means "many social, environmental and economic factors pertinent to a building's design cannot be addressed during the development approval phase" (p. 293). Multi-unit design offers little, if any, potential for variation of internal planning or exterior appearance in construction or use phases.

Research on both Australian and international markets describes such speculative, supply-led housing provision as slow to innovate, conservative, risk-averse, and delivering poor quality product (City of Melbourne 2013; Harty 2008; Sharam et al. 2015a; Wallace et al. 2013). In multi-unit provision, speculative developers carry all financial and development risk, receiving no income until the project is complete, and seek substantial profit reward for their risk exposure. As a consequence, they also carry substantial decision-making capacity, determining dwelling function, design, materials, and environmental ambitions. Building to sell for profit, developers have short-term relationships with the buildings they produce, meaning design decision-making is informed by priorities and objectives misaligned from those of potential owner-occupiers; generating "split incentives" (Easthope & Randolph 2016; Randolph & Easthope 2014) on matters relevant to use value, lifecycle management, and maintenance.

An unintended consequence of strategic plans promoting multi-unit development is the increase in speculation and distancing of future occupants from housing provision, resulting in an increase in the mismatch between household desires and available dwellings. In pursuing infill development as the dominant form of new housing provision, Australia's strategic urban plans indirectly ask households to forego the historic privilege of housing personalisation so entrenched in the Australian psyche.

1.2 Two Lived Experiences

From these two distinct structures of housing provision, two distinct lived experiences emerge. Many Australians view multi-unit housing as a temporary arrangement for young households as they worked toward achieving the Great Australian Dream, as a bespoke home for the urban elite, or as a housing option of last choice for those unable to afford an alternative (O'Hanlon 2012; Randolph & Tice 2013). Some researchers reinforce the public perception that higher-density housing is an inappropriate environment to raise children (Birrell & Healy 2013) and Fincher (2004) showed many speculative developers are of the opinion higher-density housing for families is undesirable. Such views perpetuate the entrenched perception of multi-unit housing as an inferior alternative, informing multi-unit design and construction despite research showing lower income households with children to be "a significant sub-sector of the resident apartment population, geographically concentrated in the lower value middle-ring suburbs of Sydney" (Easthope & Tice 2011, p. 415).

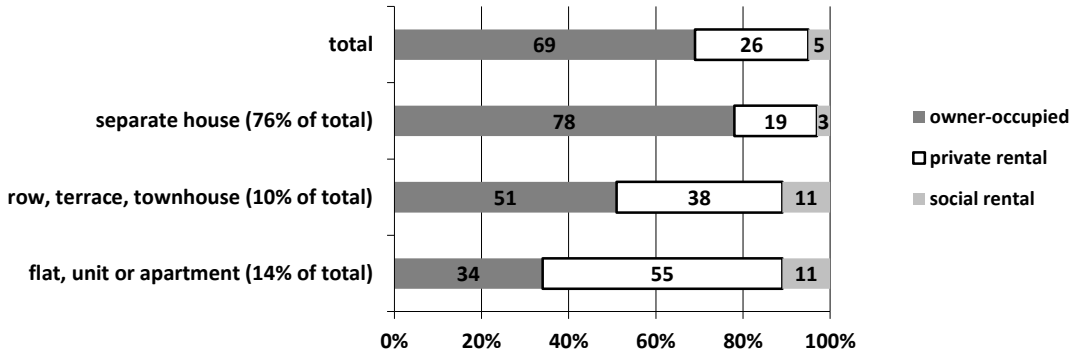


Figure 1.1. Australian Tenure by Dwelling Type. (ABS 2011)

Differences in tenure exist across housing types (Figure 1.1), with 86% of all Australian owner-occupied dwellings being free-standing houses (ABS 2011). These differences persist in metropolitan areas, with Figure 1.2 illustrating the relationship between dwelling type and tenure in the Greater Melbourne statistical area. With limited security of tenure, rental dwellings are characterised by occupants with high rates of relocation, with just 13% of renters residing at the same address after 5 years compared with 71% of owner-occupiers (ABS 2010). Mobility is even higher among medium and high-density housing, with only 37% of people resident in the Melbourne inner city statistical area in 2006 remaining by 2011 (City of Melbourne et al. 2013).

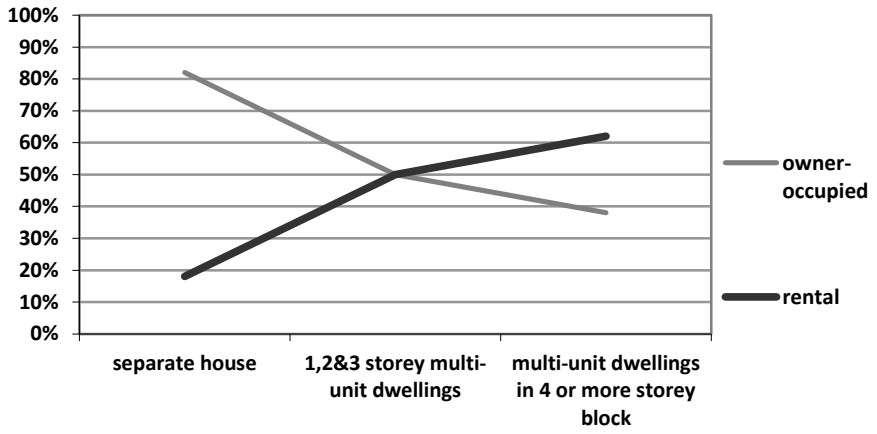


Figure 1.2. Tenure in privately-owned dwelling types, Greater Melbourne Area. (ABS 2011)

As many as 95% of inner Melbourne apartments constructed in 2011/12 were purchased by investors (Altmann 2015; City of Melbourne 2013). This disproportionate representation of rental tenure in existing multi-unit properties raises concerns regarding building quality and long-term built and social legacies (Keck 2013). There is also a lack of diversity among new developments, with minimal variation from the one bedroom and two bedroom apartments which provide maximum profit to the developer at completion, as well as maximum profit to the investor during use (Birrell & Healy 2013). Where such limited options are provided by housing systems, households have little choice but to "adapt their housing expectations and behaviours" (Altmann 2015, p. 102; Stone 2015).

Providing descriptive visions similar to other strategic plans, The 30-Year Plan for Greater Adelaide asserts designated consolidation areas will create:

> *dynamic communities where people will want to live and work… each will [have] a unique character, these communities will give residents a sense of belonging and connectedness, which will make them a drawcard … (Government of South Australia 2010, p. 71).*

If supply-led provision persists, it is more likely designated consolidation areas will offer limited diversity of housing type and function, be comprised of buildings with poor quality design and construction, and be home to a larger than average proportion of rental households with associated high mobility rates.

The preceding data on multi-unit housing produced by the existing, speculative structure of provision suggests it is unlikely to reconfigure the existing Australian Dream; and that disruption of the speculative development process is required to realise the ambitions of the urban strategic plans.

1.3 Multi-Unit Preferences

Strategic urban plans entrust project specific decision-making to profit-motivated developers, which "has meant that developers have determined the types of housing now being built" (Buxton et al. 2012, p. 111). Turner argued as early as 1976 that increased control by speculative developers had:

> *…already resulted in grossly coarse-grained cities which exclude those who fail to fit the officially or commercially specified categories. The inevitable consequences have been gross misfits and mismatches. (p. 32)*

Concurring with Turner's observations, three housing preference studies focusing on the cities of Adelaide (Fischer & Ayturk 2011), Perth (State of Western Australia 2013), Melbourne and Sydney (Kelly et al. 2011b), identified mismatches between household preferences and the housing delivered via speculative provision. They concluded almost half of all households intending to purchase a dwelling in the near future anticipated they would not be buying a detached house due to current market constraints, and that "a market exists for quality medium-density development which includes the physical and social infrastructure to support diversity in mix of people and family types attracted to living in this type of development" (Fischer & Ayturk 2011, p. 6). These findings appear to support strategic plans for consolidation. However, they also assert speculative multi-unit development falls short of meeting this identified market demand due to a lack of diversity and owner-occupant appeal. In all four cities studied, it is necessary to bridge the design and amenity gap between demand-led, free-standing dwellings and supply-led multi-unit housing.

In a report to the Government of Western Australia, Dolin et al. (1992) called on consolidation proponents to "recognise that they are tinkering with the Great Australian Dream … in which the ordinary home-buying individual had, and has, a creative and participatory role" (p. 5). Highlighting the lack of opportunity for households to initiate the design and construction of new multi-unit dwellings in the existing structures of provision (Figure 1.3), they suggested occupant participation in multi-unit development could both bridge design mismatches and overcome the challenges of split incentives.

Over time numerous groups have formed in Australian cities with the intention of collectively organising the production of private multi-unit housing for their own use. Regardless of the location or density of their proposed developments, all such groups face numerous challenges in realising their ambitions. The bespoke nature of development means a process pioneered by one group to accommodate their unique personal and locational circumstances is seldom replicable (Crabtree 2008). This leaves each new group seeking an alternative to existing multi-unit development with the challenge of developing new processes and solutions (financial, legal, administrative) relative to their

own unique circumstances, a process which can be exceptionally time-consuming and become an insurmountable hurdle to progress.

Dwelling Stock	Detached House	Multi-Unit Dwelling
Existing	Buy an Existing Detached House ✓	Buy an Existing Multi-Unit Dwelling ✓
New	Initiate Design and/or Construction of New Detached house ✓	Initiate design and/or construction of new Multi-Unit dwelling

Figure 1.3. Home Purchase Options in existing Australian Provision.
based on Dolin et al. 1992

While some small groups succeed in their ambition, these are relatively rare cases. Successful groups are identifiable through the physical presence of the resultant built housing, often featured in architectural professional journals. However, little more than anecdotal evidence exists to identify or quantify unsuccessful attempts.

Two decades after Dolin et al. 1992 report, Alves and London (2012) again advocated for demand-led multi-unit development. In the intervening years a small number of one-off, private multi-unit properties have been built in capital cities, most frequently developed by architects for their own use. A cluster of state government funded housing co-operative programs have also come and gone. However, the speculative supply-led provision of multi-unit dwellings has persisted with minimal variation, acting to reinforce the perception higher density housing is “an issue of security and investment more than one of lifestyle” (Burke & Hulse 2010). In this context, Easthope and Randolph (2016) demonstrate the ongoing influence of profit-seeking developers impact “on the success or failure of compact city strategies” (p. 16).

1.4 Developing Without Developers

The market dominance of supply-led multi-unit housing provision is not unique to Australia. The vast majority of privately owned multi-unit dwellings in developed nations are realised speculatively, with dwellings produced for sale to others; be they owner-occupiers or investors. However, around the globe, a long history of demand-led multi-unit innovations exists as a minority contribution to housing supply and has been the subject of renewed interest from both housing researchers and practitioners over recent years.

Past examples include collectively owned and managed housing co-operatives in Mumbai, India commencing in the early 20th century (2008), in inter-war Athens (Kafkoula 1994), and during the early years of the Turkish Republic (Çakin 1991). Post-WWII saw a boom in privately-owned multi-unit construction in Southern California, with documented examples of collaborations between property developers and future occupants (Lasner 2009), as well as the growth of private co-operative society housing into a viable housing option for civil servants in Hong Kong (Lai et al. 2012). Not all these examples continue today, with the Hong Kong system currently in the process of dissolution due to changing political and economic contexts together with challenges in managing an ageing building stock.

Each of these past examples emerged in the context of housing shortages resulting from conflict, rapid urban growth, or social inequality, and a dominant housing system failing to meet the needs of a segment of the population. Similar conditions persist in western nations today, with dwelling shortages in many urban locations, declining affordability (Ball 2016; Beer et al. 2007), and an ongoing prioritisation of housing's role as investment and commodity (Achtenberg & Marcuse 1986; Higgins & Moore 2015; Smith 2008; Watt & Minton 2016). In this context, contemporary demand-led multi-unit housing systems are emerging in a number of locations, either through the collective action of households, civil society groups, or policy change. Contemporary examples include both private and social housing programs in locations such as Austria (Lang 2015b), with some jurisdictions advocating an increase in market-led housing projects, private co-operatives, and not-for-profit rentals as tools for achieving urban consolidation and sustainability (Rerat 2012).

Incentivised by government policy, the Industrial Flexible Demountable (IFD) Construction programme conducted by Dutch ministries from 1999-2006 (Cuperus 2002; Geraedts et al. 2011) embraced an open building approach to designing for flexibility. Open building was first advocated by architect and educator Habraken in 1961 when he challenged speculative development, suggesting:

> *We should not try to forecast what will happen, but try to make provision for what cannot be foreseen. (Habraken 1972, p. 42)*

Elsewhere, demand-led multi-unit housing has evolved without government support. Argentina's 2001 economic crisis challenged the viability of the speculative, luxury-focused inner urban housing market. In this environment, the alternative form of development known as Fideicomisos flourished (BuenosAiresHabitat 2010; Zang et al. 2009). Fideicomisos place the architect at the centre of the process (Donald 2013; Redstone & Mihotich 2012), enabling development without a developer and realising significant financial savings (Wainwright 2013).

Like Fideicomisos, many demand-led multi-unit projects are privately-funded in Europe, with Tummers observing households who initiate the design and/or construction of new multi-unit dwellings

> *anticipate that the housing market is not going to provide their needs, be it for typology (lay-out, mixed use) finance or ecology. Moreover, they expect developments in technology (sustainable energy for example or support for the elderly) and want to implement them directly instead of waiting for general distribution. (Tummers 2011a, p. 6)*

These brief examples demonstrate the diversity of markets and motivations for demand-led multi-unit housing. An equally diverse and growing collection of academic research provides both historical and contemporary insights into alternative multi-unit housing opportunities, with a focus on European nations and, to a lesser extent, North America.

1.5 Terminology

Multi-unit housing literature includes projects described as self-managed, self-built, self-organised, collective, collaborative, and co-operative, among others. Reviewing European cohousing research, Tummers (2015a) identifies the challenges posed to this particular field of research by a lack of consistent terminology. One essential attribute of Sandstedt and Westin's (2015) definition of Swedish cohousing is the inclusion of significant shared facilities, which is also true of McCamant's definition (McCamant & Durrett 2011; McCamant et al. 1994) commonly employed in the United States. However, cohousing is regularly used as the English translation of housing terms from other languages despite a lack of common facilities (Krokfors 2012) or different meanings in their original language (Droste 2015; Jarvis 2015a; Tummers 2011b). For example, the German terms *genossenschaften* (co-operative), *wohngruppe* (housing group), and *baugruppe* (building group) are frequently all translated as cohousing, disguising variations in tenure, ownership structure, and other aspects of provision. The Swedish term *kollektivhus* and the Danish *bofaellaskab* are typically both referred to in English as cohousing despite the Swedish models prioritising collective action solely in the consumption subsystem and the modern Danish projects engaging future residents throughout all stages of provision and occupation (Egero 2014).

Similarly, the term 'co-operative' contributes to confusion in the field, carrying different legal and ownership structures in different locations. Exacerbating this, it is not uncommon for multiple housing co-operative structures to co-exist in a single jurisdiction, with multiple forms ongoing in the United Kingdom (Birchall 1988; Lang 2015a), very few of which can accommodate owner or occupier input in design or provision. Coudroy de Lille (2015) described three different types of housing co-operatives in Poland, with an even larger number of ownership arrangements. Some of these enable owner involvement in the development of new dwellings, but not all. Having provided an overview of different forms of shared and communal housing in Europe over time Vestbro and Horelli (2012) suggest that due to the legal differences across jurisdictions, the term co-operative should be avoided in multi-national studies.

Other relevant terms occurring in the English language literature include intentional communities (Marckmann et al. 2012; Scanlon & Arrigoitia 2015), self-help housing (Burgess 1978; Hill 2015), self-building (Brown et al. 2013; Hamiduddin & Gallent 2015; Parvin et al. 2011), eco-village (Broer & Titheridge 2010; Marckmann et al. 2012), collective self-development, self-managed collective housing (Tummers 2015a), and collective private commissioning (Boelens & Visser 2011). Some terms insinuate household involvement in provision, whilst others do not. Many of these terms are used interchangeably or in combination, and none reflect dwelling form, location, or density. Numerous scholars suggest there is the need for greater uniformity in terminology (Benson 2014; Brunoro 2013; Parvin et al. 2011; Tummers 2011a, 2011b, 2015b; Vestbro 2010a; Wallace et al. 2013), particularly to facilitate international comparisons (Jarvis 2015a).

Jarvis proposes 'community-led housing' as an umbrella term for all forms of housing which "stand in opposition to speculative building for the open market"(Jarvis 2015a, p. 206). This term clarifies motivation, and can be applied to both free standing and multi-unit housing typologies. Hence, it does not reflect the collective action of households required in demand-led multi-unit development.

In undertaking the European Union funded research project entitled Proficient,[4] researchers collaborating across multiple institutions and European nations sought a term to unify their work across jurisdictions. They employ Collective Self-Organised Housing (CSO) to refer to:

> *…both renovation of existing stock and construction of new dwellings, with the definitive influence of the residents. (Brouwer et al. 2014, p. 1)*

[4] The Proficient project is co-financed by the European Commission under the seventh research framework programme (FP7-2012-NMP-ENV-ENERGY-ICT-EeB;GA No. 312219) and investigates SME network business models for collective self-organised processes in the construction and retrofit of energy-efficient residential districts (www.proficient-project.eu).

> *…participation of the end-users in the process of formation, requirements definition, planning, design, implementation and maintaining their own housing project at a district level. (Bektas et al. 2014, p. 11)*

Additionally, further Proficient publications describe CSO housing as a group of households building together to live according to a shared lifestyle or vision (Brouwer & Bektas 2014; Gerohazi et al. 2014), or as "a collective of individuals that organize, finance, plan and commission their own housing projects" (Brunoro 2013). Importantly, CSO housing involves a degree of mutual dependency between the member households (Brouwer & Bektas 2014, p. 13) as together they seek to provide for themselves and each other a living solution not available to them individually (MacDonald et al. 2014).

CSO housing can occur across a range of densities, with the vast majority currently being developed at low densities in Italy and the United Kingdom (Gerohazi et al. 2014, p. 53), Austria (Wankiewicz 2015), the United States and Canada (McCamant & Durrett 2011). Urban infill CSO housing is more common in Northern Europe in both small and large urban areas, located to take advantage of existing urban infrastructure (Gerohazi et al. 2014).

Having reviewed literature which engages diverse terminology, this thesis will employ the term Collective Self-Organised (CSO) housing, acknowledging that within this term a spectrum of building types, densities, ownership structure and tenures exists.

1.6 Benefits of Collective Self-Organisation

The benefits of demand-led or self-organised development are agreed to be multiple and diverse (Ache & Fedrowitz 2012; Brenton 2013; Bresson & Denèfle 2015; Colini & Czischke 2015; de Haan 2011; Fromm 2012; Hasanov & Beaumont 2016; Horelli & Vaspa 1994; Labit 2015; Sandstedt & Westin 2015; Scotthanson & Scotthanson 2005; Sørvoll & Bengtsson 2016; Vestbro & Horelli 2012). Reviewing literature observing mature self-organised housing sectors alongside that advocating for its implementation, four themes of benefits are evident; benefits to the community, affordability, environment, and urban regeneration.

COMMUNITY

Both academic research and anecdotal evidence suggest involvement in the conceptualisation and planning of multi-unit housing has community development benefits (Ache & Fedrowitz 2012; Gerohazi et al. 2014; id22 2012). Studying elder cohousing in the United States, Glass (2012) observes residents who work together to create their living environment generate a sense of community through coherent shared experiences. Discussing projects in Finland, Korpela (2012) suggests the resultant sense of community is not merely a positive consequence of self-development, but a desirable end in itself which justifies building together – preferably around a common ideal. Self-developed housing, and particularly cohousing, has been described as providing

supportive environments which encourage care-giving and care-receiving (Jarvis 2015b; McCamant et al. 1994), and reflect the recent growth of collaborative economies (Gerohazi et al. 2014) and individual collectivism (Bernheim & ADAM Architecture Limited 2014).

Brunoro argues social cohesion among multi-unit residents during occupancy is "strengthened when there are common facilities, such as gardens, especially when maintenance is done by the community" (Brunoro 2013, p. 5). Studying multiple housing developments in The Netherlands, Eshuis et al. (2013) observe the presence of physical common facilities in developer-led projects does not necessarily contribute to social cohesion, identifying an existing desire to be engaged in community and to realise common goals as more significant contributors to positive community benefits. In support, others show community benefits from self-developed projects without shared facilities. Designed to meet the needs of future residents by "creating new or modified forms of housing that are not available in the mainstream housing market" (Jarvis 2015a, p. 204), self-developed housing encourages households to stay in the neighbourhood, adding to social cohesion within and beyond the project site boundaries (Gerohazi et al. 2014; Tummers 2015a). Supporting this, Gerohazi et al. (2014) show most privately owned CSOs accommodate owner-occupiers only, and Junge (2006) observes self-organised dwelling units in Germany are placed on the market for sale less frequently than speculative units.

An important community attribute identified by multiple researchers is that of capacity for conflict resolution (Bresson & Denèfle 2015; Hamiduddin & Gallent 2015; Junge 2006). In developing housing together, residents develop skills "to work through differences, hold the group together and ensure that individual aspirations align (to a sufficient extent) with those of the group" (Hamiduddin & Gallent 2015, p. 13). Municipalities in both France (Bresson & Denèfle 2015) and Germany (Junge 2006) observe less formal disputes in self-developed and self-managed housing than in the broader multi-unit sector; an important community benefit in light of high rates of disputes in Australian multi-unit developments observed by Easthope et al. (2012); Easthope et al. (2014).

AFFORDABILITY

Inner urban residential developments in western cities are frequently polarised, with two distinct markets. The first pole being low cost or affordable housing supported or required by social housing policies, and the second, high-cost dwellings which return a maximum profit to speculative developers. Many markets exclude middle-income households from inner urban consolidation areas as they do not meet the criteria for social housing and cannot afford the dwellings produced by speculative developers. Following a review of European self-organised housing across a range of densities, Gerohazi et al. (2014) concluded costs to residents can be reduced by as much as 10-20

percent compared to market prices, increasing both access and choice (Brouwer & Bektas 2014). Researchers also credit self-organised housing with the capacity to: avoid the overheating of markets (Gerohazi et al. 2014, p. 49); diversify the structure of the house building industry making it more resilient to market variations (KPMG in the UK & Shelter 2015); and lead to "a decline in speculative behaviour and a concentration on longer-term efficiency" (Brouwer & Bektas 2014, p. 6).

Households engaging in self-organised development as owner-occupiers prioritise use value over profit (Junge 2006; Kerimol 2012), in many cases generating dwellings noticeably different from those of speculative developments. In some locations co-operative financial structures are available to enable sharing of both social and financial capital (Junge 2006), facilitating collective development by households with differing economic capacities (Ache & Fedrowitz 2012) and enabling access to housing which would not be possible individually.

Environment

Self-organised housing is described as a form of sustainable urban development (Tummers 2015a), as increasing resilience (Scanlon & Arrigoitia 2015), and as particularly suited to urban brownfield and infill sites (Rerat 2012). Discussing the sustainability of collective housing, self-organised or otherwise, Nicol asserts "the sustainable use of housing stocks is only possible if the most important user-actors remain the same over several phases of the lifecycle of housing stocks" (Nicol 2013, p. 47). By engaging future residents in production, self-organised housing not only achieves the consistency promoted by Nicol but also ensures investment and design decisions regarding lifecycle sustainability are made by those who stand to benefit from them. Self-development is seen as making residents more interested in their local environment and more invested in environmental innovation (Gerohazi et al. 2014; Kerimol 2012), and collective action further diminishes the perceived risks of implementing innovative environmental technologies individually (Marckmann et al. 2012). Inquiring as to whether or not self-organised housing achieves the environmental potentials it is credited with, Marckmann et al. (2012) conclude it tends to integrate progressive and highly visible technologies, and that some, but not all, "hold the 'critical potential' for more profound changes in consumption practices and lifestyle that could potentially challenge modern consumer behaviour" (p. 428).

Urban regeneration

Observers of occupied self-organised communities note they "strengthen the commitment of residents to their own built environment" (Brouwer et al. 2014, p. 1), build collective responsibility for place (Hamiduddin & Gallent 2015), and can contribute to neighbourhood "stability and repair" (Fromm 2012, p. 391). Studying social cohesion in three areas of the German city of Freiburg, Hamiduddin and Daseking (2014) found familiarity and sociability to be higher in areas with significant numbers of self-organised

housing projects, both among the self-organising residents and their neighbouring community. Multiple researchers describe self-organised housing as capable of contributing to large scale urban renewal, such as that promoted in Australia's strategic urban plans (Bektas et al. 2014; Fromm 2012; Gerohazi et al. 2014; Tummers 2015b), with some privately funded projects incorporating services or facilities available to the broader community (Brouwer & Bektas 2014). Projects in Berlin, Germany and Buenos Aires, Argentina, in particular, are credited with initiating or supporting the regeneration of neglected neighbourhoods (Adamo 2014; Ballhausen 2014; Donald 2013; Eyrich 2014). Such citizen-led regeneration offers an opportunity for new residents coming into an urban consolidation area to take a more central role, building a new community and diminishing the current political interest in pacifying existing residents …

> *…a liberating alternative to state or private sector regeneration with a more directly democratic negotiation of urban change than a negotiation biassed in favour of greater political or financial power. (Kerimol 2012, p. 177)*

Discussing regeneration, Jarvis (2015a) promotes self-organised housing as an effective tool for considering "not only the claims of the incumbent population but also those of would-be residents" (p. 205). Fromm (2012) suggests collective action empowers households to express their needs and desires to influential development actors in a way not feasible individually.

1.7 Conclusion

This contextualising chapter has shown self-organisation of housing, particularly multi-unit housing in which households benefit from the power of collective action and capital, contributes to diversity and affordability, can support community development and environmental investment, and can facilitate urban regeneration. It enables citizen participation in development, facilitating "an alternative outcome that would not otherwise have existed" (Jarvis 2015a, p. 205) and realising a "flexible pathway towards diverse futures" (Ache & Fedrowitz 2012, p. 410). Importantly, self-organisation offers a useful tool in the implementation of urban consolidation policies; one which can respond to specific household aspirations, avoid the lack of innovation typical of speculative development (Tummers 2015b), and enable citizen participation in Australia's urban consolidation future.

Since the emergence of the urban consolidation agenda, the discussion has continued as to *who* will inhabit the new dwellings proposed, *what* will that dwelling form be, and *where* is it to be located? These questions are not easily answered in a private, speculative housing market. They are more directly addressed when the prospective inhabitants themselves are free to speculate on their own behalf and "build for their own use" (Millington 2000, p. 27).

Chapter 2. Understanding, Conceptualising & Visualising Housing

The complex, multi-faceted nature of housing poses challenges for housing researchers. Transcending disciplinary boundaries, housing eludes the application of a singular theoretical framework. McNelis (2014) describes each discipline contributing to the field as having "a particular focus and seek[ing] to understand and explain a particular aspect of the whole" (p. 100). He emphasises the need for collaborative, multidisciplinary frameworks, arguing future research must integrate the currently disparate disciplinary knowledge sets to obtain a more useful view of housing systems, their effectiveness, and their limitations.

This chapter outlines the theoretical frameworks utilised in this research, emphasising how they integrate different disciplinary approaches to construct a unique representation of multi-unit housing. Section 2.1, Understanding Housing Provision Structures, outlines how the research understands and contextualises multi-unit housing provision through Burke and Hulse's (2010) institutional framework of housing subsystems, a systemic approach based on Ball's Structures of Housing Provision (1983). It concludes with an initial comparison of existing Australian multi-unit and freestanding dwelling provision, highlighting differences between the two.

Section 2.2 argues for the use of Actor-Network Theory (ANT) in housing studies, conceptualising the structure of housing provision as an actor-network. In doing so, it observes past use of ANT in built environment and housing research, drawing on the works of both ANT advocates and critics alike. It concludes with key factors to address in undertaking ANT-informed housing research and outlines how they influence this research.

Section 2.3 proposes the visualisation of structures of housing provision as relational networks. It argues for the use of computational software developed for Social Network Analysis (SNA) to understand the "varying relations of power and of domination and subordination among … agents involved in housing provision" as advocated by McNelis (2014, p. 89). It concludes with key factors to address when visualising actor-networks of housing provision with SNA software, and how they inform this research.

2.1 Understanding Housing Provision Structures

2.1.1 Structures of Housing Provision

During the 1980s economist Michael Ball critiqued the disciplinary compartmentalisation of housing research and the tendency for consumption-oriented housing research to "externalis[e] the major issues out of the housing sphere … denying the necessity of fundamental reform of housing provision" (Ball 1986b). Proposing an alternative framework for housing now known as The Structures of Housing Provision Thesis (SoP) (Ball 1981) Ball argues housing production cannot be theoretically divorced from housing consumption (1986a, p. 455), and that all housing analysis must engage with context and institutional structures (Ball 1983, 1986a, 1986b, 1988, 1998, 2014; Ball & Harloe 1992). He uses the term 'provision' to encompass "the production, exchange, distribution and use of a built structure" (Ball 1986a, p. 455) and recognises all individual and institutional stakeholders as actors in housing provision, from landowners to developers and financiers to users.

Describing an SoP approach to research as "a means of ordering and evaluating particular sets of empirical material" (Ball 1986a, p. 457) and as an operational theoretical concept, Ball asserts it does not in itself provide a means of explanation, requiring integration with other social, economic and analytic theories (Ball & Harloe 1992). He emphasises its ability to draw attention to and hence encourage the consideration of, the structural and relational attributes of housing provision unidentified by discipline or problem-specific research (Ball 1986b; Ball & Harloe 1992).

Ball's conceptualisation of Structures of Housing Provision facilitates comparison of alternative SoPs within or across locations. It anticipates that housing in a particular market, location, tenure or country is determined by the inter-relations between actors involved (Ball 1986b) and that these inter-relations create and sustain structures of housing particular to their context (Ball 1986b; Ball & Harloe 1992; Burke 2012; Burke & Hayward 2000; Burke & Hulse 2010; Clapham 2005; Dalton 2009). Ball employs a SoP framework to compare international housing markets and building industries (2003). He also illustrates contrasts between the SoPs of single-family and multi-family housing provision in the United Kingdom (Ball 2003, 2006) and between speculative and contracted construction (Ball 1988, 2014). Additionally, Ball suggests that while a structure of housing provision approach can contextualise and encompass previously externalised housing issues and gain insights into housing outcomes, "[t]here is no need to remain within the confines of the forms of owner-occupied housing provision that exists" (Ball 1986b, p. 157).

The holistic view of provision Ball advocates is suited to understanding the mismatches and tensions identified in Australian multi-unit infill housing, particularly where they exist

between disconnected stakeholders. The capacity for comparison it offers is also suitable for this research in which analysis of both existing and proposed SoPs is undertaken.

2.1.2 Subsystems and System Context

Notwithstanding early critical commentary (Kemeny 1987; Oxley 1991), the SoP framework is utilised by researchers in combination with social theories including critical regionalism (Lawson 2001, 2008) and economic theories including market design (Sharam et al. 2015a, 2015c). Of particular interest to this project is the use of the Structures of Provision framework within a 'systems context', as described by Burke and Hulse (2010), Burke and Hayward (2000), and Burke (2012). Commencing from an Australian perspective, they provide an institutional framework for understanding any country's housing system as constituting four subsystems of production, consumption, exchange and management "embedded in a broader institutional context made up of the particular economic, social, demographic, administrative, legal, environmental and political processes" (Burke & Hulse 2010, p. 825). This systemic conceptualisation of housing SoPs, illustrated in Figure 2.1, recognises the roles of actors and societal norms and values within each of the subsystems and the wider context.

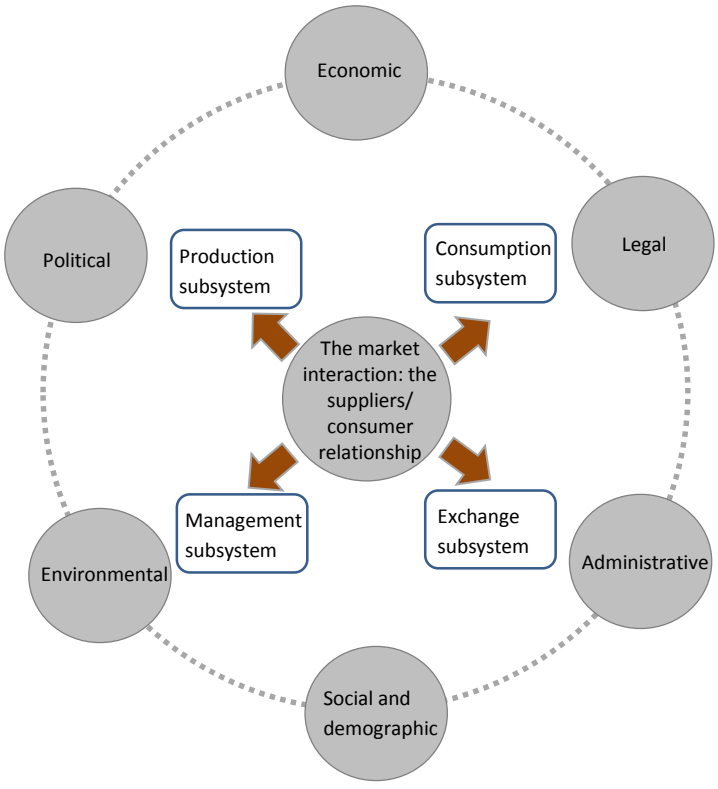


Figure 2.1. The Australian housing system: subsystems and system context.
(Burke 2012, p. 36; Burke & Hulse 2010)

"production, concerned with the nature and techniques of land ownership, land assembly and housing production;

consumption, concerned with the forms and methods by which households consume housing;

exchange, concerned with the practices and institutions which facilitate the sale, renting and use of housing; and

management, that is, the practices by which the housing system is managed, including policy and planning at all levels of government." (Burke & Hulse 2010, p. 824)

The processes and relationships within each subsystem typically evolve to serve the interest of its own actors (Burke & Hulse 2010, p. 824), with changes or shifts in one subsystem able to influence or constrain the capacity of actors in others. Employing a relational perspective, this framework recognises the capacity of actors' decisions to influence market processes directly and indirectly, intentionally and unintentionally, and identifies "[t]hese actors are shaped by – and shape – the institutional environment" (Burke 2012, p. 37). Echoing Ball, Burke and Hulse suggest "[t]his approach draws attention to parts of the housing system that are often neglected by researchers but may provide important underlying drivers" (2010, p. 836) and encourage its use in comparative analysis.

Martell (2013) suggests Burke's framework is appropriate for the study of Australian multi-unit infill housing as it recognises the dynamic, open nature of housing systems. He identifies a correlation with King's (2001) assertion that housing 'problems' require solutions which address externalities rather than remaining internally focused on technical issues or minor system modifications which typically reinforce existing practices. Burke's framework is also employed by Sharam et al. to highlight "previously unexplored issues" (2015c, p. 7) within and between exchange and management subsystems of apartment development.

Burke's systems approach is described by McNeils as facilitating a higher level view of SoPs and enabling more effective comparison (2014, p. 83). He also suggests it is most useful in addressing 'what-is-it-questions'. Drawing on Ball's Structures of Housing Provision thesis, Burke and colleagues provide a contextualising platform for this thesis which primarily addresses *what* questions and compares alternative multi-unit housing systems.

Additional theoretical frameworks layered on this platform to conceptualise and visualise multi-unit SoPs are the subject of chapter sections 2.2 and 2.3. Prior to their introduction, the remainder of this section provides a preliminary, subsystem based comparison of Australia's two distinct structures of housing provision (SoPs). The first services low-density housing provision, typically free-standing housing, and the second facilitates higher-density housing provision through multi-unit property development.

2.1.3 SoP Subsystem Comparison

The free-standing house building industry is nominally demand-led with respect to building design and function. Created primarily through contract based construction, rather than the speculative construction more common in the United Kingdom and the United States, low-density housing provision in Australia allows the owner-occupier to engage with site selection, dwelling design and fitting specifications at a minimum. Where the contracting owner intends to occupy the dwelling, the use value of the dwelling is of high importance. Resultant dwellings often strongly resemble their contemporary

neighbours but nonetheless allow households to express their individuality through the freedom to modify dwellings and their surrounds over time.

Current multi-unit dwelling provision is a more complicated process with less transparency. Semi-detached houses, townhouses, and apartments are typically offered for purchase off-the-plan or as completed dwellings. Predesigned for an anonymous occupant they offer little room for occupant intervention. The medium-density and high-density house building industry can, therefore, be described as supply-led with respect to design and function.

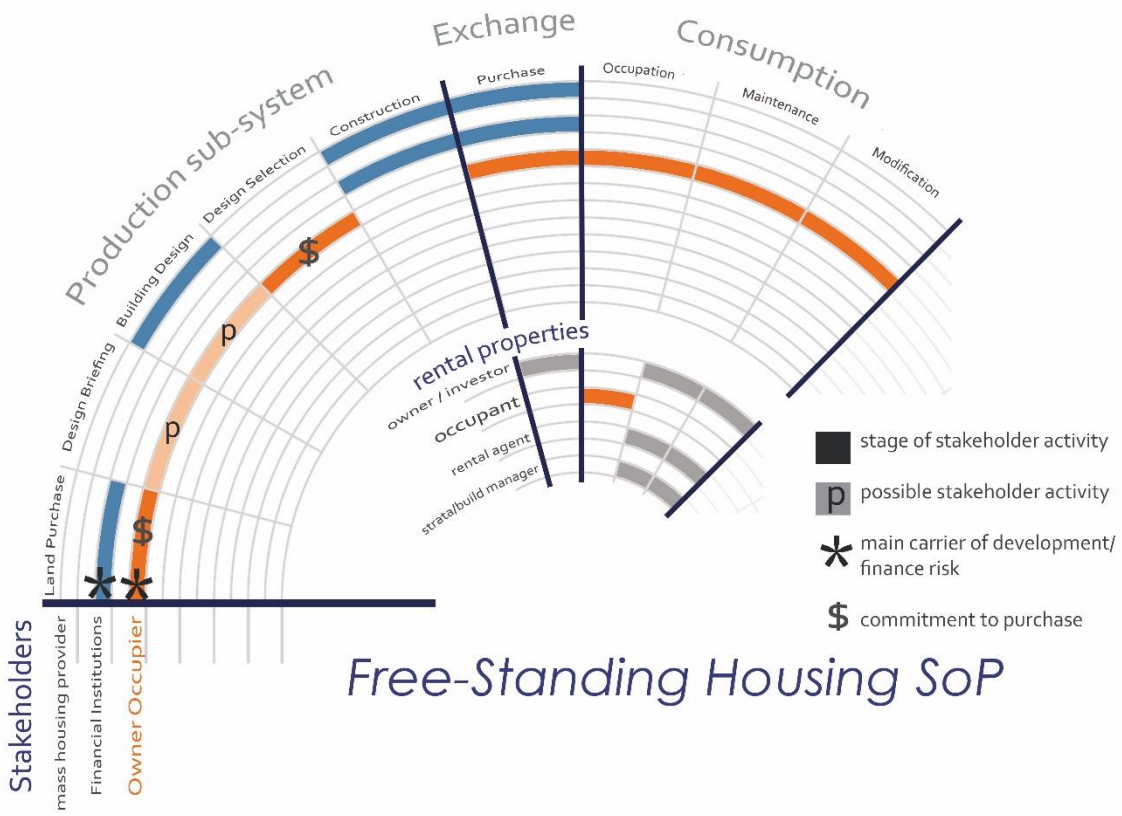


Figure 2.2. Stage of involvement of primary stakeholders in free-standing housing provision.

Figure 2.2 and Figure 2.3 illustrate the differences between these distinct SoPs, listing key stakeholders and indicating participation in the housing subsystems of production, exchange, and consumption. Figure 2.2 shows the relatively few stakeholders involved in the production of a single free-standing dwelling. Households contracting free-standing housing interact with the management subsystem, with the extent of interaction varying with contractual arrangements. The household contracting the construction typically

owns or holds a contract to purchase the building site and construction proceeds only after they have selected or approved the dwelling design. The contracting household bears risk in relation to financial investment and unforeseen construction variations. The construction contractor, providing housing to fixed price construction contracts, takes little external risk.

In contrast, current multi-unit dwelling provision is a more complicated process with less transparency. The number of stakeholders in Figure 2.3 highlights the increased complexity of multi-unit dwelling provision, be it in areas of urban consolidation or otherwise. In many cases, owners purchasing off-the-plan may have the opportunity to select from a limited range of floor finishes and tiles, but engagement in the production subsystem seldom extends beyond such minor variables, with the functional attributes of the dwelling fixed prior to purchase. Effectively, owners and occupants are not able to engage with housing production decisions and invited to participate only in the exchange and consumption subsystems.

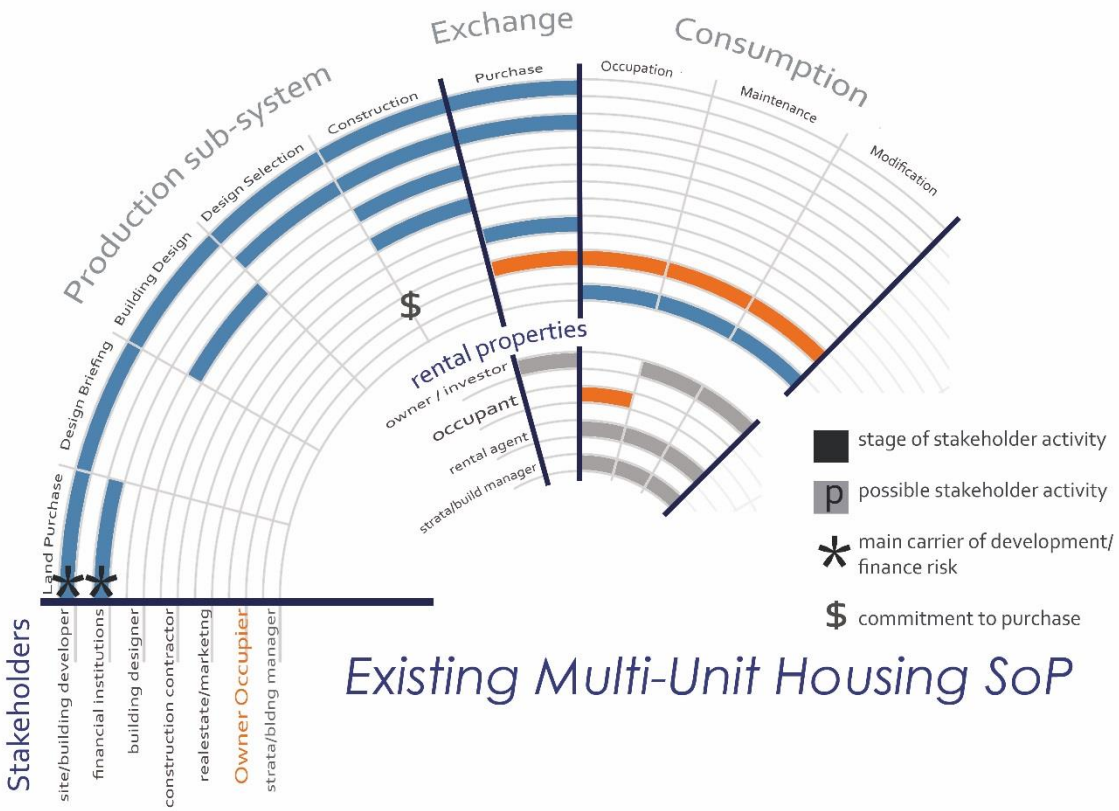


Figure 2.3. Stages of involvement of primary stakeholders in multi-unit housing provision.

The participation afforded to owner-occupiers in the existing multi-unit SoP more closely resembles that of a free-standing rental occupant than that of a free-standing owner-occupier. Dwelling design becomes the responsibility of developers and financiers as the stakeholders involved in the preliminary stages of production; stakeholders whose primary objective is to maximise development profits (Millington 2000). Hence fundamental decisions about housing design, amenity, typology and usability are being made via a risk averse lens that privileges market value over use value.

This preliminary, subsystem-based comparison of the two distinct SoPs provides a broad-brush view of the participation of human stakeholders in existing supply-led multi-unit provision and indicates how this differs from demand-led free-standing housing provision. Commencing with production, it has not paid attention to the complex network of actors present in the management subsystem or the broader systems context described by Burke and Hulse. Ball suggests an SoP includes social actors and relations that "intervene in the physical process of provision" (1986b, p. 160), going on to emphasise the influence exerted on social actors by state actions including housing policy, taxation, planning controls, building regulations, and more. To conceptualise (and later visualise) the complex interactions of social actors and their relations an Actor-Network Theory (ANT) lens is layered on the contextualising platform provided by SoP.

2.2 Conceptualising Housing Provision as an Actor-Network

Chapter 1 proposed that for urban plans to achieve the futures they advocate, the black-box of Australian multi-unit housing must be confronted; transformed to reduce the mismatch between the quality and function of dwellings produced and the preferences of potential owner-occupiers. The existing multi-unit housing provision system comprises multiple stakeholders interconnected by a complex array of activities and interests, all of which occur within a broader systems context (Ball 2012). To unlock the black-box of existing multi-unit Structure of Housing Provision (SoP), a means of conceptualising the network and its context is required.

Actor-Network Theory (ANT), pioneered by scholars including Bruno Latour, Michael Callon and John Law in the 1980s, has roots in sociology and anthropology. It originated in the study of innovation in science and technology studies, and "describe[s] why and how we have the science and technology that we do" (Cressman 2009, p. 3). ANT styles the world as composed of interacting, relational networks containing both human and non-human elements (Latour 1993) with the potential for ongoing reconfiguring as they influence each other over time (Latour 2005). Since its introduction more than 30 years ago, ANT has undergone continual modification and been adapted for use in a diverse range of disciplines.

Ruming suggests ANT's inclusion of non-human actors is particularly relevant to housing studies "given that housing is, after all, an inanimate object, yet it flows through our identities and is, in turn, composed of a multiplicity of non-human components" (Ruming 2008, p. 4). Identifying correlations with Ball's Structures of Provision thesis and Burke's housing subsystems, he suggests "it is not a stretch to theorise housing as the outcome of complex and multiple interactions of human and non-humans, as well as institutional and discursive constructs" (2008, p. 6).

Other scholars share the conception of housing provision as a socio-technical network, including Bevan and Lu (2012), who employed a socio-technical approach to study changes in provision systems driven by new technology and legislation, and Mullins and Rhodes (2007) who provide a summary of systems/network theory and their application to housing research. Among other applications, they propose using complex systems concepts for the structured description of housing systems and to generate frameworks for understanding agency and network adaptation (p. 7).

This section outlines the attributes of ANT which make it relevant to this research, including an understanding of network stabilisation, a capacity for translation, and the recognition of human and non-human agency. It then positions ANT in relation to past built environment research, with particular reference to housing. Theoretical and methodological criticisms of ANT are discussed before concluding with a summary of its utilisation in housing studies and how it is employed in the research which underpins this thesis.

2.2.1 Relevant Attributes of ANT

BLACK-BOXES

Through an ANT lens, current multi-unit housing provision can be examined as an actor-network which has stabilised over time, become black-boxed, and subsequently enrolled as a micro-actor in the macro-actor-network of urban consolidation.

Latour describes black-boxes as emerging when a network reaches its optimum operation:

> *[w]hen a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed, the more opaque and obscure they become. (Latour 1999b, p. 304)*

All black-boxes result from an initial controversy, a problematisation in time and place which has questioned a pre-existing circumstance. An actor-network is created via a process of 'translation' (Callon 1991; Latour 1992b) as actors interests' become aligned overtime and "…during which the identity of actors, the possibility of interaction and the margins of manoeuvre are negotiated and delimited" (Callon 1986a, p. 6). Further enrolment of actors reinforces the network, protecting particular interests, with eventual

stabilisation leading to irreversibility. Some networks become "able to resist counter-claims and shed controversy" (J.M.Jacobs 2006, p. 614), making it impossible to return to a point where alternatives are viable as the stabilised actor-network limits further translations (Callon 1986a; Latour 1987).

New problematisations can create new controversies, reactivating black-boxes (Latour 1987), prompting new and unique actor-network translations as contexts and technologies shift and change. New translations within existing actor-networks may re-enrol existing black-boxes as entities of known inputs and outputs, or may alter an existing black-box's relations and context sufficiently to disrupt it. To date, the macro-actor-network of urban consolidation continues to re-enrol the existing black-box of multi-unit housing unamended. ANT provides this research with a means of interrogating the multi-unit housing black-box; to ask why the existing actor-network remains stable despite the demonstrated controversy of a mismatch between desired and available multi-unit housing and the proposition of alternative networks.

Heterogeneity

Housing provision involves a complex interaction between heterogeneous entities (Bevan & Lu 2012; J.M.Jacobs 2012; Lovell 2014; Mullins & Rhodes 2007). ANT provides an appropriate framework for the study of housing provision as it "is conceived as a heterogeneous amalgamation of textual, conceptual, social, and technical actors" (Crawford 2005, p. 1) and recognises "humans are always in composition with nonhumanity, never outside of a sticky web of connections or an *ecology*" (Bennett 2004, p. 365).

With a focus on relations between entities, ANT intends "there is no separate 'agency' and 'structure', or 'actor' and 'network', but, rather, a combination of these as 'actor-networks' that are designed to dissolve these dualisms" (Thompson 2003, p. 73). ANT asserts its relational focus partly through the adoption of the descriptor 'actant' which recognises both the properties of an entity with agency and its position within the network or networks, in which it is enrolled. Recognising the contingent relationality within actor-networks, Latour defines an actant as "something that acts or to which activity is granted by others" (Latour 1996b, p. 7), later expanding this to suggest actants are entities capable of modifying other actants and contributing something new to a network (Latour 1999a, 2004a). These variations in the definition of actant reflect another attribute of ANT relative to this research; its flexibility to adapt to both time and context.

Adaptability

ANT literature has passed through three relatively distinct phases over time; first, the literature of inception (including Callon & Latour 1981; Latour 1986; Law 1986), followed

by the literature of revision and repealing (including Callon 1999; Latour 1996b; Law & Hassard 1999), and the more recent literature of revision produced post-2000 (including Callon et al. 2007; Latour 2005; Law 2009). Latour's 2005 book *Reassembling the Social* describes ANT as an "alternative social theory" (p. 2); a theory that he invites readers to use, distort or drop as they see fit. The invitation to distort (or translate) ANT has seen it adopted across many fields of research including sociology, anthropology, geography, information systems, organisational studies, event structure analysis, medicine and engineering.

Law (2006) suggests ANT employment in empirical studies across diverse disciplines and contexts results in an unending reconfiguring as it exposes, adapts to, and learns from the actor-networks which are the subject of analysis. This ongoing translation means components of the ANT vocabulary have evolved and diverged. Existing terms shift and new terms are mobilised as projects transform and translate, generating new perspectives rather than being constrained by a fixed lens. Mol suggests, "it is not possible to pin down exactly what an 'actor' is made to be in 'ANT'. ANT does not define the term 'actor'. Instead, it plays with it" (2010, p. 257). As such it becomes critical for any research informed by ANT to specify the ANT terminology and definitions it employs.

2.2.2 ANT, Built Environment and Housing

Past use of ANT to describe and open black-boxes in the built environment has ranged from single buildings, such as high-rise housing (J.M.Jacobs 2006; J.M.Jacobs et al. 2007), laboratories (Gieryn 2002), and the Sydney Opera House (Yaneva 2012), to larger scale contexts such as new suburban expansion (Ruming 2007), urban renewal (Forsemalm 2007), housing markets (Lovell & Smith 2010) and planning management and practice (Rydin 2013; Williamson & Parolin 2013). The use of ANT in built environment research extends the work of ANT pioneers Callon and Latour (1981) who illustrated some of their early ANT propositions with built environment examples (see all Latour 2003).

Fallan (2008) provided an overview of the relatively limited collection of ANT-informed research in architecture, from which three unique opportunities emerged. First, ANT encourages more ethnographic inquiry than typical in the design fields (Randall et al. 2007), enabling a more detailed and inclusive understanding of the actors contributing to architectural production. ANT studies in architecture (e.g. Ryghaug 2003; Yaneva 2012) have interrogated past design acts "… not to decide *who* is acting … but to decide *what* is acting and how" (Latour 2005, p. 60), widening the understanding of design actants beyond that typical in architectural research.

Secondly, ANT demonstrates buildings as technological artefacts capable of delegating agency. Gieryn's 2002 study of the Cornell University Biotechnology Building "effectively erases any difference between technology and architecture as objects of study … and meticulously shows that architecture is perhaps the pre-eminent example of how

artefacts disrupt the classic actor/structure dualism" (Fallan 2008, p. 85). As such, Fallan suggests architecture faces less of a mental 'leap' than other fields to consider non-human artefacts as actants and embrace ANT.

Thirdly, ANT recognises architecture's ability to act and be acted upon. Fallan asserts "[t]here is no principal difference between studying Science in Action as Latour did and studying Architecture in Action" (2008, p. 88), prompting the question: when is architecture in action? In their few references to architecture, Latour and Callon discuss only the stages of design, planning and construction, as do Gieryn (2002)and Ryghaug (2003). Fallan suggests future ANT studies apply Latour's second rule of method, encouraging ANT researchers to follow a fact or artefact over time, over the life course of a building; this being consistent with Ball's Structures of Provision thesis.

In the past decade, a number of scholars have examined the potential for ANT to contribute to housing studies (Boelens & Coppens 2015; Cowan et al. 2009; Gabriel & Jacobs 2008; K.London et al. 2015a; Lovell & Smith 2010; Ruming 2008, 2009b), some theorising its application while others pursued empirical engagement.

Ruming proposed ANT "offers a means through which the silent, absent, and 'invisible' actors and interactions can be identified and articulated in a more comprehensive analysis of urban life" (Ruming 2008, p. 1). Gabriel and K.Jacobs similarly suggest ANT, through its 'post-social' turn and focus on materiality, "will extend the scope of housing as a field of study" (2008, p. 538). They do however caution that although the 'post-social' can encourage housing researchers to examine existing practices and identify that which is absent from current research, it should act as an extension to, not a replacement of, existing empirical frameworks.

Cowen et al. undertook an empirical assessment of social housing allocation systems in action in the United Kingdom, concluding ANT offers housing studies "a relatively disciplined methodology with analytical purchase" (2009, p. 297). The works of K.London et al. (2015b) and Boelens and Coppens (2015) examine specific elements of housing provision using ANT. The latter employing ANT to observe the regeneration of social housing estates in Antwerp, while the former proposes its use to develop a collaborative model for a prefabricated housing supply chain. Analysing the adoption of a technological innovation in multi-unit housing production K.London et al. (2015a) retrospectively observe network actions, building understandings to facilitate desirable future network change. Similarly, Boelens and Coppins seek to gain network insights for future implementation. However, these examples maintain the previously criticised tendency for housing research to focus on consumption or production subsystems, foregoing the potential for ANT to uncover the complexity of interactions between all subsystems of housing provision.

Following Latour, successful actor-networks stabilise, form black-boxes, and become actants in larger actor-networks (Latour 2005). Unsuccessful actor-networks continue to modify actors and their relationships over time in pursuit of a stable state, or, alternatively, disband. J.M.Jacobs and colleagues completed multiple ANT-informed studies of housing systems (e.g. Jacobs 2006, 2012; Jacobs & Cairns 2011; Jacobs et al. 2007). Focusing mainly on high-rise dwellings, they studied both successful and unsuccessful housing networks, including catastrophic building failures (Jacobs et al. 2007). Law suggests it is through failure that we can identify how "objects, artefacts, and technical practices come to be stabilized" (Law 1989, p. 111). Referring to Latour (2005) and Law & Callon (1992), J.M.Jacobs et al. similarly suggest the "significance of failed technologies rests with the fact that previously invisible associations are, at the moment of failure, revealed" (2007, p. 10).

Past research has demonstrated the relevance of ANT to built environment and housing research. While no studies have extended to the multiple subsystems of housing provision, they have demonstrated ANT's use in comparing alternative network assemblies and the benefits of studying both successful and unsuccessful actor-networks. However, little uptake of ANT has occurred in housing studies since the publication of the research discussed above. J.M.Jacobs and Cairns comment: "It is perhaps unsurprising that a disciplinary field largely dedicated to understanding the mechanisms by which social subjects are housed should resist displacing (or replacing) its humanist infrastructure" (2011, p. 82). Gabriel & K.Jacobs (2008) suggested a number of 'Lines of Resistance' exist due to theoretical and ontological criticisms. These criticisms are not unique to housing research and have been debated by other disciplines as they adapted and distorted ANT to their contexts. The uptake of ANT in other socio-technical disciplines suggests the lines of resistance are not insurmountable. Common criticisms of ANT are outlined in section 2.2.4.

2.2.3 ANT and Assemblage

Deleuze and Guattari (1988; 1980) describe assemblages as "a mode of ordering heterogeneous entities so that they work together for a certain time" (cited in Muller 2015, p. 28). Like ANT, assemblages include non-human actors (animals, ideas and objects) without a pre-assumed hierarchy.

Built environment scholars utilise both ANT and assemblage terminology, at times without distinction. ANT-inspired researchers J.M.Jacobs et al. (2007)and Gieryn (2002) employ 'assemblage' without definition, using it interchangeably with 'network'. So too do Lovell and Smith (2010) in their study of housing markets which explicitly engages an assemblage approach but draws heavily on the work of ANT theorists. This co-existence extends to the urban scale, where assemblages are employed more frequently than in architectural or housing research. Urban researchers frequently employ 'urban assemblages' or 'assemblage thinking' informed by both earlier Deleuzian discussions and

later ANT concepts (B.Anderson & McFarlane 2011; Brenner et al. 2012; Farías & Bender 2010; Madden 2010) in a manner which has led Peck to describe it as "[t]he Deleuzian/Latourian variety of urban-assemblage theory" (2015, p. 175).

Despite conceptual similarities, urban scholars frequently express a preference for assemblages over networks, attributing this to the term's capacity to conceptualise continuous making and remaking, supporting transformation, innovation, and emergence in existing systems (B.Anderson & McFarlane 2011; Barry 2001; J.M.Jacobs 2012; Lovell & Smith 2010; McFarlane 2011; Muller 2015). B.Anderson and McFarlane (2011) argue assemblages can be deployed in research as both descriptor and concept, unlike ANT, which they see as primarily descriptive due to its commonly known focus on 'following the actors'. The principle mechanism facilitating transformation in assemblage thinking is the concept of 'agencement' (Deleuze & Guattari 1980) in which "the constituent elements intersect, fold together and transform themselves and each other" (Hillier 2010, p. 459).

Pioneering ANT scholar Callon uses the term agencement to describe "arrangements endowed with the capacity of acting in different ways depending on their configuration" (Callon et al. 2007, p. 313), a definition employed by assemblage scholars Heather Lovell and Susan Smith to observe changes in housing markets. Commencing with an assemblage framework, they draw on ANT research in markets and market theory, embracing Callon's definition of agencement to ask, "whether or not an alternative mode of operation can be brought into effect" (Lovell & Smith 2010, p. 463). Their use of ANT-informed concepts to examine alternative assemblages demonstrates that ANT, like assemblage, has the capacity to act as both descriptor and concept, and to conceptualise adaptation and transformation. For this research, it shows ANT is not only able to describe 'the housing we have', but to assist in understanding how the multi-unit black-box may be 'unlocked' and reassembled to facilitate alternative housing outcomes.

Political geographer Muller identifies sufficient similarity between ANT and assemblages that, after providing an overview of each, he proceeds to discuss them in unison in relation to how they rethink socio-material power, politics, and space. He suggests "[o]ne way to think of ANT is as an empirical sister-in-arms of the more philosophical assemblage thinking … ANT offers a more concrete conceptual and methodological apparatus that can be applied to empirical work" (Muller 2015, pp. 30-31).

At the single-building scale, a greater number of ANT-informed studies exist than assemblage-based ones. Although they do remain relatively small in number, they provide some guidance to this research. This project will assume an ANT-informed stance in preference to an assemblage-informed one. It recognises the intrinsic connection between the two sets of literature and, in common with a number of preceding studies, is attuned to the concepts of agencement and emergence inherent in assemblage-

thinking and increasingly employed in ANT-influenced research (see Forsemalm 2007; J.M.Jacobs 2012; Lovell & Smith 2010; S.Smith 2011).

2.2.4 Acknowledging Criticisms of ANT Research

ANT has experienced controversies over the course of its evolution. Latour (1993) criticises modernity for partitioning the world into separate domains of analysis and argues for a multi-disciplinary approach to understanding the world as a continuous, hybrid, socio-technical reality. This position challenges numerous theoretical and philosophical positions, and scholars from multiple disciplines have questioned and debated both the conceptualisation and the application of ANT. This section aims to identify current concerns regarding the enacting of ANT as they relate to the conceptualisation of housing provision as an actor-network and to this research in particular.

ANALYTICAL IMPARTIALITY AND GENERALISED SYMMETRY

ANT advocates the equal treatment of actors through analytical impartiality and generalised symmetry, eliminating *a priori* distinctions between the technical and the social (Callon 1986a, 1999). For ANT scholars, this avoids prioritisation of human agency. For critics, it dehumanises humans (Vandenberghe 2002), is amoral and apolitical (Walsham 1997), and lacks philosophical validity (Bloor 1999; Collins & Yearly 1992a, 1992b; Munir & Jones 2004; Whittle & Spicer 2008).

Gabriel and K.Jacobs suggest "post-social [housing] researchers need to remain vigilant to the profound impact of 'human' agency and not underestimate its significance in relation to other actors that constitute the field of enquiry" (2008, p. 537). Targeted vigilance contradicts ANT's impartiality and counteracts the assumption of generalised symmetry. However, if interpreted to suggest vigilant observation of all actors and their agencement, this view correlates with Farias' opinion that impartiality and generalised symmetry enable observation of shifting network positions and power over time:

> *…precisely because asymmetry is not presumed and explained structurally or contextually, the study of urban assemblages involves unveiling the actual practices, processes, socio-material orderings, reproducing asymmetries in the distribution of resources, of power and of agency capacities, opening up black-boxed arrangements and ways in which actors, things or processes are made present and made absent. (Farías 2011, p. 370)*

While such theoretical debates regarding ANT's asymmetry continue, studies of actor-networks in the built environment demonstrate benefits. Lovell and Smith assert ANT's material and social symmetry enabled their study of housing markets to recognise "how costs, prices and values are constituted through a hybrid combination of economics, social, political, cultural, technical and institutional factors" (Lovell & Smith 2010, p. 10). Researching the adoption of planning service systems Williamson and Parolin (2013)

undertook parallel studies. One employed ANT and another utilised UTATUT,[5] which separates social and technical networks to observe the adoption of the technical by the social. They found that the socio-technical unity of ANT gained more insights on diffusion and adoption failures than when the social and technical were separated.

This research adopts an ANT framework, committing to the principles of analytical impartiality and generalised symmetry, which previous studies have shown to be beneficial in built environment research.

Attribution of Power

ANT attributes power to both humans and non-humans, including such things as a door-closer (Latour 1987) and a tick-box on an application form (Cowan et al. 2009). This section introduces conceptions of power in ANT and related criticisms.

From an urban geography perspective, McFarlane suggests "power, political economy, and sociocultural exclusion are central to how socio-material assemblages are produced" (McFarlane 2011, p. 655). In producing actor-networks focal actors exercise 'power over' (Foucault 1983; Hassard 2008; Weber 1978) to enrol others in their propositions. This is an option only for those who hold the 'power to' act (Arendt 1970; Hobbes 1985; Lukes 2005) although Latour (1986) stresses ANT is concerned with power exerted rather than held: "when you simply have power - *in potential* - nothing happens and you are powerless" (Latour 1986, p. 265).

Similarly, Callon (1986b) describes power as something achieved by an actor through the enrolment of other actors who give it the authority to speak on their behalf. These descriptions indicate the foundations of actor-network power are constitutive rather than individualist or systemic (Saar 2010), with an actor's agency provided by their network associations (Latour 2005; Law 1992). 'Power over' and 'constitutive' conceptions of power are hence both active in networks.

Debates on power attribution in ANT research focus on three main aspects. Firstly, a perception of analytical bias resulting from the researchers' ability to relate to human actors more effectively than non-humans (Whittle & Spicer 2008). Secondly, a lack of distinction between types of network associations lessening the effectiveness of network interpretation (Cooper 2008; Haraway 1992) and thirdly, the lack of attention given to power asymmetries which "allow certain actors to speak and be heard over others" (Cooper 2008, p. 318).

This research examines actors who currently exert power and those who seek to counteract that power. Examining stabilised (or proposed) black-boxes, rather than documenting translation in action, assists in minimising human bias in power attribution.

[5] Unified Theory of Acceptance and Use of Technology, a model of technology acceptance used in Information Technology and user behaviour studies (Venkatesh et al. 2003).

Social Network Analysis software also moderates bias, identifying power and power asymmetries within networks based on type and strength of associations. This complies with Crawford's assertion that:

> *Rather than power as possession, power is persuasion, 'measured' via the number of entities networked. Power is generated in a relational and distributed manner as a consequence of ordering struggles. (Crawford 2005, p. 2)*

Ball also views agency and power as relationally generated, acknowledging structures of provision (SoP) include relations of domination and subordination, but that these cannot be assumed, becoming known only following the construction of adequate knowledge to describe the SoP and analyse its interrelations. Like ANT advocates, he asserts it is "…impossible to give a prior specification of which of them will dominate. … it is better to avoid such presuppositions" (Ball 1986b, p. 158).

ATHEORETICAL

ANT represents the world as constituted by small facts and details as advocated by Tarde, who Latour credits as an "early ancestor of ANT" (Latour 2005, p. 15). It rejects pre-existing theories, avoiding the moulding of observations to fit pre-decided frameworks (Latour 2005, p. 11) and increasing opportunity for alternative interpretation (Dudhwala 2009; P.Johnson 2008). Using inductive reasoning it enables outcomes through "generalization or extrapolation from initial information under epistemic uncertainty. Conclusions are likely, but not guaranteed, and leave room for speculation about the causality" (Stoop 2014, p. 70).

Advocates of deductive, positivist reasoning argue ANT is not a theory.[6] Cowen et al. suggest ANT is effective in housing studies "when one drops the idea that it is a theory" (2009, pp. 297-298), but do so without clarifying their conception of what constitutes a theory. Mol (2010) proposes we can conceive of ANT as a theory, where a 'theory' is:

> *something that helps scholars to attune to the world … If ANT is a theory, then a theory is a repository of terms and modes of engaging with the world …If ANT is a theory, then a theory helps to tell cases, draw contrasts, articulate silent layers, turn questions upside down, focus on the unexpected, add to one's sensitivities, propose new terms, and shift stories from one context to another. (Mol 2010, p. 262)*

From an architectural perspective, Fallan (2008, 2010) asserts debating whether or not ANT is a theory is pedantic and unproductive as it undoubtedly challenges researchers to

[6] The term 'actor-network theory' appeared in English around 1982 (Law 2007, p. 3). Later, Callon declared, "we never claimed to create a theory. In ANT the T is too much…" (1999, p. 194). Early ANT scholars concurred, (Latour 1999a; Law 2007) suggesting alternative names. Latour (1999a, p. 19) proffered the 'sociology of translation', 'actant-rhizome ontology', or 'sociology of innovation'. By 2005, the term is described as "…a name that is so awkward, so confusing, so meaningless that it deserves to be kept" (Latour 2005, p. 9). Debate continues regarding the theoretical capacity of ANT, with advocates of deductive, positivist reasoning arguing that ANT is not a theory as the name suggests (Peck 2015).

question issues of "materiality, relationality and process" (Law 2004, p. 157). Cooper observes that "instead of doing away with *a priori* frameworks, ANT has become one; instead of sociologists studying their subjects/objects within a theory of religion or capitalism, sociologists now study them within an ANT framework" (2008, p. 308).

Amidst the voices asserting ANT's capacity to provide a theoretical frame, Mol reminds researchers it is not suitable to state the intention to 'use ANT' without detailing what this means for a specific project as ANT studies can "…do different things … in different ways" (Mol 2010, p. 261).

> *In 'linking up with ANT' the art is not to repeat and confirm, but to seek out cases that contrast with those that came earlier. A contribution to ANT gently shifts the existing theoretical repertoire. And then, as the theoretical repertoire shifts, it becomes possible to describe further, different cases, and to articulate so far untold events (relations, phenomena, situations). These, in their turn, will help to add to and shift the theoretical repertoire … and so on. The point is not to fight until a single pattern holds, but to add on ever more layers, and enrich the repertoire. (Mol 2010, p. 261)*

This research embraces Mol's conception of ANT as a shifting, layered theoretical lens with which to examine multi-unit housing provision; to draw contrasts between alternatives, allowing silenced actors to emerge, and to shift stories across contexts. Its rejection of prior theoretical frames suits the analysis of structures of housing provision, corresponding with Ball and Harloe's view that there can be no primacy assigned within an SoP (such as to the spheres of consumption, exchange and production or to individual actors) as "to do so would be to posit some general theory of housing which is precisely what the approach denies can exist" (Ball & Harloe 1992, p. 4).

Limited to Description

Drawing from anthropology, ANT promotes descriptive methods (Callon 1986b; Latour 1987; Law & Callon 1992), something critics suggest limits the utility of research outcomes (Cooper 2008; Farías 2009). Radder, Philosopher of Science and Technology, described ANT as "characterized by an exclusive emphasis on case studies and empirical observation, leading to situations where researchers simply report what they see and intangible elements like values and norms are not recognized" (Radder 1992, pp. 145-146). Later, urban scholar J.M.Jacobs (2012) described studies avoiding macro-theories and adhering strictly to ANT as overly detailed and apolitical. Madden views this as a constraint of pure description, suggesting "with too much ANT, critical urban studies would be impossible" (2010, p. 588).

Cooper advises extending ANT to engage with critique, but recognises critique "works through reference to an outside, to larger structures, such as class, gender, capitalism, society and the like, all of which Latour rejects" (2008, p. 311). Cressman proposes an

alternative, advocating the study of "*what is being translated* as opposed to studying the mechanism of translation opens ANT to new lines of inquiry" (2009, p. 10).

This research examines design information translated within multi-unit actor-networks; following Cressman's suggestion, this will extend the capacity for critique and interpretation.

Reluctance to Assess and reassemble

ANT attends to how actor-networks emerge, how they are constituted and maintained; why some become stabilised, for a time, and others fail (Rodgers et al. 2009). It also observes ongoing translations (Callon 1986a) exposing the fluidity of networks.

However, critics (including Cooper 2008; Thompson 2003) and supporters (Ruming 2009b for example; Warzynski & Krupenikava 2010) both observe ANT does not assess network alternatives, with the rejection of pre-determined theoretical frameworks leaving it unable to establish criteria to determine the importance or benefit of one system over another (Cooper 2008, p. 329). ANT does not ask:

> *Which translations, which framings, which formattings, which tools, and which calculative practices are worthwhile and pertinent and which are not? Which should be encouraged and for what purposes? Which yield adequate and worthwhile results and which lead to inefficiencies, costly mistakes, and failures? ANT remains largely silent on these issues, something that limits its analytical reach. (Thompson 2003, p. 84)*

While agencement (see 2.2.3) conceptualises the capacity for actants to act in different ways, transforming themselves and others, it does not "outline a set of strategies whereby we might decide to pursue or reject a possible path" (Cooper 2008, p. 314). In relation to housing studies, this lack of action contributes to Gabriel and K.Jacobs (2008) observation of ANT as failing to improve society.

In this research, alternative actor-networks are compared, asking which (if any) should be encouraged and how might alternative actor-networks be initiated? To do so, criteria for comparison and assessment are drawn from the networks themselves. It asks: do the outputs of the actor-network achieve the ambition of its instigators? And, if not, what actants, or configurations of actants, limit capacity to do so? By doing so, it proposes preferred alternative networks.

Law (2002) suggests utilising the fluidity of networks to initiate interference and generate preferred alternatives. Interference in existing networks risks unintended consequences and requires precaution (Meadows 2008), particularly in complex socio-technical networks balancing conflicting stakeholder interests, such as housing provision (Tomlinson 2012).

While Law suggested the fluidity of actor-networks needs to be exploited to instigate desired change, he provides no guidance on the process as system and design scholars do (Brand 2008; Brezet et al. 2001; Manzini & Francois 2003; Sevaldson 2013; Shedroff 2009;

Thakara 2006). Guidance on initiating desired alternative actor-networks is provided by Warzynski and Krupenikava (2010) who see ANT as a tool for process-based innovation. By combining ANT with known concepts of management practices (Powell et al. 2005) they propose network re-configurations which "address resistance and align the innovation or change within the existing culture and social structure of their organization" (P.Smith & Cockburn 2013, p. 277) while paying attention to powerful macro-actors, powerless actors and dissidents in networks. (Warzynski & Krupenikava 2010, p. 9).

Similar to Warzynski and Krupenikava's approach to reassembling actor-networks through combination with existing industry or discipline-specific concepts, challenges of reassembling Australian multi-unit infill housing provision are observed here by combining ANT with Ball and Burke's understandings of housing provision.

Absence of Method

The phrase most commonly associated with ANT is 'follow the actors' (Latour 2005, p. 68), beyond which ANT founders refrain from providing detailed direction on method. Critiques of ANT's relationship with methods have three main themes related to site selection, data collection, and analysis.

Peck suggests ANT researchers are bereft of principles for identifying study sites and have a tendency to study unconventional sites, avoiding the power and politics associated with 'conventional' sites (2015, p. 176). In this thesis, the background and context established in Chapter 1 act as a frame for determining (conventional and unconventional) site(s) for research independent of engagement with ANT. Site selection responds to the research questions posed and ANT used to conceptualise and examine the socio-technical networks present at those sites.

Randall et al. (2007) describe ANT as having two main approaches to data collection, the ethnography of following actors via interviews and observations, and the examination of inscriptions. Inscriptions, including texts, images, and artefacts, document and reinforce particular views of the world, are active in network translation and, hence, critical to ANT-informed research. Sufficiently rich data is required to describe and analyse an actor-network, with the story of hotel keys requiring different data from that of an urban intervention. Cowan et al. observe the level of data collection required exceeds the norm in housing research. In their study of social housing allocations they employed interviews and snowball sampling, and found this "did not produce a rich enough ethnography to satisfy the demands of ANT" (Cowan et al. 2009, p. 296). This research uses both the examination of inscriptions and ethnographic methods. To ensure sufficiently rich collection of data, the network-analysis is constructed from a 'meta-analysis' of existing literature in combination with primary interview data.

ANT's adaptive approach to method is criticised by Peck as promoting "freestyle inductivism" (2015, p. 176). In contrast, R.Smith attributes ANT's flexibility with enabling

"a richer poststructuralist-inspired conceptualization of networks and provid[ing] the rationale for the adoption of a whole range of qualitative methods for understanding the actual organisation of … networks" (2003, p. 31). Researchers engaging ANT in the built environment do caution that interpretations and findings can be unintentionally biassed by an informing actor's views and influenced by the research objectives and frame (Cressman 2009; Ruming 2009a; Thompson 2003). Mol (2002) suggests such multiple views of an actor-network enrich opportunities for analysis. Having employed ANT in urban studies, Ruming confirms the flexibility of method provided opportunity to identify and trace influential actors invisible to more directive research frameworks (Ruming 2007, pp. 463-464). The ongoing discussion of this issue emphasises the reality that actor-networks are not fixed objects with defined boundaries and relations awaiting observation but constructed in part by the research design.

Here, actor-network[s] of multi-unit housing SoPs are constructed for both observation and comparison. Actants and the flows of intermediaries are observed to identify key actants and identify opportunities for network reassembly. Actor bias is minimised through the cross-referencing of informants views with those of other actants and sources.

2.2.5 Conclusions on Conceptualising Housing using ANT

ANT is not a singular theory or method. Adapted across disciplines and scales it has both evolved and diversified since its inception in science and technology studies. Cressman asserts, "ANT cannot be reduced, once and for all, to a catch-all theory that can be universally applied. In other words, one person's use, or reading, of ANT may differ considerably from others" (Cressman 2009, p. 2). Within the interconnected fields of built environment, architecture and housing, researchers use and read ANT in multiple ways. The relatively small number of architecture and housing scholars engaging with ANT express diverse opinions on its suitability to the field. Those writing from a purely theoretical/philosophical perspective are more critical than those reflecting upon empirical research experiences. These groupings reflect Cooper's observation of two 'kinds of ANT', first, as a universal theory or master discourse, and secondly, "the constrained microanalysis of specific situational studies" (Cooper 2008, p. 308). Empirical ANT researchers identify positive benefits in utilising ANT in housing studies, including its ability to identify previously silent or invisible actors, and increasingly recognise it as providing terms and modes of engagement (Fallan 2008). Numerous criticisms have been levelled at ANT over time, the preceding discussion of how these relate to the application of ANT in architecture and housing research has demonstrated that the challenges they pose are surmountable.

Rooted in Tarde's earlier (1902) rejection of nature/society divide and macro/micro-distinctions, ANT's incremental knowledge building enables the interrogation of existing housing actor-networks, acknowledging the inseparable nature of the social and the

technical components of housing systems (J.M.Jacobs et al. 2007). It is most appropriately employed where a controversy is preidentified, or what Latour refers to as "a matter of concern" (Latour 2004b, 2005). This provides an analytical frame, enabling the research to extend beyond the purely descriptive.

Agencement has been underutilised in previous ANT-informed housing research, with J.M.Jacobs and colleagues pioneering this in their architectural studies of residential towers. An increased engagement with agencement, how an actant's capacity to act varies in relation to their network associations, can provide a lens for comparing alternative housing actor-networks and initiating preferred alternatives. Extending ANT beyond description to engage in analysis and actor-network reassembly would address Gabrielle and K.Jacobs' concern that ANT fails to improve society.

As an advocate for ANT in housing research, Ruming (2008) observes parallels between Law's assertion that in actor-networks there are many possible modes of ordering (Law 2007) and Ball's Structure of Provision thesis. Ball suggests individual dwelling structures each result from a unique set of relations, relations which may originate outside the traditional, conceptual boundaries of the housing industry. ANT provides housing studies with a means of expanding the boundaries to identify and recognise relations that influence housing outcomes. Based on the preceding discussions, seven key factors are identified to be addressed in the design of ANT-informed housing research. These are outlined in Table 2.1.

Table 2.1. Key factors to be addressed in the design of ANT-informed housing research.

1.	Identification of the controversy or issue of concern being researched.
2.	Clarification of ANT's role in the project at hand: to build incremental theory, or for specific situational study (Cooper 2008), or to study stabilised actor-networks/black boxes, or to observe actor-networks in translation.
3.	Identification of intermediaries for study. Intermediaries being that which travels between actors and describes the network.
4.	Clarification of the analytical frame employed in assessment and/or comparison of actor-networks.
5.	Specification of the ANT terminology and definitions employed.
6.	Description of the methods of data collection and analysis.
7.	Clarification of how additional, non-ANT, theories and methods are integrated.

Responding to the key factors identified in Table 2.1, the matter of concern addressed by this thesis is the current inability for multi-unit owner-occupiers to engage in the design and provision of dwellings for their own use.

The role of ANT in this research is to enable the study of multi-unit housing systems and facilitate comparison between alternatives. The research does not seek to generate a historical examination of how this black-box experienced translation and came to dominate: it seeks to open and examine the stabilised black-box of multi-unit housing provision to understand what determines existing dwelling design and function and how this differs from alternative cases.

The intermediary of the multi-unit actor-network to be studied is design information used to make design decisions, reflecting the research focus on engagement of future residents in the design and provision of dwellings for their own use. The mapping of alternative intermediaries such as finances or professional interactions would result in alternative views of the same actor-network. The actor-networks being studied will be analysed in relation to the objectives of the key actors and instigators. These include both strategic-level and project-level instigators. The ANT terminologies and definitions to be employed are detailed in Table 2.2. Methods of data collection and analysis are introduced in Chapter 3. Ball's Theory of Provision provides an initial conceptualisation of multi-unit housing provision, see 2.1. A unique visualisation of the actor-network is generated using network analysis software. Section 2.3 discusses the links between ANT and the theory underpinning the software design.

Table 2.2. ANT Definitions Employed.

ACTANT	"Any element which bends space around itself, makes other elements dependent upon itself and translates their will into the language of its own" (Callon & Latour 1981, p. 286).
ACTOR-NETWORK	"… reducible neither to an actor alone nor to a network … An actor-network is simultaneously an actor whose activity is networking heterogeneous elements and a network that is able to define and transform what it is made of" (Callon 1987, p. 93). "The ANT network is conceived as a heterogeneous amalgamation of textual, conceptual, social, and technical actors" (Crawford 2005, p. 1).
INTERMEDIARIES	The intermediary or language of a network, that which "passes between actors in the course of relatively stable transactions"(Bijker and Law 1992, p.25) Includes "anything passing between actors which defines the relationship between them," with four main types identified: • Texts (including literary inscriptions, books, articles, patents, etc.), • technical artefacts (machines and other non-humans), • human skills and knowledge, • money (Callon 1991, p. 134).
BLACK-BOX	Referring to cybernetics, Latour states that "whenever a piece of machinery or a set of commands is too complex. In its place they draw a little box about which they need to know nothing but its input and output" (Latour, 1987, pp. 2–3). Created when "many elements are made to act (and speak) as one" (Latour 1987, p. 131).
CONTROVERSY	"[S]ituations where actors disagree (or better yet agree on their disagreement) … controversies begin when actors discover that they cannot ignore each other and controversies end when actors manage to work out a solid compromise to live together. Anything between these two extremes can be called a controversy" (Venturini 2010, p. 261).
FOCAL ACTOR	One who acts to align the interests of a diverse set of actors with their own interests, enacting translation (Callon 1986a).
MEDIATOR	actors who "transform, translate, distort and modify" other actors (Latour 2005, p. 39).
OBLIGATORY PASSAGE POINT	A situation that has to occur for all of the actors to be able to achieve their interests, as defined by the focal actor (Callon 1986a).
IMMUTABLE MOBILES	Relatively fixed elements within a network which contribute to its irreversibility, e.g. safety legislation, building codes (Latour 1993).
ASSEMBLAGE	"Entities – human, non-human, and textual – aren't solid…..Instead, they are sets of relations, for instance in the form of networks. And they are co-extensive in those networks" (Callon & Law 1997, p. 170).
AGENCEMENT	"arrangements endowed with the capacity of acting in different ways depending on their configuration" (Callon et al. 2007, p.313).

Table 2.2 continued

TRANSLATION	The creation process of an actor-network, "a process in which sets of relationships between projects, interests, goals, and naturally occurring entities - objects which might otherwise be quite separate from one another - are proposed and brought into being" (Callon & Law 1989, pp. 58-59). Translation comprises the four moments of problematisation, interessement, enrolment and mobilisation.
Problematisation	Focal actor/s identify interests (engage in controversy). The focal actor/s may establish obligatory passage points and/or identify roles for other actors in the network.
Interessement	Actions by which the focal actor "attempts to impose and stabilize the identity of the other actors it defines through its problematization" (Callon 1986a, p. 8).
Enrolment	When actors/actants negotiate or accept the proposition put forward in interessement. Actors' interests become aligned.
Mobilisation	"Actors are given the tools of communication" (Williamson and Parolin 2013, p. 421) and both the actors and the network are mobilised. The solution gains wider acceptance and may become stabilised over time.
INSCRIPTION	The creation of objects or artefacts which embody or protect particular interests (Callon 1991; Latour 1992b).
IRREVERSIBILITY	When associations between actors "cannot be easily disassociated, disconnected, or dismantled, renegotiated or re-appropriated" (Latour 1987, p. 131). Extent to which the actor-network shapes or determines subsequent translations (Callon 1986b).
PUNCTUALISATION	"[T]he process by which complex actor-networks are black boxed and linked with other networks to create larger actor-networks" (Cressman 2009, p. 7). "[T]he process of punctualisation thus converts an entire network into a single point or node in another network" (Callon 1991, p. 135).

2.3 Visualising Housing Provision with Actor-Network Mapping

Structures of housing provision (SoPs) are highly complex networks comprising a large number of actors. Mapping is proposed to facilitate their visualisation, understanding, and analysis. This aligns with Balls' assertion that in studying SoPs:

> *the functions of agencies in the production process can be mapped out for each type of housing development. This has the benefit of recognising that any agency or firm in housing development is involved in a network of interrelationships and enables a mapping out of the constraints and influences on individual agency behaviour. (Ball 2006, p. 154)*

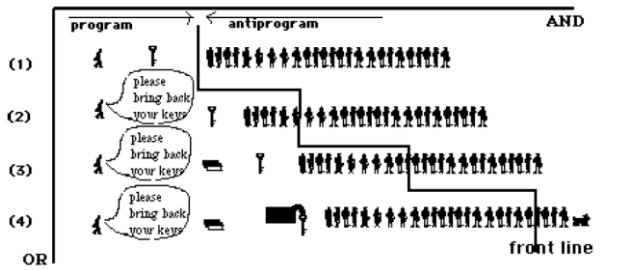
The mapping developed here provides a uniform representation of SoPs to facilitate comparison across cases. As Carlson and Gorman (1992, p. 83) suggested:

> *creating a simple, uniform system for representing an innovation as the accumulation of heterogeneous elements, it should be possible to compare different technologies, discuss the network-building strategies of technologists, and investigate the unravelling of networks by competitors, regulators, consumers, and other groups. Overall, a uniform mapping scheme should allow scholars to share data and insights from many case studies, and to use these shared insights to generalize about the process of innovation.*

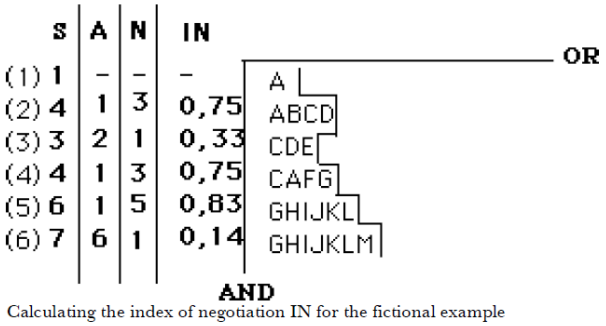
This section first provides an overview of past mapping in Actor-Network Theory (ANT) research. It then proposes the use of Social Network Analysis (SNA) software as a mapping tool, comparing differing scholarly views on this matter prior to reviewing previous mappings of heterogeneous networks using SNA software. It concludes with a summary of how such mapping can be utilised in housing studies and how it is employed here.

2.3.1 Previous ANT Visualisations

ANT scholars have previously employed actor-network visualisations. Latour and colleagues (Latour et al. 1991) proposed socio-technical graphs (STGs) in "an attempt to create a visual and conceptual space" (Latour et al. 1992, p. 33) documenting the process of translation (see Table 2.2). Using a consistent representation method, STGs enabled the comparison of case studies. They achieved this both through visualisation and the quantification of network characteristics (Latour et al. 1991), as shown in Figure 2.4.



A Socio-Technical Graph (STG) representing an actor-network at the four stages of translation from the perspective of a single actant or source of information about an artefact. Additional STG diagrams are required to view the same actor-network from alternative viewpoints. (Latour et al. 1991, p. 6)



	S	A	N	IN	OR
(1)	1	–	–	–	A
(2)	4	1	3	0,75	ABCD
(3)	3	2	1	0,33	CDE
(4)	4	1	3	0,75	CAFG
(5)	6	1	5	0,83	GHIJKL
(6)	7	6	1	0,14	GHIJKLM

AND

Calculating the index of negotiation IN for the fictional example

Table calculating the Index of Negotiation, an indicator of the process of translation through enrolment of actants. (Latour et al. 1991, p. 10)

Figure 2.4. Socio-Technical Graphs.
(Latour et al. 1991)

STGs were short lived, used by a small number of scholars in the early 1990s (e.g.Scott 1992). As proponents of cognitive mapping and the visualisation of heterogeneous networks, Carlson and Gorman (1992) raised concerns with the STG method including: reliance on textual narrative sources, bias toward first person narratives, lack of criteria for determining relevance of information, and focus on the number of actants enrolled in a network with the assumption that more is 'better'. In response, they argue heterogeneous network mapping evaluates narrative materials against other source materials, defines research objectives and subsequent criteria for determining relevance, and represents the quality of elements and connections, not just quantity. These recommendations are acknowledged in the ANT mapping developed in this research.

Latour maintains heterogeneous mapping has a role in ANT analysis. He identifies benefits to 'quali-quantitative' perspectives enabled by computing software (Latour 1992a) and has engaged in the development of mapping software to 'map controversies'.[7] Of particular interest is its use for 'controversy mapping' in the built environment by architectural anthropologist Yaneva who observes the construction of social issues in urban controversies (Yaneva 2012; Yaneva & Heaphy 2012). Documenting specific

[7] As part of European Union funded consortium MApping COntroversies in Science for POLitics (MACOSPOL), see Venturini (2010) and Yaneva (2012).

architectural projects, Yaneva's maps visualise the flow of multiple intermediaries, described as concerns. Intermediaries include cost, usage, and legacy, as shown in Figure 2.5, with maps representing moments in time, and dynamically animated to illustrate progressive changes.

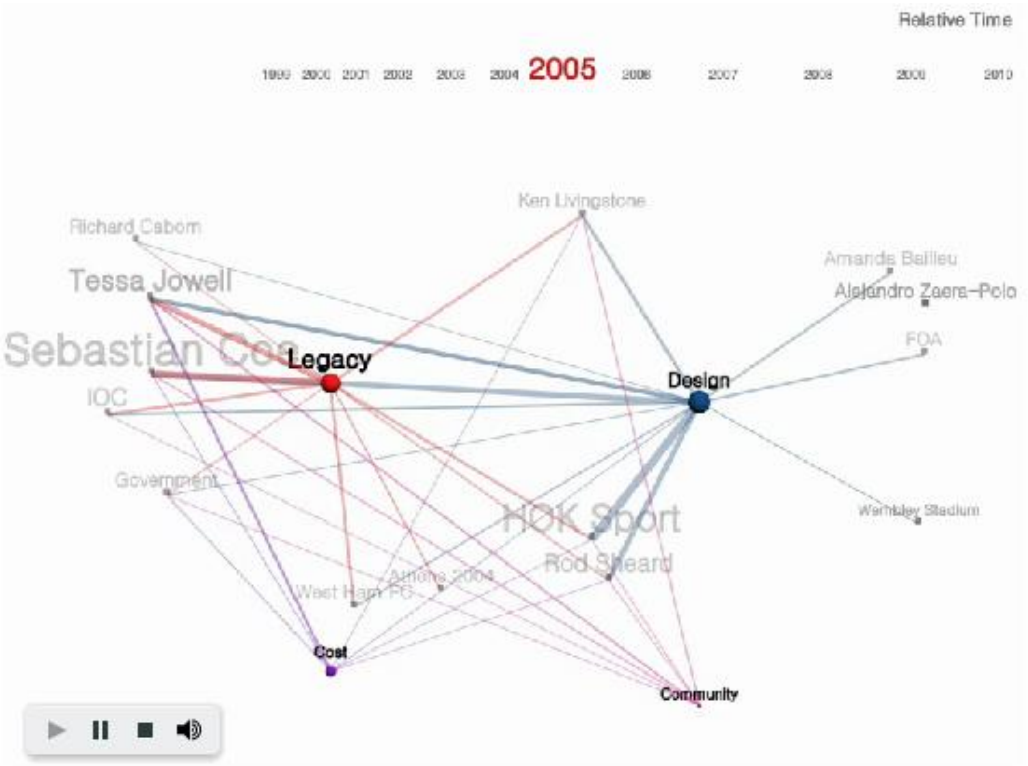
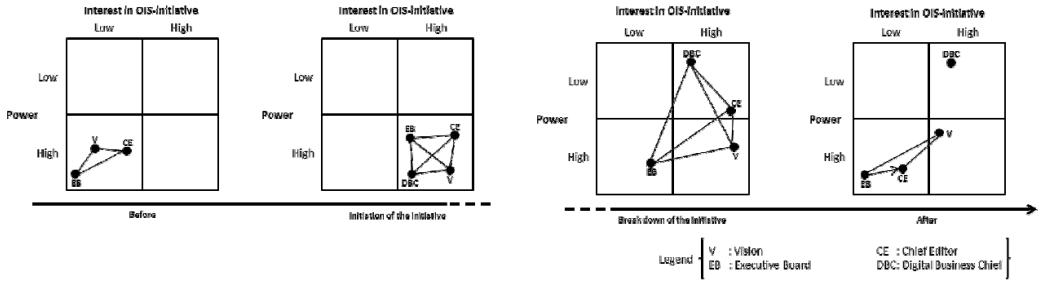


Figure 2.5. Controversy Mapping London Olympic Stadium.
(Manchester School of Architecture n.d.)

Yaneva relies on media and other public performances of controversies in the design process, including only those individuals or organisations of media interest. Abrahams (2012) suggests this divergence from typical ANT data collection, which seeks data directly from the study group, results in incomplete network representation. This method of mapping controversy omits many actants involved in the production and/or use of buildings and, as such, is unsuitable for studying the physical buildings or urban environment artefacts about which controversy occurs. Crosby et al. (2014) also adapt Latour's controversy mapping, creating a participatory tool for collaborative urban activism. They identify and visualise matters of concern to stakeholders, including Australian housing affordability, but their adaptation does not extend beyond representing the existing complexity of singular controversies.

ANT informed mappings have been proposed by scholars from other disciplines, including Information Systems (Gartner & Wagner 2009), Project Management (Comber et al.

2003), and Information and Communication Technology (Lyytinen & King 2002; Thapa 2011). Bengtsson and Eriksson Lundstrom (2013) provided an overview of ANT visualisations in Information Systems (IS), identifying that most do not explicitly map the ANT concepts of translation and inscription. They propose visualisation of IS networks using a temporal series of sociograms describing actors enrolment in a network through levels of interest and power (Figure 2.6). This method is effective for the aims of the specific study focusing on enrolment, but does not address ANT attributes of interest to this research and is not able to communicate large actor-networks such as housing SoPs.



Bengtsson & Eriksson Lundstrom's sociograms (2013, p. 11). Each matrix represents the same four actants at different points in the translation process, with their network enrolment described by level of interest and power.

Figure 2.6. ANT Visualisation in Information Systems Research.

These examples demonstrate the diversity of visual mapping in past ANT research, including its use by founding ANT scholars. They identify the requirement for ANT mappings to address the specific needs of both the discipline/field of study and the unique research project. The examples have focussed on the representation of network translation, with most requiring multiple network representations to communicate the complexity of the actor-network to the observer. This reflects ANT's agenda of 'following the actors' through the translation of socio-technical networks to observe the success or failure of new technologies. ANT researchers frequently present the ANT research environment as continually emerging, with no fixed-point of analysis (Carroll 2012; Latour 1987; Latour & Yaneva 2008; Law 2002). However, once a black-box has emerged it represents a fixed point of analysis for the researcher seeking to unlock it. In this thesis, research commences from the locked-in black-box of concern, which is both a complex actor-network in itself and an actant in the larger actor-network of urban consolidation.

The visualisation of actor-networks in this research follows Carlson and Gorman's (1992) advice; it follows Yaneva's example of specifying the intermediary mapped, and seeks a discipline and project specific approach, as advocated by Bengtsson and Eriksson Lundstrom. It

- represents a stabilised, heterogeneous network of actants,
- documents the flow of a specified intermediary between the actants,
- considers the quality of elements and connections, not just quantity,
- visualises the concepts of ANT critical to the definition of the network (including focal actors, obligatory passage points, mediators and immutable mobiles), and
- places the mapping within the context of a discipline-specific understanding of the network.

The following section demonstrates the suitability of network analysis software developed for Social Network Analysis in achieving such a network visualisation.

2.3.2 Employing SNA Tools

This section discusses the use of Social Network Analysis (SNA) software to visualise and compare multi-unit housing actor-networks. SNA is briefly introduced before discussing relevant conceptual and methodological similarities and differences with Actor-Network Theory (ANT).

SNA describes social structures based on social relations in preference to social or cultural categories or attributes. SNA, like ANT, describes relational networks between interacting entities. Entities in SNA may be individuals or collectives, organisations, businesses, animals, countries, or any mixture of such. SNA typically utilises software tools for visualising networks from empirical data, producing maps rooted in Moreno's early sociograms. Maps can represent numerous types of interactions or relations between entities, be they descriptive, perceptual, affective, active, locational, or transactional. Relations can also be dimensional, indicating parameters such as strength, duration, frequency, or intensity. This corresponds with ANT's ability to describe networks based on a range of different intermediaries which may be modified as they pass between actants.

SNA software extends beyond visual representations of relationality, providing metrics to describe both the network as a whole and the personal networks of its constituent entities. We have seen previously that Latour embraces the potential of quantification in ANT analysis, having himself developed a means of measuring network properties from socio-technical graphs. Callon also suggests integrating quantification as one form of network description:

> *[n]etworks can rarely be put into simple and easily quantifiable descriptive frameworks. 'Putting things into numbers', which is the extreme case of 'putting things into words', is only one possible form of description. Whether or not this is possible clearly depends on the state of the network. It makes no sense to try to quantify or to reduce behaviour to variables and functions*

> *under all circumstances. On the other hand, it is silly to reject all quantification. (Callon 1991, p. 152)*

Drawing from the work of ANT founders, actor-network informed research is amenable to the use of networks metrics as one component of network description and analysis.

A small number of scholars have previously proposed hybrid ANT/SNA methods in planning practice research and the study of collective action in science. A team of health care researchers propose the conceptual combination of SNA and ANT to provide an alternative basis for network-centric health care operations, which they refer to as S'ANT (Wickramasinghe & Bali 2009, 2011; Wickramasinghe et al. 2009). It is not proposed here that SNA theory and ANT 'theory' be unified, but that computational tools developed for SNA be engaged in generating actor-network visualisation. The open, flexible approach to methods offered by ANT facilitates such engagement.

Both ANT and SNA perceive networks as analytical tools (Thompson 2003, p. 86), but do so with separate origins. Both involve extensive data collection to build understanding inductively or abductively, rather than from established theoretical frames. Comparing network theories, Thompson concludes both ANT and SNA consider a network as a set of relations between actors and both explain network outcomes as "variations of network structures" (2003, p. 23). While ANT achieves this in a predominately descriptive manner, SNA employs increasingly complex statistical methods.

Mutzel sought to "bring these two approaches into a conversation" (2009, p. 872), demonstrating significantly more similarities than differences between these two approaches to networks. Similarities exist on critical epistemological matters such as the recognition of networks as heterogeneous, dynamic, socio-cultural formations, and the rejection of *a priori* reifications of 'the social' or 'society'. The two main differences Mutzel identifies are not barriers to using SNA software tools in ANT analysis. The first concerns how the relevance of information is determined and hence how data is collected, with SNA researchers assigning relevance in networks, and ANT researchers allowing the actors to establish the relevance of other actors. As SNA software provides visual representations and network metrics based on the data entered by the researcher, its use is not affected by which of these two approaches is employed in data collection. The second difference regards the symmetry of actants. While ANT attributes agency to all actants alike, SNA asserts "[h]umans can ascribe stories to objects, and thus incorporate them in a social network and account for interacting with them, but social action emanates from humans only" (Mutzel 2009, p. 879). Despite this being a significant difference, the SNA distinction between human and non-humans ability to act is not embedded in the software tools, but applied by the researcher in interpretation. Hence, SNA software can equally be utilised in a network analysis where no such distinction exists.

Having suggested SNA software is suitable for ANT-informed actor-network mapping based on existing literature, it is critical to note this is not a universal view. Yaneva stated unequivocally that social network analysis tools are not relevant to studies employing Actor-Network Theory because "as argued extensively by ANT, networks cannot be reduced to social relations only" (Yaneva 2012, p. 95 referring to Callon et al. 1986). Latour (1999b) asserts SNA theory focuses so much on the social realm that it does not address the influence that material elements can have on actants and the relationships between them. This criticism focuses on SNA theory, not SNA software mapping or the adaptation of SNA over time to represent networks comprised of entities such as concepts (Carley 1997; Schnegg & Bernard 1996), categories (Cambrosio et al. 2004; Martin 2000; J.W.Mohr & Duquenne 1997), and narrative clauses (Bearman et al. 1999; Bearman & Stovel 2000) which extend beyond the social realm. More recently, SNA scholars Borgatti and Halgin discuss how SNA is not limited to social relations, but can equally represent the transfer of resources between entities, such as ideas or goods (Borgatti & Halgin 2011, p. 1176).

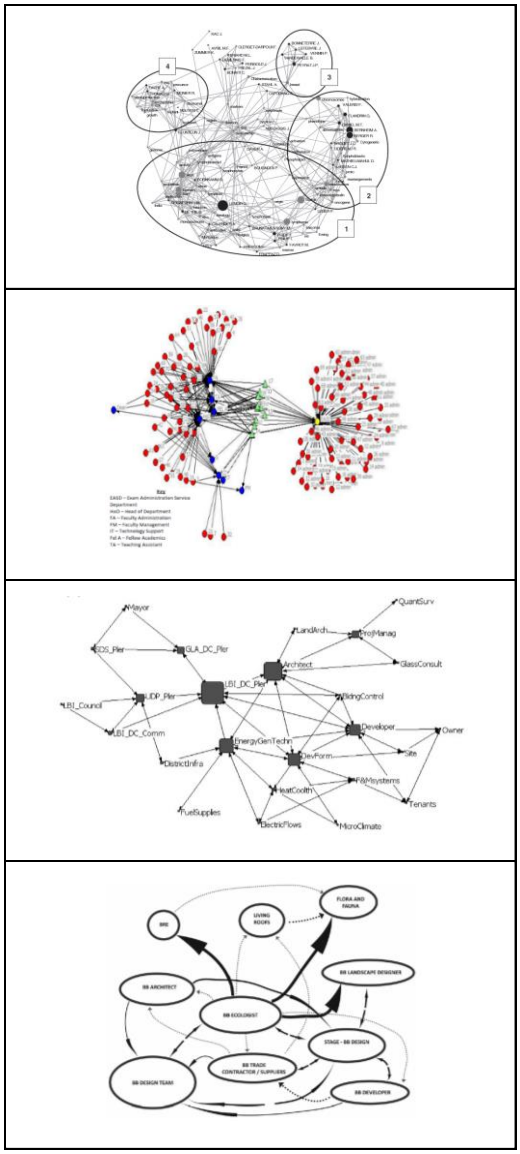
This thesis argues SNA software can represent actor-networks within the flexible approach to methods enabled by ANT. The following section presents the work of scholars who have previously sought to do so.

2.3.3 Past ANT Visualisation with SNA Tools

This section extends the theoretical proposition of using SNA software for actor-network visualisation by comparing previous examples. A search for visualisations of heterogeneous networks revealed just four previous research projects which met the search criteria of visualising a specific research case or cases: being constructed from data collected primarily via ethnographic methods and defining network boundaries based on data gathered, not pre-determined measures.

The visualisations identified are relatively recent, and each has unique motivations for engaging with SNA/ANT mapping. Shown in Figure 2.7, they are from diverse disciplines including science and technology studies (Bourret et al. 2006; Cambrosio et al. 2004), service network innovation (Carroll 2012, 2014; Carroll et al. 2012), planning practice (Rydin 2013), and building (Spinks 2015). The earliest examples (Bourret et al. 2006; Cambrosio et al. 2004) do not self-identify as ANT-inspired, but seek to expand network analysis to include non-human actants in 'hybrid collectives'. The three later studies explicitly state intent to employ SNA tools for ANT-informed research. Carroll (2012) suggests such mapping can provide a means to model and analyse relational structures; he hypothesises the 'co-application' of SNA and ANT to "develop an audit framework with associated metrics which has a significant theoretical contribution for Service Science performance analysis" (p. 90).

Detailed images and descriptions of the four examples are contained in Appendix A, including the subject of the study, the types of non-humans included, the purpose of the mapping, and the SNA software employed. Appendix A also contains tabulated comparisons of the four examples identifying the similarities and differences between them, as discussed below.



Science and technology studies

Bourret et al. (2006); Cambrosio et al. (2004)

Service network innovation

Carroll (2012, 2014); Carroll et al. (2012)

Planning practice

Rydin (2013)

Building

Spinks (2015).

Figure 2.7. Examples of past ANT visualisation with SNA tools.

Three main variations are identified across the examples. The first of these is the staging of network construction, with two studies (Bourret et al. 2006; Rydin 2013) constructing human only networks prior to the inclusion of non-humans. This approach suited

Bourette et al.'s research design, but in Rydin's study of planning practice, this staging was neither rationalised nor observed as beneficial to the study. The networks containing both human and non-human actants in a single map gained the most effective insights in all cases.

The second variation relates to the mapping of temporal features of the network. Despite previously cited views that ANT-informed mapping should demonstrate translation in action (Bengtsson & Eriksson Lundstrom 2013; Yaneva 2012), three of the examples employ static representation, with the fourth utilising multiple static representations for comparison over time. Such static representations are observed to aid legibility, enable comparison between alternative networks, and facilitate examination of stabilised networks.

The third variation relates to the relationships between actors; what it is the ties represent, and their description. Within complex actor-networks, it is possible to identify multiple relationships (or intermediaries), each of which connects (bonds) or moves (flows) between actants. Mapping of different intermediaries provides alternative views of the network. Two of the examples (Carroll 2012; Spinks 2015) differentiate relationships between actors by strength and direction as they represent specific flows of information. The others simply identify the presence of a particular type of connection between entities. The inclusion of descriptive properties, such as strength or direction facilitates greater analytic capacity when using SNA software metrics during analysis.

Additional differences exist between the examples in relation to analysis. The one common analysis employed was visual observation, identifying clusters, cliques, bridging ties, or other attributes described by SNA. Three examples used whole-network analysis while the fourth analysed only ego-networks; none used both whole-network and ego-network analysis. Carroll's study alone compared alternative networks, observing differences before and after a network intervention. In doing so, it demonstrates the comparative capacity of SNA metrics.

The examples make relatively little use of the quantitative capabilities of SNA software, with the most common correlation between SNA metrics and ANT definitions being the use of betweenness or centrality measures to define 'central actors' or Obligatory Passage Points. This may be a result of the use of ties to represent binary connections in most examples, concurrent with SNA's focus on social networks, rather than flows of intermediaries, which are a common focus of ANT analysis. Carroll's directional mapping of information transactions in university grading systems corresponds to a flow or pipes model of network function (Borgatti & Halgin 2011, p. 1172) and offers greater opportunity to utilise SNA metrics for network analysis.

Each example represents a unique investigation by the authors into the opportunities offered by this combination of tools and methods and as such the authors' own

observations regarding the utility of the exercise are worthy of consideration. Bourett et al. suggest the heterogeneous map "introduces a new analytical dimension" (2006, p. 445). Cambrosio et al. state the "maps has allowed us to structure and add visual strength to our analytical argument" and "…., network maps should become an important element of the ethnographic interviewer's toolkit" (2004, p. 357). In Carroll's view, ANT and SNA work together to enable researchers to "model the system's relational structures through a coherent framework and methods of analysis" (2012, p. 100).

Following ANT, differences between actants are "brought about by power relations and the constructions of networks that *will elude analysis* if we presume *a priori* that macro-actors are bigger than or superior to micro-actors" (Callon & Latour 1981, p. 280). The examples of past SNA/ANT mappings demonstrate the quantitative capacity of SNA software to describe relationships between entities, taking the flat ontology of ANT networks, and locating power within networks. This complies with Crawford's observation that in actor-networks:

> *Rather than power as possession, power is persuasion, 'measured' via the number of entities networked. Power is generated in a relational and distributed manner as a consequence of ordering struggles. (Crawford 2005, p. 2)*

These empirical examples support Mutzel's theoretical suggestion that connecting the quantitative and qualitative analytic strategies of SNA and ANT offers analytic benefits and adds to the "larger sociological research area on the relationship between culture and structure in network and cultural thinking" (Mutzel 2009, p. 872 referring to Breiger 2007). This connection does not suggest a theoretical unification of SNA and ANT, but that the linking of formal and interpretative analysis can enhance the study of relational networks.

2.3.4 Conclusions on Visualising Housing Actor-Networks with SNA Tools

This section has proposed the use of computational tools developed for SNA in the visualisation and analysis of heterogeneous actor-networks, including the use of SNA metrics. Despite the contrary views of some ANT theorists, multiple advocates for such an approach have been identified, providing both theoretical and empirical guidance. This includes a small number of built environment and architecture scholars, but none specifically associated with housing studies.

Actor-networks of housing provision consist of a large number of actants and exist within a complex context of conflicting interests. Discussing mapping of large, complex networks Venturini asks:

> *What would be the interest of such a [mapping] if it could just deliver a reproduction of the observed phenomena? To be of any use, social maps have to be less confused and convoluted … They cannot just mirror the complexity*

of controversies: they have to make such complexity legible. (Venturini 2010, p. 2)

The use of SNA tools to map actor-networks in housing studies must achieve such legibility; providing an additional perspective for analysis. When legibility is achieved, actor-network mapping and analysis can provide housing studies with "a basis for reflection on [its] evolutionary path, future planning and action" (Coviello 2005, p. 57) and aid subsequent theorisation (Callon 2006, p. 14).

Based on the preceding discussions, the eight key factors need to be addressed when visualising housing provision using actor-network mapping and SNA software, as shown in Table 2.3.

Table 2.3. Key factors: visualising housing provision actor-networks with SNA software.

1.	Map all network actors together, human and non-human.
2.	Employ static representations to increase legibility and enable comparison.
3.	Clearly specify the particular type of relation or intermediary being mapped, with flow model of networks offering greater opportunity to utilise SNA metrics in analysis.
4.	Map relations/intermediaries with adequate descriptions (eg strength, direction, properties, values) to undertake analysis using SNA metrics as appropriate to the research.
5.	Where possible, contextualise the actor-network in relation to an existent understanding of the housing attribute being examined to ground the visualisation and enhance legibility.
6.	Determine the suitability of undertaking whole-network or ego-centric analysis (or both).
7.	Specify any correlations between SNA metrics and identification of ANT network properties to be utilised, ensuring the SNA metrics used are suited to the intermediary being observed.
8.	Only compare alternative networks where they have been mapped using identical methods.

Responding to the key factors identified in Table 2.3, this thesis visualises multi-unit housing SoPs, enabling comparison with alternative, innovative actor-networks. It obtains network information via document analysis, literature review and semi-structured interviews with key stakeholders (see Chapter 3). Network actants are determined from the collected data. Mapping combines all actants, human and non-human, free of assumptions regarding pre-existing attributes such as position, size, complexity or power, which are later defined through network associations. SNA software Netdraw (Borgatti

2002) and KUMU (J.C.Mohr & R.Mohr 2011) are both utilised to visualise the networks, and UCINet (Borgatti et al. 2002) to generate network metrics for analysis.

The intermediary of the multi-unit actor-networks is design information used to make design decisions, mapped with a description, direction, and strength of design influence, as detailed later in Chapter 4 (Table 4.1). The multi-unit actor-network is contextualised by the subsystems of the Australian housing system as described by Burke and Hulse (2010), and both whole-network and ego-centric analysis are utilised.

SNA metrics (in-degree, out-degree, flow betweenness centrality, two-step reach, hub and authority) are used to determine focal actors, mediators, obligatory passage points, and immutable mobiles as detailed in Chapter 6 (Table 6.2). Multiple actor-networks representing both existing and alternative multi-unit housing SoPs are mapped employing identical methods to facilitate effective comparison.

Demonstration of the use of SNA/ANT mapping is included in Part Two: The Key Case of Existing Australian Multi-Unit Housing Provision (Chapters 4, 5, 6, and associated appendices).

2.4 Conclusion

This chapter introduced Structures of Provision (SoP) as described by Ball and enhanced by Burke and colleagues. It then proposed this contextualising platform be layered with concepts drawn from actor-network theory and visualised using social network analysis software. These multiple frameworks were shown to share compatible conceptual approaches to important theoretical issues including the identification of actors/actants in networks, the approach to structure and agency, and the attribution of agency/agencement/power based on relational network properties.

Key factors to address in undertaking ANT-informed housing research were provided along with key factors to address when visualising actor-networks of housing provision with SNA software. These are applicable beyond this research for comparative analysis of housing systems understood from a SoP or socio-technical network perspective.

Reflecting on contemporary housing research trends, Stone observes households are central to housing consumption research but typically absent from production subsystem research, and that when included "their role tends to be residualised to that of end-users" (2015, p. 101). Ball argues that to move from a consumption approach in housing research "towards an understanding of the impact of social relations on housing provision … It is not what is looked at that necessarily has to change, but how it is looked at" (Ball 1986b, p. 163). The means of understanding, conceptualising, and visualising housing systems proposed in this chapter examines households' role in production, responding to Stone, and creates an alternative view of provision as advocated by Ball. A view expected to "draw attention to parts of the housing system that are often neglected by researchers but may provide important underlying drivers" (Burke & Hulse 2010, p. 836).

Chapter 3. Research Design

As discussed in Chapter 2, multi-unit housing provision is conceptualised here using an actor-network lens. Given the absence of a prescribed methodology for executing Actor-Network Theory (ANT) informed research, this chapter outlines the methods employed. Fundamentally, the research employs a case study approach utilising a variety of data sources including document analysis, literature review and stakeholder interviews. This chapter discusses case study method, data collection, and analysis, concluding with how each aligns with the research questions.

3.1 Case Study Method

Case study research is multifaceted and variable. Stake describes a case study as "both a process of inquiry about the case and the product of that inquiry" (2005, p. 444). Comprised primarily of in-depth analysis of a bounded phenomenon in a particular context, case study research addresses primarily HOW and WHY research questions (Thomas 2011a; Yin 2014). A case study can also facilitate a variety of research outcomes, with Simons noting that "by focusing in depth and from a holistic perspective, a case study can generate both unique and universal understandings" (Simons 1996, p. 225).

Discussing case study research in the social sciences, Hammersley and Gomm (2000) highlight a lack of consistency in the use of the term both across disciplines and over time. They direct the contemporary researcher to be explicit about how they employ case studies in relation to project specific research ambitions. The relevance of the case study to ANT-informed research is discussed before summarising how the case studies address the research questions.

3.1.1 Case study research and ANT

Thomas (2011a) describes a case study as a bounded phenomenon in a specific context observed and analysed via an analytical frame utilising multiple data sources. This holds strong parallels with Latour's description of the study of networks as the

> *summing up of interactions through various kinds of devices, inscriptions, forms and formulae, into a very local, very practical, very tiny locus. (Latour 1999a, p. 17)*

ANT scholars frequently employ specific, located cases to illuminate their theorisation of ANT in research, including electric vehicles, scallops, trains, shipping and human disease. (Callon 1986a, 1986b; Latour 1996a; Law 1989; Mol 2002). The synergies between case studies and ANT are identified by key scholars of both (Callon 1986a; Latour 2005; Thomas

2011a, 2011b; Yin 2014), with case studies common in network research from marketing and business development (Borch & Arthur 1995; Coviello 2005), to information systems (Carroll 2014), and bio-medicine (Wickramasinghe & Bali 2009; Wickramasinghe et al. 2009). A relatively small number of housing actor-networks have been studied using case study methods, ranging from planning and development (e.g. Ruming 2009a; Rydin 2013) to individual buildings (e.g. J.M.Jacobs et al. 2007).

Some case study approaches hold positions in relation to the prior deployment of existing theoretical frames, the explanation of causal links, and the pursuit of generalisation that contradict the approaches of ANT. For example, despite recent changes in Yin's case study approach (2014) which acknowledge capacity for inductive theory development and working hypotheses as described by Cronbach (1975), Yin maintains an intrinsic aim of analytic generalisation, advocates the use of *a priori* theoretical frames and pursues causal explanations. These theoretical and methodological stances contradict those of ANT and hence, despite its dominance in architectural and built environment case study research, Yin's approach is not conceptually compatible with the ANT-informed research undertaken here.

The contradiction between Yin's pursuit of generalisability and ANT-informed case study research is significant. This thesis seeks to gain knowledge through Australian and International case studies to provide alternatives to the existing Australian multi-unit housing provision system. It does not seek to generalise. Kaplan states "generalization must be truly universal, unrestricted as to time and space" (1964, p. 91), something Lincoln and Guba (2000) argue requires an abandonment of context, conflicting with the contextualisation essential to case study research. They argue for rejecting the search for generalisation from case studies, embracing Cronbach's abductive view that "[w]hen we give proper weight to local conditions, any generalization is a working hypothesis, not a conclusion" (Cronbach 1975, pp. 124-125).

Cronbach's working hypothesis offers an opportunity for theory generation and testing through subsequent cases as well as for transferability. Transferability, discussed by Kennedy (1979), Tripp (1985), Hammersley et al. (2000), and Hesse-Biber and Leavy (2011), enables working hypothesis generated in one case study to be used to understand other related cases or contexts. Lincoln and Guba (2000) describe the degree of transferability of working hypothesis as directly related to the congruence between contexts, which they term fittingness. They argue "a broad range of the related" (p. 38) exists between the two extremes of the general and the unique and that the "thick descriptions" (Geertz 1973) generated by case study research enables researchers to determine fittingness. Likewise, Cronbach (1975) suggests researchers are capable of recognising and accommodating factors unique to context when moving between cases, with contextual transferability becoming the aim of research as opposed to generalisability.

In seeking transferability over generalisability this research moves away from the trend in housing research to "favour generalisation as a basis for comparison and cumulative knowledge" (Gabriel & Jacobs 2008, p. 535). In light of the research aims, the case study approach described by Thomas (2011a) is engaged as it avoids contradictions with ANT, facilitating abduction and cross-case comparison. It is also amenable to the transfer of working hypothesis between cases, an incremental process of knowledge generation compatible with the incremental distortion of ANT.

Positive convergences between ANT and case-studies include:

- The study of a specific bounded phenomenon in a particular location.
- The use of multi data sources to gain insight into the phenomenon studied.
- The generation of thick descriptions which support emergent theorisation and knowledge generation.

Additional correlations enabled by the selection of Thomas' case study approach include:

- Commencing case selection and data collection based on the research questions and insights gained via literature review rather than applying an *a priori* theory.
- Embracing an abductive approach to theory generation.
- Validating knowledge generated through triangulation with multiple sources as well as the comparison and contrasting of multiple cases.
- Accepting that establishing causality is not a focus
- Comparison of experiences and transferability of knowledge in preference to generalisation.

The following section provides further explanation of Thomas' case study approach prior to detailing its application.

3.1.2 Applying a Case Study Typology to Multi-unit Actor-Networks

Following a review of case study classifications and types by preceding scholars, Thomas (2011a, 2011b) proposes a typology for case studies in social science to increase clarity of both methodology and purpose. Thomas' typology classifies case studies by layering understandings of subject, object, purpose, approach, and process to define a project-specific case study method (Thomas 2011b, p. 518). Subject refers to the case itself, the focus of study, and the object consists of "[t]he analytical frame or theory through which the subject is viewed and which the subject explicates" (Thomas 2011b, p. 511).

Thomas' typology is visualised in Figure 3.1. This approach assists in establishing how case studies are mobilised in a specific project, responding to Hammersley & Gomm's (2000) call for clarity of how case studies are employed and how they relate to research ambitions. With multiple variables in four classificatory layers, Thomas' typology can be navigated via multiple pathways.

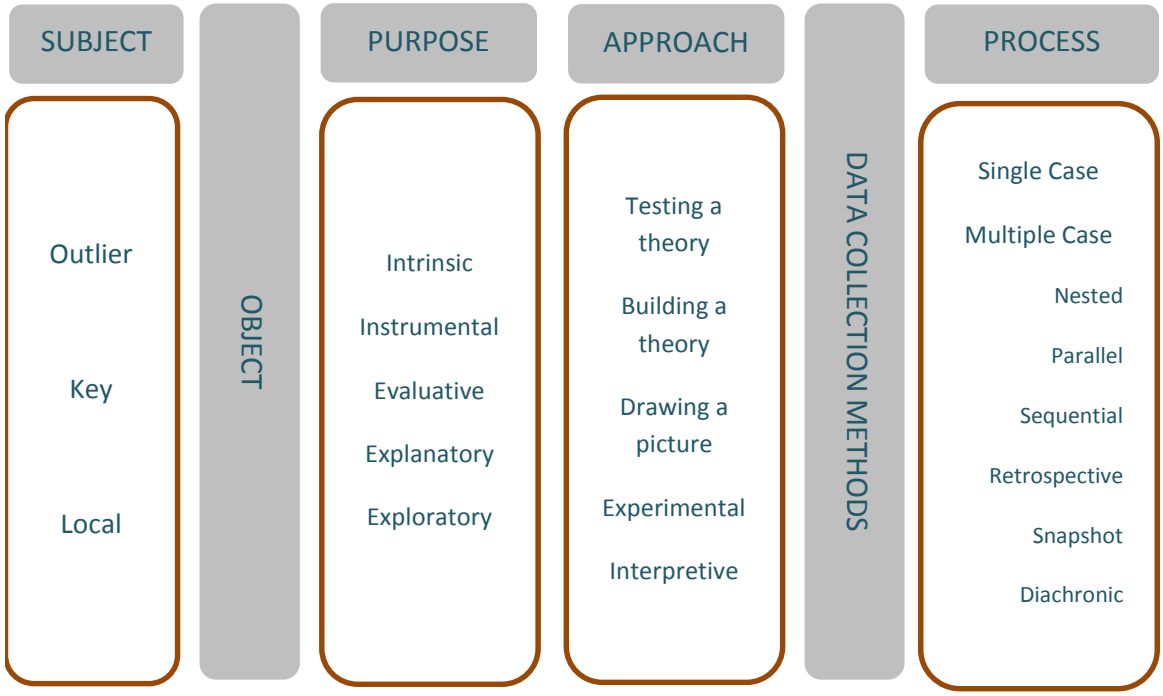


Figure 3.1. Thomas' Case Study Typology.
(Thomas 2011a, 2011b)

Case studies are utilised in this research in response to the research questions detailed in Chapter 1, with a key case study providing a base against which outliers (alternatives) can be compared. Case studies respond to different research questions at each project stage, varying in purpose, approach, and process. The relationships between the research questions and the case studies are represented in Figure 3.2, with the multiple case studies providing comparison and contrast across locations, more robust theory than single case research (Eisenhardt & Graebner 2007).

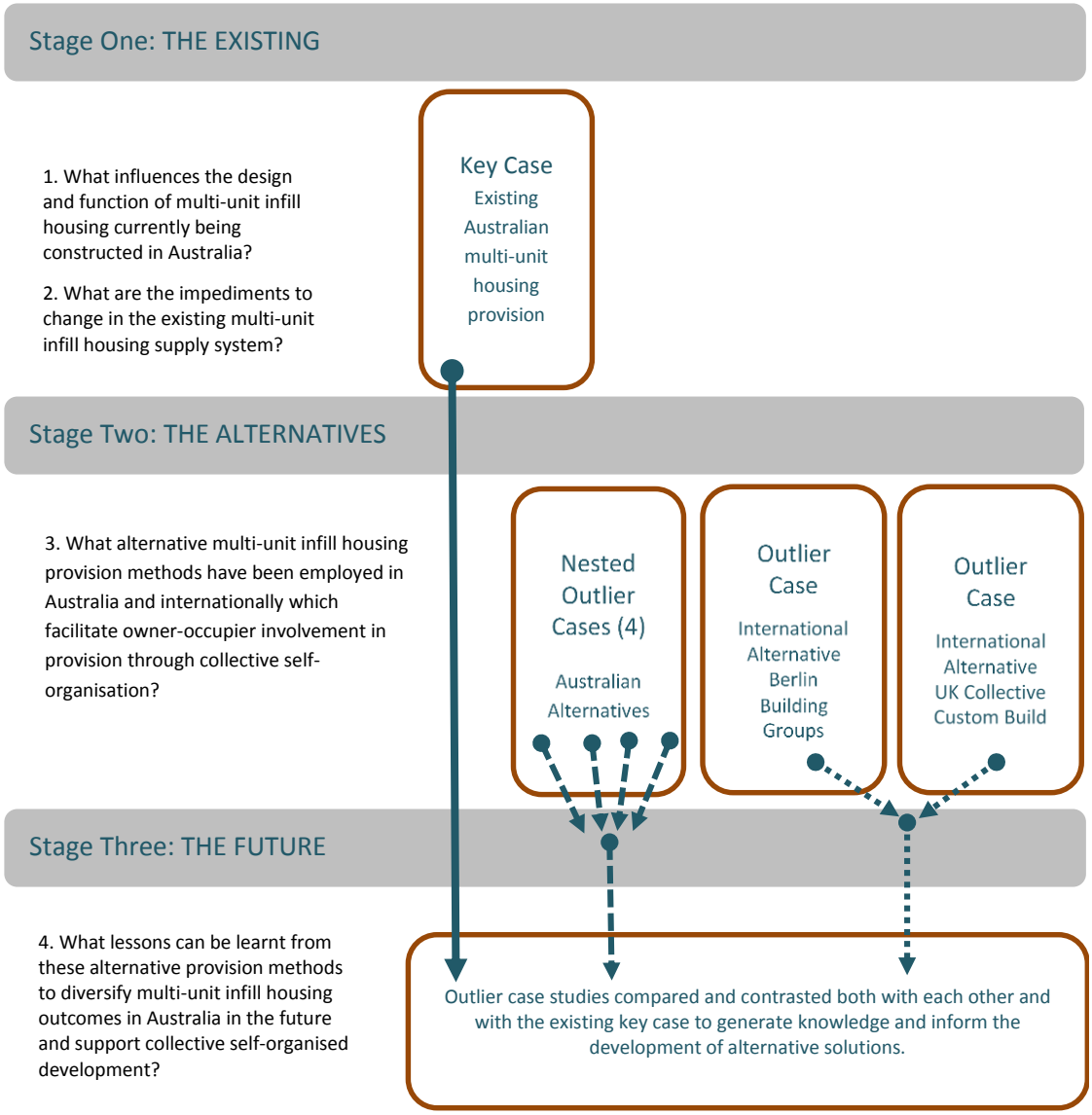


Figure 3.2. Relating Case Studies to Project Stages and Research Questions.

To elucidate the cases in the language of Thomas' typology (Figure 3.3), the subject(s) of analysis are the key case of existing Australian multi-unit housing and multiple outlier cases of alternative multi-unit housing provision from both Australia and overseas. The object or frame through which the subjects are viewed is informed by the literature discussed in preceding chapters; namely, the posited need to establish mechanisms to facilitate non-speculative, demand-led multi-unit housing in Australian urban infill. The case studies are both instrumental and explanatory in that they serve a particular purpose and enable insight. In instrumental studies "[t]he case is of secondary interest, it plays a

supportive role, and it facilitates the understanding of something else" (Stake 2005, p. 445). Here, the cases provide insight required to implement future change.

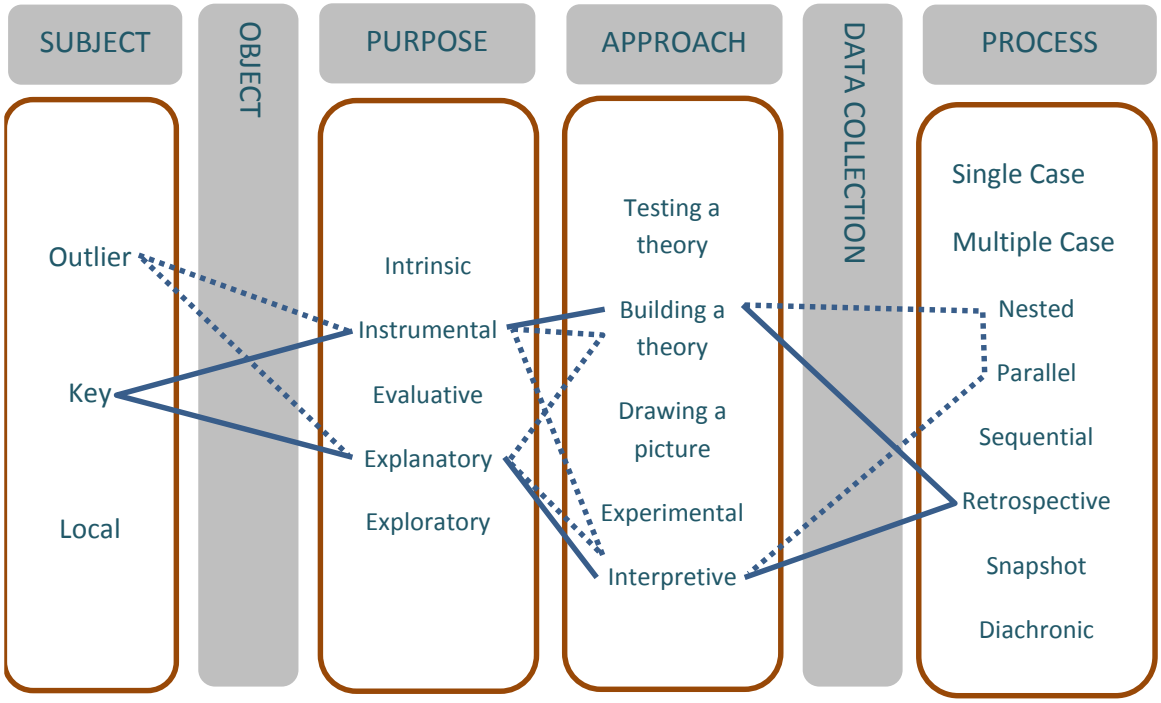


Figure 3.3. Relating Cases to Case Study Typology.

The approach clarifies the purpose of the study (Thomas 2011b) and must ensure correlation with the object. The case study research presented in this thesis takes a theory building approach in the sense that it aims to provide a framework to facilitate a non-speculative multi-unit housing system in Australian urban infill which does not currently exist. Thomas defines building a theory as "developing, almost from scratch, a framework of ideas, a model that somehow explains the subject you are researching" (Thomas 2011a, p. 112). In achieving this aim, the case studies are also interpretative in that the framework of ideas is abductively constructed from the data collected via the ANT-informed conceptualisation and visualisation discussed in Chapter 2.

Multiple, comparative cases are employed which ensures the research focuses on the object of the study rather than the subject (Thomas 2011a). This suits the research questions which ask what can be learnt from the comparison of the existing key case study with multiple outliers. All cases are active at the time of study although the duration of their lifespans varies considerably. For older cases, a higher degree of retrospection is required. A description of each case is provided prior to undertaking comparison through

both similarity and dissimilarity. The four cases of alternative Australian multi-unit housing provision are nested for comparison.

3.1.3 Conclusions on Case Study Method

This section has interrogated contextual and methodological approaches to case study research to ensure consistency between the case study approach employed and the research ambitions, as recommended by Hammersley and Gomm (2000). It has questioned the suitability of case study approaches in ANT-informed research, concluding not all approaches are congruent with ANT attitudes to theory and generalisation. In doing so, Yin's case study method, commonly applied in built environment, architecture and housing research, is found to be unsuitable. Thomas' case study typology is determined to be the most appropriate for ANT-informed comparative housing studies and is used to classify the multiple cases that inform the thesis. The selection of Individual cases is detailed in the relevant sections of the thesis.

3.2 Data Collection

The conceptualisation of housing provision as a heterogeneous network of human and non-human actants guides data collection. Network research integrates methods such as participant observation, interviews, and document analysis of archival sources, with a particular focus on the generation of data from fieldwork (Coviello 2005; Latour 2005; Mutzel 2009). Utilisation of multiple data sources balances the strengths and weaknesses of different data sources and achieves triangulation through correlation. This corresponds with case study data collection methods described by Groat and Wang (2013); Hesse-Biber and Leavy (2011); Thomas (2011a); and Yin (2014).

Network and case study scholars collectively highlight the importance of integrating both qualitative and quantitative data to enhance network/case understanding, or as described by Coviello, "interactional (soft) and structural (hard) network dimensions" (2005, p. 43). In determining data collection methods, consideration was given to O'Donnell and Cummins' assertions that "to understand network relationships … and their dynamics over time, a qualitative approach to data collection is most relevant" (1999, p. 43).

Network research frequently rejects the division between qualitative and quantitative research, along with the associated label of 'mixed-methods' (Breiger 2004; Mutzel 2009). In preference to the discrete analysis of separate data types, ANT-informed research combines qualitative and quantitative data in case specific, network focused analysis through a bi-focal lens. Coviello (2005, p. 43) emphasises the ability to analyse and interpret qualitative data both qualitatively and quantitatively; an attribute exploited in this research using Social Network Analysis software.

For each case study, a combination of literature review, document analysis, and key stakeholder interviews was sought to collect sufficient data for effective case description and analysis. Variation in data collection across case studies, demonstrated in Figure 3.4, reflected the different stages of maturation of the cases and the availability of documents.

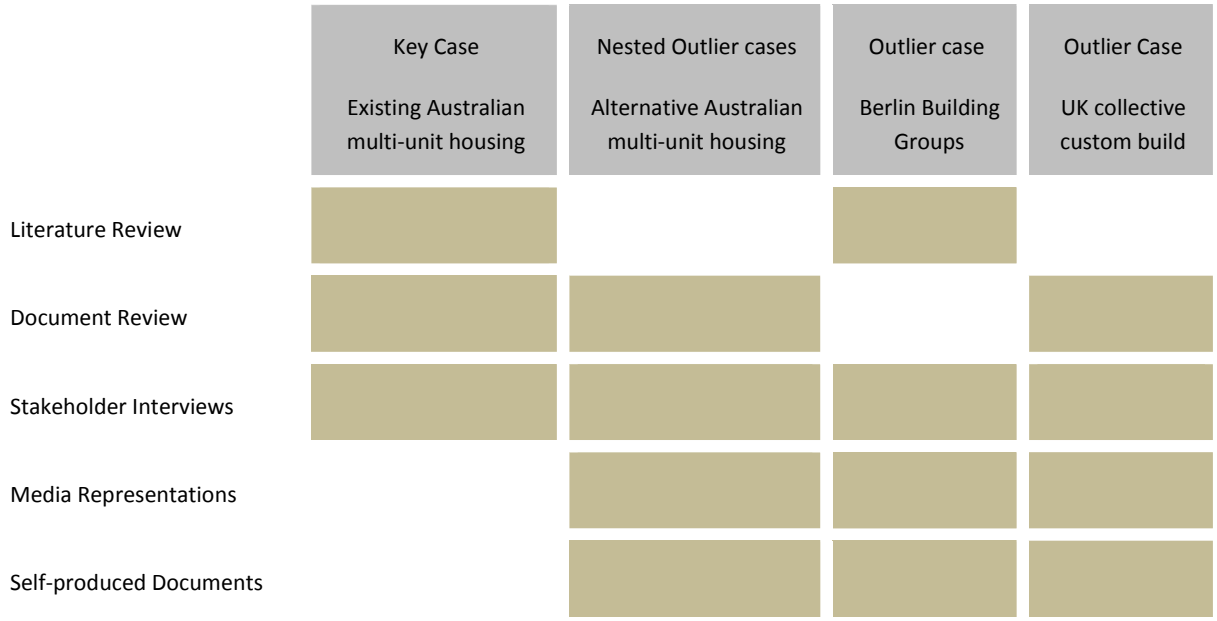


Figure 3.4. Case Study Data Collection.

The relative newness of the outlier cases from Australian and the United Kingdom (UK) equates to a lack of published material. In the UK case, there has been a recent flurry of academic research providing context, but as yet no substantial case specific literature exists. Being more established, the Berlin case offered a richer collection of literature. However, very few organisational and institutional documents were available in English for this case, placing some limitation on the effectiveness of the document review.

Media representations of the cases, including paper and digital newspapers, blogs, and audio-visual interviews provided additional secondary data. These included professional and community websites, social media sites, and promotional materials such as recruitment pamphlets and videos.

In-depth, semi-structured stakeholder interviews were used across all cases, providing individual accounts of experiences relative to each case studied. Having used semi-structured interviews in ANT-informed housing research, Cowan et al. suggest they "allow for the possibilities that ANT opens and requires" (2009, p. 286). All interviews were conducted by the researcher and used interview guides, with questions constructed

around themes of interest to the research. For the initial key case study, all interviews used the same interview guide to "gain rich qualitative data on a particular subject from the perspective of selected individuals" (Hesse-Biber & Leavy 2011, p. 95). The interview structure provided scope for interviewees to discuss matters of importance to them and allowed for the exploration of additional themes raised. This structure acknowledged that numerous aspects of the interviewees' experiences relative to the topic of research are likely to be unknown by the interviewer at the commencement of the interview process. Interviews in the key case study employed ego-centric diagrams to facilitate and document conversations, as detailed in Chapter 4. Interviews conducted as part of the subsequent outlier cases, both international and Australian cases, utilised more flexible interview guides than the key case. These reflected the different roles played in the housing provision process by different stakeholders. For more information on interviews conducted as part of the alternative cases see Chapter 8 and Chapter 10.

A combination of deliberative sampling and snowball sampling was utilised to ensure adequate network coverage. The interviews were undertaken with the approval of the University of Adelaide Human Research Ethics Committee. Interviewees were provided with Participant Information Sheets describing the project prior to scheduled interview times and completed Ethics Consent forms that provided the option of anonymity. Audio recordings were made of all interviews. Interviewees were provided with a copy of the audio file for their review if desired and made aware of their option to alter any comments made on the recording or to withdraw from the research at any time. Information regarding complaints procedures was also provided to all participants. Interviews conducted as part of the initial key case were transcribed for analysis. For subsequent interviews, the interviewer took written notes, with reference made to the audio recording for clarification as required.

Details regarding the recruitment of interviewees, the themes of interview guides used for each case study, and other information describing interviews undertaken for each case are provided in the relevant sections of the thesis. The recruitment letters, participant information sheets, consent form and interview guides are included in Appendix B.

3.3 Analysis

Two distinct stages of analysis are undertaken. The analysis of primary and secondary data collected generates network representations. These network representations subsequently become the focus of further analysis to facilitate network comparison.

The in-depth semi-structured interviews returned large volumes of data as notes, diagrams, audio recordings, and transcripts. Having employed interviews as a means of gathering 'deep' information from interviewees (J.M.Johnson 2002, p. 104), a structured means of analysing the resultant quantitative data is required.

From a network research perspective, Mutzel (2009, p. 873) advocates systematic coding of qualitative data, with a view to quantification, and the examination of resultant structural network characteristics. In this research, the interview data is one of the multiple sources of information for the mapping of actor-networks. It is used to confirm actants enrolled in the networks and ties between them as seen from the interviewees' perspectives. The interview techniques employed to achieve this outcome and the methods of (primary and secondary) data analysis used to generate the network maps are detailed in Part Two and associated appendices.

Thematic analysis (Braun & Clarke 2006; Rapley 2011) of the interview data is undertaken to identify commonalities, differences and patterns in stakeholder views, focusing particularly on the information gathered which is not included in the visual representation of the actor-network(s). Analysis of interview data occurred after the completion of all interviews associated with a particular case. Analysis for each case study, or set of nested case studies, was completed prior to undertaking cross-case comparisons. This approach to identifying dominant themes and subthemes in qualitative data sits in methodological agreement with the overarching research methods of ANT and case studies discussed previously.

In the analysis of secondary data, caution was exercised in relation to the less rigorous sources. Atkinson & Coffey warn self-produced documents are not neutral or transparent, but that they "actively construct the very organisations they purport to describe" (2011, p. 77). Where it was necessary to employ self-produced documents and media representations, these were treated warily, with confirmation or convergence of information sought from multiple sources.

Following the generation of network maps, these were analysed and compared with both visual observation and the use of Social Network Analysis software. This process is first engaged in Part Two and associated appendices, where it is explained in detail in relation to the key case study.

3.4 Comparison in Housing Research

In its use of multiple cases, this research compares multi-unit housing structures of provision (SoPs) within and across locations. An influential critique of comparative housing research was provided by Kemeny and Lowe (1998), questioning the legitimacy of research employing description, juxtaposition and comparison of cross-national housing systems. Others maintain international comparative housing research is advantageous to policy development and market understanding, but that transference between locations can be problematic due to peculiarities in different market contexts (Ball 2006; Ball et al. 1988; Gurran 2008; Lawson & Milligan 2007; Oxley 2004).

Comparative housing research is identified by Stephens (2014) as having the primary role of informing housing policy, using comparisons either over time or between places. He does not advocate direct policy transfer between locations, but like Milligan et al., who suggest "cautionary tales [may be] of potential relevance to Australia" (2009, p. 2), he identifies cross-national comparison can enhance a researcher's understanding of their own country's housing markets (see also Doling 1997). For effective comparison, Stephens asserts research must employ a system-embedded approach; "embedded in an understanding of the housing system and the wider social and economic structures with which the housing system interacts" (2014, p. 34).

It is generally agreed that "international approaches cannot simply be cut and pasted into the Australian context" (Milligan et al. 2009, p. 123) and international comparisons require recognition of historic, cultural, political, economic, and social differences between locations, including differences in urban governance and housing policy (Gurran 2008; Lawson et al. 2009). Kemeny (2001) suggests one must theorise the relationship between housing and its context to explain why different housing systems and typologies emerge. Similarly, Elsinga (2014) advocates the qualitative comparison of outcomes across jurisdictions, suggesting comparative housing research provides "… a credible evidence base for highlighting national differences" (Dunning 2014, p. 243) and proposes it be used "… to explain why something does not happen rather than why it does" (McNelis 2015, p. 2746).

In this research, a system-embedded contextual understanding of housing provision is sought as advocated by Burke. Using actor-network visualisation and analysis, comparison of actor-networks within and across international jurisdictions "draw both positive and negative lessons across time and space" (James & Lodge 2003, p. 189), enhancing the understanding of existent structures of provision. This concurs with Lincoln and Guba's (2000) previously discussed approach to transferring working hypothesis between contexts based on fittingness (3.1.1).

In using comparative case studies this research does not propose direct policy transfer, rather it aims to explain why changes sought in the Australian outlier cases are not always achieved and what can be learnt from the experiences of the international outlier cases.

3.5 Limitations

Limitations exist in relation to three main issues. Firstly, the selection of a case study located in a non-English speaking country presented some limitations to the researcher. As mentioned in 3.2 this has impacted on the collection of documentary material, although this situation has been effectively negotiated. It is also notable that almost all stakeholders interviewed for the Berlin case were interviewed in their second language. It is suspected the need for interviews to be conducted in English influenced recruitment

and some barriers were experienced during interviews regarding the use of professional and technical terms. Translation of terms between German and English is also inconsistent in the sourced literature, particularly terms differentiating different housing types and housing procurement models.

Secondly, the researcher embarking upon housing research in a foreign location is inevitably limited in their observational capacities due to a lack of contemporary and historic knowledge of the local economic, cultural and housing systems. The third issue is the maturity of the cases. Some cases are relatively recent and as discussed in 3.2, this has led to slight variations in data collection across cases. Selection of the alternative Australian cases was influenced by the developmental status of the projects, with the decision to remove one particular case from the study influenced by the project instigators reluctance to discuss potential intellectual property in development. Given the retrospective nature of interviews, the varying maturity of cases adds a minor variance to data collection as interviewees from some cases rely more on memory and recollection than others.

Part Two: The Key Case of Existing Australian Multi-Unit Housing Provision

In a 2013 speech addressing the Australian Institute of Building, the Assistant Governor (Economic) of the Reserve Bank of Australia, Christopher Kent, observed the rise in the proportion in "higher-density housing" building approvals across the nation. Kent suggested this trend constitutes a "durable, structural change in the market [with] important implications for builders and developers" (Kent 2013). To gain insight into what implications such market change may have on multi-unit housing provision, it is necessary to build a detailed understanding of the existing structure of provision (SoP): to look inside the black-box.

This Part of the thesis examines the key case of existing multi-unit infill housing provision over three chapters. It addresses Research Question One and Research Question Two, from the perspective of stakeholders in the existing structure of provision.

Research Questions:

1. What influences the design and function of multi-unit infill housing currently being constructed in Australia?

2. What are the impediments to occupant involvement in multi-unit infill housing provision?

Chapter 4 develops an initial mapping of the heterogeneous actor-network of provision based on literature review. This initial mapping identifies key stakeholders for interview.

Chapter 5 details stakeholder interviews, and thematically analyses the collected data before Chapter 6 refines the initial actor-network mapping using the interview data. Key actants in housing provision and design decision-making are defined through analysis of the mapped network relations. To test the effectiveness of actor-network mapping as a tool for comparison, two variations of the existing multi-unit structure of provision (SoP) are compared; those of the traditional developer and the integrated developer.

In addition to presenting the key case in the body of the thesis, associated appendices provide more detail of the Actor-Network Theory (ANT) mapping developed. As discussed in Chapter 2, this mapping employs Social Network Analysis (SNA) software and has no direct precedent. Hence, it is demonstrated in detail via this key case before deployment in the comparison of alternative SoPs in Part Three.

Part Two: The Key Case, concludes with observations of the existing SoP related to disconnections between market value and use value, production and occupation subsystems, and human and non-human design decisions. The influence of risk and longevity of investment are also shown to impact multi-unit design outcomes in the existing SoP and impede occupant involvement in provision.

Chapter 4. The Key Case: Initial Mapping & Interviews.

By examining existing Structures of Provision (SoPs) the key case enables a view into the black-box of speculative multi-unit housing provision, providing the research with insight into the existing heterogeneous actor-network of provision and a base line for comparison with alternatives. This chapter details the initial mapping of the actor-network generated from literature review.

The inconsistent definitions of medium-density housing and high-density housing in Australian strategic urban plans posed a challenge in determining literature for review. Appendix C discusses these inconsistencies alongside alternative terms relevant to housing development in existing urban areas. It concludes that the term multi-unit infill housing is most appropriate to this research, using it to describe new dwellings:

1. located on infill sites in urban areas designated for consolidation,
2. privately owned
3. in strata or community titled projects of 4-60 dwellings,
4. three-storey or higher, and
5. with a land use of 75-150 square metres per dwelling (site density of 65-130 du/ha).

This scope of multi-unit infill housing is representative of projects currently occurring across Australian cities as small- to medium-scale speculative developers progressively redevelop unused and underutilised urban land.

The taxation and finance frameworks currently applicable to Australian housing have remained relatively consistent for some time,[8] meaning a cohesive literature relevant to this key case is accessible, with over 300 policies, reports, reviews, studies and articles appraised. The vast majority of the materials reviewed were published after 2001, with many being post-2010 and reflecting industry practice following the global financial crisis of 2007/2008.

[8] The 'negative-gearing' of investment property expenses has remained unchanged since 1987 and capital gains tax benefits for property investors were introduced in 1999. Following the regulation of financial institutions by the Australian Prudential Regulation Authority (APRA) in 1998 and financial products by the Australian Securities and Investment Commission (ASIC) in 2001, a relatively stable system of financing multi-unit development evolved, which remains in place today (Bryant 2010; Yanotti 2013).

4.1 Initial Actor-Network Mapping

Discussing the limits of Actor-Network Theory (ANT) in creative practices like design and architecture Rose notes that whilst it can recognise stronger and weaker links it "isn't very good at differentiating between different kinds of links" (2013, p. n.p.). The mapping approach used here avoids this limitation by focusing on a single kind of link: the flow of design information. Mapping the actor-network with design information as the intermediary responds to Research Question 1, which focuses on the design and function of multi-unit housing. One can also analyse the same network of actors with respect to an alternative intermediary, such as financial flows or professional relationships, to address different research questions.

The collection of network data from secondary sources is common in network research, with paper records and databases frequently utilised, particularly in historical contexts. When employing primary data the researcher can control the types of relationships being studied and ensure appropriate data is collected, whereas secondary data may be limited in the types of relations and information recorded (Borgatti et al. 2013). Very little published research on Australian multi-unit housing explicitly positions itself as concerned with the flow of design information. Those which do tend to emphasise design concerns (see for example, City of Melbourne 2013; Martel et al. 2013b; Morgan & O'Sullivan 2009). Nonetheless, the vast majority of texts reviewed provided some insight relative to design outcomes, be it explicit or otherwise.

For example, Rowley and Phibbs (2012) present barriers to development, identifying specific actants and the influences they exert or receive. Sources such as planning policies, strategic plans and legislation, as non-human network actants, directly specify the influence they exert in the network. Other sources discussing specific aspects or impacts of multi-unit infill housing offer less explicit insights into the connections between actants. As one example, J. van der Heijden's 2013 study of New Governance in the Australian building sector provides insight into the determinants of urban developments and dialogues between participants relevant to the mapping of the network. Another, Randolph and Tice (2013), is not explicitly concerned with housing production but asks 'Who lives in higher density housing?' and in doing so identifies the importance of distinct sub-markets to the housing provision network and the different connections which exist within the network relative to tenure. The relevance of secondary data has not presented an obstacle in this case, with explicit and implicit information gathered from all sources combined to map the heterogeneous actor-network of existing multi-unit provision.

Initially, 45 actors were identified, shown in Figure 4.1 grouped by the primary subsystem (Burke 2012) in which they act and represented as humans, texts, organisations, artefacts, and values/perceptions. This representation assists the researcher to differentiate between material and non-material non-human actants and follows the precedent of

Wolf & Toxler (2015) who employ the categories of 'non-human material actors' and 'quasi-actors' in their study of co-design networks. Representing actants by type also enables an understanding of the capacity of the actant to influence or be influenced. The identification of large numbers of actants alludes to the complexity of the network.

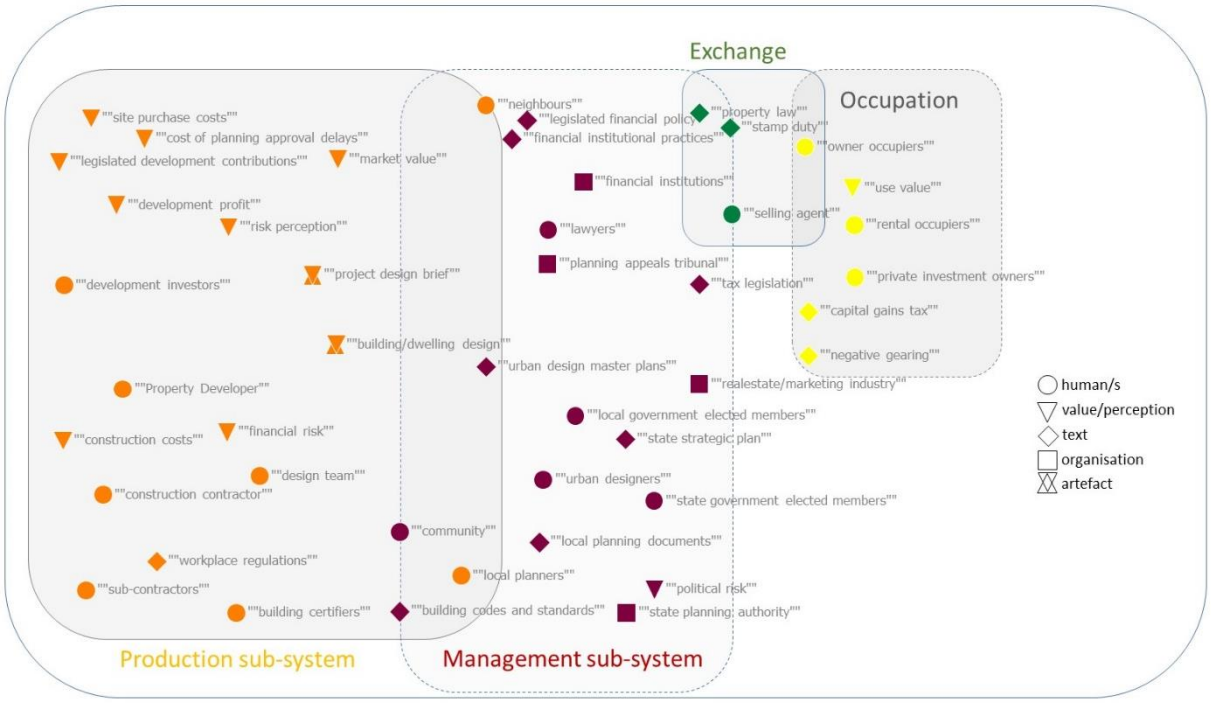


Figure 4.1. Initial Mapping of 'Black-Box.' Actors shown by Subsystem and Type. ^

While Social Network Analysis (SNA) mapping is usually associated with the identification of social relationships, flows are acknowledged by Borgatti et al. (2014; 2009) as one of the four basic kinds of dyadic phenomena in network research. Flows can represent, for example, the exchange of money, materials, or information. Flows are mapped directly, as opposed to the mapping of relationships with the subsequent inference of flows based on relational properties. They are also mapped showing the direction of flow and relative strength. Based on the literature review, six types of intermediary flows between actors are identified and assigned strengths as shown in Table 4.1. Mapping flow strength recognises the variety of design influences exerted in the network. As a prescriptive text, the National Construction Code ('Building Codes and Standards') provides directive information for implementation and does not typically enter into discussions or negotiations with other actors. In contrast, the influence of 'market value' on 'private investment owners' is advisory. The mapping in Figure 4.2 includes identified flows. The position of nodes and the length of the connecting ties have no metric meaning.

Table 4.1. Intermediary Flow Strengths Utilised in Mapping.

Intermediary Flow Type	Strength	Example
Provides input/opinion for design decision making	1. Low impact on design outcome	'Community' provides opinion to 'State Planning Authority' during public consultation on 'State Strategic Plan'.
Sets boundaries to design decisions	2.	'Local Planning Documents' set boundaries for 'Design Team' to generate design proposals.
Provides propositions for consideration by others		'Design Team' provides design propositions for consideration by 'Property Developer'.
Limits future design decisions by others	3.	Development Investors or Financial Institutions agree to fund a project with set conditions, limiting subsequent decisions made by Property Developer.
Determines/prescribes set design decisions	4. high impact on design outcome	Building Codes and standards directly inform Design Team with prescribed solutions to safety, amenity, fire standards etc.
Takes actions/makes final design decisions		Property Developer makes decision to proceed with proposed building/dwelling design or not.

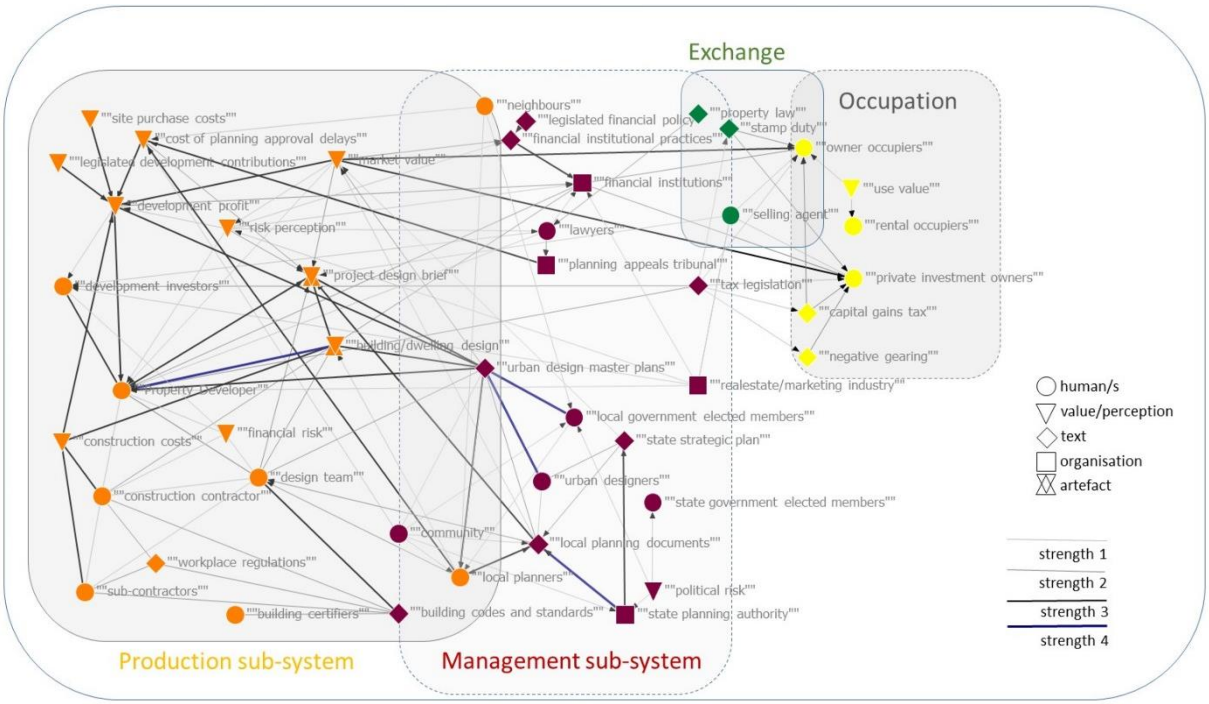


Figure 4.2. Mapping showing Actants and Flows of Design Information by Direction and Strength.
^

The collection of relational (tie) data from the reviewed literature inevitably required a high level of interpretation. Discussing the labelling or description of relational data, Borgatti et al. assert that "[t]he higher the level of interpretation the more theoretically useful the data is likely to be, but the greater the chance of being wrong" (Borgatti et al. 2013, p. 31). Considering this caution, relational network data drawn from the literature reviewed is included in the network mapping only when supported by multiple sources and multiple authors.

This initial, literature based, mapping of 45 human and non-human actants with over 130 intermediary flows constitute a stabilised network which, having formed over time through a variety of translations and inscriptions (Callon 1986b), has been offering multi-unit infill housing to the Australian market for an extended period of time. It constitutes the contents of the stable black-box.

4.1.1 Initial Actor-Network Observations

Having established an initial network mapping, both visual and metric observations of the multi-unit SoP can be made. Commencing with the visual, very few connections exist between the production and consumption subsystems, with the flow of design information between the two passing through actants located in the exchange and management subsystems (namely the real estate industry, taxation, and financial institutions). Particular actants are shown to have wide influence, providing design information to numerous others (including market value, risk perception, tax legislation) and information converges on particular actants (property developer, design team, development profit). The variable strength of design information is also visible, with the strongest flows (4s) appearing to cluster around planners and planning documents in the management subsystem, although a greater number of strong flows (3s) clustering around a small number of actants in the production subsystem.

Observing the mapped network as a whole is visually challenging. Focusing on ego-networks of individual actants enhances understanding. For example, given that dwelling function and design is determined by the project design brief, it is useful to observe which other actants (or 'alters' in SNA vocabulary (Borgatti et al. 2013, p. 28)) provide design information directly to the project design brief. These are shown in Figure 4.3, where the property developer and local planning documents can be seen to provide the strongest design input into the project design brief.

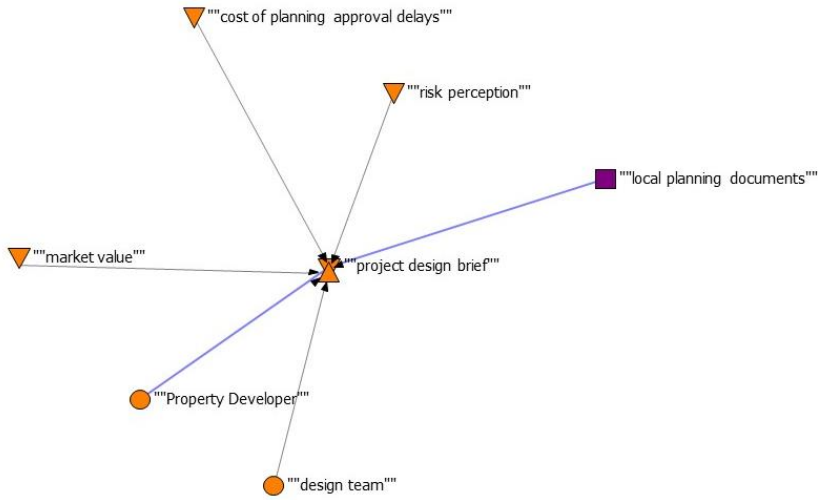


Figure 4.3. One-step Ego-network for Project Design Brief.

Expanding the ego-network to include all actants two steps away from the project design brief (Figure 4.4) provides a view of which actants provide design information to those who subsequently inform the design brief. Discussing influence in networks, Bowler and Brass (2006) suggest that beyond two steps, or third-party relationships, an actant's influence diminishes significantly. This two-step observation is supported by other network researchers (Bian 1997; Gargiulo 1993; Labianca et al. 1998). The two-step ego-network of the project design brief can be used to identify actants who sit outside the two-step sphere of influence. In this case, building occupants and all actants primarily associated with the consumption and exchange subsystems are shown to have minimal influence on the project design brief.

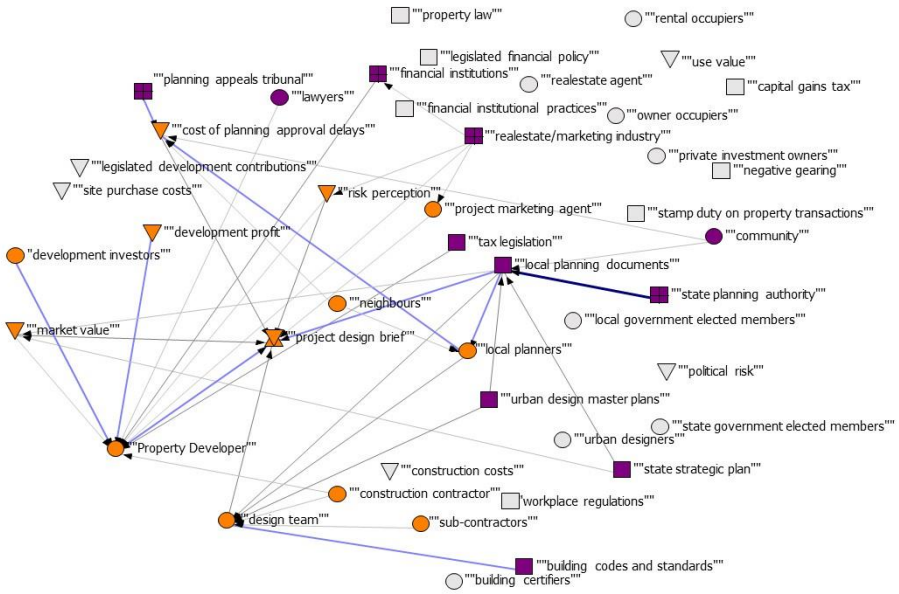


Figure 4.4. Two-step Ego-network for Project Design Brief. ^

Visual observations of the path length between two specific actants (an 'ego' and an 'alter') can also be made. Having seen in Figure 4.3 that market value of housing directly informs the project design brief while use value has significantly less influence, it is possible to visualise the path design information takes from 'use value' to the 'project design brief'. Figure 4.5 shows information flows via more than one path, each consisting of different combinations of human and non-human actants. With a minimum of five steps along the flow path, design information provided by use value (or owner-occupiers) has low influence as it is potentially mediated, modified, distorted or normalised by actants along the path. Each such mediation is also influenced by inputs from other actants; inputs which may be contradictory or assert greater sway.

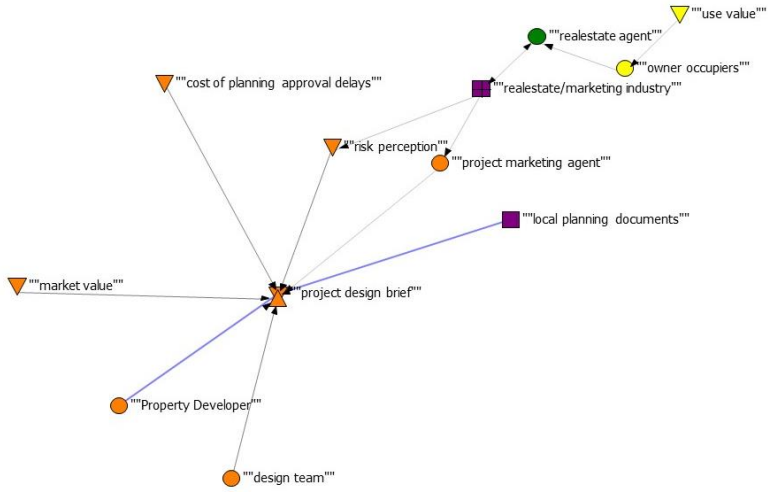
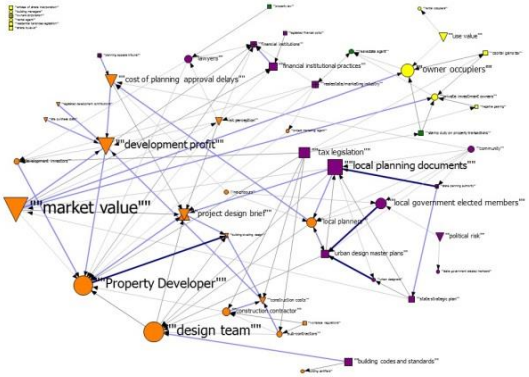


Figure 4.5. Path of Design Information from Use Value to Project Design Brief.

This demonstration of the actor-network observations enabled by mapping the existing multi-unit housing SoP has to date been based on the initial mapping produced from the literature review. The mapping extends beyond pure structural representation by including the attributes of actants (type and subsystem), their behaviours (the actions they make with the intermediary of design information), and the content they share with others; information that can lead to insights into the meaning of network structure (Golbeck 2013).

To validate and refine the network mapping technique described here interviews were undertaken with key stakeholders. This process complies with the two main methodological approaches advocated by ANT: 'following the actors' via interviews and ethnographic research, and examining inscriptions (Williamson & Parolin 2013, p. 420). SNA metrics were used to provide insight into the mapped network and identify key stakeholders.

Table 4.2. Initial mapping showing Actant properties of In-degree, Out-degree and Betweenness. ^

Icon and text size represent the relative values calculated for each actor using UciNet and Netdraw software.	Key human stakeholders identified	Key non-human stakeholders identified
In-degree		
	Property developer	Project design brief Development profit Financial institutions
Out-degree		
	Real estate/marketing Community Design team	Tax legislation Market value Risk perception Local planning documents
Betweenness		
	Property developer Design team	Market value Development profit Local planning documents

4.1.2 Identifying Key Stakeholders

NetDraw 2.141 software (Borgatti 2002) was used to observe three common SNA metrics in the initial mapping and determine key stakeholders in the network. Firstly, in-degree, a measure of the number and strength of directional ties to an actor. An actor with high in-degree is prominent in a network and seen to have high esteem and capacity for leadership (J.C.Mohr & R.Mohr 2011) as other actors want or need to connect with them. Secondly, out-degree, a measure of the number and strength of directional ties from an actor to others, demonstrates network influence. High out-degree actors easily spread their ideas and views to others and may control the flow of information. Thirdly, betweenness measures how often a node lies on a path between two others (Freeman 1979), with a high value indicating a broker or gatekeeper role with high potential to influence other actors and control network flows. Chan and Liebowitz suggest an actant with high betweenness "may extract 'service charges' and isolate actors or prevent contacts" (2006, p. 24). Table 4.2 shows the key human and non-human stakeholders identified using these measures.

4.2 Key Stakeholder interviews

4.2.1 Recruitment

Employing deliberative sampling, requests for an interview were forwarded to professionals actively engaged in multi-unit infill housing in the key stakeholder roles established above. The use of SNA metrics to inform the selection of participants follows J.C.Johnson and Orbach (2002) who showed central actors are able to recall and describe networks more accurately, suggesting they are appropriate informants both for the provision of reliable network data, and to review the network data collated in the initial network mapping. The key non-humans identified in Table 4.2 informed the interview questions posed.

Two-thirds of professionals approached agreed to interviews. Eight interviews were conducted in Adelaide, South Australia, between September 2014 and January 2015, each between 70 and 120 minutes duration. Approximately half the interviewees elected not to be identified, consequently, all are referred to by pseudonyms.[9] The interviewees' roles in the multi-unit SoP are described below.

[9] Despite the use of pseudonyms, some participants can be identified by the reader due to their unique professional roles. These participants agreed to being identified. Their pseudonyms are used for consistency, not privacy, purposes.

Design Team – This includes all members of the design and consultancy team such as architects, engineers, and others whose input is required in the design process. Interviews were sought with architects, as the profession traditionally responsible for the co-ordination of the design team.

- Two architects (AD2, AD3): Directors of separate medium sized, Adelaide-based architecture practices with experience in multi-unit infill housing delivery. Recent projects located in inner city locations and areas strategically designated for intensification. Experience working with private developers and the State Government Development Agency.
- The South Australian Government Architect (AD1): Charged with "promoting the value of excellent and effective design to ensure quality built environments for South Australians" (ODASA n.d.), the government architect's office is responsible for South Australia's Design Review Program, a process offering independent advice on design quality to support design excellence.

Property Developers – The initial mapping represents traditional multi-unit provision where the property developer takes a predominately administrative and contractual role, coordinating the outsourcing of tasks required to realise development. Alternatively, a developer may operate using an 'integrated development' model, integrating services which would otherwise be externally contracted, such as project management, site construction, planning services, real estate, marketing, design and documentation. The private developers interviewed both conduct business in an integrated manner and bring an understanding of the advantages and disadvantages of both models.

- Two Private Developers (PD1, PD2): Directors of Adelaide-based residential development companies specialising in small to medium sized urban infill development. PD1 focuses on residential developments of 4-6 stories in the inner city, PD2 develops mainly in inner suburban transit corridors.
- State Developer (SD1): Director of Major Project Delivery at the State Government Development Agency. Facilitates development opportunities for the private sector on government land holdings in support of the urban renewal agenda of The 30-year Plan for Greater Adelaide.

Community – With a moderately high out-degree, the community is able to make others aware of its views. As community directs information toward local government elected members and local planners, local planning documents and urban design master plans, it was determined planners and urban designers could provide insight into the role of the community in the actor-network.

- Certified Practicing Planner (PP1): currently director of a private planning practice located in South Australia. Past experience as town planner in government and private sectors, strategic and statutory planning, and community engagement.

- Urban Planner and Designer (PP2): senior planner and designer for an Adelaide based private practice. Experience in both urban growth areas and urban consolidation precincts.

Real estate/Marketing Agents – Integrated developers PD1 and PD2 integrate real estate and marketing services within their corporate business structure. As such, they provide insight into real estate and marketing as it relates to both their integrated business practices and traditional development.

Additionally, interviewees held a range of positions in industry bodies, giving them a broad understanding of industry practices beyond their individual project experiences. These include the State Chapter President of the Royal Australian Institute of Architects, Board Member of the State Government Urban Renewal Authority, State President of the Planning Institute of Australia, and The Property Council of South Australia Urban Design Committee.

The interviews were undertaken in Adelaide, and provide insight into the Australian multi-unit SoP. Differences exist in Australian capital cities in relation to multi-unit infill housing markets, particularly differences in land availability and cost, market demand, construction labour costs and unionisation, market value and demographics. Differences in costs and demand impact on individual project feasibility in any given location. However, legislation relative to finance, taxation, and construction codes and standards is applicable nationally. Researchers of housing provision in Australia have previously argued that despite state-based variations in planning processes, the findings of state-based observations are relevant to Australian housing provision systems at a national level (e.g.Bryant 2010).

4.2.2 Interview Structure

The purpose of the interviews was two-fold. First, to elicit primary information regarding key stakeholders' experiences of the actor-network they act within and associated design decision-making. Secondly, to review the initial actor-network mapping previously generated using secondary data. The interview structure reflected these two purposes, comprising two discrete parts. Part One of the interviews is the subject of Chapter 5 and Part Two is the subject of Chapter 6. The interview guide is included in Appendix B.

Chapter 5. The Key Case: Participants' Network Perceptions.

Part One of the key case stakeholder interviews collected participants' network perceptions, focusing on design decision-making processes. It used a series of ten questions focusing on the interviewees' role in multi-unit infill housing, the identification of other stakeholders in the network, the description of connections between stakeholders, the influence of these on design outcomes, and experiences of project outside-the-box.

5.1 Method

During each interview an ego-centric diagram was collaboratively constructed, documenting the network stakeholders and their interactions from the perspective of the interviewee (see Figure 5.1). Chan and Liebowitz describe ego-centric data collection as providing "a local view of the network instead of the overall picture" (2006, p. 26). Additionally, this method provides ego-network data on the interviewees as well as other actants with whom they are engaged; their alters. It provides rich, detailed data on alters who themselves are not among the interview participants, which can then be used to inform the whole network (Borgatti et al. 2013).

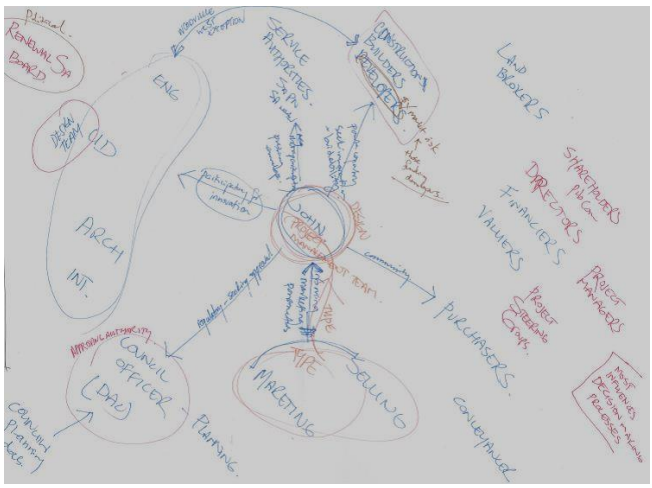


Figure 5.1. Example of an Ego-centric Diagram generated during stakeholder interviews.

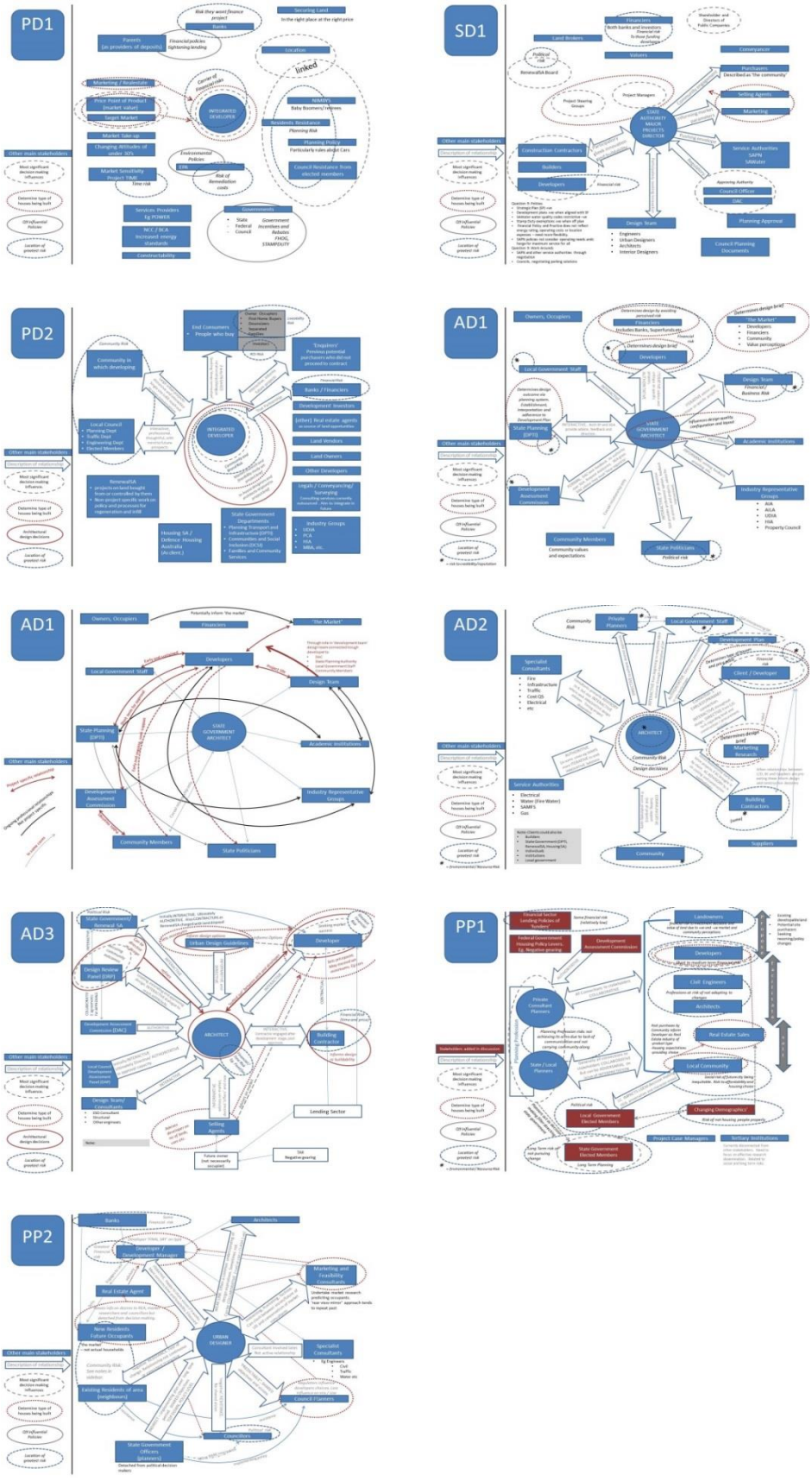


Figure 5.2. Ego-centric Diagrams. ^

The ego-centric diagrams focused on capturing data about each alter identified and associated ties. Interviewees were asked to describe the nature of the relationships between actors using their own terms, be they (for example) collaborative, directive, adversarial, interactive, or regulatory. Following J.C.Anderson et al. (1994), the network horizon was simply defined by the view of the interviewee. Colour coding was used to illustrate who in the network was seen to have the greatest control of financial decisions, development decisions, design decisions, and who takes the greatest risk. Within 24 hours of each interview the researcher converted the hand drawn diagram into a digital image and provided a copy to the interviewee with the opportunity to review and revise the document.

Creating diagrams/illustrations of these qualitative interviews enabled an iterative, non-linear representation of the complexity of the topic as contended by Brightman (2003, p. 8). In alignment with Actor-Network Theory (ANT) research processes advocate by Latour, it allowed respondents to "display their cosmos and map it" (Wolf & Troxler 2015, p. 19).

Figure 5.2 shows the ego-centric diagrams generated in the interviews, indicating the variation in data provided by informants. These diagrams constitute raw data for analysis and were not modified to comply with a pre-determined template. AD1 and PP1 produced diagrams noticeably distinct from others. PP1's double-layered diagram includes network associations for both Private/Consulting Planners and State/Local Planners, reflecting the interviewee's experience in both roles. AD1 generated both a personal ego-centric diagram and an additional layer of information describing relationships between others, or a 'name-interrelator' map (following Borgatti et al. 2013, p. 267). This reflects the role of the State Government Architect to oversee design and development. Borgatti et al. suggest name-interrelating data can be inaccurate and difficult to validate. In this case, the ties suggested by AD1 were validated against responses from other interviewees.

5.2 Analysis of Stakeholders' Network Perceptions

Analysis of the interview data identified three common themes, each influencing design decision-making in multi-unit provision. The first of these relates to divisions identified between stakeholders, which limit innovation and create barriers to the adoption of a shared vision. The second identifies diverse types of risk existing in the structure of provision (SoP), and the third the interrelation between risk and design decision-making capacity.

The reminder of this chapter expands each of these themes, with discussion of how they contribute to or hinder innovation in multi-unit provision.

5.2.1 Stakeholder Relationships and Disconnects

All interviewees identified a common set of human actants as central to multi-unit provision; property developer, design team/architect, local council planning staff, marketing consultants, and financiers. Of these, only the property developer engages with all other central actants (Figure 5.3). Local planners and architects have no direct connection with marketing consultants or financial institutions. For architects, this represents a systemic disconnection from project briefing: for planners, a disconnect between the future thinking plans they administer and current market and finance contexts.

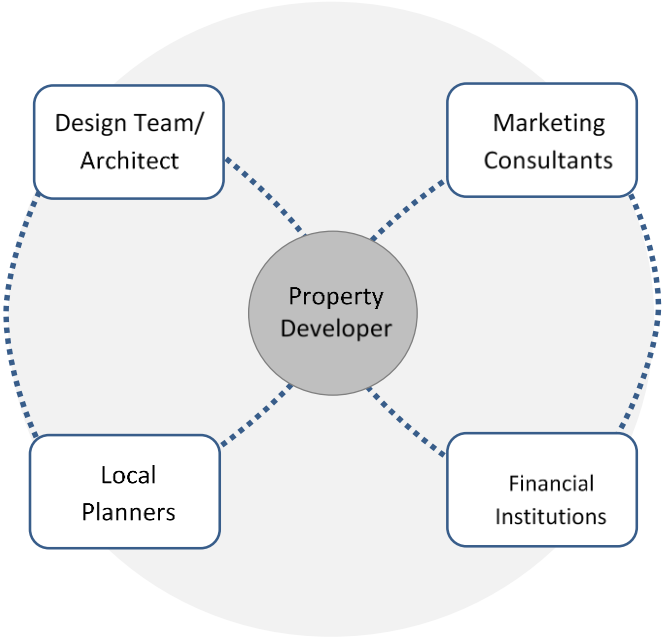


Figure 5.3. Central Actants identified.

The developer typically engages architects after the project feasibility stage, at a time when the functional design brief (apartment types, function, and price point) has been determined by the developer in conjunction with the marketing consultants. The marketing consultant's reflective observation of past project successes ensures predictable outcomes and minimises risk, but "does not consider the changing demographics and changing needs in the community" (AD3). All architects interviewed identified that they were not able to engage at a stage when design input can make high-value contributions and lead to innovation. They promoted engagement of architects at the design briefing stage to alleviate the tension between the future and the past, and reduce the reluctance to deviate from the *status quo*.

Entirely absent from this core group of actants identified by interviewees were strategic-level actants such as urban designers and state government representatives (State Government Architect, state development agency and state government plans). Dividing

the interviewees into project-level and strategic-level actants, additional disconnects become evident. The two groups seldom identified direct connections with each other. Urban designers, as strategic-level actants, were almost entirely absent from the ego-diagrams of project-level actants; only being identified by strategic-level colleagues. Conversely, construction contractors were identified by only one of the four strategic-level actants, whereas all project-level actants mapped or discussed construction contractors, regardless of whether or not they had a direct connection. This division of human actants between those advocating multi-unit development and those providing it contributes to the mismatch between the objectives of strategic urban plans and the reality of multi-unit housing developments discussed in Chapter 1. In particular, the lack of contact between strategic actants and design teams regarding specific projects was seen as a barrier to the realisation of strategic objectives by design actants at both levels (AD2, AD1, PP2, AD3).

From a planning perspective, PP1 suggested the disconnect between strategic- and project-level actants is exacerbated by the lack of cohesion between planning documents and economic feasibility. Strategic and local plans focus on measurable physical features desired in a given location (height limits, car parking ratio, plot ratios etc.) but the private development sector frequently alter these material ideals to achieve project feasibility. It was suggested strategic planners, responsible for the production of development plans, need an increased understanding of project economics and feasibility (PP1, AD3, AD1, PP2, SD1), enabling the generation of planning documents which propose not only desirable but feasible, urban futures.

The visionary nature of strategic urban plans, with their promises of vibrant future communities, requires a sharing of that vision to achieve the desired outcomes. Local planners, responsible for the implementation of local planning policy documents (and urban design master plans, where relevant) act as a bridge between the strategic and project-level spheres; a gatekeeper between the strategic plans and individual projects. This concurs with the initial network mapping and emphasises the need for local planners to “share the vision” (PP2). However, interviewees suggested the local planner’s ultimate role as administrator of local planning rules limits the scope for them to do so if the materialisation of that vision extends beyond the bounds of the existing development plans (AD1, AD2, PP2, PD2, PD1). In total, five of the eight interviewees doubted the ability of the planning profession to fulfil this bridging role effectively, with some questioning the adequacy of local planners’ education in relation to design outcomes. Such concerns among industry stakeholders question the effectiveness of this sole existing bridge between strategic intent and project delivery.

Another disconnection exists between the production subsystem and the occupation subsystem. Interviewees’ included the dwelling user in their ego-centric diagrams using the concepts of “the market” and “the community” – never as an actual household. Some

strategic-level stakeholders interviewed did not identify dwelling occupants as actants in housing provision at all.

5.2.2 Types and Location of Risk

The type and location of risk in multi-unit housing provision is a major barrier to innovation and a contributor to unaffordability. Initial perceptions of risk were typically financial, however, interviewees identified other forms of risk ranging from societal to professional. Risks typical to the development and construction industries, including buildability, the use of unfamiliar construction systems, unforeseen site circumstances, business practices and others, were discussed by interviewees as being universal; not specific to multi-unit provision (PP2, AD2, AD3, PP1). Here, attention is given only to the risks that differentiate multi-unit housing provision from free-standing housing provision.

While all interviewees agree with the preceding literature that developers incur the main financial risk in a multi-unit project, the developers interviewed perceived that risk differently from each other. One highlighted the complexity of the risk profile while the other proposed risk can be eliminated.

> *There are so many risks from the day you buy the land to the day you hand it over and someone settles and pays you some money. …if you outsource it and don't know what you're doing, then any one of those steps, planning, construction, sales, …can bring you down, you have to control it all. (PD1)*

> *I don't take risk in development. I identify risk, put controls in place to the point where the risk being taken – the risk formula is negligible. (PD2)*

The lack of cash flow during a multi-unit project, alluded to by PD1 above, is a feature unique to multi-unit provision, with the developer and any investors carrying the entirety of land purchase, development, building, and carrying costs through to project settlement.[10] This risk is exacerbated by the prospect of settlement default, where, despite the use of pre-sales contracts, risks increase when market fluctuation occurs over the construction period, resulting in final property values below the original contract price (Bryant 2010, 2012; Sharam et al. 2014, 2015b).

Access to finance is a substantial cost to developers, with time delays in approvals, construction, and settlement compromising the profitability of the project (PD1, PD2, SD1). The risk of time delays contributes to the repetition of relatively conservative buildings compliant with local planning documents and seldom pursuing alternative

[10] In free-standing housing, the land developer typically receives payment for the serviced block of land prior to the commencement of construction and the building firm contracted to construct the home receives progress payments from the purchaser during construction. Staging of payments distributes risk, ensuring no single stakeholder carries a disproportionate level of risk on behalf of another. The building firm takes business risk in providing the agreed dwelling for the agreed price, but the household contracting construction takes risks associated with unforeseen site conditions, change in market value over the construction period, and provision of adequate finances during construction for the project to be completed.

spatial or material options. Given the multi-layered risk taken by multi-unit developers, it is perhaps understandable they should seek higher return on investment. Urbis (2011) showed the developers profit margin on a two bedroom infill unit in Melbourne reached $82,000 in 2010 compared with $44,000 for greenfield residences.

The location of financial risk also varies with the specific contractual arrangements employed on individual projects. Architects, for example, indicated an exposure to 'risk shifting' in their own practices, having experienced projects in which developers allocated final construction, servicing and finishing specifications to the construction contractor and sub-contractors rather than the design team.

> *…depends on the contractual arrangements between people. And look, there's so much risk shifting in the construction industry. Everyone's trying to shift risk. But risk actually manifests itself in terms of dollars always. So that if a developer tries to move the risk across to the building contractor, the more he moves across to the building contractor, the more the contractor will charge the developer. Unless the building contractor is foolhardy. (AD3)*

This is both a cost-saving measure, with the contractors exploiting efficiencies via their personal supply contacts, and a risk shifting measure, making the contractor responsible for delivering a suitable product for a set price. However, no strategic-level actants interviewed observed construction contractors taking risk in the SoP.

Interviewees saw financial institutions as carrying significantly less financial risk than developers, particularly given their ability to review loan-to-value ratios and revise lending terms in response to market valuations.

> *So the bank, when [the] GFC came, went to all the developers and said, 'We've just revalued. We've done a [loan-to-value] re-evaluation on your project over here. You're underwater. Please dip in another X million dollars'. (PD1)*

This shifting of risk away from the financial institutions toward the developer further accentuates their central risk position.

Architects, as this interviewee explains, also see themselves as one of the actants taking some financial risk:

> *…to produce good architecture, and that's our professional responsibility … we need to have sufficient time … and time is money. If we don't have sufficient fees, we don't allow ourselves enough time to discharge our professional responsibilities to the community and to our client. So fee cutting is effectively negligent in terms of our professional responsibilities. (AD3)*

Although others did not share this view, architects saw themselves as risking their own business viability and professional credibility due to increasingly low consultancy fees and cost cutting.

Despite the fact dwelling owners frequently purchase off-the-plan and, in so doing, have little control of quality, few interviewees identified them as exposed to financial risk.

Design team actants in particular recognised dwelling owners take risk by buying into an unknown future environment, an as yet unformed community. Speaking from the position of an Integrated Developer, PD2 articulates both the financial and experiential risks taken by purchasers.

> *I think on the investor side, they are taking financial risk. They're investing in our product in the hope that it produces a return for them – it may not. The owner-occupiers at the moment, just about all of them are taking a liveability risk because most of them would never have lived in apartments. They've been brought up in a traditional house. They don't know whether they're gonna be able to live with that. (PD2)*

Integrated developers, state and local planners, and the State Government Architect all identified the reputational and political risk carried by politicians and the state planning authority. Individual views of the actor-network directly influenced perceptions of political risk. Strategic-level actants identified it only at the state level, planners noted its affect on both local and state elected members, and private developers did not identify political risk at all.

Multiple interviewees identified non-project-specific or lifecycle risks, including community risk and environmental risk. As one architect stated, they are "… future thinking concerns, not in the project cash flow sheets" (AD2). Community risk was described as including risk to social diversity, to housing affordability, housing choice, and equality. This risk of "not housing people properly" (PP1) was of greatest concern to planners and architects.

> *The long-term risk is to the government and the community. Anyone who is here in Adelaide in 30 years' time … it's really important to consider, what is your housing choice gonna be up in the future? 'Cause if you don't consider that now, when you get there, it won't be there. (PP1)*

Unlike previously identified risks, community risk is not specific to professionals or households who choose to engage in multi-unit housing provision and occupation. Rather, the physical, infrastructure, and social impacts of multi-unit housing extend beyond the boundaries of the particular infill site/s, being described by one interviewee as "applied to community, not taken by it" (PP2). Actants interviewed who did not identify community risk in multi-unit provision were a developer and the two strategic-level actants charged with implementing the state strategic plan. These were the same actants who had previously identified reputational and political risk as primary concerns.

Architects alone identified environmental or resource risks. These relate to the life-cycle of a building and are often insufficiently considered in current multi-unit provision due to the disjunction between the production and occupation subsystems and associated split incentives.

> *I mean, there's the risk of … the way we use our resources, like not only to build, fabricate, and erect a building but it's life-cycle cost of that building. It's something that we think about; the impact on the environment … (AD2)*

The lack of connection between those stakeholders investing in building and those who will operate and/or maintain the dwellings over their life span was seen as a barrier to innovation, "… a bit of a barrier, yeah, because our clients [developers] are usually looking at maximising their profit, and getting in and getting out" (AD2). Developers discussed the increasing tendency to specify double glazing in apartments and install solar panels for common lighting services, however, they raised these in relation to increasing affordability of such products and market differentiation, as opposed to a concern for future risks related to resource use or environmental impact.

Emphasising the necessity to unlock the black-box of housing provision, PP1 identified the long-term risk of the planning profession failing to achieve the aims of its strategic urban plans due to poor implementation and insufficient consumer/community engagement in the consolidation conversation.

5.2.3 Design Decision-Making and Risk

In seeking to understand the existing multi-unit structure of provision (SoP), it is necessary to identify who/what currently decides the type of housing provided. Early project decisions such as dwelling function and price point can pre-determine demographic, tenure, and socio-cultural characteristics of a future community. Interviewees were asked whom they perceived as influencing and/or making decisions on dwelling type, particularly in relation to dwelling function and accommodation (number of bedrooms, bathrooms, and parking spaces), dwelling size, intended market, price point, and mix of dwellings in a building or site, rather than building aesthetics or style.

Given the identified mismatch between the strategic intent of urban plans and existing multi-unit housing provision, this summary of interview outcomes commences with state planners, the authors of strategic urban plans, and progresses to the building occupants they intend to house. State government planners were identified by other strategic-level actants as influencing the type of housing being built, suggesting they and the State Government Planning Agency determine housing outcomes via the planning system; through the establishment of development plans and their subsequent interpretation and implementation. In contrast, no project-level actants identified the State Government Planning Agency or its planners as having an influence on the types of infill dwellings delivered. One project-level actant did suggest the state strategic plan set a general agenda within which to act; that it allows for higher dwelling densities in some locations but does not inform project-level actants in relation to type or mix of dwellings. Local planning documents (development plans) and urban design guidelines were described as setting minimum standards and informing design options but not as directly informing dwelling type.

The State Government Architect (SGA) was the only stakeholder interviewed who identified the SGA as influencing housing type. In fact, one architect, with experience on

an atypical site requiring design review by the SGA, asserted that the SGA and the design review process enhanced design outcomes but even when directly engaged in a project did not influence the type or mix of dwellings provided. Similarly, only local planners identified themselves as decision-makers in relation to dwelling type, despite all actants identifying them as having a directive or authoritative role in the SoP. The ego-diagram approach to data collection employed here has revealed, at the strategic-level, a strong belief by individual actants in the positive impact of their own role in the provision of an alternative housing future. However, these individual views do not correlate with those of others within the SoP.

Without exception, interviewees agreed that the developer ultimately determines the design brief, the type and mix of dwellings and the price point. Many observed that developers may choose to exceed the minimum standards set in planning documents to deliver products which will provide the highest profit with minimum risk, directly influencing housing affordability and household mix. The developer makes such decisions based on market research and hence the marketing consultant (or selling agent) has a significant influence on the design brief, dwelling type and price point. Where design and pricing decided by the developer appeal to private investment owners rather than owner-occupiers, this influences tenure, mobility, and community cohesion.

Only stakeholders without direct connections to financial institutions suggested they influence dwelling type. Property developers, having the most direct relationship to financial institutions, did identify cases in which financiers were not satisfied with the risk profile of a proposal and declined to provide funding, but indicated this occurs only where a proposed project deviates significantly from previous market experiences.

> *As long as you bring in the pre-sales, I've never seen a bank try and analyse the product unless it's massively outside the norm … (PD2)*

One deviation from the norm was a project comprised entirely of single bedroom apartments without car parking (PD1). The bank viewed this as high-risk in the local market and the developer chose to proceed with alternative funding. The project sold, demonstrating demand exists for a housing type that the funder viewed as high risk. However, the profit margin achieved on this project was less than that of more common unit configurations; pre-sales had been slow, and all units sold to investment purchasers (PD1).

All architects indicated that they are not involved in decisions regarding dwelling type or price point, describing their role as realising the best possible outcome for the design brief and budget set by the developer. In relation to building design, architects described themselves as "nutting out the best solution" (AD3) between themselves and the developer, not engaging in the broader strategic context.

Another division between the strategic-level and project-level actants emerged regarding the decision-making influences which future occupiers and the community have on

dwelling type. Project-level actants acknowledge future occupants, as individual households, do not have direct engagement in decision-making. They are aware the preferences of 'the market' are determined from analysis of previous sales. In contrast, strategic-level actants suggested future occupants play a critical role in determining what is built, particularly in relation to internal arrangements and function.

> *[planning documents don't] so much go into whether it's two bedroom apartments or one bedroom or a family. I think that's where you get back to communities and have them — potential homeowners determining some of the layouts and some of those things… I think from a design perspective, the internal configuration is very much — the end-user has a big impact. 'Cause again, the people determine what they want. (PD1)*

The community was described by strategic actors as able to "drive innovation by demanding certain things" (AD1), and it was suggested that past dwelling sales represent an active decision by a community to embrace greater housing choice (SD1, PD1). This engagement of future residents and community in the multi-unit SoP presumed by distant, strategic actants is at odds with the experiences offered by project-level actants. This mismatch between the theoretical ideal viewed from above and the reality presented from those on the ground probably adds to the mismatch between the agendas of strategic plans and infill housing being delivered.

Having located both risk and decision-making within the SoP, the correlations between the two provide insights into determinants of current multi-unit housing. The key decision-makers in relation to specific projects are those willing to take on the short-term financial, business and reputational risks of implementation. Strategic actants take reputational and political risk in relation to proposing infill strategies and advocating urban change but were not seen to have input into the housing type produced. Owners, occupants, and community bear the greatest long-term risks in relation to liveability, community, environment, and resource costs, but do not have the decision-making influence on dwelling type suggested by strategic actants. As a result, multi-unit dwellings are designed to meet property developers' objective of timely, risk-free, predictable outcomes, rather than the long-term outcomes which are of greater interest to occupants, communities and strategic actants.

This co-location of financial risk and design decision-making within the actor-network contributes to the increasing perception of housing as an investment commodity rather than as home. An integrated developer interviewed asserted traditional developers are not "in-touch with use value [and] not really interested in it. It's a commercial, financial business for them…" (PD1). Similarly, AD1 suggested developers make decisions "from a point of view of the way the system values valuing, the quantitative, more than it does the qualitative. The system almost completely ignores the qualitative" (AD1).

In conclusion, one strategic-level interviewee articulated an alternative perception of decision-making, risk and multi-unit outcomes. This view suggests decisions are made indirectly and, possibly unknowingly, by a large number of disconnected people in a manner which seeks to spread both responsibility and risk; questioning if anyone in the complex multi-unit SoP has the capacity to influence change.

> *I don't think any of them, or any of us, are really influencing what's happening. As a big picture idea, I don't think anyone is directing some vision that's being achieved. To put it another way, what we see come out of the ground is just a combination of lots of little decisions that just create something that nobody had in mind exactly. The council planners and the state government officers may have a high-level strategic plan and have a vision for a certain type of development, certain types of buildings, certain types of land uses, certain types of designs. Developers get a hold of it and the feasibility guys decide that doesn't work, so they change it to something else that maybe is more feasible. The councillors get involved and they change bits of it with planner and neighbour input as well. The new residents might have some preferences that they didn't know of, which results in it changing so that what actually gets built is not all that similar to what the original intention or vision was. Do any of them have any more influence than anyone else? I'm not sure if they do. What gets built is a sort of trend that just sort of emerges out of that kind of chaotic system. (PP2)*

This view reinforces the complexity of the SoP and the multiple interests it seeks to address. It also highlights the multiple barriers to reconfiguring the actor-network.

5.2.4 Limits to Innovation

The complexity of the SoP, the mismatch between the locations of risk and decision-making, and the disconnect between strategic actants and project-level actants' perspectives each contributes to the stabilisation of the actor-network. Innovation within the context of a stabilised network becomes increasingly difficult over time as the network develops greater resilience (Warzynski & Krupenikava 2010).

As central decision-makers, developers suggested any innovation in multi-unit provision carries corresponding commercial risk (PD1, PD2). Architects expressed frustration in response, describing developers' reluctance to "be the first to do something" (AD1) as limiting innovation (AD1, AD3). Architects described their profession as having the skills to promote design and construction innovation, but saw change as limited by the low fees and short time frames set by their developer clients.

> *The design teams are limited by a tough environment and small fees, so that [they] don't have the time that it takes to innovate in that sort of context. (AD1)*

The multi-unit SoP eternally shifts in small steps, with each project "a cautious evolution of what happened before" (PP2). Larger steps are taken occasionally: AD3 described past projects that have challenged both existing planning guidelines and building regulations. Instigated by a progressive developer, they experienced significant delays in obtaining

approvals, with associated financial implications. The developer perceived these innovation costs as an investment; creating new knowledge, experience, and supply chains for future projects, and distinguishing themselves within the industry. One project incurred delays by challenging local planning guidelines regarding construction on land boundaries and another prototyped an alternative construction method with significant cost savings potential. Like many innovations in multi-unit provision, these cases focused on construction, costs, efficiency and market value. No interviewees cited cases of innovation in relation to use value, dwelling type, or occupant engagement.

Resistance to innovation beyond cautious evolution is not limited to developers. One architect discussed a specific case that experienced resistance from a local council Development Assessment Panel (DAP); the local approval body consisting of local council staff, elected local councillors and appointed community members. He concluded

> *…that for too many years developers had been regurgitating what had been done before and getting approval to do that. Essentially I felt that the DAP was being extremely conservative and wanting to see more of the same, and when we put something that was different in front of them they had difficulty understanding it. (AD3)*

Similar comments were made about community values and expectations, suggesting the public are "…for the most part, wanting to see what they've already seen" (AD1). However, it is questionable if these views come from potential multi-unit residents given previous studies which, as discussed in Chapter 1, indicated households interested in living in multi-unit developments did not see the products available as meeting their needs.

To increase innovation, some strategic-level actants emphasise the role of demonstration projects in showing people what multi-unit living is like. In contrast, project-level actants indicated a need to discover more about what people want. However, all indicate there are challenges to the effectiveness of market studies, with one developer describing them as having "…some value, but what people tell you and what they will do are two different things. What they value in design and what they will ultimately pay for are two different things" (PD2). The pervasive concept of 'the market' was identified as contributing to resistance to innovation; not what the market actually is, but "…what people *think* the market is" (AD1).

The multiple disconnects between actants demonstrated by the interview data limit network-wide innovation as problematisation becomes restricted to stakeholders' network horizons. With contradictory views on network properties, design decision-making, and risk between strategic and project-level actants, innovation becomes limited to subsystems or to the ego-network of an influential actant, such as the developer above. Strategic stakeholder PP2 observed that

> *In our work we are envisaging a future that doesn't exist, and people that don't exist, and behaviour that doesn't exist. We might be completely wrong, and we can certainly learn from the past … So there's a real kind of reluctance to change methods and products and techniques…partly that's the marketing focus and its need to focus on the past … (PP2)*

Interviewees suggested that to implement the future envisaged by strategic-level actants, it needs to become a shared vision supported by central project-level actants, which is not occurring in the currently disconnected actor-network. From an ANT perspective, the strategic advocates of alternative housing are not currently able to achieve their ideal outcomes as they have not enrolled the project-level actants in their vision to enable mobilisation.

5.3 Conclusion

The ego-diagrams and transcripts from Part One of the stakeholder interviews have provided important insights into key stakeholders' understandings and experiences of the actor-network and associated design decision-making. The identification of divisions between network actants highlights the ego-centric focus of actants and emphasises the absence of a cohesive view of the overall actor-network. The allocation of decision-making capacity to those actants with short-term financial interests rather than those with long-term risk exposure exacerbates the influence of risk aversion on design outcomes; limiting innovation and directly influencing the capacity to realise the infill communities visualised by urban consolidation agendas.

Chapter 6 redeploys the ego-diagrams together with data from Part Two of the interviews to validate of the initial actor-network mapping.

Chapter 6. The Key Case: Actor-Network Mapping.

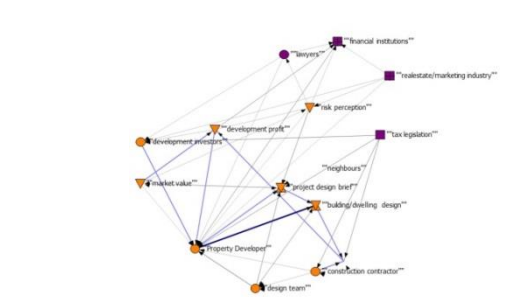
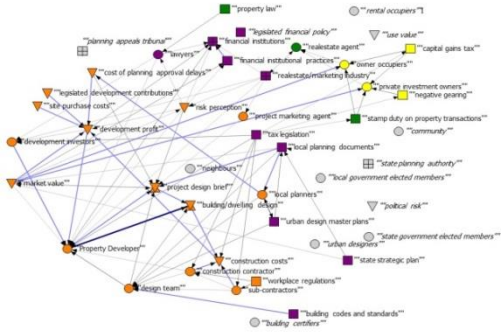
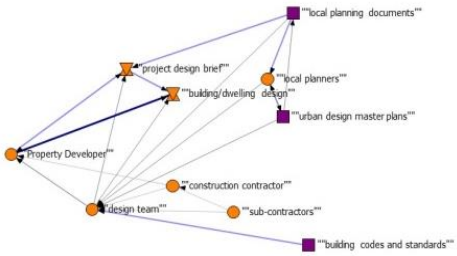
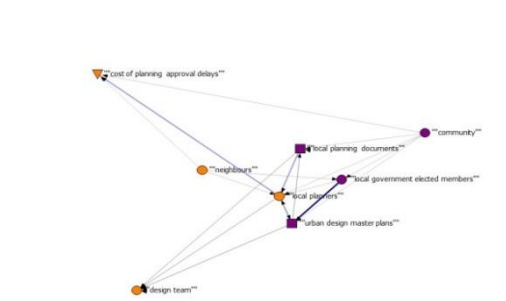
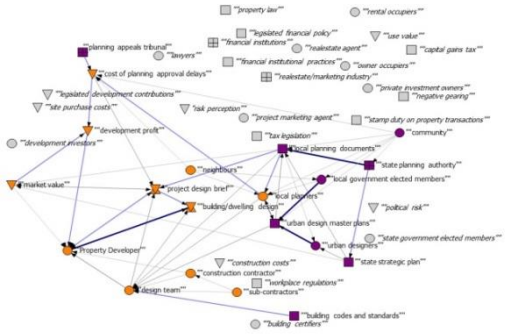
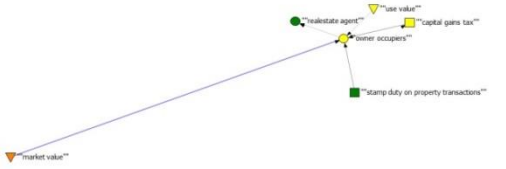
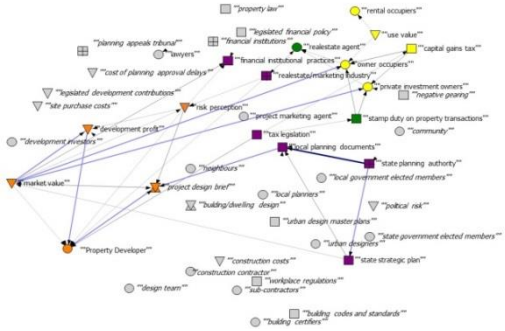
Part Two of the key case stakeholder interviews reflected on the initial actor-network mapping. This chapter is concerned with establishing whether the interviewees corroborate the findings of the initial mapping and refining the actor-network mapping. It details the methods used in Part Two of the interviews and, after summarising interviewees' observations of the initial network mapping, presents the revised mapping (6.3 and 6.4) before testing it through comparison (6.5). Section 6.6 summarises impediments to network change identified in the key case.

6.1 Method

Part Two of the interview presented interviewees with the initial mapping of the multi-unit actor-network introduced in Chapter 4. This included those showing in-degree, out-degree and betweenness (Table 4.2). These diagrams triggered discussion of dominances within the network as well as apparent absences, with the primary ambition of determining whether the interviewee concurred with the actor-network representation. Each interviewee was shown an ego-network extracted from the initial mapping that represented their role in the Structure of Provision (SoP), with one-step and two-step diagrams used depending on the usefulness of the information each presented (see Table 6.1). Comparing the ego-diagrams generated in Part One of the interviews with the ego-networks from the initial mapping identified differences for discussion. All interviewees were shown the ego-nets of owner-occupiers, providing opportunity to discuss perceived barriers to owner-occupier engagement in the existing multi-unit SoP.

This data collection technique reflects that of Cambrosio et al. (2004) and Bourret et al. (2006) who similarly used visual mappings to gather additional, iterative information when interviewing members of a network under analysis. They attributed the technique with providing prompts to interviewees not enabled by other ethnographic methods and confirming the initial mapping "displayed meaningful patterns and that our tentative interpretation was basically sound" (Bourret et al. 2006, p. 442). Here, this interview process provides data triangulation, validates the interpretation of data gathered from secondary text sources, and tests the unique combination of Actor-Network Theory (ANT) and Social Network Analysis (SNA) tools.

Table 6.1. One-step and Two-step Ego-network Diagrams used in Interviews. ^

	One-Step ego-network	Two-Step ego-network
Property Developer		
Design Team		
Local Planner		
Owner Occupier		

6.2 Summary of Stakeholder Observations

Interviewees provided both network-wide and ego-centric observations of the initial actor-network mapping. The network-wide view provided by the mapping extended beyond the individual respondent's usual network horizon, providing an unfamiliar view of the SoP.

Interviewees generally agreed that the actor-network mapping using SNA software correctly identified the key actants in the network. Some differences in observations were evident between the strategic-level stakeholders and the project-level stakeholders, with the former initially finding the prominent role of taxation policy surprising and the latter questioning the prominence of the design team. Project-level stakeholders observed, and concurred with, the disconnection of owners from the production subsystem as evidenced by the mappings. Strategic-level actants did not.

Split opinions emerged on the role of financial institutions and planners in design decision-making. Those not directly engaged with financial institutions assumed their role in the network would be more prominent, but those engaged with financial institutions concurred with the mapping. Views on the role of local planners vary with the type of relationship the respondent has with them, be it advisory, visionary, or authoritative.

The ego-centric diagrams generated by interviewees generally correlated with the ego-networks of the initial actor-network mapping. The types of connections with alters described by interviewees in their individual ego-diagrams confirm the descriptions/strengths allocated to ties in the initial network mapping.

The interviewees' responses to the network-wide and ego-centric mappings provided data for revision of the initial actor-network, with respondents proposing modifications including the addition or removal of actants, change of actant subsystem, removal or addition of flows, and changes to flow strength. Support for proposed changes is sought both in the responses from other interviewees and the previously reviewed literature. Appendix D: Network Revision contains a detailed discussion of interview data and explanation of individual changes made to the network mapping in response.

6.3 Revised Actor-Network Mapping

Figure 6.1 shows the revised actor-network. The SNA measures of in-degree, out-degree, and betweenness are represented using Kumu software (J.C.Mohr & R.Mohr 2011) and provide an initial reading of the mapping (Figure 6.2 to Figure 6.4).

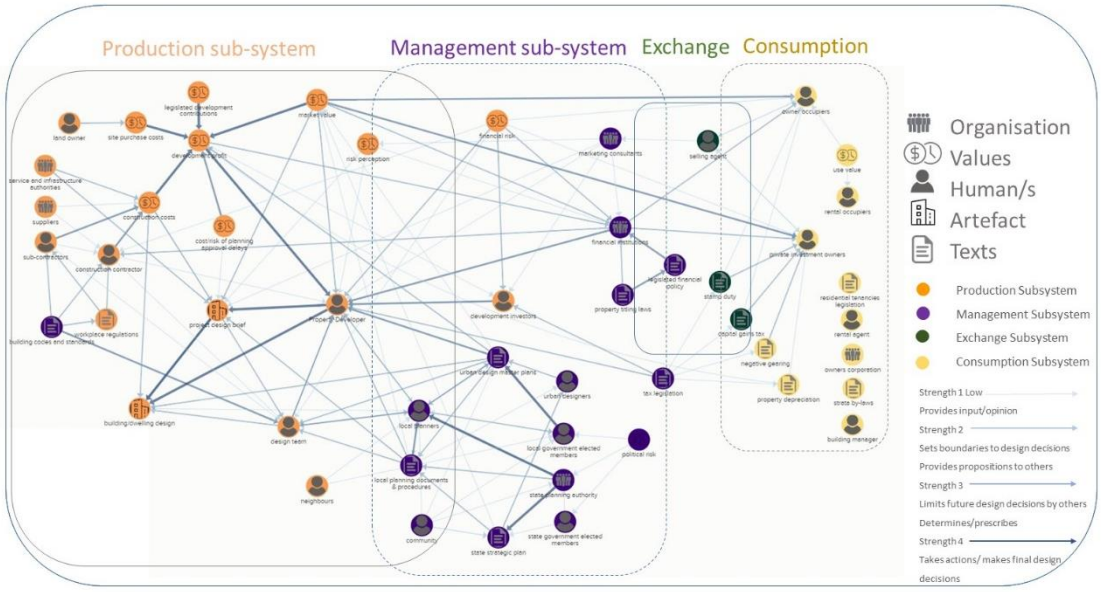


Figure 6.1. Existing Multi-Unit SoP: Traditional Developer. ^

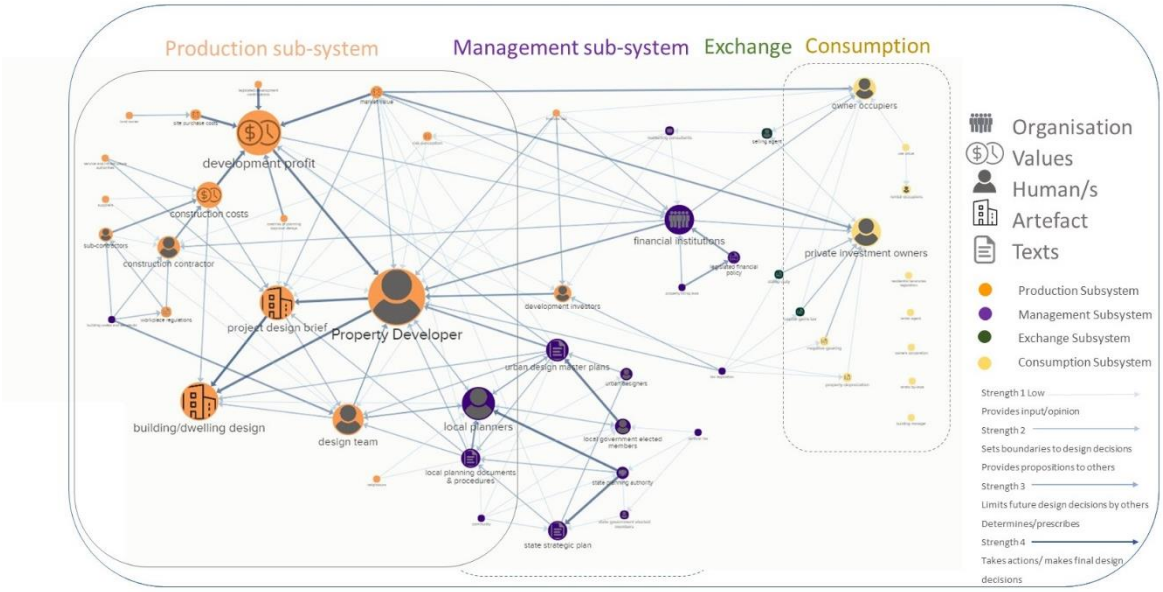


Figure 6.2. Existing Multi-Unit SoP: Icons sized by in-degree. ^

The property developer has the highest in-degree in the SoP, far exceeding other actants. The majority of high in-degree actants are located in the production subsystem. As a measure, in-degree alone does not demonstrate how the received information is subsequently mobilised. For example, in Figure 6.2, dwelling owners (both owner-occupiers and private investors) are shown as having medium in-degree, however as later out-degree measures show in

Figure 6.3, they have little opportunity to influence design outcomes based on that information.

Out-degree provides guidance to understand the flow of information in the network in a number of ways. Firstly, out-degree shows non-human actants such as market value and urban design master plans have a high impact on the decision-making of others. Secondly, it compares the potential influences of different actants, such as between market value, which has a high out-degree, and use value, which does not. The highest congregation of medium and high out-degree actants is in the management subsystem. Out-degree does not, however, provide an understanding of which actants in the network make final design decisions.

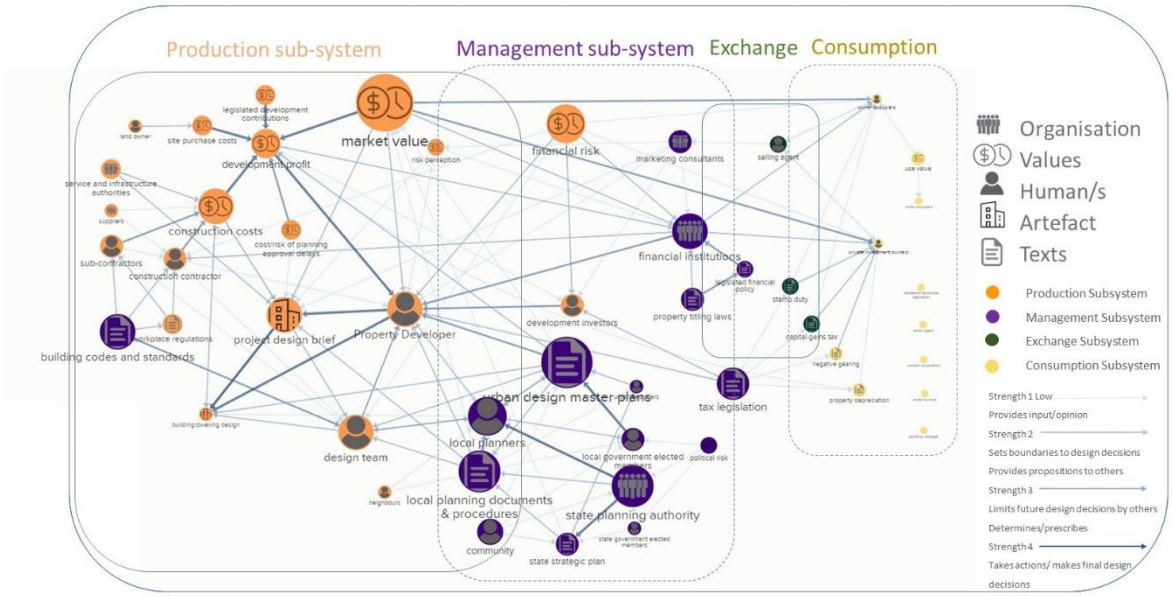


Figure 6.3. Existing Multi-Unit SoP. Icons sized by out-degree. ^

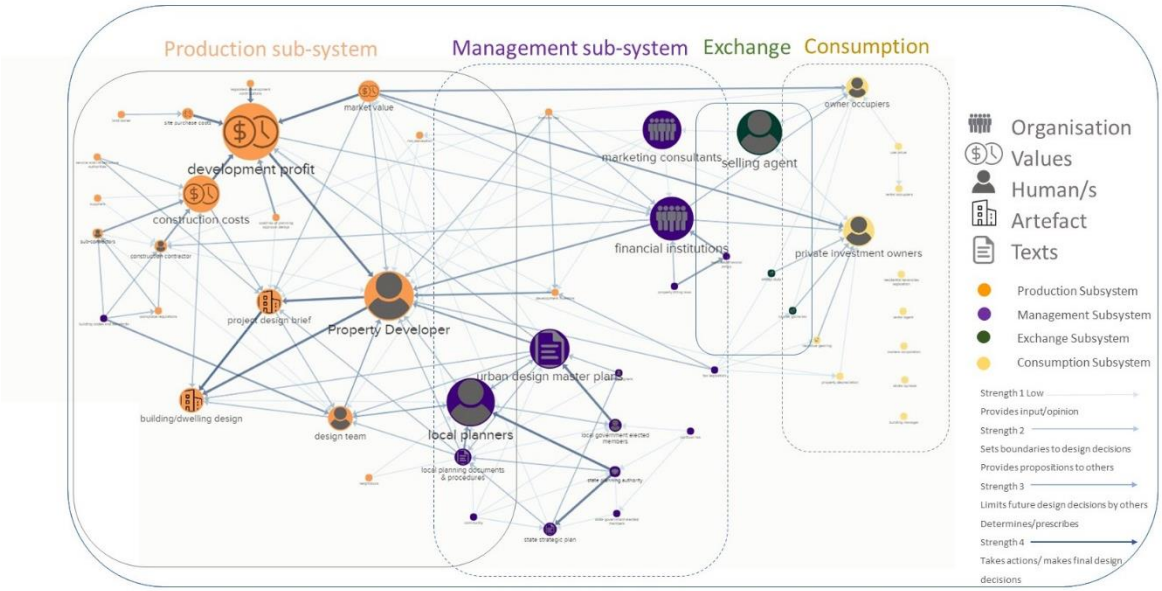


Figure 6.4. Existing Multi-Unit SoP: Icons sized by betweenness centrality. ^

Betweenness centrality highlights the importance of non-human actants in the network, including development profit and financial institutions.

> *In a sense, nodes with high betweenness are in a position to threaten the network with disruption of operations. More generally, high betweenness nodes are in a position to filter information and to colour or distort it as they pass it along. (Borgatti et al. 2013, p. 175)*

A node's (actant's) ability to exploit a high betweenness depends also on other network properties. In this case, the moderate betweenness measure calculated for dwelling owners does not directly translate to capacity for influence. This is because their outflow of information is to a single actor who is able to maintain ties to other actants with or without the information provided by future dwelling owners. The dwelling owners are not in a position to stop transmission of information to those who need it or to influence the efficiency of the network.

The use of SNA measures to observe the flow of information in the SoP network is effective in providing an insight into the network structure, the roles of both human and non-human actants, and the connections between them. However, single SNA measures do not provide the network observer with a definitive description as to who are the key players in the network and what influences design outcomes. To relate the SNA metrics to an ANT reading of the socio-technical network, multiple metrics are combined with knowledge of the SoP to identify key actants.

6.4 Identifying Key ANT Actants

The multi-unit SoP mapping developed in this case study to date represents the actor-network of housing provision as a socio-technical network of actants and the flow of design information which occurs between them. The aim of this section is to identify actants within the network who are more prominent, influential, or important than others through an ANT lens. Using the ANT vocabulary defined earlier in Table 2.2, focal actors, mediators, obligatory passage points, and immutable mobiles in the SoP are identified as summarised in Table 6.2.

Table 6.2. Defining Key ANT Actants.

FOCAL ACTOR: one who acts to align the interests of a diverse set of actors with their own (enacts translation).	
SNA Metric/s	High in-degree and/or out-degree in network and/or high centrality and/or high two-step reach.
Network Knowledge	The researcher employing network knowledge can discount an actor from being a focal actor regardless of the SNA metrics, provided the reason for the high metric value is considered.
MEDIATOR: actors who transform, translate, distort, and modify.	
SNA Metric/s	Actor with high in-degree and significantly lower out-degree, together with capacity for translation, and/or high authoritative sources measure (Kleinberg 1999).
Visual Observation	The researcher can be informed by the actor's location in the network.
Network Knowledge	Some actors do not hold the capacity to mediate and are excluded.
OBLIGATORY PASSAGE POINT (OPP): a situation that has to occur for all of the actors to be able to achieve their interests, as defined by the focal actor (Callon 1986).	
SNA Metric/s	Here the aim is to determine which actors hold power in relation to obligatory passage points. No specific SNA metrics are employed here, however it is highly likely in most networks that OPPs are associated with focal actors which have been previously determined.
Visual Observation and Network Knowledge	Having previously established focal actors, the mapping provides the opportunity to view them in relation to their alters and, in combination with network knowledge, observe points in the network where multi-unit projects may become unfeasible or are unlikely to proceed.
IMMUTABLE MOBILES: Relatively fixed elements within a network which contribute to its irreversibility (Latour 1993).	
SNA Metric/s	Immutable mobiles are typically documents or artefacts which are relatively stable. They may also be enrolled black-box actants and can be associated with other networks. All actants with a 0 or low in-degree are potential immutable mobiles.
Visual Observation	Low in-degree can be observed either through the SNA metrics or visual examination. The type of actor is also evident visually.

An expanded version of this table is included in Appendix E, detailing also the SNA software used, specific SNA measures employed, and discussion of its execution in this particular case. The Key ANT actants identified using this process are summarised in Table 6.3 and visualised in Figure 6.5.

Table 6.3. Existing Multi-Unit SoP Key ANT Actants.

Focal Actors	property developer, development profit, market value, urban design master plan, local planner, selling agent, marketing consultant, financial institutions, risk perception, local planning documents, tax legislation.
Mediators	urban design master plan, construction costs, property developer, design team, financial institution, marketing consultant, local planning documents.
OPPs	market value, development profit, financial institution, development investors, urban design master plan, local planning documents, property developer.

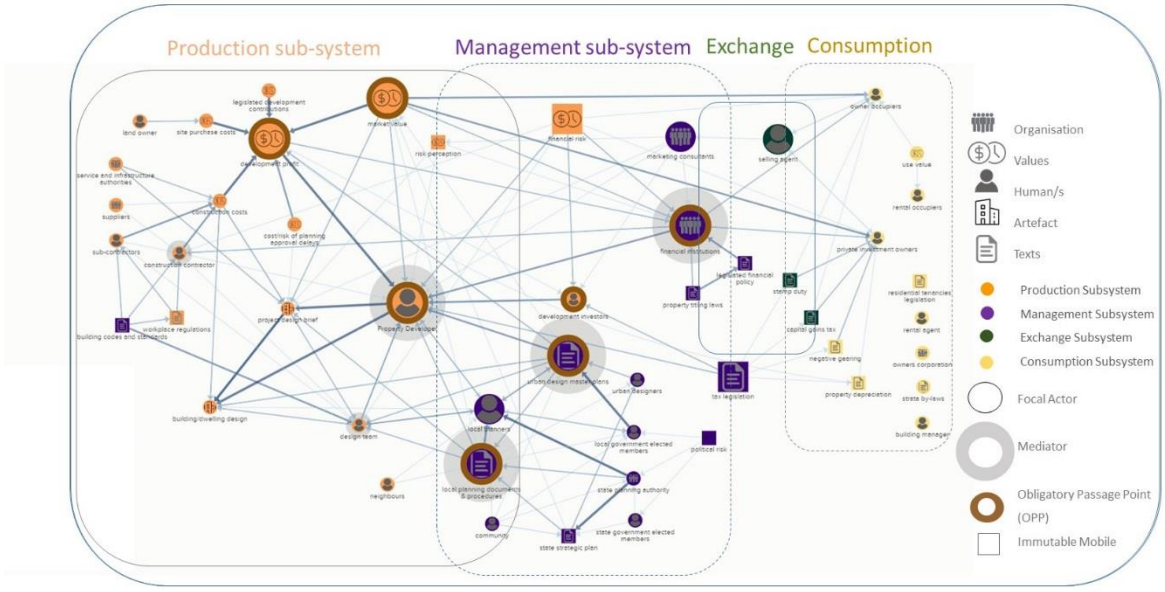


Figure 6.5. Existing Multi-Unit SoP. ANT Mapping. ^

The ANT mapping identified a total of 14 key actors in the network (Figure 6.6). Residents of the housing, be they owner-occupiers or rental occupiers, are not determined to have a key role in the design process, which is shown to be dominated by the management subsystem, the property developer, market value, development profit and risk

perception. Occupants and use value are identified as amongst the least influential and least connected actants in the network and no key actants are located primarily in the consumption subsystem. Amongst the focal actors, there is a notable absence of humans who might be seen as advocates for good design or innovation.

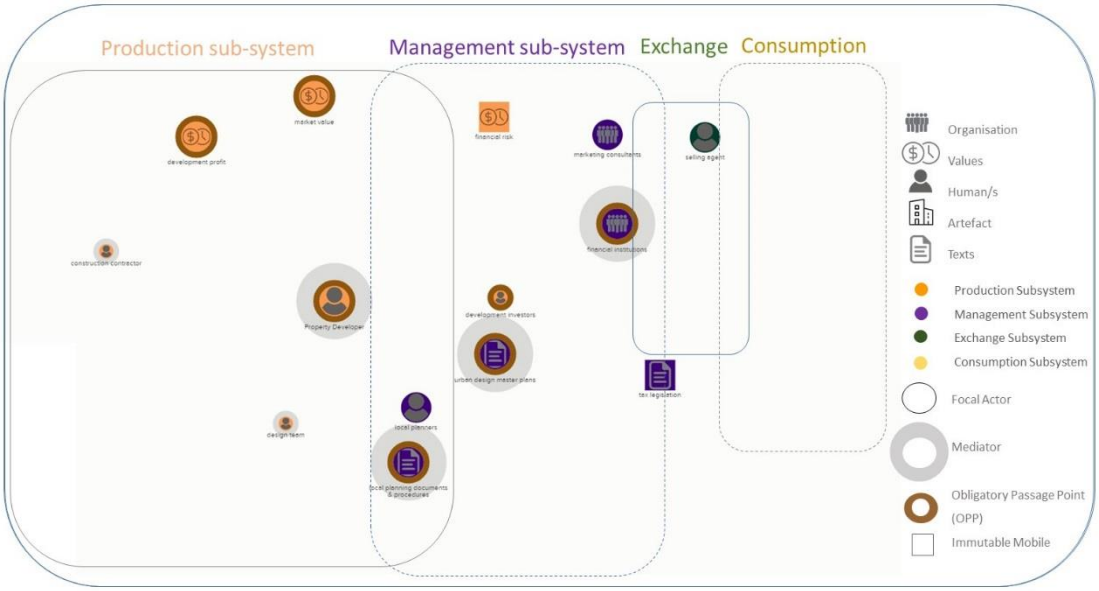


Figure 6.6. Existing Multi-Unit SoP: Key ANT Actants. ^

The simplified view of the actor-network in Figure 6.6 enables superimposition of ego-networks or path flows between actants for examination. Figure 6.7 for example, shows the ego-network of both owner-occupiers and the project design brief. It visualises the disconnection between production and consumption subsystems in relation to design information and shows owner-occupiers can only pass design information to selling agents or marketing consultants. In cases where the selling agent and the marketing consultants are a single entity a two-step alter connection from owner-occupiers to the project design brief may be possible, but as indicated by interviewees, this does not involve individual households providing direct design briefing, rather it is a reflection of the broader market.

> *…not directly, it's come indirectly. And that's where the marketing people or whoever is on the team, they'll say 'our buyers now want this, they don't want that anymore'. But we've never had the direct link with an end user saying 'I want this' and we design for them, that's never happened. (AD2)*

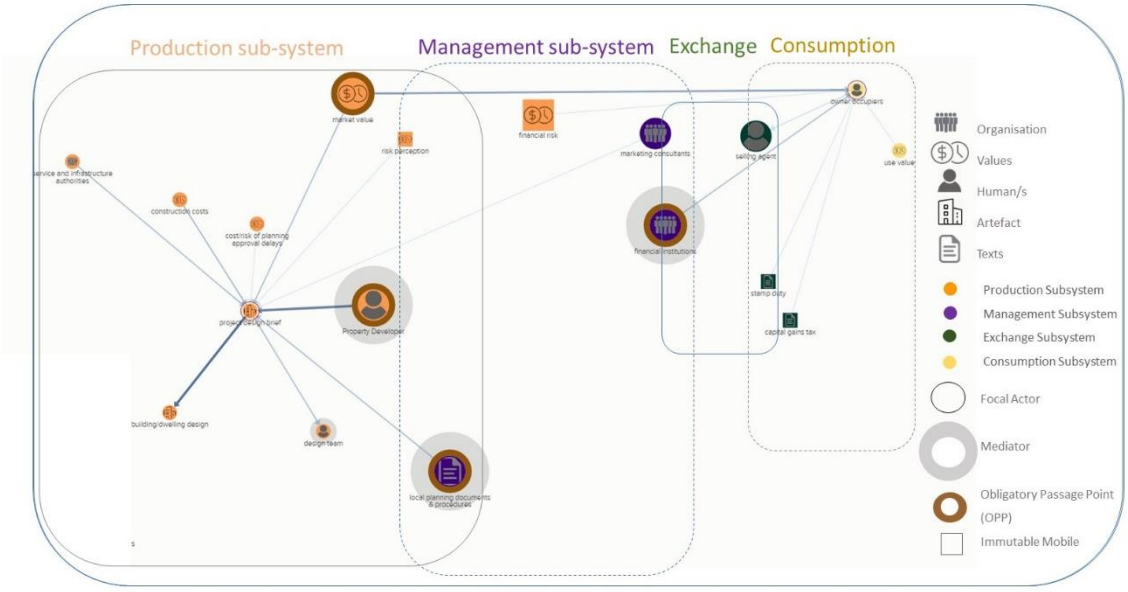


Figure 6.7. Existing Multi-Unit SoP. Path Diagram from owner-occupier to project design brief. ^

Based on the literature review and refined via stakeholder interviews, the actor-network mapping of the existing multi-unit SoP provides a network-wide visualisation of the complex system of housing provision, extending beyond the individual interests and network horizons of individual actants. Employing ANT definitions of key actants, the mapping enables visual identification of focal actors, mediators and obligatory passage points, giving comprehension as to which humans and non-humans in the network make important decisions regarding multi-unit housing design; decisions which directly influence the ability of such housing to achieve the more sustainable urban futures envisaged by contemporary urban strategic plans.

To further test the validity of the mapping technique proposed here the following section compares the traditional developer model of multi-unit production with the alternative integrated developer model.

6.5 Comparing Traditional and Integrated Development

The existing multi-unit SoP discussed to date reflects the traditional development model. As described in 4.2, a variation within the existing SoP is integrated development. Both private developers interviewed (PD1, PD2) employ an integrated business model. Their organisations include town planners, building designers, drafters, project managers, construction managers, sales agents, rental agents, and strata managers. One developer also integrates subcontractors. This section compares the actor-network maps of

traditional and integrated development to test the effectiveness of the network mapping as a tool for SoP comparison.

The motivations to implement an integrated development model are threefold and relate to time efficiency and costs, control of risk, and business reputation. Interviewees stressed integrated development's ability to reduce development time frames and costs by co-locating the diverse skill sets required to deliver a successful project.

> *… if you look at the most successful players, Jennings, Mirvac,… they do it all in-house. Their marketing teams, their constructability. They build themselves. Not because they want to, but unless you can control the delivery – you need to be able to control it all, so you can actually deliver to these people at that price, when you say you will. (PD1)*

Directly employing professionals one would otherwise access via hourly consultancy fees improves efficiency and reduces costs only where the development scale and rhythm ensure all professionals are continually utilised (PD2).

As shown previously, financial risk in the SoP primarily rests with the traditional developer. Integrated developers interviewed indicated they sought to reduce risk by centralising control, ensuring a central position in the SoP and minimising distances between their development business and other key actants.

> *I don't wanna get things second, third, […] I wanna go connect directly to every dot that matters. Yup. Every influencing dot. [That is,] the policy makers and the end consumers for us. (PD2)*

Integrated developers described the practices of traditional developers as tarnishing the multi-unit market by delivering poor quality product while remaining distanced from the local community. Unlike traditional developers who regularly shift between different opportunities and locations, the integrated developers interviewed establish permanent roots and work within local communities. Having described his business as a bridge between policy makers and consumers, PD2 emphasised the need for location-based developers to engage directly with both the management and consumption subsystems of the SoP over time to ensure business viability.

> *Your brand is everything and your reputation is everything. (PD1)*

Integrated developers emphasised the importance of delivering the highest quality housing products possible at the locally appropriate price point, developing an ongoing relationship with purchasers, and taking the time to invest in understanding the preferences of the local context.

> *Us bringing the real estate agency function into the building was probably number one step in getting a clearer, more accurate connection with the end consumer in terms of getting feedback about design and liveability, etcetera 'cause when you're using third party agents, they're not gonna take the time to feedback. They chase the next commission. (PD2)*

Given the known difference between traditional and integrated development models, comparison of their actor-network maps is expected to reveal differences in the centrality of the overall network structure, the centrality of the developer, and the flow of design information from occupants to the project design brief and developer. The ANT mapping process established previously is repeated for the Integrated Property Developer (IPD) model, with the Key Actants listed in Table 6.4 and mapped in Figure 6.8.

Table 6.4. Key Actants identified in IPD Actor-Network.

Focal Actors Identified	integrated property developer, development profit, market value, urban design master plan, local planner, local planning documents, financial institution, tax legislation.
Mediators Identified	urban design master plan, construction costs, integrated property developer, local planning documents.
Obligatory Passage Points	urban design master plan and local planning documents, integrated property developer, market value, development profit, financial institution.

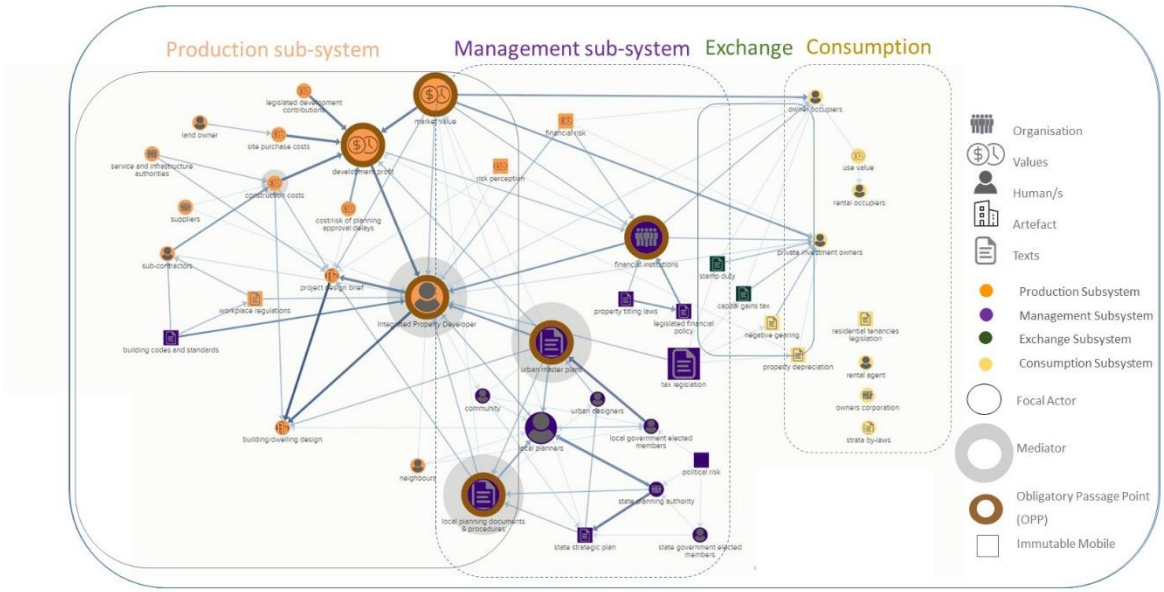


Figure 6.8. Actor-Network of Integrated Property Developer (IPD). ^

The traditional property developer SoP included 46 actants with 131 information flows. In the integrated property developer SoP this is reduced to 40 actants with 113 information flows. The number of ANT key actants is reduced from 14 to 9. Comparing Figure 6.8 with the equivalent for traditional property developers (Figure 6.5 page 118), it is visually evident that these changes occur primarily in the production subsystem, with the management subsystem remaining relatively fixed. The immutable mobiles, linked primarily to the management subsystem, are unaltered.

Visual comparison of the maps (e.g. Figure 6.9) shows the Integrated Property Developer (IPD) receives additional design information flows, and a direct connection is present between the occupation and production subsystems. The influence of financial institutions reduces, and the community becomes more central to the network. Each of these observations is expanded below with reference to network metrics.

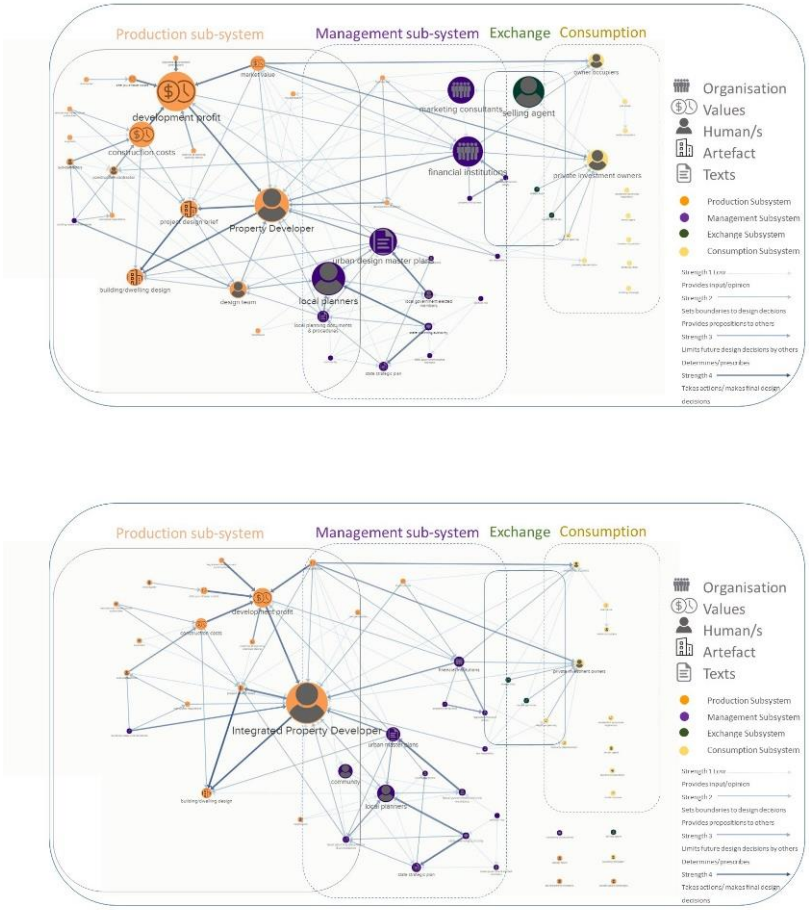


Figure 6.9. Traditional Property Developer SoP (top) and Integrated Property Developer SoP (bottom): Actant icons sized by betweenness centrality. ^

The design information flowing from immutable mobiles and through the management subsystem is not significantly altered, but how this information is employed in the production subsystem is. Observing the network metrics of the IPD compared with the Traditional Property Developer (TPD), substantial increases in the measures of in-degree, out-degree, and flow betweenness centrality are evident. The IPD centrality measure far exceeds any other actant in the network whereas the TPD is 12th highest. This is expected as the IPD combines a number of actants and continues to receive the design information each previously received independently. The difference between in-degree and out-degree continues to indicate that the developer plays the most influential mediation role in the network, but there is no significant change in the authority measure of the IPD in comparison with the TPD.

Integrated Property Development reconfigures network relationships between stakeholders in the SoP, altering the owner-occupiers connections within the network and providing a link between production and occupation. While there is no change in the design information that owner-occupiers receive and pass on (in-degree and out-degree), their hub measure increases as they are connected to an actant with authority (Kleinberg 1999). It is this direct connection to the IPD which represents the greatest change in the network from the owner-occupiers perspective, placing them within two-step reach of the design project brief and a higher proportion of key actants in the network (Figure 6.10). Previously the owner-occupier was four-steps distant from the property developer and project design brief.

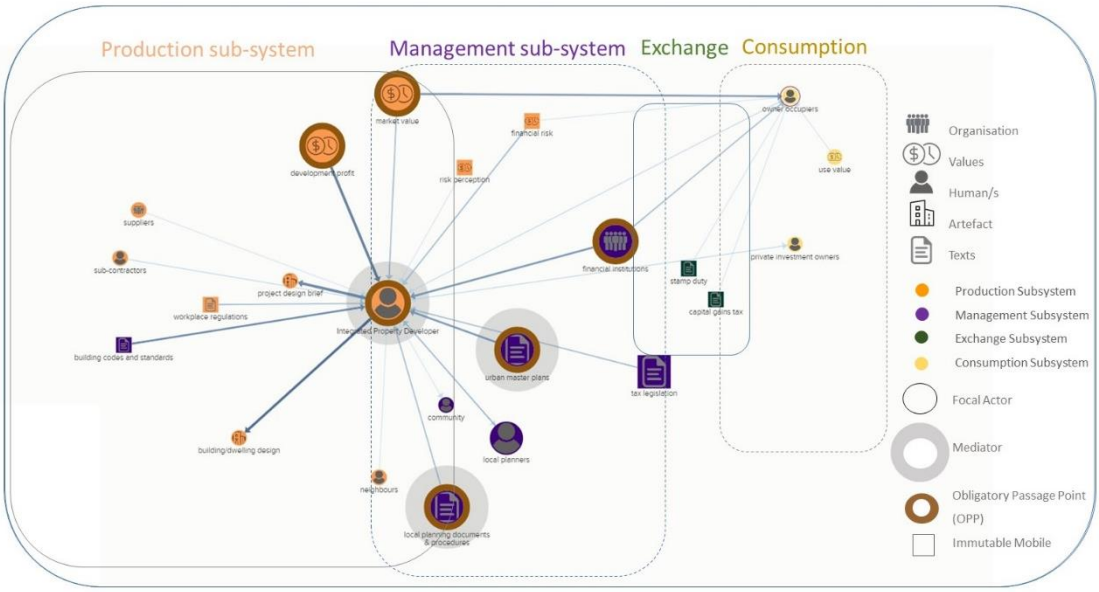


Figure 6.10. Integrated Developer. Flow path owner-occupier to developer. ^

Use value and market value do not experience changes in design information flows, but the path distance between use value and the IPD reduces from four-steps to two. Nonetheless, market value continues to have a far greater impact on design information than use value, with the ability to reach almost four times as many actants within two-steps (31 compared with 8). The community experiences relatively few changes, but now reaches a greater number of focal actors, including a direct connection with the production subsystem.

Observing the whole network, the normalised flow betweenness centrality index of the network increases from 9.7% to 13.6%. This index measures the percentage of the total possible number of connections between actants that are in place, providing an indication that the cohesiveness of the network is increased (Freeman et al. 1991).

The network changes of increased centrality and additional bridges between subsystems were anticipated based on information provided by interviewees, the literature review and industry knowledge. The actor-network mapping has provided confirmation of these changes and enabled comparison of the two networks. In addition to these anticipated outcomes, the mapping reveals other changes. For example, network metrics calculated show changes in the influence exerted by financial institutions. Financial institutions maintain the same in-degree measure but in the integrated developer SoP, they have a lower out-degree as they engage with fewer stakeholders, giving them a lower two-step reach, and lower flow betweenness centrality in the network. No longer does the property developer source money from one financial institution to make payment to construction contractors who repay funds drawn from another financial institution. With the merging of these actants into a single integrated developer, complexity, risk and costs of financing are reduced; reducing influence imposed by the financial institutions and costs to the developer. These savings may be passed on to the end purchaser or, more likely, realised as additional profit by the developer. In this new position, financial institutions are no longer mediators of design using the ANT/SNA correlations described in Table 6.2.

Integrated developers interviewed expressed a willingness to experiment with a degree of innovation in their projects, pushing a small portion of their projects outside the typical boundaries of production to “test the market” (PD2). They suggest the freedom to undertake such incremental testing results from fewer actants carrying financial risk and, therefore, having an influence on the housing product delivered. The IPD model is by no means free from financial constraints, as evidenced by the network metrics for development profit. The flow betweenness centrality of development profit reduces, due to fewer actants being apportioned profit, but development profit has the highest authority in the IPD model.

An alternative visualisation of the differences between the TPD and IPD models is provided in Figure 6.11. Each SNA measure is represented separately for a selection of key actants. SNA measures from the TPD actor-network are on the left-hand vertical axis in each graphic and measures from the IPD actor-network are on the right. Numeric values are not shown, with the purpose being to observe trends and/or exceptions.

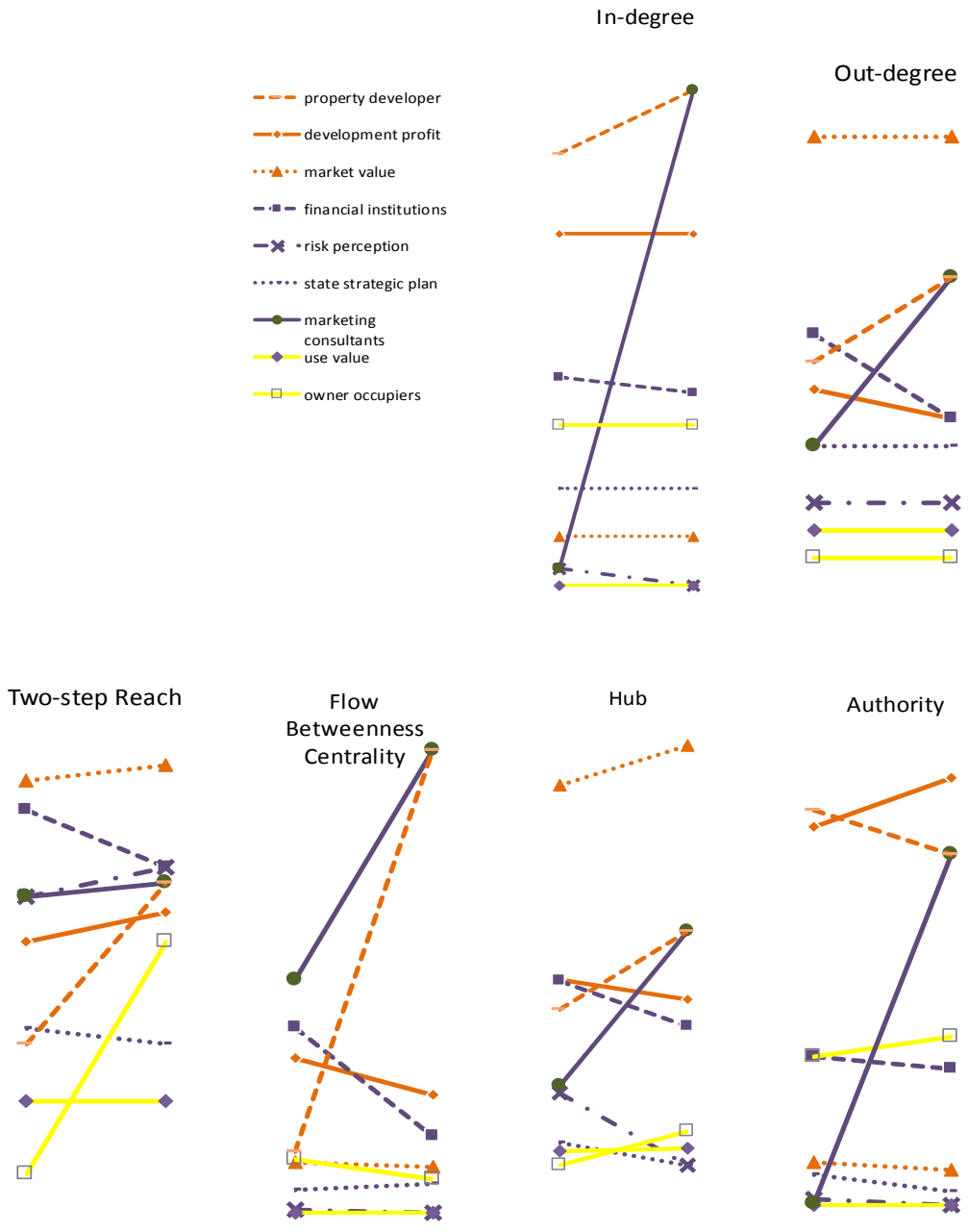


Figure 6.11. Relational Visualisation of SNA Metrics.

TPD left vertical axis and IPD right vertical axis.

An actant represented by a horizontal or relatively horizontal line in Figure 6.11 remains stable within the network despite the changes occurring around them. Stable actants tend to be from the management and consumption subsystems, emphasising that the reconfiguration of the production subsystem undertaken by integrated developers occurs within a stable management framework that remains unaltered. This is demonstrated in the in-degree and out-degree diagrams which show design information flows remain unaltered for the majority of actants, with changes occurring only for those who become integrated with the developer (e.g. marketing consultants). Out-degree flows from financial institutions and development profit are reduced as they have fewer actants to influence. The significant increase in the two-step reach of the owner-occupier exceeds even the increase experienced by the developer, however, their capacity to act as an authoritative source of information (as defined by Kleinberg's measures of hub and authority) remain significantly lower than that of many other actants.

The information flows to and from use value, market value and state strategic plans remain unaltered, meaning the capacity of these actants to influence design outcomes is unchanged. Market value maintains the highest reach, betweenness, hub weight, and authority weight among these three important actants. Integration thus strengthens the influence of the Integrated Property Developer by most measures analysed. The concentration of the capacity for brokerage (measured by flow betweenness centrality) and authority with the developer further increases the impact of their motivations on design outcomes (Millington 2000). This is also demonstrated by the increase in the authority measure for development profit.

The restructuring of the traditional development actor-network to create the integrated alternative occurs under the influence of the integrated developer themselves. Motivated by the desire to drive efficiency, reduce risk, and maximise control, the modifications they apply to the existent network 'fortify' their position in the network. Gulati and Srivastava (2014) describe fortification within networks as the deployment of resources by actants to consolidate their existing structural position to achieve stated aims. Actor-network mapping and its analysis with SNA software shows the shift from traditional to integrated development represents a reconfiguring of one subsystem of the SoP, not a reconfiguring of the wider actor-network, which remains boxed.

Bourret et al. (2006) suggest heterogeneous maps provide three main analytical functions: to uncover relational attributes of the network; to identify structural attributes of the network; and to enable comparison between networks. Through comparison of the traditional and integrated development models, the ANT mapping method proposed in this research is shown to achieve each of these analytical functions. In combination with network metrics derived using SNA software they encourage the observer to delve deeper in their examination; to question the structural reasoning behind the shifts in metrics observed.

6.6 Impediments to Deviating from the Existing SoP

This thesis suggests greater involvement of occupants in multi-unit dwelling design and production can increase acceptance of this promoted dwelling type, as well as increasing opportunity to deliver the strategic aims of current urban plans. This section discusses information gathered from interview participants about occupant involvement in the existing multi-unit SoP before observing impediments to deviating from existing practices.

Interviewees agree the increase in multi-unit dwellings distances the end user from production. Strategic-level stakeholders suggested this results from the high level of complexity and risk associated with multi-unit development, and the relatively inflexible management system that has evolved as a result (SD1, AD1, PP2). While agreeing developers hold significant control of design decision-making, PD1 commented that "the industry has only the resident in mind in doing it. Otherwise, they don't have a business". Developers and designers identified that dwelling design evolves over time to meet end users' needs despite their disconnection from design and production, with pre-sales viewed as providing engagement with end purchasers.

> *…the developer is going out into the marketplace with a plan only and says do you want to purchase this. If enough people say yes he'll build it. So you could argue that's a way of engaging people in that process. (AD3)*

However, the majority of pre-sale purchasers are currently private investment owners, not residents (Birrell & Healy 2013; Kent 2013; Randolph & Tice 2013). Relying on the market to determine housing outcomes in this way has been shown to result in less than ideal housing outcomes that fall short of achieving the strategic aims of infill development and perpetuate negative perceptions of multi-unit housing.

All architects interviewed stated that they typically design for anonymous occupants and do not have contact with dwelling owners during design or occupation. AD1 suggested the gap between occupation and production is conceptually bridged by the skill set of the designer.

> *…while it's not a direct relationship to the user/occupier… The skill sets there are the ones that will provide the most opportunity to anticipate or accommodate potentials of inhabitation. (AD1)*

However, the architect and design team rarely engage in design briefing and, most commonly, act under the direction of the developer. This arrangement limits the capacity for designers to execute such skills. One architect noted the sales agents have more influence on dwelling function than the design team or end user.

> *…for a particular developer we have just completed one [block of] apartments, and we are starting on a second one. So the developers come back to us and say, 'Our sales people on the first project, … they have come back with this feedback …' … and we've been briefed and we're taking that feedback on board, but it's come indirectly, it hasn't come directly from the end user. (AD2)*

This view correlates with the ANT mapping of the existing SoP (Figure 6.5) showing the sales agent as a focal actor, one able to enrol others in their ideas, whereas the design team are mediators of the design information they receive from others. Like the design team, occupants engage in the existing multi-unit SoP too late in the development process to influence building functionality. Although the integrated development model enables owners some direct connection with the production system, this also occurs late.

> *I would say the closest relationship [the occupant has] is with the developer, in terms of informing, potentially informing. But they don't really have input, it's already been designed. (AD1)*

The opportunity remains in the existing SoP for individualisation of dwellings post building design. Developers interviewed identified a reduction in the choices made available to purchasers in recent years, justified by the need to bulk order materials and maintain repetition to achieve material and labour economies. Greater choice is associated with higher cost projects, typically aimed at owner-occupiers. However, such projects were described by PD1 as too emotive.

> *Ten, fifteen years ago, it was important that we had three colour boards. So you had three colour boards and three colour schemes. […] And people would say, 'I want the tiles from that one, but the carpet from that one'. And, 'Look, I'm not sure. Can we get back to you?' … today, if you buy an apartment off me, you can either have the dark carpet or you can have the light carpet, but I suggest you have the dark carpet…the process is so complex [that] to introduce something as random as individual people making their own decisions about things – just too hard. (PD1)*

Developers saw the desire to individualise dwellings during construction as unnecessary, suggesting individualisation over the dwelling lifetime as more appropriate, but underutilised. "[Y]ou can paint the walls red. You can do whatever you like. You can pull the kitchen out. People don't. But they can" (PD1). From the developers' perspective, it is more time and cost efficient to systematise production of a generic dwelling which people can put their own personality onto with furniture, artwork, and other interior elements.

> *So what we do is we try to create a perception of putting their own personality on it. But we can't sit there for two days with you and say, 'What colour of tile do you want? What colour of paint do you want in this room? What colour of bench top do you want?' … that's a far more emotive transaction for them and we don't have the culture and resources to deal with individual people's emotions … our systems are more geared for dealing with the collective emotion. We've systemised how we deal with emotion. (PD2)*

This view conforms to the prioritisation of market value over use value in the network mapping and accentuates the conception of dwelling purchasers and occupants as a portion of the amorphous market rather than as individuals or households.

Developers and architects had markedly different responses when discussing the opportunity for occupants to engage in shaping interior spaces to meet their household needs, varying such things as wall locations, connectivity between spaces, or spatial arrangements. Architects were positive about the prospect of individualising designs, seeing it as possible within their professional practice and suggesting amendment of the existing SoP to enable participation by future owners earlier in the development process. AD1 suggested the potential for owners to act in consort with, or as, developers.

> *…if you consider what [choices] does a purchaser have in the single dwelling market right now and [suggest] that in an ideal world you'd give a similar range of choice to someone in the medium-density market … I don't see why you couldn't. (AD3)*

> *…if you have an owner or occupiers involved with developers, in some capacity, either they are the developer or they're part of a consortium or whatever, then they can influence that. But, if they're buying off-the-plan, their ability to influence is limited by the choices that are offered. (AD1)*

Observing the SoP from a different viewpoint, developers expressed concern around time delays caused by individual households and their decision-making. In contrast with architects, the developers viewed input from occupants as something which would need to be accommodated within the existing SoP, a potential imposition upon their current practice with negative consequences on profit and feasibility. The idea of allowing a purchaser to configure internal spaces to their own needs is interpreted as 'moving a wall', indicating the developer continues to view the building as something which is designed prior to purchaser involvement.

> *Well, even that's problematic. Because to move a wall involves a lot of people. You've actually got to – anything that involves council, you gotta go back to the council planning process. You gotta go back to your private building rules certifier … then you gotta get re-documented. Then it's gotta go to the tender department, then it's gotta to the trades and it's – so all of that for… (PD1)*

The self-image of the developer as "the conductor of the orchestra" (PD1) is supported by the ANT mapping for both the traditional and integrated versions of the existing multi-unit SoP, in which they are focal actor, mediator, and obligatory passage point; receiving and interpreting design information to align with their own interests. This position provides control over many other actants in the network, including purchasers and the design team. Developers have the capacity to facilitate or disable connections between other actants in their brokerage position. As such, it is essential they, along with other key actors, share the vision of strategic urban plans.

Initially, all developers interviewed declared multi-unit buildings too complex for purchasers to engage with design, with one stating:

> *I think apart from the colours … and the types of finishes in apartment buildings, it's gonna be near impossible for consumers to have […] input because an apartment building is such an integrated beast in terms of where the structures go, the walls, the service ducts … (PD2)*

before adding:

> *When it's not imposing on the structural integrity and the servicing of the building, I think – yes – there is scope for that … So I think there is a lot of scope for changing the internal form and function of the dwellings. (PD2)*

Project-level stakeholders universally assumed owner-occupier engagement in design will result in cost implications.

> *… to make a medium-density housing development stack up, say if you had 20 dwellings in a medium-density project, to have those 20 dwellings, all uniquely different would be probably economically not viable. (AD3)*

> *…and if you start introducing a lot of owner-occupiers … that would just compound the amount of variables and make the process and the project more complex and even more expensive. (AD2)*

Again, this position assumes minor modifications within the existing SoP as opposed to the development of an alternative actor-network of provision. Choosing, for example, to build a three bedroom, one bathroom multi-unit dwelling in an activity centre without car parking would have positive cost implications for the purchaser, but negative profit implications for the developer who, in the existing SoP, can achieve a higher return from a two bedroom, two bathroom dwelling with car park.

One interviewee suggested changes in the existing SoP are not limited by actual risks to profit margins, but the untested expectation profits would be negatively impacted by time-related costs. It is feasible that costs associated with additional time in development may be compensated by 'good design' leading to increased value generation (Horne et al. 2014).

> *It would absolutely have to take more time to understand that user or inhabitant better, and immediately, that would be seen as a cost imposition and affecting the bottom line, even though it might actually be the opportunity to generate increased profit and valuations. (AD1)*

The formation of organised groups of households to represent their preferences was seen by PD1 as one way of overcoming the difficulty of getting diverse voices heard through the noise of the existing SoP and bridging the division between the occupation and production subsystems.

> *I think – if there is a force within the market for that and people want to be heard, the market will respond. If you've got groups who have a common bond and they're willing to spend the time, then it can happen. But it won't be a standard market practice … it's not something that the industry could embrace in any great extent at the moment though we could be sitting here in ten years' time saying it's the latest thing that everybody's doing because that's a market driven demand. (PD1)*

PD2 proposed a social media platform to link people seeking multi-unit housing with developers based on their individual preferences. This alludes to a smart housing market

as proposed by Sharam et al. (2015a, 2015c; 2012) or the 'CitiNiche' model discussed in 7.1, neither of which the interviewee was previously aware of. If executed in an effective manner, such marketing changes would produce housing which responds to user needs. However, PD2's motivation in proposing these changes was to strengthen the developers' business position.

> *We need our buying communities of the future to help us, as developers, understand what they want. Yup. And we've got to adapt our business to the customer without question. Our industry is a bit arrogant. We go, 'This is what's on offer. Take it or leave it'. …'cause there's always someone that'll buy it. I think the winners of the future, the parts of the industry, the business and industry that will win are the ones that find that connection where their business is driven by the customer. They don't drive the customer. The customer drives them. (PD2)*

No propositions for changes to the existing SoP were made by strategic-level actants. This again accentuates the disconnection between the strategic and project-level actants which threatens the ability to effectively implement the strategic urban plans. The sole suggestion for change proposed by strategic actants was the introduction of a champion or advocate by state government to promote and co-ordinate the introduction of more housing of the types promoted by urban plans.

> *There's no champion for this stuff. There's no one person or group that stands above the crowd and set a clear direction and helps everyone get there. There might be on some projects, but the leader isn't really clear. I don't think there's clear and positive leadership around [multi-unit] housing. (PP2)*

Interviewees initially understood the proposition of increased occupant involvement in dwelling design and production as a time and cost imposition unable to be efficiently embraced by the existing multi-unit SoP. Further consideration shifted this understanding, leading to a perception that an alternative SoP enabling occupant involvement would be economically feasible if an adequate market existed; that skills and experience are present in the industry to achieve this, but it would be unlikely to displace existing processes. Strategic-level actants, however, were unable to provide insight into user engagement in either existing or alternative practices of production. Production subsystem actants identifies impediments to deviating from the existing SoP as existing mainly within the management subsystem. The various disconnections between subsystems, or between strategic and project-level stakeholders, limit owner-occupier engagement in design and production of multi-unit infill housing.

Conclusion to Part Two: the Key Case

Part Two of the thesis comprised the Key Case of existing multi-unit infill housing provision and asked 'What influences the design and function of multi-unit infill housing currently being constructed in Australia?' and 'What are the impediments to deviation from the existing multi-unit infill housing supply system?'. It has combined secondary data from the review of literature and primary data from stakeholder interviews in an actor-network mapping of multi-unit provision to provide a unique view of the SoP. The combining of qualitative methods with software analysis of the network has enabled each technique to inform the other, with key stakeholders identified for an interview via the initial literature based mapping, and interview questions informed by observations of the initial actor-network map. The interviews, in turn, enabled a refining of the mapping. Employing this approach identified and visualised multiple levels of detail within the stabilised network, to understand why the black-box produces the outcomes it does. In this case, why we have the multi-unit housing designs we have. Similar to Gartner and Wagner's ANT mapping of Information Technology systems, this approach "describes the status of the network at a crucial point rather than its development in time" (Gartner & Wagner 2009, p. 203).

The key case study has provided insight into the influences on design and function of multi-unit housing provision from the perspectives of individual stakeholders and through a network-wide view. First, the ANT mapping has visualised previous research findings, producing a mapping which reasserts that market value and development profit are the primary drivers of multi-unit dwelling provision, with these monetary measures carrying greater influence in the SoP than the use value of dwellings. This is demonstrated by the reach and influence of financial actants who, primarily located within the management subsystem, connect directly to all subsystems of provision.

Secondly, the mapping of the existing SoP has reiterated the disconnection between the production and occupation subsystems and highlighted the limited network opportunities that exist for occupants to engage in, or directly inform, the production process. The rear view mirror approach to production decisions makes the assumption that past purchasers adequately represent future purchasers and that purchasers seek equivalent housing to those who have preceded them. In its current state the structure of the SoP fails to provide an opportunity for engagement with potential multi-unit purchasers who have not interacted with the marketing consultants or selling agents. As such, potential multi-unit occupants not interested in the available investment-purchaser driven product remain silent within the existing actor-network.

Thirdly, the attribution of ANT-informed characteristics to key network actants has emphasised the concentration of key decision-makers in the production and management

subsystem, only about half of whom are human actants capable of negotiation and possible innovation. Notably, the strategic urban plans are not focal actors in determining multi-unit design outcomes, although they are located within two-step reach of other key actants. Contrasts in strategic-level and project-level actants' perception of the network were shown to exist in relation to understandings of the location of risk within the network, of who in the network decides what types of dwellings to build, and the influence purchasers are able to exert on dwelling design. The interviews supported the previous premise that multi-unit housing remains a closed black-box to many strategic actants.

Finally, the duration of an actant's investment in a project informs design. The focal actors, mediators, and obligatory passage points identified in the SoP are the key decision-makers in relation to the type and function of multi-unit dwellings constructed. Many of these key decision-makers take significant short-term financial risk, but none have any long-term interest or investment in the building's occupation and operation. The co-location of decision-making with financial risk in the existing SoP leaves those actants exposed to long-term risk (liveability, community, environmental) without influence in the actor-network and allows the motivations of actants seeking short-term financial profit to translate information flows and mediate design decisions on their behalf.

In answer to the research question, 'What influences the design and function of multi-unit infill housing currently being constructed in Australia?', this case has shown the key influences to be financial profit, financial risk, and financial systems including banking institutions and tax legislation. Equally, it has revealed who or what has the least influence on design and function of multi-unit infill housing, that being the potential owners/occupants and use value. In particular, the SoP excludes potential multi-unit owners/occupants not represented by previous multi-unit purchasers. Comparing SoPs, Figure 6.11 showed that State Strategic Plans have less capacity to influence dwelling design than many other network actants. Additionally, it suggests that as the centrality and authority of focal actants increase, as occurs in the Integrated Property Developer actor-network, the influence of such planning documents can be further diminished.

Impediments to deviation from the existing multi-unit SoPs have also been identified. Interviewees acknowledged a reluctance on the part of key ANT actants, particularly those identified as being in brokerage roles, to compromise their current network position for fear of financial loss. Additionally, the network mapping reveals that those actants who may seek an alternative network solution, such as use value, future occupants, or designers, are not located in a structural network position which enables them to modify the existing network.

Part Two of the thesis has refined and validated the actor-network mapping prior to its deployment in the comparison of alternative SoPs representing the alternative cases in Part Three. In keeping with Ball's description of housing provision, the mapping "specifies

the nature of the social agents involved in the provision of a particular form of housing and their interlinkages", including producers, consumers and financiers in their different guises (Ball 1988, pp. 29-30).

The usefulness of the mapping process has been demonstrated by comparing variants of the existing SoP, the traditional developer and the integrated developer. The comparison highlighted the stability of the actor-network, showing that despite significant reconfigurations occurring between actants in the production subsystem, the network properties of actants in the management subsystem (policy, planning, financial, institutional and contractual systems of development) changed very little in response. The stability of this subsystem, in combination with the reluctance of key stakeholders interviewed to allow network disruption, has the potential to limit interactions between other actants, blocking the development of alternative SoPs.

Part Three: Australian Multi-Unit Innovators

The stabilised multi-unit structure of provision (SoP) described in Part Two of the thesis has dominated infill housing for some time, limiting industry and community exposure to alternatives (Martel et al. 2013a). Individuals and groups seeking to navigate an alternative multi-unit outcome are pursuing a small number of innovative infill housing projects in Australia. In the spirit of Collective Self Organised (CSO) housing projects they seek to enable owner-occupier input into design to varying degrees. This part of the thesis examines four such innovative examples in the form of a nested, outlier case study (Thomas 2011a).

Chapter 6 details the selection of example projects for study and data collection methods. It concludes with initial comparisons. Chapter 7 uses primary interview data, identifying what drives the project instigators to seek an alternative solution, what inspires residents to be involved, what degree of resident input in design development is enabled, and what barriers are experienced in the pursuit of such alternatives.

Chapter 8 then compares the four nested cases using the actor-network mapping demonstrated in Part Two, identifying differences in capacity for action resultant from the network changes introduced and associated network constraints. This Part respond to research questions 2 and 3 with respect to the Australian Alternative Cases.

Research Questions:

2. What are the impediments to occupant involvement in multi-unit infill housing provision?

3. What alternative multi-unit infill housing provision methods have been employed in Australia and internationally that facilitate owner-occupier involvement in provision through collective self-organisation?

Insights obtained in these chapters guide the observation of international cases in Part Four.

Chapter 7. Introducing the Nested Innovative Case(s)

An Australia-wide search for Collective Self-Organised (CSO) infill housing was undertaken in early 2013 to identify projects and stakeholders with experience in attempting to reconfigure the existing black-box of Australian multi-unit housing. Approximately 30 CSO housing projects were identified at various stages of development, with seven of these compatible with the scope of multi-unit housing established for this research. Informal discussions were held with key stakeholders in five of these seven projects in September 2013. One was found to have used a non-replicable development process, a view supported by a previous academic study (Crabtree 2008), while another benefited from a unique land acquisition process. The latter, along with one other, had not engaged future residents in design. These examples were omitted and the four remaining projects become the innovative Australian cases for investigation.

All cases are located or intended to be located, in the inner northern suburbs of Melbourne less than ten kilometres from the central business district. It is noteworthy that at the time of case selection, three remained speculative, with just one having led to the delivery of housing units. Over the following 17 months, contact was maintained with key proponents in each of the cases, following the progress of the projects through direct email communication and observation of websites and social media. By early 2015, the case that had realised a development previously had commenced two further projects. Another had completed contractual negotiations for development to proceed. Unfortunately, neither of the remaining two cases had progressed. As these two cases were relatively similar, one was omitted from the study. An additional case was identified in late 2014 through architectural media. Also located in Melbourne's inner north, it is distinctly different from the other cases, with an initial apartment project commencing construction in 2016. The project complies with all the criteria previously used to select cases in the initial search and has been included as a case from February 2015.

The resultant group of CSOs represents four distinct approaches to navigating or reconfiguring the existing multi-unit structure of provision (SoP). Publically available secondary data was collected for each case, including project websites, promotional or recruiting materials, blogs, and media reports. This chapter introduces each case in turn, with an emphasis on the motivations of the instigator, how they differ from existing multi-unit provision and changes in risk and cost.

7.1 CitiNiche

CitiNiche was launched on March 6, 2013, with substantial media attention. It is the creation of a group of Melbourne-based professionals in planning, development, and marketing, led by architect Ivan Rijavec (The Fifth Estate 2013). Rijavec, experienced in apartment design and delivery in Melbourne's inner north, conceived CitiNiche as a means of alleviating constraints experienced in previous projects. These constraints include excessive costs to end users, the generic living choices resulting from corporate developers' perception of market risk, and the lack of consultation in design (Rijavec 2013; Rijavec & Shaw 2013). The CitiNiche process, illustrated in Figure 7.1, offers owner-occupiers the opportunity to engage in multi-unit design.

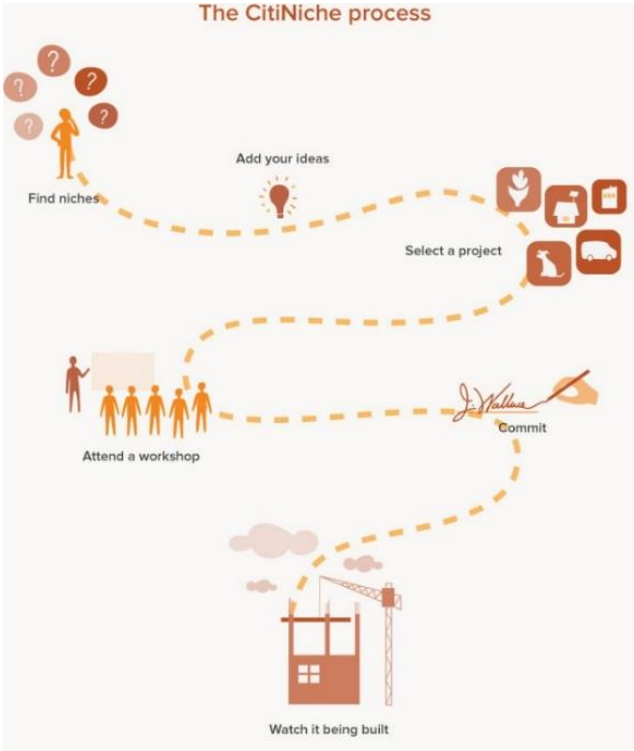


Figure 7.1. The CitiNiche Process.
(CitiNiche Pty Ltd 2013a)

In particular, CitiNiche advocates consultation with individual households seeking to reside in multi-unit housing:

> *giving you an avenue to voice your ideas, so you can shape your life and the community you live in. CitiNiche puts you at the centre of the traditional development model with new property development initiatives evolving from community input. (CitiNiche Pty Ltd 2013a)*

The initiators suggest CitiNiche will act as a catalyst to "radically transform the property development industry in a number of fundamental ways" (Rijavec 2013), reducing development risk and hence cost, increasing the purchasing power of collectives, and providing the opportunity to have a say. Importantly, in relation to community acceptance of multi-unit infill development in existing areas, Rijavec suggests,

> *CitiNiche will also change the adversarial dynamics of the planning process, since instead of being a contest between developers versus residents, it will introduce new communities into established ones which has the potential to be a far more socially cohesive paradigm. (Rijavec 2013)*

CitiNiche uses an on-line platform which matches interested parties to form groups or 'niches' of households with similar needs or interests. Initial niches proposed include city pet-owners, urban gardeners, urban families, and older households. The niches represent households whose needs are not met by the existing multi-unit housing product. CitiNiche partners with developers and designers committed to the CitiNiche ethos; partners use information provided by households about their needs and preferences to propose projects they believe will appeal to niche members. They seek further input from households to finalise designs and once planning permission is obtained, apartments are sold off-the-plan to niche members, with a limited range of individualisation options.

Some media outlets, along with the founders, have described the CitiNiche model as the 'crowdsourcing' or 'crowdfunding' of development (Pope 2013; Rijavec et al. 2013; Riley 2013a; The Fifth Estate 2013). Another coined the term 'crowdhousing,' highlighting that "[u]nlike crowdfunding, crowdhousers are not donating to someone else's project, but contributing to their own" (Edgar 2013). This reference to crowdfunding is misleading as the eventual dwelling owners do not provide sufficient capital for development to occur, something which is effectively prohibited by the *Commonwealth Corporations Act 2001*.[11] CitiNiche members who purchase a dwelling at the end of the design phase commit to doing so through typical pre-sale contracts, with settlement occurring at the completion of construction. The primary crowd action is that CitiNiche "connects the crowd to development professionals who serve the needs, budgets and preferences of the crowd directly" (Rijavec 2013) enabling greater certainty, reducing risk, improving economic viability, and increasing emotional investment in multi-unit buildings through engagement.

The facilitation of members input into the design process is one of the attributes CitiNiche promotes to potential dwelling purchasers. It is embedded into the agreements between CitiNiche, niche members, and design/development professionals. Hence, CitiNiche provides a different type of product, not a different finance model.

[11] Note the *Commonwealth Corporations Act* of 2001 was under review at the time of writing, specifically in relation to crowdfunding of capital.

When launched, CitiNiche received encouragement from the then Victorian Government Architect, Geoffrey London, and numerous housing advocates expressed confidence in the ability of the initiative to disrupt the existing system, with Tim Jackson of JCB Architects commenting:

> *The development world becomes generic very quickly… Everyone starts copying the most recently successful one. [CitiNiche] is a way of throwing something into the mix that hopefully hasn't been thought about. Not only might it push the typology, it might also suggest areas of the city developers wouldn't normally have considered. (Jackson quoted in Edgar 2013)*

Similarly, James Legge of Six Degrees Architects described the potential for CitiNiche to increase multi-unit diversity, improving both housing quality and 'fit'.

> *Most high-density [housing] is appalling … What needs to happen is an exploration of all sorts of models for increasing the urban density … [CitiNiche], instead of developing a project that attracts like-minded people, like-minded people help create something that suits them. (Legge quoted in Edgar 2013)*

CitiNiche does not exclude private investment owners purchasing dwellings for rental, but it does offer a design approach more appealing to owner-occupiers. It provides households interested in residing in multi-unit infill housing with the opportunity to engage with the processes of provision in a way that has not been previously available to those without the skills and resources to instigate development themselves. The fully professionalised services proposed ensure risk is as controlled as possible and project feasibility maintained while introducing some variation to multi-unit development. The primary shift in the multi-unit SoP intended by CitiNiche is the conceptual centralisation of the occupant from early in the development process.

> *Well, CitiNiche is all about you, the person who will invest and grow in these places. It's a website that gives you the power to shape your future home by tailoring its design to your lifestyle. (CitiNiche Pty Ltd 2013b)*

At the time of writing, CitiNiche continues to seek appropriate sites for development and aims to assemble a 'crowd' to launch a project in the near future.

7.2 Property Collectives

Property Collectives is a CSO consultancy service focusing on wealth creation through collective investment. Started in 2010 by services marketing professional Tim Riley, it promotes property syndicates for diversifying property investment portfolios. In addition to assisting syndicates in purchasing existing or new properties, Riley instigates syndicates to undertake CSO developments. It is this latter component of the Property Collectives model that is of interest to this research.

Property Collectives' promotional material suggests a more positive, wealthy and sustainable lifestyle is possible if one approaches the future more collectively, and "[s]tart

shifting the culture of me to the culture of we." (Riley n.d.). This call appears to parallel that of recent trends toward collaborative consumption and a sharing economy. However, it is not referring to spatial or material collectivism, but financial collectivism for wealth creation.

> *[A] unique feature of a Property Collectives syndicate is that we position your finance strategy (your money strategy) as the central pillar in the design of the structure. This is because we believe that when it comes to property, you are not actually in the business of property, what you really are in, is the business of finance. (Property Collectives n.d.)*

The initial CSO project instigated by Property Collectives was the Saint George Collective, four three-storey townhouses. Initiated in late 2010, construction was completed mid-2013. The SoP enabled purchasing of housing at wholesale costs, saving on stamp duty and realising the developer's profit as reward for time invested and risk taken by members. One syndicate member intended to reside in the property for a short time following completion, others intended to realise profit at the time of completion or install tenants. However, in Riley's words,

> *everyone was so happy with the end result that at completion everyone decided to occupy the dwellings instead of rent them out. We've been living side by side for the last 12 months, sharing meals, drill bits, sugar, the odd potato, babysitting duties and garden maintenance. (Property Collectives n.d.)*

With property valuations approximately 17 percent above the total cost of development (Riley 2013b), the collective members realised their wealth creation goal, as well as the unplanned outcome of producing desirable homes for their young, expanding families in close proximity to supportive, caring neighbours.

The process of development was not simple. Riley and an architect friend completed feasibility studies on approximately 15 sites over ten months, meeting with local planners, and bidding on three sites before securing one suitable for four townhouses. Having found a site, the collective rapidly expanded to include investment purchasers for all four houses. After forming a joint venture partnership, the land was purchased by a company established for the purpose, in which all investors owned a portion correlating with their investment share. The four primary protagonists were long-term friends, including an architect with multi-unit housing experience. Construction was funded via a construction loan in the names of all collective members, after which the property was strata titled and each title transferred to the investors. The collective was hence dissolved, allowing owners to rent, sell, or occupy their dwelling as desired within the context of typical strata management.

Since 2013 Property Collectives have formed further CSO development collectives and purchased three sites in Melbourne's inner north for projects of six to nine townhouses. One collective continues to seek members at the time of writing, with the Property

Collectives blog now promoting CSO joint ventures as achieving more than financial outcomes:

> *Our vision is to create developments with architectural and environmental integrity that deliver real financial and social capital for all members of the collective. We want to create rewarding shared experiences and an end product that we can all be proud of. To achieve this we want partners that are committed to sharing, to openness and collaboration. (Riley 2013a)*

While an insufficient number of developments have been completed to observe rates of owner-occupation versus investment purchasers, anecdotally, interest from owner-occupiers is significant. Some collective members are first home-buyers who had struggled to purchase in inner city areas and have entered syndicates together with parents providing capital assistance (Power 2015). A trend toward owner-occupation is suggested by the financial prospectus of one collective which requires capital contributions of approximately $250K per unit, with an estimated total cost of $710-790K and anticipated value of $850k-$950k (Riley 2015). These figures are not particularly attractive to investment purchasers, with less than 26 percent of existing investment properties in Australia valued at over $750k in 2014 (Matusik Property Insights Pty Ltd 2015). These projects are in high demand locations, including Northcote, where the 12-month average sale price for houses passed $1M in September 2015, and averaged $807,500 for three bedroom units in the 12-months to October 2015 (REA Group 2015). In this context, the three bedroom townhouses proposed are moderately priced, particularly given the objectives of high design quality.

Property Collectives aim to deliver dwellings at a 'wholesale' price of around 20% less than the 'retail' price of an equivalent product (Power 2015), increasing the number of households able to access housing in the locations they desire, be it in such an expensive location or elsewhere. Wholesale savings combined with owner input in design enable the provision of alternative housing solutions. "You have something that you would otherwise have not been in the position to source or buy" (Power 2015).

Discussing co-ownership of investment properties, Riley suggests syndicates are "… a way of being able to get involved in an investment opportunity when you're perhaps in a situation where you've not got the level of resources to go it alone" (Riley quoted in Molloy 2012, p. 37). Property Collectives has shown this directly translates to multi-unit development, something seldom within the resources of individual households.

The most significant shift in the multi-unit SoP Property Collectives offers is the creation of a collective that assumes the dual role of developer and client, designing to meet their collective needs and sharing both risk and reward.

7.3 Urban Coup CoHousing

Urban Coup, initiated by eleven households in 2008,

> *…is an initiative of a group of Melbournians who share a vision of creating not just housing, but community. Home is where the hearth is … but more than this, home is where our community is, our family, friends – the networks that support and nourish us. (Urban Coup Inc. n.d.)*

'The Coup' aims to self-develop an inner urban cohousing community of up to five stories within 5-10 kilometres of the Melbourne central business district. Sustainable building design, higher-density living, and collaborative use of resources will enable a small ecological footprint. The group is united by a common drive to achieve more sustainable urban lifestyles, with the vision of being "a resilient, positive, and diverse community that contributes to a healthier world, and one that enriches its residents' lives" (Urban Coup Inc. 2015, p. 5).

The intended community size of 30 dwellings is based on previous cohousing groups' experiences of optimum economies of sharing, scale and manageability (Blundell 2010; Critchley 2014). Included will be a mix of one to three bedroom dwellings with associated shared facilities. Multi-unit urban cohousing is present in international contexts, but has little precedent in Australia, with just one project completed previously in Adelaide, South Australia. Due to this lack of familiarity, such housing is frequently perceived as related to alternative lifestyles or communes. This misunderstanding is compounded by a mis-association with co-operatives, and the false assumption of collective ownership with limitations on resale. This perception is quite inexplicable in the Australian context as co-operative housing here is most commonly government-funded housing occupied by low-income households on a rental tenure, and represents less than 0.06% of the Australian housing stock (Gilmour 2012). A negligible number of 100% equity (privately owned) housing co-operatives exist, none of which are multi-unit urban infill. In reality, the cohousing proposed by Urban Coup will be self-contained, privately owned residences within a strata-titled or community-titled development able to be traded freely.

Two variations from typical strata developments exist: the first relates to shared facilities, which are to include a community kitchen and dining area, music room, guest accommodation, garden, and car sharing spaces. Extensive shared facilities are increasingly common in high-end, high-rise buildings, which can include office facilities, function spaces, swimming pools, gymnasiums, cinemas, and barbeque areas for use by building occupants. Hence, such shared facilities are not unique and can be administered under existing strata or community titling. The second variation is the intentional creation of a collaborative community based on shared values; a community which engages in self-management in preference to outsourcing to external strata management providers.

The name Urban Coup attempts to differentiate it from co-operatives at the same time as insinuating a disruption, or coup, to existing housing practices (Urban Coup Inc. 2015, p. 3). The disruption sought is to enable a

> *… way of living differently, to help ourselves to help the planet. Choosing to build a cohousing development is our answer to an age when global resources are being strained by modern living, urban sprawl is ever-expanding, and many of us in the city find ourselves isolated from real community in our current homes … (Founding Member Karen Deegan quoted in Nilsson 2010)*

Urban Coup's membership demonstrates the diversity of household types interested in residing in consolidation areas and provides this research with an example of a group of households seeking to inhabit a multi-unit community that corresponds with the ambitions of strategic urban plans. The case provided by Urban Coup relates to any group of intended self-developers, be they seeking cohousing or not. Collective self-development clearly sits outside the existing multi-unit SoP and presents many challenges; to the extent that, after eight years of persistence, Urban Coup is yet to realise their housing objectives.

Difficulties obtaining development finance led to the consideration of partnerships with private developers and not-for-profit organisations. In December 2013, a partnership agreement was signed with the Women's Property Initiatives (WPI), a not-for-profit Registered Housing Provider with the mission "to build a secure future for disadvantaged women and children" (Women's Property Initiatives 2015). It is intended that WPI act as the developer of a site chosen by coup members, with buildings designed to suit the members' wishes and budget. Coup members will enter into off-the-plan sales contracts, with WPI retaining five dwellings on site for rental. This arrangement enables the securitisation of development finance against the substantial property holdings of WPI and results in a mix of tenures which appeals to both parties. At the time of writing all legal, financial and management preparations have been finalised to enable the project to proceed when suitable developable land is secured.

The anticipated costs of construction, land, and environmental technologies combine to result in dwellings in the $400K to $600K price range, depending on size. Car parks will be sold separately for $20K to $40K (Barnes 2015). Due to the need to enter into a partnership with a developer, Urban Coup cannot realise their dwellings at true wholesale prices, although there are savings in the avoidance of market risk from the developer's perspective.

Describing Urban Coup, journalist Neil McMahon observes:

> *It's not an easy concept to get off the ground. You need the money and you need the land, both need to be managed effectively, and you need a group of people able to stick it out through the various debates and roadblocks that are sure to arise. (McMahon 2013)*

The most significant shift in the multi-unit SoP Urban Coup offers is the intentional creation of a multi-unit community with shared values who formulate a project specific design brief prior to involvement of a developer or selection of land.

7.4 The Nightingale Model

Frustrated by the commodification of housing and the tendency to measure multi-unit project success solely from a financial perspective (Crafti 2014), a collaboration of Melbourne-based architects has proposed 'The Nightingale Model'. Instigated by Jeremy McLeod of Breathe Architecture in 2014, it

> *…is a triple bottom line development model that delivers homes that are environmentally, socially and financially sustainable. Our ultimate goal is to provide quality urban housing by simplifying and humanising both the development process and the building itself. It isn't about profit maximisation. Instead, the model seeks reasonable returns whilst maximising social and environmental outcomes through exceptional design. (The Nightingale Model n.d.-b)*

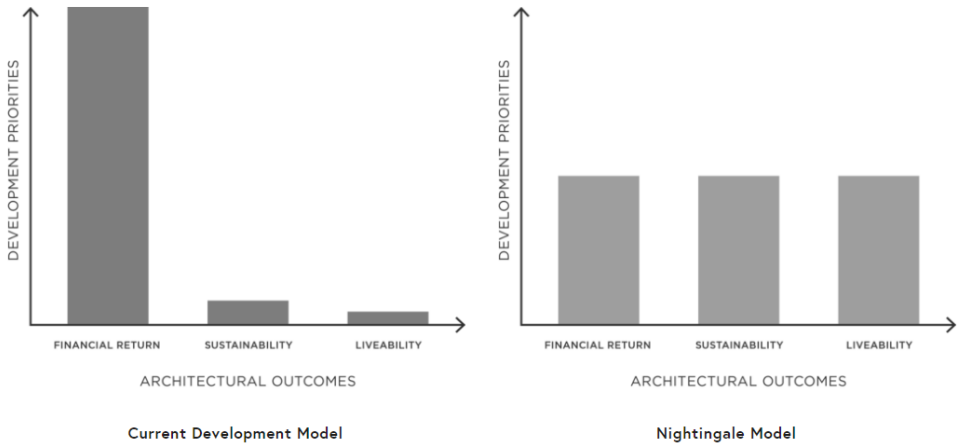


Figure 7.2. Development Priorities
(Breathe Architecture 2014a)

Prior to conceiving The Nightingale Model, Breathe Architecture completed a 24 apartment project called 'The Commons' which collected numerous industry awards in 2014 (Australian Institute of Architects 2014) and has been described as "Australia's most sustainable apartment building" (Lucas 2015a). It is also frequently described as affordable, although at a purchase cost of $7,500 per m^2 of private interior space (McLeod 2015b) it is equivalent in cost to other apartment developments in the high-demand area of Brunswick and far from meeting accepted definitions of affordable housing. The Commons and The Nightingale Model both aim to be "more affordable" (Breathe Architecture 2014a, p. 13) and "to deliver high-quality homes to purchasers at fairer prices" (The Nightingale Model n.d.-a). This aim is achieved through the shifting of development proprieties, as shown in Figure 7.2.

Table 7.1. The Commons: savings and benefits enabled by an architecture of reductionism.

Differences between The Commons building and typical multi-unit construction which contribute to project savings in excess of $1.5mil, or approximately $65K per unit.	Benefits enabled through financial savings and alternative SoP.
Changes to typical multi-unit building features - Passive design and high building efficiency removing the need for air conditioning. Saving $250K. - Removal of second bathroom from two bedroom apartments. Saving approximately $200K. - Minimal detailing of wet areas, minimal use of ceramic tiles, removal of glass shower screens and chrome fittings. - Use of recycled materials including bricks and brass fittings. - Simplified joinery materials and detailing. - Removal of private laundries. Saving approximately $150K. - Exposure of structural concrete surfaces in preference to installation of suspended ceilings. - Removal of car parking typically provided underground in comparable buildings. Saving $500-550K. Changes to SoP - Removal of real estate agent and marketing consultants through direct sales. Saving of approximately $300K. - Removal of display unit costs. Saving approximately $100K. - Ethical investors receive profit limited to 15 percent. - Ethical investors fund the equity component of financing, not entire development costs. Hence profit margin paid on only a portion of development costs, not all.	Increase in shared facilities available to residents: - three secure bicycle parks per unit and storage spaces, - extensive rooftop garden in excess of 500m^2 housing individual and shared vegetable gardens and fruit trees, significant outdoor entertainment areas with bbq facilities, bee hives and shared tools, - shared rooftop laundry and drying facilities, - environmentally conscious waste management facilities including onsite composting and worm farms. Increase in liveability of individual units: - units slightly larger than typical, with a focus on increased functionality of living spaces, - larger living spaces enabled by reduction in wet areas, - large balconies in the form of winter gardens extending living spaces, - light courts ensure natural light and ventilation to all interior spaces in all units, including bathrooms. Increase in specification standards: - high performance glazing solutions, - high quality opening walls to winter gardens. Reduction in living costs: - effective passive design eliminates costs typically associated with thermal conditioning, - high-quality daylight design, - large solar power system to common facilities, - solar hot water. Reduced environmental impact: - avoidance of high embodied energy and toxic materials, - minimal energy requirements, - reduction in material quantities. Changes in approach to private vehicles: - the cost of housing people financially separated from the cost of housing cars. Residents without private vehicles not required to purchase car parking space. Residents desiring car parking source off-site. - building and broader urban environment more able to adapt to future of less private car use advocated by strategic urban plans. Improvements in SoP: - direct connection between development team/designers and future residents.

Sources: (Breathe Architecture 2014a; McLeod 2015a,2015b; The Nightingale Model 2015; The Urban Developer 2015)

Through an “architecture of reductionism” (Breathe Architecture 2014a; McLeod 2015b; The Nightingale Model n.d.-b) numerous elements of a typical multi-unit building and its SoP are removed or altered, delivering financial savings. Table 7.1 summarises how this reductive approach was implemented in The Commons, demonstrating the capacity for multi-unit project costs to be reduced. In this case, the savings are reinvested in the liveability of dwellings by building more, “more space, more ceiling height, more volume” (Crafti 2014).

The Nightingale Model proposes an alternative financial approach to development. Approximately 25 ethical shareholders invest in a project, providing funding from land purchase through to sales. For the first project, known as Nightingale 1, “[t]hese shareholders are Melbourne architects who have displayed a strong agenda towards socially sustainable/ethical/affordable design” (Breathe Architecture 2014a, p. 7). Investors make a return on investment limited to 15%. Should profit exceed 15% the excess is returned to the Owners Corporation funds, reducing the influence of market value by limiting the cost to purchasers to real development costs plus 15% (McLeod 2015a).

Following purchase of the Nightingale 1 site by shareholders, provisional designs were submitted to the local council. With this initial design in place, potential purchasers were surveyed and 53 households interviewed by Breathe Architecture (Breathe Architecture 2014b; McLeod 2015b) to finalise the design. Unlike housing preference questionnaires, which can lead to a mismatch between indicated preferences and financial feasibility, the questions emphasised trade-offs between building features and cost to determine design priorities. For example, when addressing laundry preferences the questionnaire asked if purchasers wanted to (a) have a shared rooftop laundry, or (b) pay an extra $7,500 and have 2m^2 less living space to accommodate an individual laundry (Breathe Architecture 2014b). The survey asked numerous questions relative to design and cost, as well as inquiring about potential purchasers’ hobbies, travel modes, and more. The survey and interview data informed subsequent design development. With the final design in place, interest in Nightingale 1 continued to exceed the 20 available units many times over, resulting in the use of a ballot system to allocate units to purchasers in January 2015 (Urban Melbourne 2015), giving priority to intending owner-occupiers. Using this process, Nightingale 1 apartments were 100% committed for pre-sale within three months of land purchase (McLeod 2015b; Urban Melbourne 2015).

The Nightingale 1 project introduces an additional focus on centralisation, delivering further savings in construction and operation costs. Centralised electricity supply, solar hot water, and communication networking will eliminate individual connection fees, with internal meters monitoring individual usage. Additionally, the Owners Corporation will retain, rather than sell, one ground floor commercial unit (Chua 2015), with resultant rental income supporting the operation of the building. Selling the commercial unit would

reduce the initial cost of each residential unit by $10-15K, but the majority of survey respondents stated they would prefer to retain the commercial unit to reduce ongoing costs (McLeod 2015a).

The objective of The Nightingale Model instigators is to "challenge existing social mind-sets and industry practices" (Australian Design Review 2015) and "change how people perceive apartment buildings in Melbourne" (Lucas 2015b). To achieve this, all financial and legal details of the model will be made public, enabling the process to be repeated by others. "We hope to engender an industry-wide attitude towards architectural activism via architect as ethical developer" (The Nightingale Model n.d.-b). This objective requires a substantial repositioning of the architect and the design team within the actor-network of the existing SoP; one which redefines the role of the architect as described by The Nightingale Model team:

> *Above designing beauty, maintaining client relations and delivering projects on budget, we believe that architects have an obligation to greater society to protect the interests of the people. We need to stand up for those that the industry is ignoring. The status quo development model is to build meaningless apartments designed to investor specifications for maximum yield with little or no regard for the people who will live there or their impact on the environment. Our city deserves beautiful, affordable, well-built and well-sized apartments designed for real life. At present, developers are not delivering this and as long as their current formula remains profitable, they do not have an incentive to do so. …we want to redefine the meaning and quality of city life and make an alternate development model that is easily replicated and beneficial for the city. (Breathe Architecture 2014a, p. 4)*

Architects in other Australian cities have expressed interest in expanding The Nightingale Model even prior to the realisation of an initial project, and by mid-October 2015, 650 Melbourne households had registered interest in purchasing future Nightingale Model homes (The Nightingale Model 2015). Six Degrees Architects are leading the second project, Nightingale 2, in Fairfield, Melbourne. Four further projects were in initial stages as of October 2015, each led by a different architecture firm, all of whom invested in Nightingale 1 (McLeod 2015a, 2015b):

> *Next year there might be 15 of these projects running. In 10 years there might be 500, I don't know. But the idea is that we catalyse an industry change from the ground up. With architects leading the charge and Melbournians who care about the future of the city, investing in behind those architects. (McLeod 2015b)*

The most significant shift in the multi-unit SoP The Nightingale Model offers is the repositioning of key stakeholders in the development process, mainly the architect, the financial investors and the future resident community. Working together, these actants effectively remove the need for a commercial developer and reduce market risk. With a focus on residents and liveability, an expansion of success measures, and the ability to reflect community concerns, The Nightingale Model disrupts the existing cycle of housing commodification and moves design decision-making closer to the occupation subsystem.

7.5 Initial Comparison

Comparison with the existing multi-unit SoP shows all the alternative cases offer increased opportunity for involvement in project development, moving toward that of traditional free-standing housing provision.

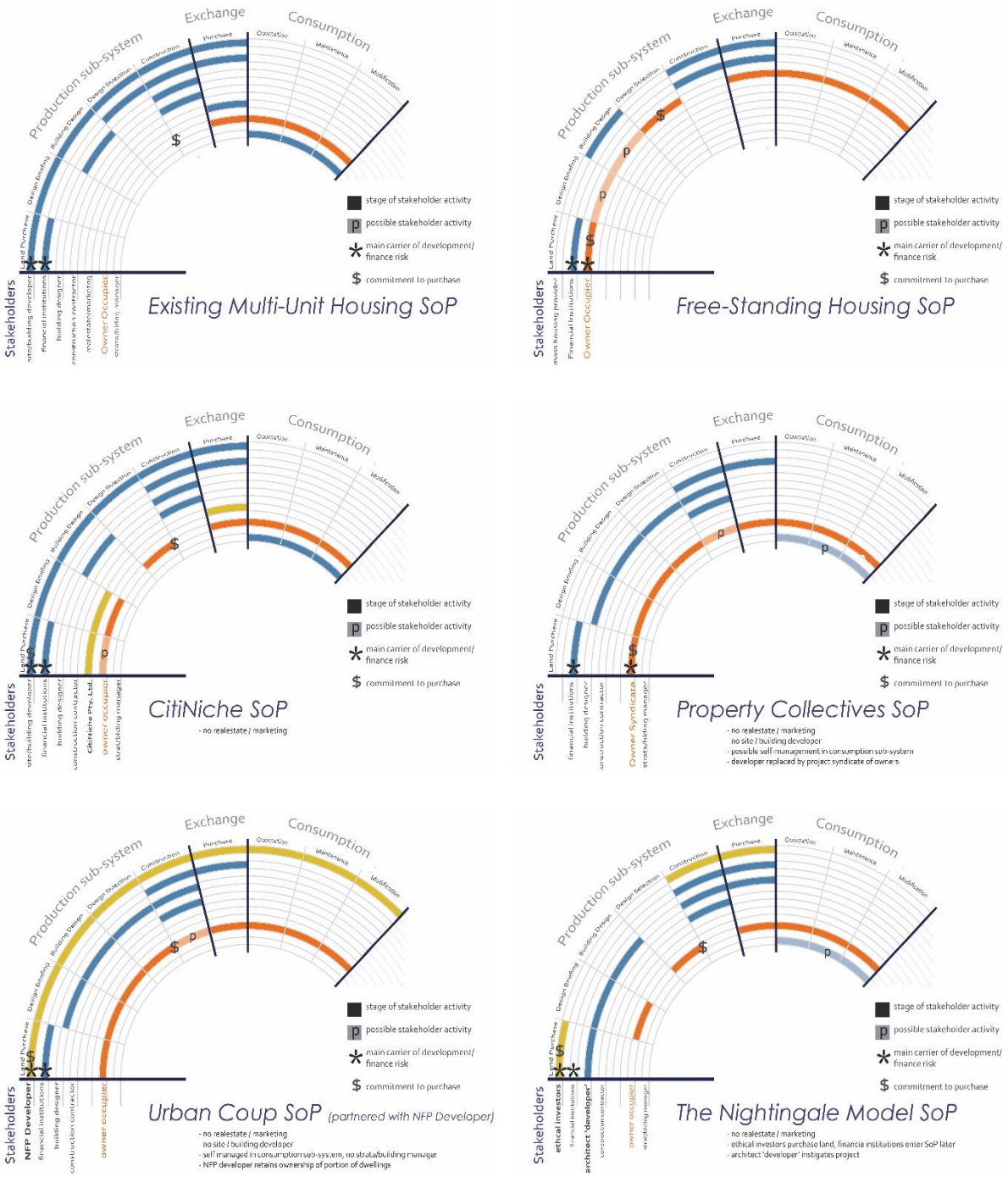


Figure 7.3. Comparison of stakeholders and stakeholder activity in alternative multi-unit SoPs. ^

Comparing the stakeholder diagrams in Figure 7.3, four critical observations are made:

Complexity

Most cases reduce the number of stakeholders compared with the existing multi-unit SoP. This reduces the number of stakeholders seeking to obtain profit and increases the influence of owner-occupiers in design decision-making. However, it does require fewer stakeholders to fulfil the multitude of tasks required to deliver a successful project. The one exception to this is the CitiNiche SoP, in which CitiNiche Pty Ltd effectively replaces the real estate/marketing stakeholders, leaving the production subsystem relatively unchanged. Differences in network complexity are discussed further in Chapter 9.

Subsystem connections

All cases reduce the division between production and consumption subsystem stakeholders. The Property Collectives and Urban Coup SoPs extend the role of both developer and owner over the lifetime of the project as the former is constituted of, or in partnership with, the latter. This facilitates life-cycle based design decision-making. In the CitiNiche SoP, the developer's relationship with the project continues to be terminated at the completion of construction, as does that of CitiNiche Pty Ltd. This is also true of The Nightingale Model, however, given individual Nightingale projects sit within the broader context of an 'architect-developer' housing model the decision-making motivations of developers differ between the two, with the latter commencing with the ambition of improved use value and liveability over financial profit. Hence, although these two SoPs appear similar, the motivation of instigating stakeholders is of significance and is discussed further in Chapter 8.

Owner-occupiers in design

Two cases, Urban Coup and Property Collectives, enable continuous owner-occupier engagement in the production subsystem, with some or all occupants involved prior to site selection and design briefing. In these cases, the future occupants personally and collectively fulfil tasks required for building production, including site selection, brief development, the establishment of project policies and agreements, and more. In the others cases, occupant involvement is discontinuous, with project production remaining in control of the professional design and development team. The capacity for owner-occupier involvement in design decision-making is discussed further in Chapter 8.

While all cases invite purchasers to engage in the production subsystem, three of the four cases do not alter the existing multi-unit SoP in relation to pre-sales contracts. These continue to occur at the conclusion of the design process and prior to the commencement of construction. Hence, despite seeking input from future purchasers, control of the project remains primarily in the hands of the instigators and/or funders and is influenced by their motivations for entering into the project. The exception, Property Collectives, requires a financial commitment from collective members from the very commencement

of the project as they collectively provide all funding for the development and hence hold a more central decision-making position in the SoP. The variation in owner-occupiers influence is discussed further in Chapter 8

LOCATION OF RISK AND INFLUENCE ON COSTS

Each case varies the extent and location of risk in the development process which offers the potential for financial savings. As discussed in Part Two: The Key Case, developers and financiers are the primary carriers of financial risk in the existing multi-unit SoP and this is seen to directly influence building design. In three of the cases, this situation remains unchanged, with development and construction costs continuing to be financed commercially by a party other than the end occupants, be they commercial developers (CitiNiche), not-for-profit developers (Urban Coup) or ethical investors (The Nightingale Model). None of these three cases change the risk profile to which the purchaser is exposed.

All cases eliminate one significant risk; that of not knowing who will be the building occupants, an important attribute in the pursuit of atypical dwelling design. In part, it is the removal of this risk which enables The Nightingale Model to execute an architecture of reductionism, shown via The Commons to realise a reduction in costs of approximately $65K per unit. Although in most cases future occupants do not make a financial commitment to purchase dwellings until pre-sale contracts are made, their active input into design briefing and design development promotes an increased sense of ownership in the process and a commitment to the project.

Regardless of the type of developer or investor engaged, all projects maintain a commercial imperative and necessarily provide an acceptable Return-On-Investment (ROI). Financial institutions generally require developers to demonstrate a minimum 20% ROI to approve project funding (Rowley & Phibbs 2012, p. 57). In comparison, The Nightingale Model's ethical investor contract stipulates a maximum ROI of 15% for Nightingale 1 and seeks to reduce this progressively to 10% or lower as the model is proven through implementation. The Urban Coup's not-for-profit developer is seeking a relatively minimal ROI on costs from purchasers, along with the retention of a portion of the dwellings developed, and development profit associated with these.[12] CitiNiche's commercial developers may be willing to accept a slightly lower ROI due to greater certainty of sales and potential for decreased settlement risk. Hence these alternative SoPs offer some savings off retail dwelling prices despite financial risk remaining with investors/developers. However, without realised projects, these propositions are yet to be tested.

[12] Documents detailing the financial agreements between Urban Coup and WPI have not been provided to the researcher. Information was collected from interviewees only.

In all cases, the costs of marketing, display suites and sales agents are minimised or eliminated. Such costs vary with project size, sales processes, and market buoyancy. In the final National Housing Supply Council Residential Cost Analysis, Urbis (2011) showed the cost of Marketing Fees and Sales Commissions as 3% of purchase price for a dwelling in a 50 unit infill development in Melbourne or Adelaide in 2010 (2.3% in Sydney, 2.5% Brisbane, 3.5% Perth). Sharam et al. (2015a, p. 4) however, suggest pre-sales campaigns by developers can amount to as much as 10% of project costs, particularly in investment driven projects where financial planners' commissions of 6% can apply. In the case of The Nightingale Model, the 'architect-developer' effectively replaces the sales agent and some costs associated with this activity will necessarily become embedded in the fees charged for professional services. An architect interviewed in relation to the existing multi-unit SoP observed architects and other consultants frequently undercharge for their services, limiting the time available to a project and compromising outcomes (AD3). In this light, it is likely the architect-developers leading Nightingale projects will need to revise their fee structures over time to reflect the reality of this unique process of development. Hence, although savings will be made in relation to marketing and sales costs, it may be less significant than anticipated as other consultants fees rise. In the CitiNiche case, where CitiNiche Pty Ltd charges 2% on project costs for all projects that proceed to development, less potential exists for savings.

The most unusual alternative case in relation to risk and cost is Property Collectives. Here the syndicate of owners, in the legal form of a company, assume all financial risk usually carried by investors and/or developer. At project completion, the syndicate members realise the profit usually paid to the developer as ROI, no marketing costs are incurred, and stamp duty applies only to land costs. As such, of these alternative cases, Property Collectives offers the greatest potential for financial savings to end users at the same time as offering a high level of design input. However, such savings come with considerable associated risk. In the development process all syndicate members, as company shareholders, are jointly and severely liable for the entire costs of project development; a situation which would be beyond acceptable risk to many households. This development structure means extreme caution need to be exercised in selecting development partners with compatible design objectives and limits the size of infill projects undertaken via this model. The relationship between risk, cost, and design input in these and other cases is discussed in Chapter 9.

An attribute these cases all have in common is they exist within the established management subsystem. They are hence required to navigate the existing policies and procedures of the planning, financial, institutional, and contractual systems which have evolved to facilitate the existing multi-unit SoP. In this context, each case has experienced a range of barriers over time, often forcing the restructuring of intentions to facilitate progress.

This chapter has introduced the four cases of CSO infill housing and provided an initial comparison of the SoPs they utilise or propose. The following chapter uses interview data to discuss the experiences of stakeholders to date; including instigators and participants' motivations, the extent of design input enabled, and barriers to realisation.

Chapter 8. Innovators' Experiences

This chapter uses primary data obtained in interviews to discuss the experiences of stakeholders in these innovative Australian Collective Self-Organised (CSO) projects. To expand on differences identified between the cases in Chapter 7, it discusses innovators' motivations, the extent of design input enabled, and barriers to realisation.

The researcher sought interviews with project instigators, project partners, group members, and residents, completing 13 interviews with stakeholders in February 2015. Twelve interviewees were project-level actants in specific cases, and one held a strategic advisory position to the Victorian State Government. The majority of interviewees undertake multiple roles as shown in Table 8.1. Interview topics focused on participants' motivations and experiences, with the number of questions varying from 14 to 20 depending on participant's role(s). For the interview schedule, see Appendix B. Interviews ranged from 50 to 120 minutes, were audio recorded, and notes taken by the interviewer. A small number of participants chose to remain anonymous, while the majority agreed to being identified. For consistency, all are referred to by pseudonyms.

8.1 Motivations

All interviewees sought to reside in inner urban areas with good public transport, to be close to the "urban vibe" (A5), and to engage in an "open-minded and progressive community" (A6). Acknowledging "the place you live has an impact on your life" (A6) many concurred with Tim Riley's assertion: "I don't want to live in the suburbs" (A2). This section discusses the motivations of interviewees to participate in CSO developments in preference to engaging in the existing multi-unit structures of provision (SoP). It identifies two main themes: financial and ideological.

In an environment of worsening housing affordability, financial motivation frequently focuses on reducing purchase costs. It can also involve reducing housing costs over the building lifetime or redistributing limited financial resources to achieve improved housing outcomes. Interviewees from Property Collectives were the most obviously financially motivated, attracted by the opportunity to access housing at a reduced initial cost. One resident of the Saint George Collective recounted a six-year pursuit to purchase a dwelling in the area, during which he "realised [we] couldn't afford where we wanted to live" (A3). Hence, while this interviewee described their primary objective as "…to get a house where we want to live…" (A3), the motivation to achieve this via the Property Collectives process

was primarily financial, with the reduced initial costs of self-development enabling access to an otherwise unaffordable housing option.

Table 8.1. Interview participants: Australian nested alternative cases.

		Project Level Actants						Strategic Actants					
	Primary role/name	Project Instigator	Facilitator	Group Member	Current Owner Occupier	Future Owner Occupier	Private landlord/investor	Architect	Project Manager	Group Member with Relevant experience/profession	Financial Partner/Developer	Housing Advocate	Pseudonym
CitiNiche	Instigator and Architect Ivan Rijavec	X	X					X					A1
Property Collectives	Instigator Tim Riley	X	X	X	X		Int*		X	X	X		A2
	Architect Dan Damant	X		X	X			X	X	X	X		A3
	Development Collective Member			X	X		Int				X		A4
	Resident				X								A5
	Development Collective Member			X	X		Int				X		A6
Urban Coup	Long-term member Nathan Alison			X		X							A7
	Long-term member Cath O'Shea			X		X				X			A8
	Recently joined member			X		X							A9
	Recently joined member			X		X							A10
	Registered Housing Provider Project and Development Manager Caroline Larcher								X		X		A11
Nightingale	Instigator and Architect Jeremy McLeod	X	X	X	X			X		X	X	X	A12
Strategic Actor	Senior Advisor, Urban Design and Architecture, Office of the Victorian Government Architect Tom Alves											X	A13
Number of interviewees	13	4	3	9	6	4	3	3	3	4	6	2	

* Int = intended

The Nightingale Model and Urban Coup both aim to achieve higher quality housing outcomes with lower environmental impact and lower operating costs for an initial cost comparable to average market prices in the area. To achieve this they redistribute project resources, realising housing different in form and function from that available in the existing SoP. Urban Coup will construct small private dwellings, relocating savings to shared facilities and sustainability infrastructure. The Nightingale Model trade-offs were discussed in 7.4. In these cases, the influence of financial motivations on design is related to the project instigators' or members' ideological motivations.

The interview data revealed three sub-themes of ideological motivations; community, environmental, and professional. Urban Coup members universally asserted they seek to reside in a community with a strong sense of neighbourhood and shared values. This community initiated project places importance on gradual community evolution through working together to establish group procedures and co-design the living environment. Interviewees identified the cohousing features as a main appeal of the project, seeing spatial, social, and environmental advantages to sharing (A7, A8, A9, A10).

> *More and more about having an authentic community about me … [there is a] joy people don't necessarily expect in sharing spaces, outcomes greater than the sum of the inputs … (A8)*

In contrast, The Nightingale Model and CitiNiche generate project initiated communities, formed by coalescing previously unlinked households around a design proposition. CitiNiche projects respond to niches defined by common lifestyle desires, and The Nightingale Model attracts households interested in the collaborative, reductionist approach to apartment dwelling offered. Residents of The Commons, as the precursor to The Nightingale Model, report positive experiences of a project initiated community.

> *I love my neighbours, I love the people that live here, I love the community aspect of things. I love that we live in the building where people know each other and we have a laugh, and we say hi. (Australian Institute of Architects 2014)*

> *There is beautiful design and there's beautiful fittings and features and all that, but essentially it's about how people live their lives and interact with each other. I think this place has put that as its central goal. (Australian Institute of Architects 2014)*

The financially motivated Saint George Collective residents expressed both surprise and delight at the community they had developed, observing that by working together to realise the dwellings the group grew closer. One resident suggested that "…if developers do it those people have nothing to do with each other necessarily" (A5), identifying a potential future challenge for CitiNiche projects.

The pursuit of community frequently co-exists with a desire for a more environmentally considered way of life (A3, A7, A8, A9, A10, A12). Urban Coup members and The

Nightingale Model designers are highly motivated by environmental concerns, concerns that directly inform building design, material selection, service provision, and management (A12). One interviewee described a desire for housing suited to a resource challenged future, wanting to "…find a way of situating myself more sustainably than typical [with] more community around than typical, a more resilient way of life." (A7) Another felt "society does not support" (A8) their personal choice to adopt a sustainable way of living and that cohousing will assist.

Property Collectives and CitiNiche informants did not identify environmental motivations, although the alternatives they propose are able to accommodate them. The Saint George Collective designer (A3) identified integration of climate responsive design principles and avoidance of high environmental impact materials as a core responsibility of architectural practice. This ideology produced a climatically responsive building which does not inhibit residents from embracing more sustainable lifestyles, and to which sustainable technologies can be retrofitted over time.

Despite such ideological views, "…architects are increasingly impotent in the complex process [of housing provision] as they [developers] ask us to do unliveable things" (A12) One architect observed the housing produced by the existing SoP requires occupants to compromise their lifestyle, to 'make-do' with the spaces and designs available to them (A1). CitiNiche and The Nightingale Model, are instigated by architects motivated by strong professional ethics; a desire to produce better quality environments for end users across multiple projects.

> *I'm an architect, I read the code of ethics when I became a registered architect… You don't just work for your client, you work for the broader community, you work for the end user. (A12)*
>
> *My job is making housing for humans, not product for profit … the people who live here, they deserve better. (A12)*

Each takes a different approach to their common goal. CitiNiche invites households into the existing multi-unit SoP, whereas The Nightingale Model proponents assert the existing SoP is incompatible with an architect's professional responsibilities, advocating a radical reconfiguring of the actor-network.

Residents without building experience also cited poor design as a reason to engage in alternative projects. Architects were motivated to instigate replicable, network-changing alternatives whereas residents had a narrower field of concern, focusing on addressing their personal housing needs.

> *I don't think I would ever buy off plan. (A5)*
>
> *I would never buy a townhouse if it wasn't something I had significant design input into because they don't fulfil what I find important. (A9)*

Stakeholders' decisions to participate in CSO developments in preference to the existing multi-unit SoP were informed by financial and/or ideological motivations. Ideological motivations inform financial decisions and, along with participants' fields of concern, can influence expectations in relation to design and process.

8.2 Design Participation

All interviewees seek multi-unit housing of differing design or finish to that of the existing SoP. The differences sought are various, reflecting motivations. Whether a particular case includes individual laundries, air-conditioning, or shared facilities is not important to this research; what is of importance is whether owners were enabled to express a preference for such inclusions and negotiate design outcomes. Thematic analysis of interview data reveals four aspects of design participation of importance: (1) the stages of provision where design participation is enabled, (2) the necessity to recognise owner-occupiers design input, (3) the balance between collective and individual design decisions, and (4) decision-making processes engaged.

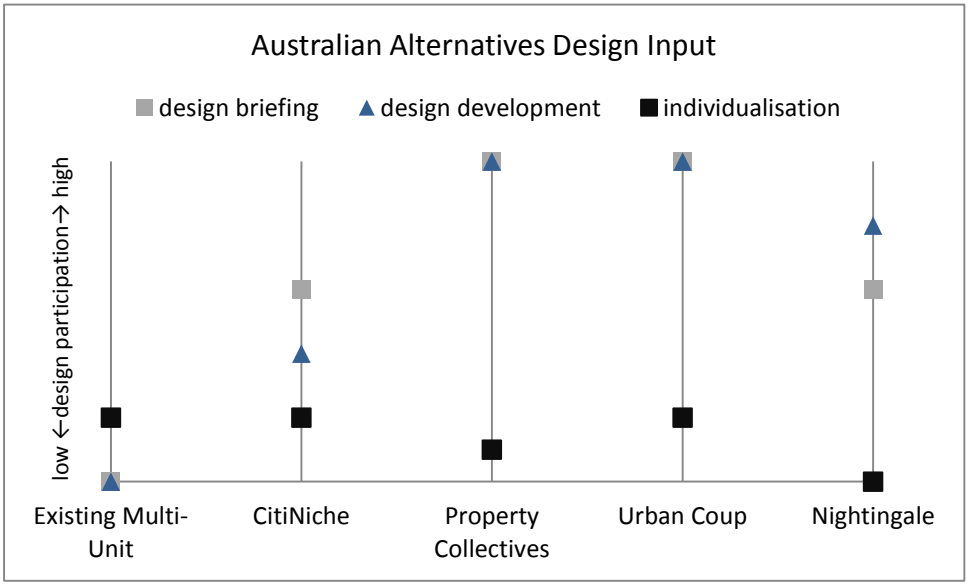


Figure 8.1. Stages and extent of Design Participation in Australian Alternative Cases.

All cases increase participation in design briefing and design development beyond the existing SoP (Figure 8.1), with differences evident between the project instigated communities and the community instigated projects. Both the project instigated communities collect interested households' lifestyle preferences and priorities via on-line surveys. Developers/designers interpret the survey results to propose projects they hope will attract enough interested households to proceed. Households joining a CitiNiche

project have two or more group meetings with the project partners during design development. However, the risk-carrying developer holds final decision-making powers and may defer to the open market. Hence, the CitiNiche process affords participants a design voice, but their participation is not essential in a buoyant market. During design development, The Nightingale Model households prioritise desired building attributes over others; with collective preferences determining the form and functionality of the final design. The design must satisfy both owner-occupiers and ethical investors, as construction proceeds only with financial commitment from both groups.

Community instigated projects engage owner-occupiers in the production subsystem, continuously and collectively, from project commencement. Members develop group protocols, establish partnerships, inform design briefing and development, and may engage in site selection. In Property Collectives, the syndicate of households owns the site and must approve the design before construction. Should a design not be agreed between Urban Coup members and the partnering not-for-profit developer, the developer, as landholder and development financier, could elect to proceed independently or on-sell the site. Hence, the necessity to integrate owner-occupiers preferences in design is unrelated to the method of project instigation.

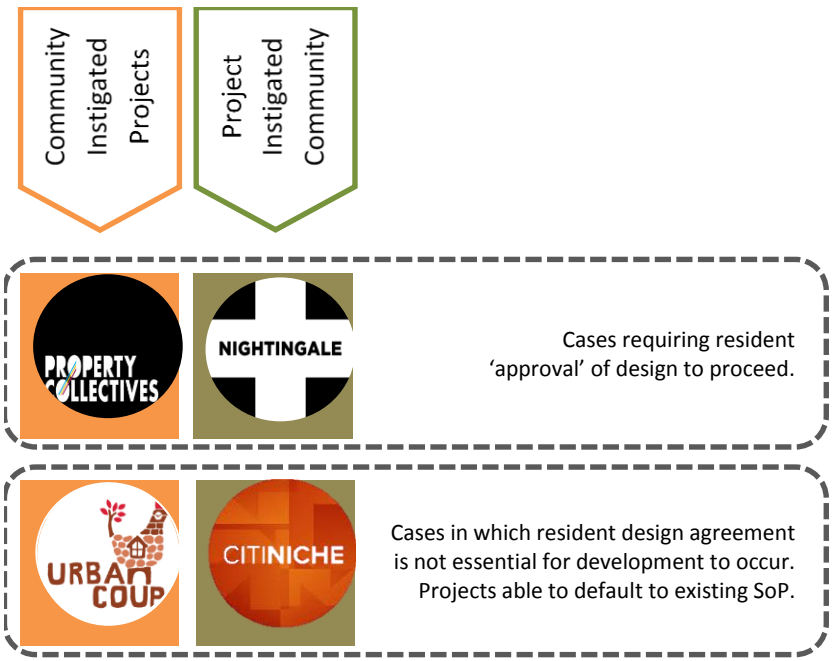


Figure 8.2. Alternative Australian Cases - Residents Design Influence.

Figure 8.2 shows that across the four cases, the need to recognise owner-occupiers' design input is more directly correlated with land ownership and finance structures.

Where a developer holds land ownership or the existing financial/funding processes and associated risks are not disrupted, it is possible for projects to default to the existing SoP. This emphasises the need for innovative SoPs to locate owner-occupiers in the actor-network such that their participation becomes integral to the project proceeding to construction. No case offers more individualisation than the existing SoP (Figure 8.1). CitiNiche and Urban Coup intend to provide two material finishes options. The Saint George Collective's only individual choice was kitchen wall tiles. The Nightingale Model's reductionist architecture removes most applied finishes and offers no opportunity for individualisation during construction, focusing instead on potential for individualisation during occupation; "we give a starting point for people to adapt their own homes" (A12).

No cases offer individualisation of floor plans or the ability to adjust spatial arrangements to household needs. The Urban Coup not-for-profit development partner asserted there must be "some limits, not a free for all for design, it is not like we are going to design 30 different looking homes" (A11). The architect of Nightingale 1 suggested spatial individualisation is "… too hard. On smaller scale maybe, but not in 20 to 30 apartments … we don't have the fees in there to do it … apartments at viable price point requires repetition" (A12). The need to minimise options is a view commonly held by project instigators/project professionals motivated to achieve industry change (A1, A2, A3, A11, A12). The provision of a limited range of options to "non-building-professional owner-occupiers" (A3) was described as appropriate to their experience, skills and capacity to have effective design input (A2, A3). In contrast, current and future residents expressed a desire for greater individualisation (A5, A6, A7, A8, A9, A10), however all identify that this increases complexity.

Minimal individualisation requires project-wide design decisions to accommodate all residents. For project instigated communities design decisions and product specifications rest with the architects/developers, whereas in community instigated projects members have collective influence over many decisions. Numerous interviewees identified the need for compromise in collective decision-making:

> *….I'll just let that go if someone else feels strongly about it … finding happy medium ground. (Property Collectives resident A5)*
>
> *I think there will be compromises… I think you can't always get what you want. The important things will be there. (Urban Coup member A9)*
>
> *…it's driven by them as end residents and owners … it's a compromise scenario, they're aware they need to compromise on their wish list to make it real. (Urban Coup not-for-profit developer A11)*

Interviewees from both community instigated projects emphasised the importance of a common vision in facilitating design decisions. The instigator of the Saint Georges Collective suggested subscription to a vision enabled members to accept the majority of decisions are made on their behalf "for the good of the whole" (A2), enabling projects to

proceed efficiently. Similarly, Urban Coup has a documented value set and vision which guides the project (A7, A8, A9). Their development partner credited this document with enabling them to satisfy the members of the community by addressing the common vision rather than individual's preferences (A11). Despite the almost complete removal of individual design decisions, Urban Coup members described their participatory design process as a proactive one which empowers them to set priorities for themselves (A7), providing the ability to "make our own judgement on whether it's important enough [to pay for]" (A8).

Making early collective decisions was relatively simple for members of the Saint George Collective. Conceiving the project with an investment focus, they described themselves as "looking at it as facts and figures … a step further away" (A4). The designer, who intended to reside in the development, also attempted to remove emotion from decision-making processes and stated: "it's deliberately not my dream home, it's a stepping stone … based on what would be financially and liveably feasible" (A3). All members suggested this emotional detachment simplified the process of reaching compromises (A2, A3, A4, A6), and all acknowledge this changed "[w]hen we knew we were moving in … [we] became more emotionally invested" (A5). In contrast, Urban Coup members have undertaken a time consuming process to develop a collective vision of an ideal living community, which for a large portion of households represents their 'dream home'. Interviewed members acknowledged their brief requires further amendment to suit a specific site and achieve financial feasibility, and that the "expectation adjustment" (A7) required is likely to pose a challenge.

The prioritisation of collective decision-making is emphasised by the procedures of the community instigated projects. Both defer allocation of individual dwellings until late into the design process; ensuring group members are concerned equally with the design quality and liveability of all dwellings. This avoids the tendency to prioritise one's personal concerns.

Urban Coup has a consensus-based decision-making policy and a dwelling allocation policy (Urban Coup Inc. 2015). Long-term Urban Coup members expressed satisfaction with the policies, but recognised that due to a lack of precedents their refinement had been a lengthy process (A7, A8). Newer members viewed the policies as too extensive, focussing excessively on potential conflict, and indicated that they would not willingly undertake the processes the longstanding members have experienced (A9, A10). All Urban Coup members described the policies as relevant in both production and consumption stages; important to the success of the future residential community.

In contrast, decision-making processes for Property Collectives are concerned solely with the production subsystem. Delivered in a short time frame, the Saint George Collective dedicated little time to refining decision-making processes. The primary instigator and designer, both now residents, asserted decision-making processes were contained in the

partnership agreement (A2, A3). The general concept being "the amount of involvement [each member had] depended on how much involvement they wanted" (A2), with all members afforded an opportunity to express views, and one vote cast per dwelling. The designer attributed this process with enriching the design as it included "…more opinions from different points of view, [was] more considered, and [had] more people pulling it apart" (A3). Despite this account of a balanced, equitable process, the description of other members as "silent partners" (A3) suggests an alternative perspective. Other members, now also residents, recalled the level of participation they were afforded was extensive (A4, A5, A6) and that requests for decision-making input were possibly more numerous than necessary (A4, A6). However, they asserted there was no decision-making, dwelling-allocation, or individualisation processes defined in advance (A4, A5, A6); that the "…process evolved. We just had to agree on it" (A6). This became problematic, leading to minor disagreements regarding designs options (A6), dwelling allocations (A4, A5, A6), property valuations (A4, A5) and remuneration for members' professional services (A6). Some members (A4, A6) observed a hierarchy developed within the group, and they "…did not necessarily have a vote like [others] did" (A6). These interviewees placed a high degree of trust in the instigators to do "the best they can" (A4), but suggest it would have been "better to have an agreed process before we started" (A6).

> *I think we rushed it, we found a site, there was always a deadline, the auction happens. [They] bought it and it's underway. Then there were design deadlines, planning deadlines… we were prioritising all those deadlines rather than ensuring all the decision-making processes [were] in place. (A4)*

The participation of future residents in dwelling design and production varies across the four cases. Community instigated projects offer greater opportunity for participation in design briefing and design development, but the centrality of resident participation varies not with how the project is instigated, but with the location of risk and land ownership. The prioritising of collective design decisions over individual choices is common to all cases, with no case increasing individualisation beyond the existing multi-unit SoP. The establishment of group decision-making processes for community instigated projects is critical to their success, with a non-hierarchical process preferable. However, where a hierarchical structure evolved within one group, residents continue to express a high level of satisfaction with the resultant dwellings and the lived experiences of the resident community.

8.3 Barriers Experienced

Past research by Rowley and Phibbs (2012) and Sharam et al. (2015a, 2015b, 2015c) identified barriers to infill development in Australian cities. The earlier work examines challenges to project feasibility on small scale infill sites and the later observes limitations

placed on apartment design by the management subsystem of the existing multi-unit SoP. Interviewees identified similar barriers as these previous studies. Additionally, interviewees identified barriers specific to the implementation of the CSO structures of provision they propose, and it is these unique barriers which are the focus of this section.

Strategic actant, A13, suggested that while alternative SoPs can improve affordability, improve design outcomes, and increase access to multi-unit housing for more households, the barriers to entry are high. Barriers identified by interviewees relate to three themes; accessing knowledge, time commitment, and the inflexibility of the existing network. Many of these barriers are experienced differently by community instigated projects and project instigated communities.

8.3.1 Accessing Knowledge

All four cases seek to increase the influence exerted by future residents while facing the challenge that "consumers lack professional knowledge about how to procure building and development per se" (A13). Community instigated projects draw expertise from within their membership. Initially instigated by design and construction professionals, Urban Coup attracts members willing to contribute professional skills to the project (A7, A8). Similarly, members of the Saint George Collective contributed extensive time and skills, fulfilling the roles of building designer and project manager (A2, A3). Interviewees recognised the membership of these project groups is not representative of the general population, with one describing the Saint Georges Collective as "an anomaly" (A3). It is not realistic for all community instigated groups to have internal access to such expertise.

Professional group members recognised the knowledge set necessary to deliver a project extends beyond the capabilities of any individual profession. Group members identified that partnering with others was essential to gather the full skill set required (A2, A3, A6), for example, one registered architect (A3) stated "[w]ithout [A2] there I couldn't have done it, the financial aspects of the project were too daunting for me". Similarly, the key protagonist of The Nightingale Model's architect-led development acknowledged "securing construction finance is a skill us architects don't have" (A12).

The lack of precedents adds to the challenge of accessing and collating necessary knowledge. Each group must establish financial, contractual and taxation arrangements suited to their specific circumstances, which the majority of interviewees identified as time consuming and confusing, with one suggesting each group tends to "reinvent the wheel" (A6). Long-term members of Urban Coup acknowledged they have "spent a lot of time finding out what wasn't possible" (A7) leading to "delays not just in design, but in finding the right path" (A8). They also recognised there exists little opportunity to transfer knowledge to others due to the one-off nature of the project (A7). The other cases each aim to generate replicable procedures over time. While each Property Collective syndicate is unique, requiring individualised agreements, there are aspects that will

become repeatable or adaptable as more groups develop in this way (A2, A6), including contracts and policies for decision-making and unit allocation. Holding unique knowledge required to enact the SoP establishes Property Collectives in a brokerage role as they mediate between other actants and control information flows. The costly legal and taxation advice, contracts and other documentation developed for The Nightingale Model will be publically available and can be used for multiple projects (A12, A13).

CitiNiche stakeholders did not identify accessing knowledge as a challenge, as the SoP proposes minimal variation to existing professional boundaries.

8.3.2 Time Commitment

Households engaging in CSO infill projects confront the interrelated challenges of collective decision-making and time commitment. Long-term Urban Coup members recognised the project has demanded more of their personal time than anticipated (A7, A8). They conceded "consensus decision-making is extremely slow" (A8), "a time burner" (A7), and unremunerated time requirements placed on members can be excessive and demotivating. This has contributed to members leaving the group and encouraged a policy of promoting the regular exchange of roles among group members. For some members of Urban Coup, the project has become a part-time occupation at times, with one member commenting: "I ask myself if it would be possible if everyone worked full-time" (A7).

Residents of the Saint George Collective also identified time commitment as a challenge over the duration of the project, noting it required regular meetings and "the excitement wears off pretty quickly" (A6). All residents observed differences in time commitment of participants, with those leading the project contributing 20 or more hours per week of professional skills to realise the project (A4, A5, A6), while others had less significant roles:

> *Others got a sweet deal, handed something on a plate but couldn't proceed without them. (A3)*

Time challenges also relate to project length. The Saint George Collective was completed in a time efficient 33 months from site purchase. Urban Coup, in contrast, is yet to purchase land after more than a decade of pursuing their collective housing ambitions. An estimated 80% turnover of members has occurred (A8), some leaving for personal or other reasons, but some due to the lengthy time frame. Current off-the-plan unit sales typically aim for a completion time frame in the range of two to three years, Property Collective have shown this to be feasible for community instigated multi-unit sites also. Current and future Property Collectives projects will test the replicability of this time frame.

Experienced property developers emphasise speed in approval and construction processes due to its direct association to costs and profit. Steele argues a slower approach

to housing development is required when engaging in "alternative/unorthodox approaches that support and promote community-based initiatives, sustainability and social equity in the face of 'fast capitalism'"(Steele 2012, p. 179).

Time challenges also relate to project length. Current off-the-plan unit sales typically aim for a completion time frame in the range of two to three years. Having completed the Saint George Collective in a time efficient 33 months from site purchase, Property Collective have shown this to be feasible for community instigated multi-unit sites also.[13] Urban Coup, in contrast, is yet to purchase land after more than a decade of pursuing their collective housing ambitions. An estimated 80% turnover of members has occurred (A8), some leaving for personal or other reasons, but some due to the lengthy time frame. While a shorter project time frame is desirable for Urban Coup, the increased number of invested human actants and some stakeholder lack of development experience would suggest matching speculative development schedules is unrealistic. Steele argues a slower approach to housing development is required when engaging in "alternative/unorthodox approaches that support and promote community-based initiatives, sustainability and social equity in the face of 'fast capitalism'"(Steele 2012, p. 179).

8.3.3 Inflexibility of Existing SoP

Each interviewee identified situations in which the existing SoP, and the processes it has brought into being, have resisted the alternatives they propose. Having described a spectrum of multi-unit housing provision possibilities ranging from speculative development at one end to groups of consumer households initiating self-developing at the other, A13 observed the constraint of the existing SoP "often pushes what would have been consumer initiated to somewhere else on the spectrum". This section discusses barriers in the interlinked subthemes of risk, finance, reflective practices, and land.

RISK

The existing SoP has developed mechanisms to contain and control risk. Many stakeholders in CSO projects are motivated by potential cost savings, but achieving more affordable housing through the avoidance of developers' profits requires the relocation of risk. With risk formulas based on the existing SoP, multiple banks declined to fund Urban Coup and The Commons, advising the instigators to partner with an experienced developer (A12, A8, A7). Hence The Commons was delivered in partnership with a commercial developer and Urban Coup established an agreement with a not-for-profit developer after holding discussions with commercial developers who they concluded were not good "value for money" (A8). The perception that deviation from established processes increases financial risk undermines the instigators' intention to self-develop. In

[13] Current and future Property Collectives projects will test the replicability of this time frame.

response, Urban Coup members concede they will not achieve the cost savings originally sought:

as it's gone on we realised it's not going to be affordable housing. (A7)

The Nightingale Model instigators have established an alternative funding system for land purchase and construction as described in 7.4. However, financial institutions continue to require a development profit of 15% in project budgeting. This is lower than that required for typical development funding and was negotiated with financial institutions based on 100% pre-sales. Even with this high pre-sale quota financial institutions view lower profit as "too risky" (A12).

Property Collectives face fewer challenges in securing finance without a developer. As the only case that relocates financial risk entirely to the self-developing collective, they are able to access funding provided the final market value of the housing exceeds costs. Collective members effectively receive the developers profits as equity in the completed dwellings, delivering a "pretty reasonable return-on-investment" (A3). "Banks love it because they can see right from the start where the money is coming from to pay down the construction loan" (A2).

When purchasing existing or off-the-plan multi-unit dwellings, purchasers negotiate mortgages with loan-to-value ratios (LVR) as high as 90 or 95% depending on economic climate and markets. Development loans however typically limit this to 65 to 70%, requiring access to higher equity levels (A12, A11, A13, A2) (Sharam et al. 2015b). In Property Collectives, this requires members to have access to larger than typical deposits, limiting participation. All Property Collective members are also jointly and severally liable for the full amount of development debt until construction is complete, property titling approved, and individual units refinanced. The Property Collectives case shows the capacity to relocate risk and profit in the network in a way which is acceptable to financial institutions, it does however require future residents to accept a high level of risk themselves, something which project participants are reluctant to undertake (A7, A8, A9, A10, A11, A13). Hence, while interviewees identified resistance from financial institutions, the risk profile acceptable to the households involved also acts as a barrier to implementation, reinforcing the dominant role of the financing developer in the SoP.

Figure 8.3 compares risk, design participation, and potential cost savings across the existing and alternative cases. All cases except Property Collectives maintain a level of risk to owner-occupiers equivalent to that experienced in the existing SoP. CitiNiche offers a small opportunity for financial savings, but this is less significant than that offered by Urban Coup and The Nightingale Model which propose greater variations to building and dwelling form and function. Of the three innovative cases that do not increase financial risk to owner-occupiers, Urban Coup is able to offer the greatest opportunity for design input as it has invested heavily in the process of enrolling fellow actants into its

shared vision. This has, of course, required a lengthy time commitment from members and has not yet realised a built project. Property Collectives, in comparison, offer the highest level of design input and by far the greatest potential savings, which correlates with a high level of financial risk to members.

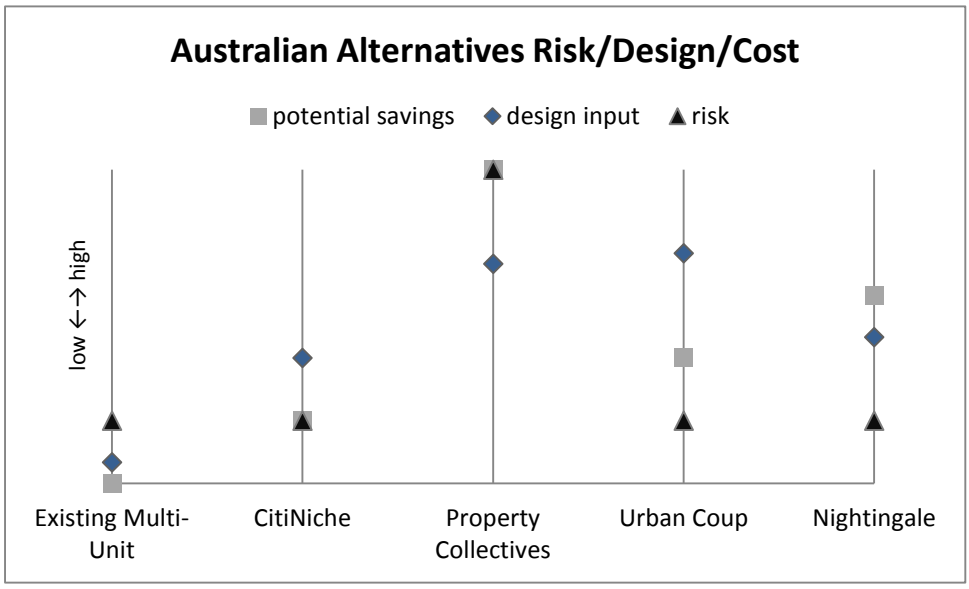


Figure 8.3. Australian Innovative Cases: risk, design, and cost.

These interview findings relate directly to findings by Sharam et al. (2015b) who interviewed residential development financiers regarding loan parameters for self-development of multi-unit housing. Sharam et al. showed the key financial barriers to alternative multi-unit SoPs to be the credibility of the project proponent, loan security, equity, pre-sales, profitability, and loan-to-value ratios.

FINANCE

All cases except Property Collectives source funding through a developer or other third-party; a commercial developer for CitiNiche, a not-for-profit developer for Urban Coup, and a group of ethical investors for The Nightingale Model. To access construction funding financial institutions require these entities to establish pre-sales contracts with the purchasing households (A1, A12, A11). Following Australian Consumer Law intended to protect off-the-plan purchasers' interests, pre-sale deposits are held in trust until settlement. This stops households using their own equity to secure construction funding, becoming an unintentional barrier to self-development. It "stops investors using their own equity to build for selves" (A12) and, again, acts to reinforce the role of developers in facilitating finance, with associated costs to the occupant.

> *Biggest [barrier] is not letting owner/occupier use their hard earned savings as equity in development… It is risk aversion which hurts the very people it's meant to protect… [the fact you] can't use investors' money as equity because you need it as a deposit for the bank is an absolute travesty. (A12)*

These financial constraints within the existing SoP act as barriers to implementation of alternatives. The Nightingale Model establishes a financial model which represents a compromise between the instigators' vision and the everyday practices of financial institutions; a "[h]appy medium between what I accept as acceptable return and banks accept as perceived risk" (A12). The ambition is to develop trust in the architect-as-developer SoP over time, allowing a progressive "tuning down" (A12) of profit expectations and an higher loan LVRs.

Reflective Practices

Property Collective instigators describe their housing as relatively typical in function (A2, A3), and thus easily valued in the existing market. However, when dwelling form or function deviates from the typical, barriers in property valuation can be experienced. Valuers view the removal of car parking from Nightingale buildings as reducing amenity and representing lower value despite reduced living costs and other spatial advantages (A12). Equally, there are limited precedent sales to reference when valuing the proposed cohousing dwellings of Urban Coup (A7, A8). With access to finance directly based on anticipated property value, the personal views of property valuers can be a barrier to alternative housing outcomes. This barrier was primarily of concern to project instigators. One interviewee described it as "ludicrous" (A12) that valuers, the least qualified professionals in the SoP, possibly no experience of multi-unit living, and little exposure to alternative design options, should have such influence on housing outcomes.

Land

A barrier in all cases has been accessing appropriate land for development. Difficulties occur in relation to market competition, the speed of land sales, and future residents' expectations. CitiNiche, The Nightingale Model, and Urban Coup are all seeking land of a size and location which is equally of interest to commercial developers. Market competition drives land prices up and challenges project feasibility. Urban Coup, seeking a site of 3,000m^2 for 30 dwellings (A7, A8, A11) are in direct competition with developers who tend toward higher densities and hence are willing to incur higher land costs (A11).

Direct competition with developers also has time implications. Experienced developers with established professional and financial relationships are able to respond to land opportunities more rapidly than an inexperienced, self-organised group of households. Members of the Urban Coup land search team observed that land sales frequently occur quietly between industry players without public notification, and "the speed of land sales is too fast, we can't keep up with developers" (A7). Interested primarily in Melbourne's

inner north these groups are additionally competing in a heated real-estate market. Newer Urban Coup members, along with their development partner, suggest site purchase has been slowed, in part, by members' reluctance to alter their expectations regarding site location and size (A9, A10, A11). A13 concured, asserting "planning for new types of housing needs to be holistically reconceived" to improve financial feasibility, including the need to alleviate competition in high demand locations.

Competition with developers for land is less significant for Property Collectives, who undertake relatively small projects. With projects ranging from 4-9 townhouses, Property Collectives pursue land which is of less interest to apartment developers, existing in a "niche land market" (A2). There was some interest in the Saint George Collective site from small-scale developers at the time of land acquisition, but as an unusually proportioned site, it was "only interesting to developers if super cheap" (A3), which allowed the collective to successfully compete. The subsequent Clark Street Collective site is larger and elicited more interest from developers. The Collective initially sought to construct six dwellings, however, a bidding developer based their feasibility on the site maximum of ten units. Hence, the site costs escalated, with the resultant purchase price forcing the Collective to expand to seven for financial feasibility (A2). The developer's interest in the site has compromised the future residents' planned living environment.

Stakeholders' experience of the inflexibility of the existing SoP differs between cases, with Property Collectives deviating from the existing SoP the least with regard to dwelling design and experiencing the fewest difficulties to date. The founder of Property Collectives stated that they were not confronted by anything within the existing SoP which they sought to change but were unable to (A2). In contrast, Urban Coup and The Nightingale Model, each has attempted to negotiate the existing SoP with varying degrees of success. It is interesting to observe that no interviewees raised the current urban plans or town planning approvals as barriers to implementing their alternative multi-unit SoP. However, following the interviews, the Victorian Civil and Administrative Tribunal overturned the Moreland City Council Urban Planning Committee's February 2015 decision to approve the first Nightingale building after an appeal by neighbouring property owners (Byard 2015). A second approval was obtained 12 months later following design revision, incurring additional costs and time delays (The Nightingale Model 2015).

Each of these CSO cases has sought to reconfigure the existing, stabilised black-box of multi-unit provision. To varying extents, they have been faced with resistance to change, which A13 suggests results from the vested interests in the current system which "work against reforms". More innovative solutions may be possible with greater freedom to move beyond the constrictions of the existing SoP. The following chapter presents actor-network mappings of these four cases, observes differences between them employing an actor-network lens, and contrasts the different types of network interventions each proposes.

Chapter 9. Comparing Innovators' Actor-Networks

This chapter compares the actor-networks of the four innovative multi-unit projects from Australia. It makes both visual and metric network observations, comparing the information flows between key actants in each network to identify variations. The chapter concludes by positioning the alternative cases in Gulati and Srivastava's (2014) framework of constrained agency, which proposes the interplay of network actions, actors' motivations, and resources which can enhance network insight.

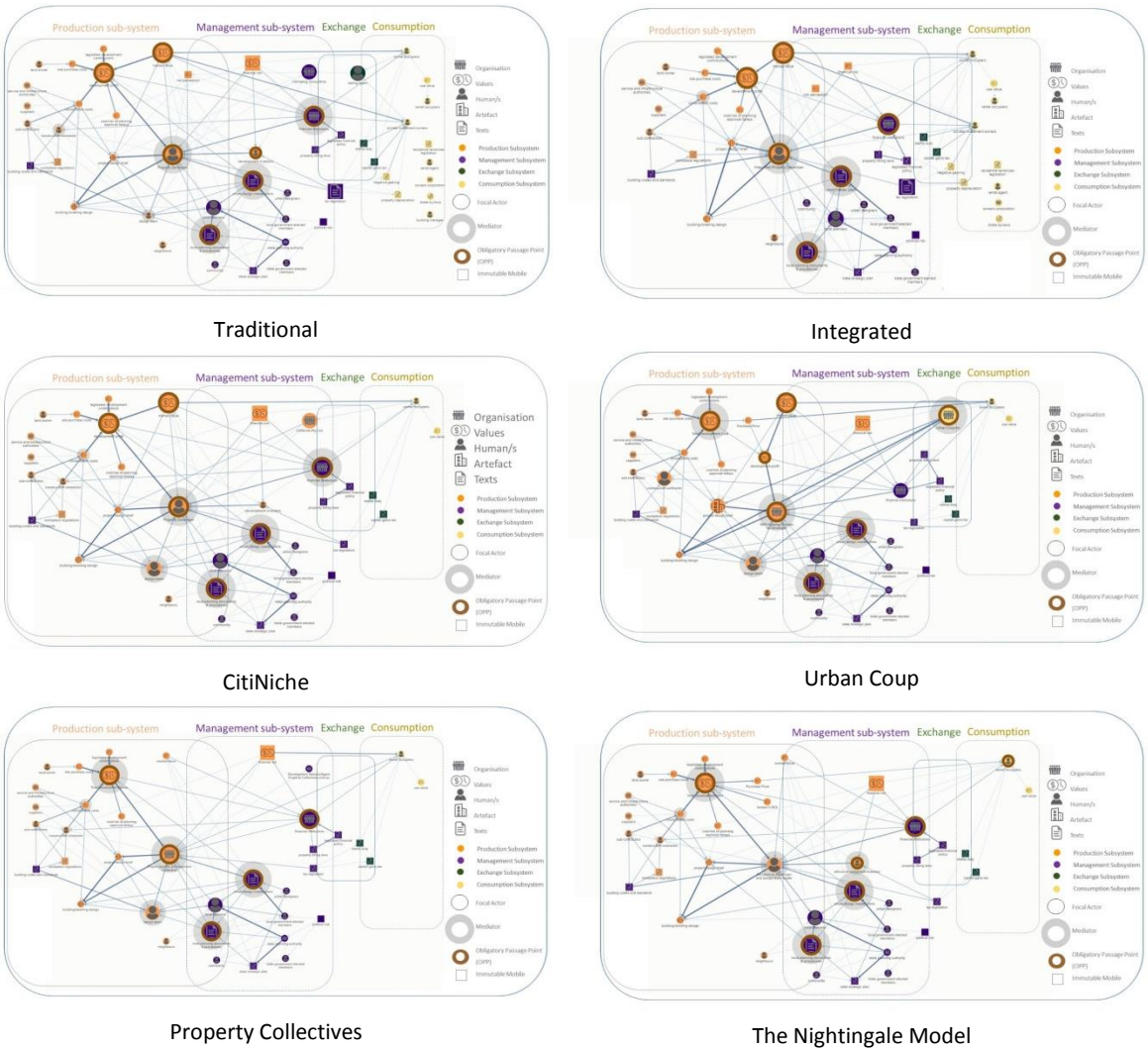


Figure 9.1. Actor-network maps of existing and innovative multi-unit structures of provision. ^

9.1 Innovator Maps and Metrics

Information from personal communications with project instigators, publically available documents, and primary data from stakeholder interviews informed the construction of actor-network maps representing the four innovative cases. Figure 9.1 shows the actor-network maps of the existing and alternative multi-unit cases.

Visual observation of the actor-networks reveals differences not only between the existing and innovative networks but also among the innovators themselves. Four features are of particular interest. First, the consistency of many actors across all cases is evident, highlighting again the fixed attributes of the Structures of Provision (SoPs). The shading in Figure 9.2 indicates the network actants whose associations remain unchanged across all the actor-networks. Included are many non-humans, previously identified immutable mobiles, and the vast majority of actants in the management subsystem. The unshaded actants are the ones who change roles across the alternative cases. Most variation occurs in the Production subsystem, with the network changes executed there altering the capacity of others to influence design across all subsystems.

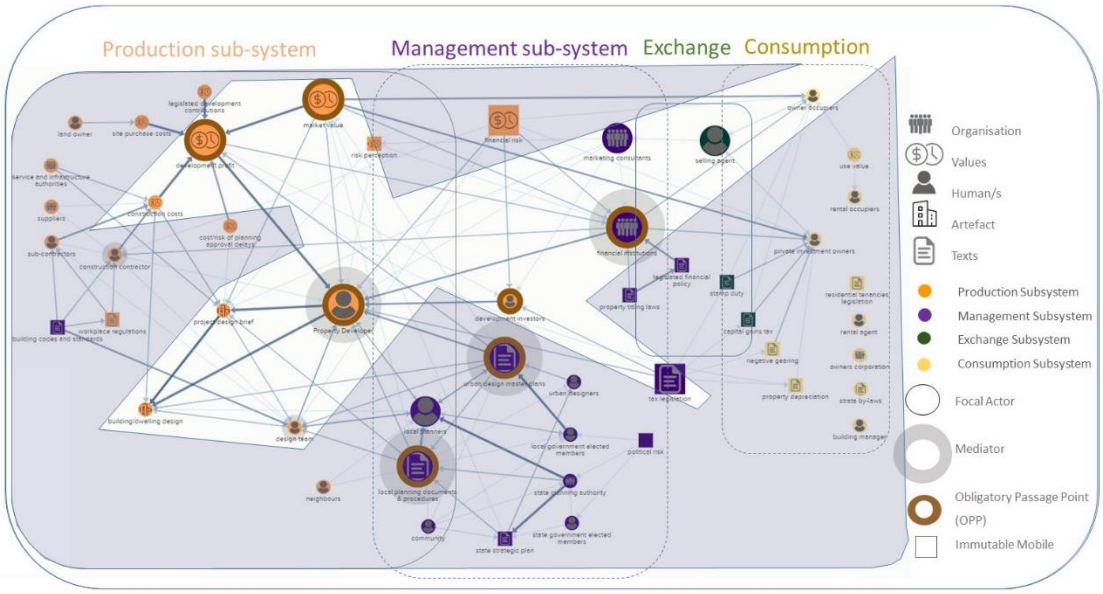
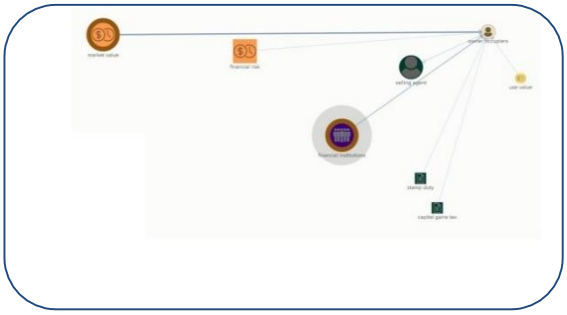


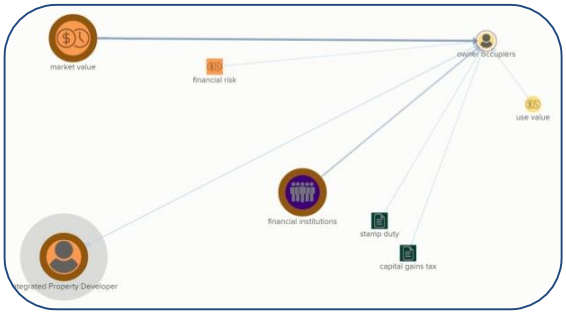
Figure 9.2. Existing multi-unit SoP. Masked actants unchanged across all alternative SoPs. ^

As the proposed SoPs remove private investment owners from the actor-network, the design influence of tax legislation diminishes. Hence, tax legislation is an exception to the consistency of non-human actors in the management system and is not a key influence on design outcomes in these Collective Self-Organised (CSO) housing projects. Secondly, the exchange subsystem actants, identified in the existing SoP as bridging between owner-occupiers and the production subsystem, are absent from the alternatives. With no key actants located primarily in the exchange subsystem of any of the CSO networks,

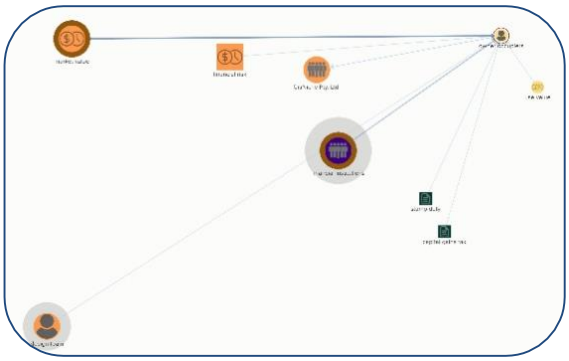
the focus on housing as an exchange commodity reduces. CitiNiche Pty Ltd broker between the future owners and the design/development team. In all other cases, a direct connection exists between future owners, or owners' groups, and key human actants in the production subsystem. No such tie exists between human actants in production and consumption subsystems in the existing SoP. Thirdly, direct ties between owner-occupiers and key human actants in production increase for community instigated projects in which future occupants act as a client group. Figure 9.3 shows the ego-networks of owner-occupiers.



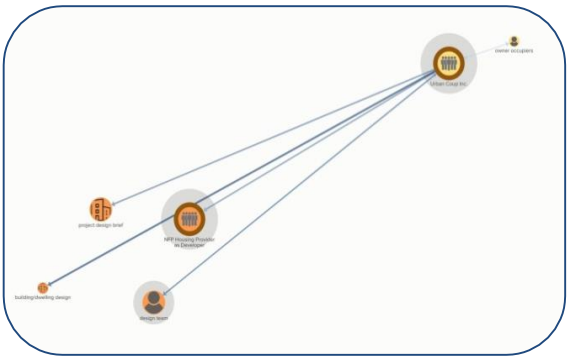
Traditional SoP.
Ego-network of Owner-Occupier



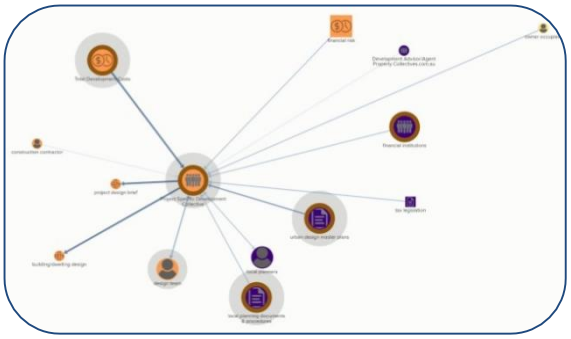
Integrated Developer SoP.
Ego-network of Owner-Occupier



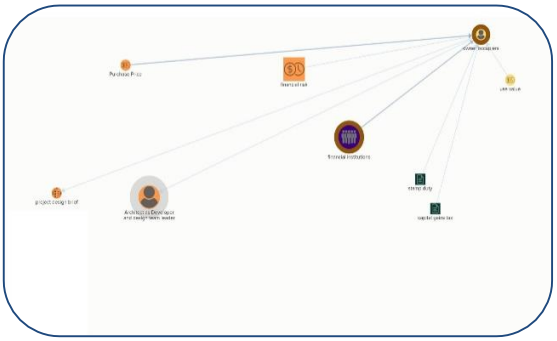
CitiNiche
Ego-network of Owner-Occupier



Urban Coup
Ego-network of Urban Coup Inc as client group



Property Collectives
Ego-network of Project Specific Development Collective as client group and self-developer



The Nightingale Model
Ego-network of owner-occupier

Figure 9.3. Ego-network maps of owner-occupiers in alternative multi-unit SoPs. ^

CitiNiche provides a relatively similar connection between the occupants and the production system as the integrated developer, with the difference being that in CitiNiche, the owner-occupier engages directly in a specific project and provides input into the project design brief. In other cases, the owner-occupier household maintains ties to financial institutions, financial risk, stamp duty, capital gains tax, and use value as stable components of the network, but other ties vary. For example, the owner-occupier in The Nightingale Model is no longer directly connected to market value, a key actant influencing design outcomes in the existing SoP, but is now connected to the alternative actant of purchase price and has a direct influence on the project design brief. Urban Coup owner-occupiers, as a member of the client group, have more direct input into the project design brief than in either CitiNiche or The Nightingale Model. The group of owner-occupiers guides design information across the SoP, directly informing production from their primary position in the consumption subsystem. The Property Collectives ego-network moves away from the attempts to bridge distant subsystems seen in the other cases. Here the client group, as self-developer, relocates itself into the centre of the production subsystem, becoming one of the most centrally connected actants in the SoP, with links to all key actants as well as the project design brief and building/dwelling design.

Fourthly, the number, type and location of key actants, identified by repeating the techniques detailed previously (Chapter 5 and Appendix E), varies across the networks. Some actants maintain their influential position in the actor-network as ties and flows become modified around them, whereas others lose or gain influence in design. Figure 9.4 provides a simplified view of all the actor-networks, showing only key actants. As shown previously, the Integrated Property Development model employed by some existing developers reduces the number of key actants in comparison with the Traditional Development model. The Property Collectives case achieves an actor-network with the same number of key actants as the integrated developer. The other three cases also have fewer key actants influencing design outcomes than the traditional development model.

There are more humans as key actants in all the alternatives cases than in the existing SoPs. All except CitiNiche include the owner-occupier or the client group as a key actor in design. Shifts are evident across subsystems, with all alternatives having fewer key design actants in the management subsystem than the existing SoP. Urban Coup shows by far the highest number of key actants in the production subsystem, with many more humans actively engaged in design decision-making. This suggests a more complex production process, which concurs with information provided by interviewees. In contrast to the existing SoPs, Urban Coup and The Nightingale Model both have key design actants in the consumption subsystem. So too does Property Collectives, given the project specific development collective dissolves at the completion of construction and its members become the owner-occupier community. These three innovative SoPs therefore have a greater capacity to address the needs of future multi-unit housing residents through direct engagement.

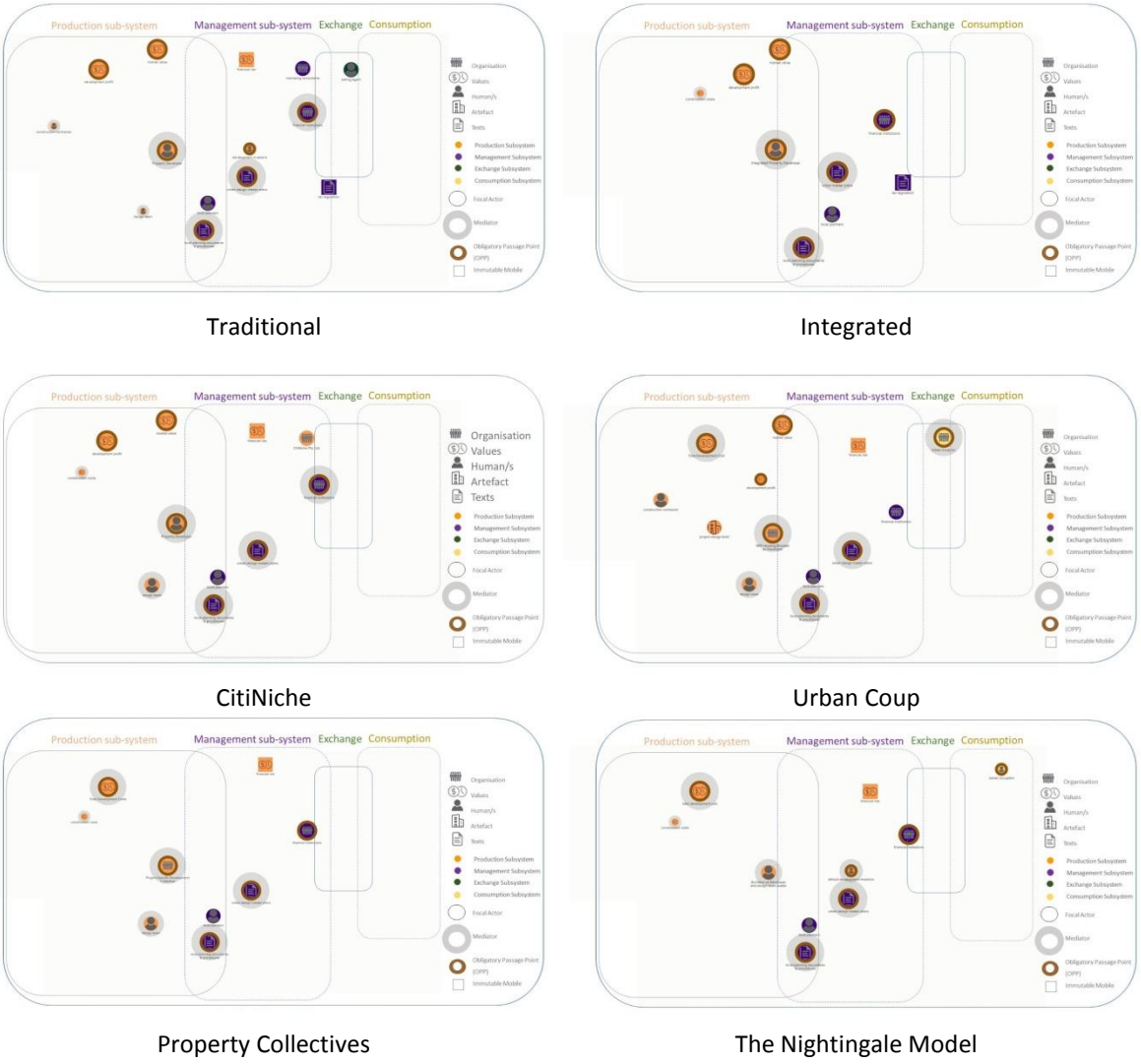


Figure 9.4. Key Actants of existing and innovative multi-unit structures of provision. ^

To compare the different SoPs, Figure 9.4 shows the key actants in the existing and alternative SoPs. These are also summarised in Figure 9.5 to Figure 9.7. The most consistent actants are in the management subsystem and are non-humans or, in the case of local planners, those humans administering prescriptive texts and rules such as the local planning documents. Local planning documents, including urban design master plans, are the only actants to be focal actors, mediators, and OPPs in all cases. Financial risk is a focal actor in all cases, highlighting the inherent risk in all development regardless of the development method employed. The developers present in each actor-network are focal actants and design mediators in all cases. These consistencies across the SoPs

identify the network actants capable of resisting changes proposed by others, in some cases preventing other actants from initiating network translations.

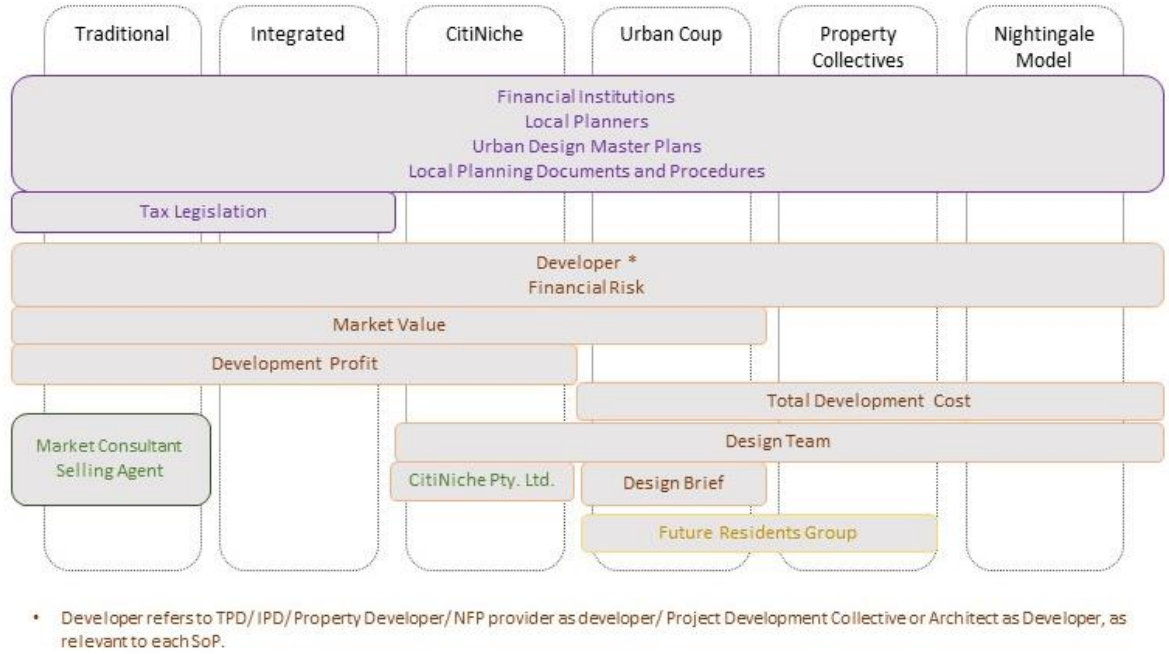


Figure 9.5. Focal Actors across all Structures of Provision, coloured by primary subsystem.

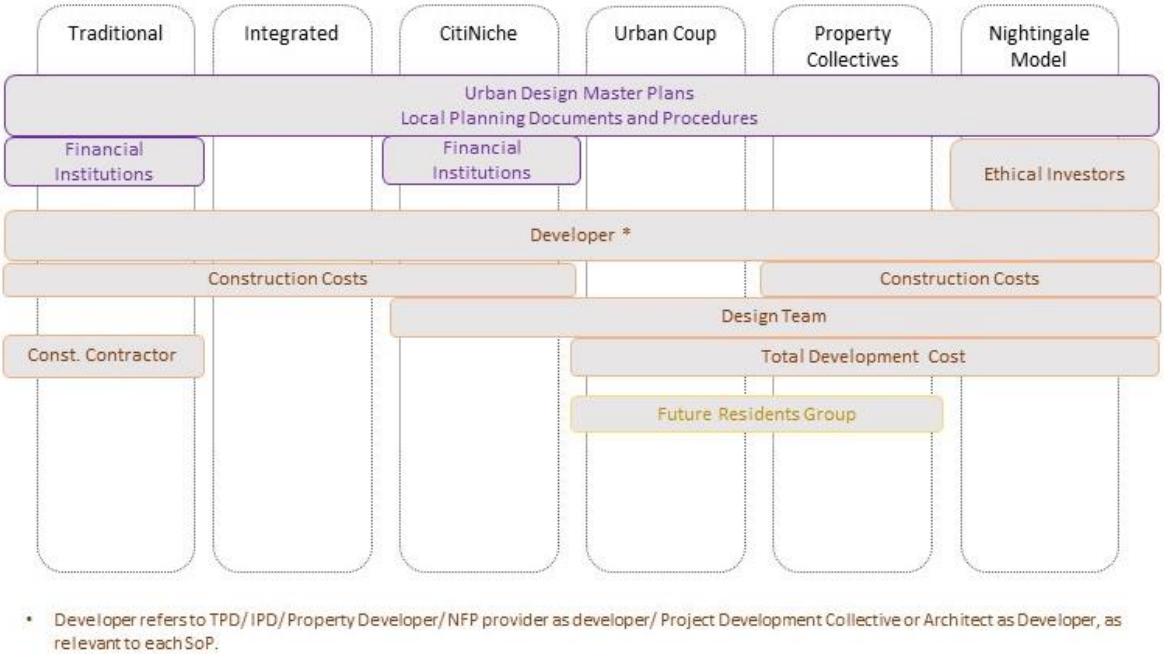
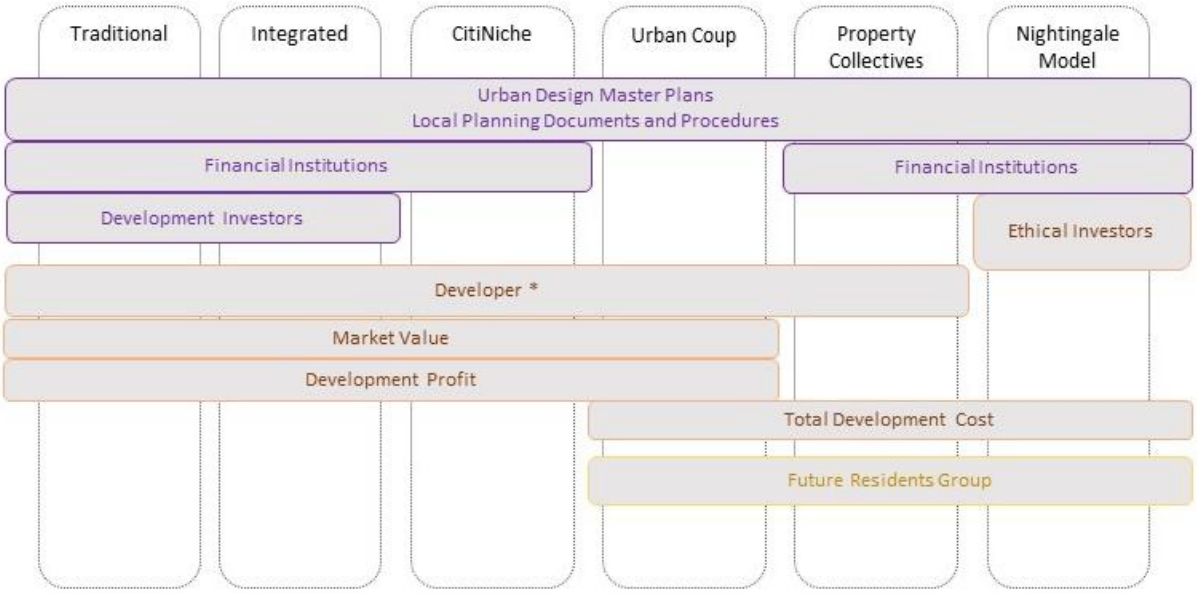


Figure 9.6. Mediators across all Structures of Provision, coloured by primary subsystem.



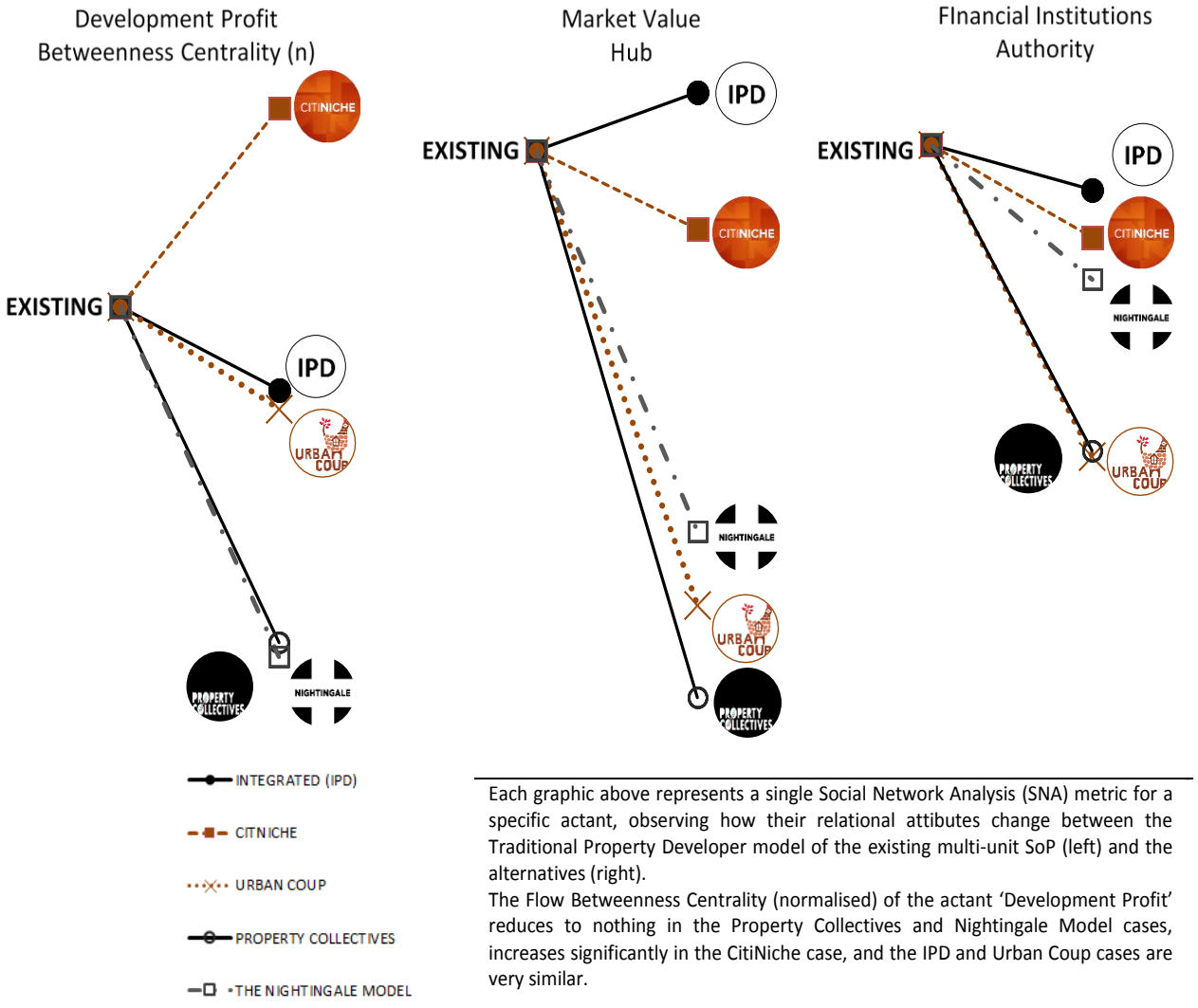
• Developer refers to TPD/ IPD/ Property Developer/ NFP provider as developer/ Project Development Collective or Architect as Developer, as relevant to each SoP.

Figure 9.7. OPPs across all Structures of Provision, coloured by primary subsystem.

Figure 9.5 to Figure 9.7 also show attributes which vary across the different actor-networks, including the fact that where the developer is not seeking to realise maximum development profit (The Nightingale Model) they are no longer an OPP for design but relinquish this role to their ethical investors and the future residents. In three of the innovative cases, development profit is no longer a focal actant in relation to the flow of design information as its position in the actor-network reduces its flow betweenness centrality. Total development cost replaces development profit as a focal actant, and also becomes both mediator and obligatory passage point for design. This represents a network shift from ensuring maximum profit for developers and investors to ensuring effective value to consumers. The exception is CitiNiche, where the dominant role of developers and investors is undisrupted and the flow betweenness centrality of development profit greatly exceeds that of both the existing actor-networks (Figure 9.8). Given it is also an obligatory passage point, development profit has a greater capacity to influence design outcomes in the CitiNiche model than in any other SoP.

Cases which avoid engagement of a commercial or not-for-profit developer, either by groups of clients self-developing (Property Collectives) or professionals working for set fees rather than profit margins (The Nightingale Model), the influence of market value on design is greatly diminished (Figure 9.8). In these cases, market value is no longer a focal actor or an obligatory passage point, with market value being disconnected from the financial costs incurred by the owner-occupier who now pays true costs.

The hub measure of market value reduces in all cases compared with the existing SoP, indicating less connection to actants with authority (Figure 9.8). In the CitiNiche SoP, market value remains the actant with the highest hub measure in the network, supplying more design information than local planning documents, master plans, strategic plans, or design briefs. The reduction is more significant for The Nightingale Model, Urban Coup and Property Collectives, in all cases reducing the connection of market value to authoritative actants to less than that of planning documents and the design brief. This reduced impact of market value on design does not suggest it becomes insignificant, as it continues to inform loan-to-value ratios for obtaining mortgage finance. Property valuers' reflective practices continue to act as a barrier to change however, the degree they influence design outcomes reduces. In the CitiNiche and Urban Coup cases, the feasibility of a housing project remains directly linked to development profit and market value, both of which continue to be obligatory passage points to development.



Each graphic above represents a single Social Network Analysis (SNA) metric for a specific actant, observing how their relational attibutes change between the Traditional Property Developer model of the existing multi-unit SoP (left) and the alternatives (right).
The Flow Betweenness Centrality (normalised) of the actant 'Development Profit' reduces to nothing in the Property Collectives and Nightingale Model cases, increases significantly in the CitiNiche case, and the IPD and Urban Coup cases are very similar.

Figure 9.8. Comparison of SNA Metrics for network actants in Innovative Cases.

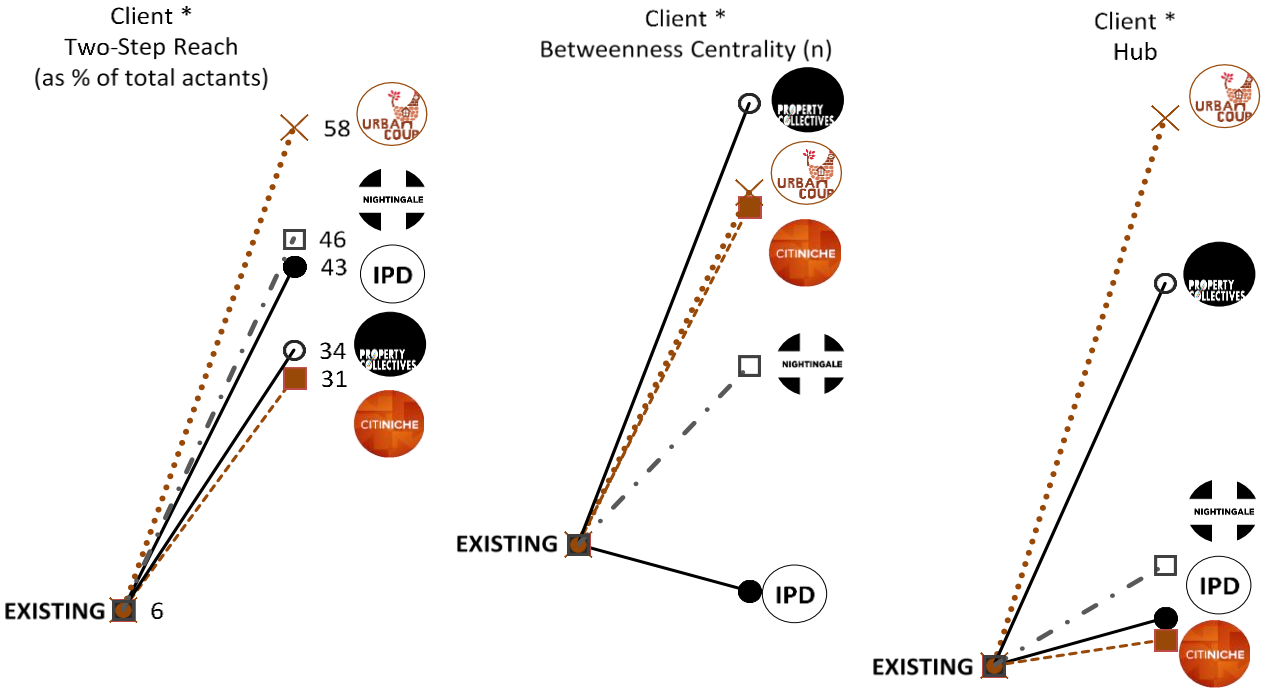
The shifting role of financial actants affects the influence of financial institutions. CitiNiche reinstates the role of the financial institution as design mediator as the developer accesses funding via the existing SoP. This is reflected by a higher authority measure for financial institutions in the CitiNiche actor-network than any other alternative case. The opposite occurs in the Urban Coup model, with financial institutions losing their role as an obligatory passage point as the contractual relationship with the not-for-profit developer reduces the financial institution's risk profile. By far the greatest fall in authority measure for financial institutions is seen in the two community instigated cases, both of which have client groups directly informing the project design brief.

The absence of the design team and project design brief as key design actants is notable in the existing SoP. The SoPs of the innovative cases all address this, with the design team identified as both focal actors and design mediators, increasing their capacity to act (agencement). The change in the role of the design team does not result from changes to the design information they receive or distribute, but from a structural shifting which increases their centrality, reach, and influence. This modification to the actor-network supports designers in executing their skill set outside the constraints of the profit-driven development cycle. As noted by an existing stakeholder, architects “are the ones that will provide the most opportunity to anticipate or accommodate potentials of habitation” (AD1).

The Urban Coup differs from all other cases in that the project design brief becomes a focal actor in the network because of its high in-degree. For the Urban Coup SoP, the project design brief represents the shared vision of the group members, it reifies the collective future vision to assist the flow of design information through the network and enable effective negotiation between actants. Its position as a centralised actant in the Urban Coup actor-network means it establishes ties with more authoritative actants, resulting in it having the second highest hub value in the network after Urban Coup Inc. itself. In the traditional developer SoP the project design brief has the 15th highest hub value in the network, in the Integrated Project Developer SoP, this increases to 5th highest, which exceeds those of Property Collectives (7th), The Nightingale Model (8th), and CitiNiche (12th). Hence, not all SoPs that enable owner-occupier input into the project design brief subsequently locate that brief in a structural network position that enables it to have maximum impact on design. Urban Coup, The Nightingale Model, and Property Collectives all disrupt the flow of design information from development profit to the project design brief.

Differences in owner-occupier's roles across SoPs is significant, with only some of the alternative SoPs having key actants located in the consumption subsystem. Members of the Urban Coup and Property Collectives client groups have the greatest influence as focal actors, mediators, and obligatory passage points. As focal actors, they are capable of recruiting others to engage in their design vision. As mediators, they influence and change

design outcomes; and as obligatory passage points, they must be satisfied with the project design for development to proceed. In contrast, The Nightingale Model owner-occupiers are only obligatory passage points, and CitiNiche owner-occupiers are not located in the actor-network in a way that enables them to be key design influencers (Figure 9.9).



* The term client refers to individual owner-occupier households in the existing SoPs, The Nightingale Model and CitiNiche cases. In the community instigated projects it refers to the client group, that being Urban Coup Inc, and Project Specific Property Collectives.

Figure 9.9. Comparison of SNA Metrics of Clients in Innovative Cases.

A significant change for the owner-occupier/client group in the actor-network is an increase in the proportion of network actants within two-step reach, increasing from 6% in the existing multi-unit SoP to 58% for Urban Coup Inc. All innovative SoPs also increase the client group or owner-occupiers flow betweenness centrality (n), showing they are structurally located in positions of greater influence than in the existing SoP. Multiple measures interact in the network, with the ability to reach more actants not being of benefit unless they are also influential actants able to be recruited or supplied with alternative information. Hence, while all networks increase two-step reach, only the two cases featuring client groups (Urban Coup and Property Collectives) provide the clients/owner-occupiers with both high betweenness centrality (brokerage) and high hub

values indicating strong links to authoritative actants. Figure 9.9 shows all networks change the owner-occupiers agencement, or capacity to act, with the collective self-organisation of community instigated projects having the highest capacity to influence design outcomes.

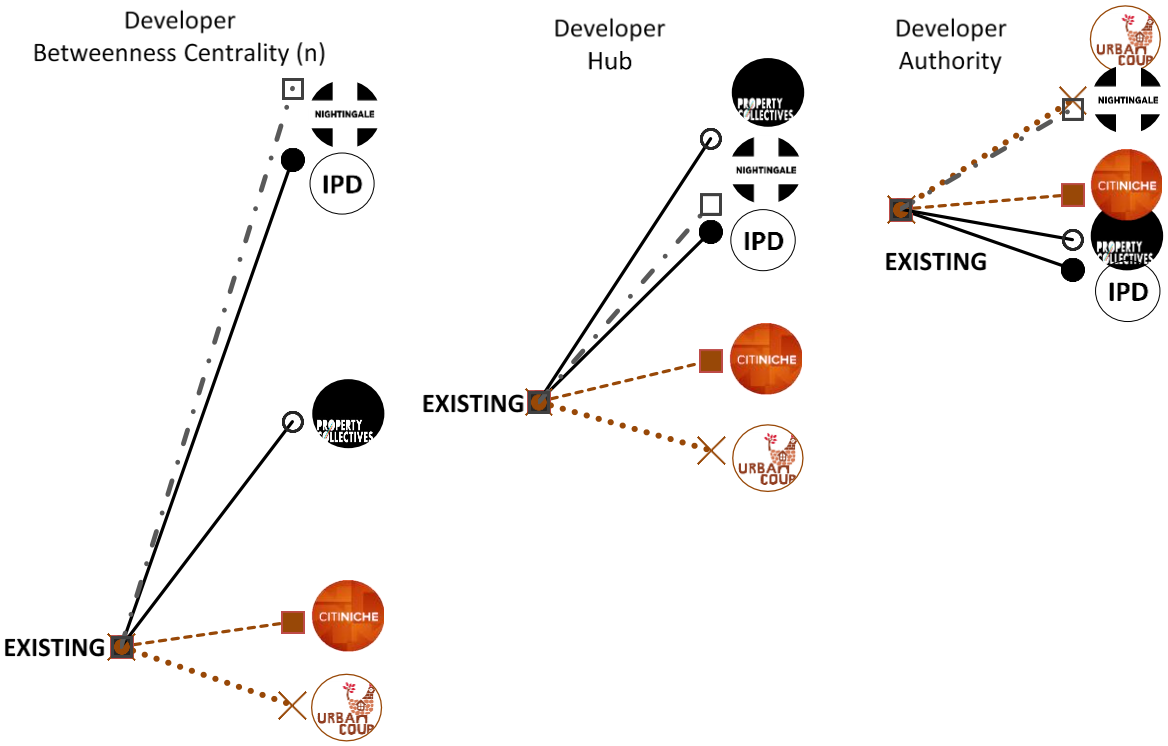


Figure 9.10. Comparison of SNA Metrics of Developers in Innovative Cases.

The shifting of the owner-occupier or client group within the actor-network has a relational effect on other actants, including the developer. In the existing multi-unit SoP, the property developer has a central position in the network, as measured by a high flow betweenness centrality (n), which increases further in the integrated property developer model (Figure 9.10). Three of the CSO cases have actor-networks in which the centrality of the developer falls below that of the integrated developer, reducing their influence on design outcomes. The Urban Coup actor-network provides their not-for-profit developer with slightly less centrality in the network than the existing SoP. This is due to the influence of the client group and their project design brief however the not-for-profit developer has a high level of authority and, as observed in Section 8.2, maintains the capacity to change the network configuration and return to the existing SoP if desired. Property Collectives, with the developer comprising a collective of future residents, places

the developer in a more centralised position than the existing SoP. Given this is one of the actor-networks identified as requiring resident approval of design for development to proceed, it provides the future residents with greater influence on design outcomes than any of the other actor-networks.

The highest centrality value for any developer is in The Nightingale Model, with the architect-developer holding a powerful position in the network, controlling and brokering the flow of design information, as well as having a high two-step reach and strong connections to authoritative actants as indicated by a high hub measure. The Nightingale Model developer may, or may not, be an interested stakeholder and may, or may not, provide a design solution which appeals to owner-occupiers in preference to private investment owners. It is here that the motivations of the project instigators influence the resultant built form. If utilised by less scrupulous actants, such as a developer (or architect-developer) and investors not motivated by a moral responsibility to provide improved housing outcomes, the centrality and authority provided to them by The Nightingale Model actor-network could be exploited.

The CitiNiche case shows minimal change to the influence of the developer on design outcomes compared with the existing SoP.

Previously, the normalised flow betweenness centrality index of the overall network[14] was shown to increase substantially when the SoP changed from the Traditional Property Developer (TPD) to the Integrated Property Developer (IPD) actor-network. All four innovative cases maintain or further increase this measure (Table 9.1), showing the networks to be more cohesive, and enable design information to flow along more paths than the traditional developer network (Freeman et al. 1991).

Table 9.1. Normalised flow betweenness centrality indices.

	Traditional	Integrated	CitiNiche	Property Collectives	Urban Coup	The Nightingale Model
Network Centrality Index	9.7%	13.6%	14.9%	13.6%	13.9%	14.8%

The actor-network mapping of the existing and alternative SoPs has corroborated expected outcomes and confirmed interviewees' observations in both the key case and these nested outlier cases. In addition, it has revealed some unexpected network attributes. Figure 9.11 shows the capacity of strategic urban plans to supply credible information to other network actants is reduced, in comparison with the existing SoP, by

[14] A measure of the percentage of total possible number of connections between actants that are in place, as discussed in Section 6.5.

both the integrated property developer and the proposed actor-network of Urban Coup; with only marginal variation in the CitiNiche case. However, in the two cases which aim to remove the profit-making focus in multi-unit housing development, Property Collectives and The Nightingale Model, the authority of Strategic Urban Plans is increased.

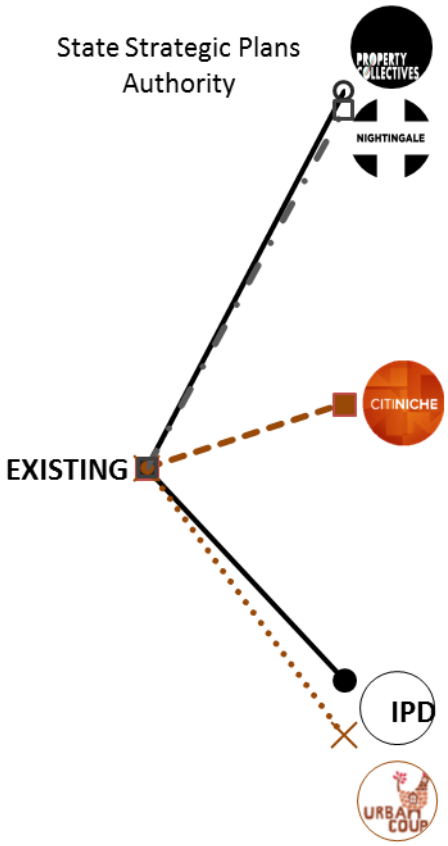


Figure 9.11. Comparison of 'Authority' of State Strategic Plans in Innovative Cases.

Figure 9.12 compares the ranking of network actants by authority across the SoPs. The most authoritative actant in the existing SoP is development profit. This is unchanged by CitiNiche, significantly reduced by Urban Coup and eliminated by Property Collectives and The Nightingale Model. Overall, CitiNiche is again shown to offer minimal variation from the existing SoP whereas, the other cases increase the capacity for the design team to influence design outcomes and noticeably vary the influence of the strategic plans.

In the existing SoP, strategic plans are ranked fourteenth by authority measure, giving thirteen other network actants more influence. The ranking of strategic plans is increased in the Property Collectives and Nightingale Cases. The Nightingale Model is the only actor-network observed in which strategic plans have more authority in the network than market value, suggesting shifting away from multi-unit housing as a commodity can increase the capacity to realise the strategic visions of urban plans.

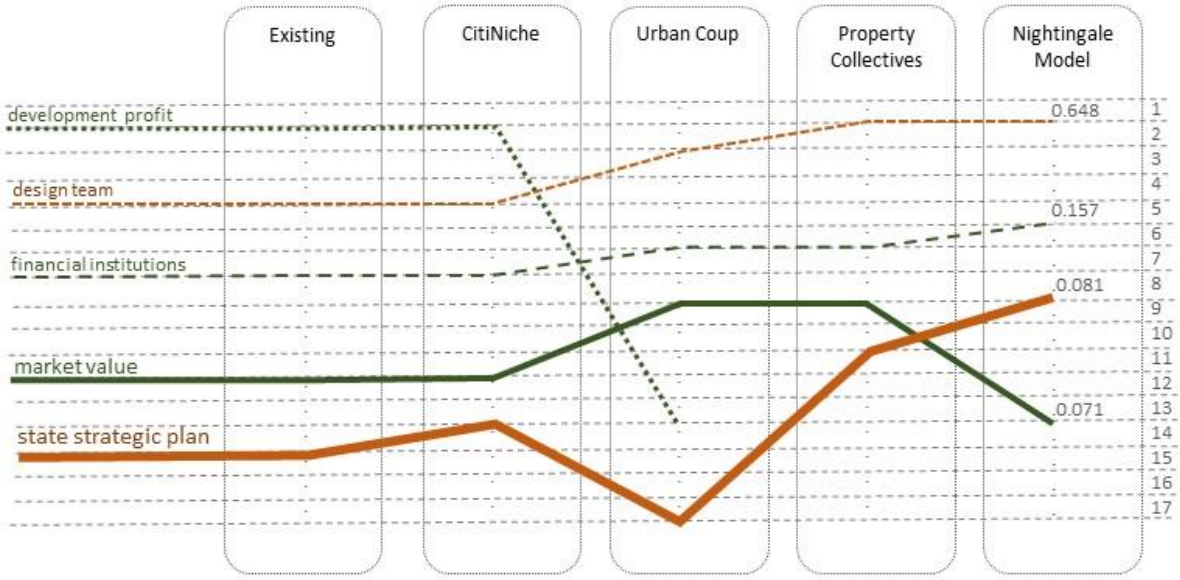


Figure 9.12. Ranking of Key Actants by 'Authority'.

Comparison of the actor-networks of the four CSO projects and the key actants identified within them has enabled a more detailed understanding of the SoPs they propose. The comparison shows that the network actions each produce distinct outcomes and opportunities for design. Most cases enable owner-occupiers to pass design information more directly across existing subsystem boundaries. Most redefine the roles of the developer, the design team, financial institutions, and future residents while engaging more human actants in the production subsystem.

All instigators are motivated to achieve improved multi-unit living environments for themselves or their clients, and each disrupts the existing SoP to varying degrees. Comparison of detailed network attributes using network metrics calculated with SNA software demonstrates these differences, revealing CitiNiche as achieving the least variation from the existing SoP. Urban Coup and Property Collectives, both being community instigated and involving a client group of future residents in design, facilitate significant disruption. However, there are differences between these, with Urban Coup owner-occupants engaged in a more complex production subsystem requiring the sharing of responsibilities. The Property Collectives actor-network, on the other hand, engages in a simpler production subsystem, increasing the influence of owner-occupiers at the same time as increasing risk exposure. Reflecting on the initial Property Collectives building, interviewee A3 suggested it "benefited not only from input from owners but from removal of the developer". The Nightingale Model also removes the developer from the network, installing an architect-developer and investors and, by some network measures, providing them with even greater network control than that available to developers in the existing SoP.

Instigators motivations and resources influence each case; the following section of this chapter uses the network understanding developed here to position the alternative cases in Gulati and Srivastava's (2014) framework of constrained agency.

9.2 Innovative Cases and Constrained Agency

Having identified the differences between the four Australian CSO projects, Part Three of the thesis has shown that the capacity for network actants to introduce alterations in the actor-network varies with their motivations, their structural position in the existing actor-network, their ability to influence others, and their capacity to access knowledge and resources. In concluding this part of the thesis, Gulati and Srivastava's (2014) framework of constrained agency and network action is employed to identify the different types of network action being undertaken by each of the alternative cases. Gulati and Srivastava's framework proposes the interplay of actors' motivations and resources can enhance network insight, providing an understanding of both network action and network constraint. It is selected as an appropriate means of categorising network action in the innovative cases as it is concerned with capacity for endogenous change in network structure, acknowledging

> *Structural positions influence the resources available to actors and colour the motivations that shape their actions. Resources equip actors to exert agency, while motivations propel them to do so. (Gulati & Srivastava 2014, p. 73)*

Interview data identified stakeholders' and instigators' motivations for participation in the alternative cases as driven primarily by frustration with the limitations of the existing actor-network and a desire to redefine the position of themselves and/or future multi-unit residents to improve built outcomes and increase participation. Hence their actions both emerge from, and are constrained by, the existing black-box of provision.

Gulati and Srivastava categorise four forms of constrained agency in networks defined by actants motivations, the type of action taken, and the resources employed. Each form has different capacities for intervention related to changes in network position and the meaning of the ties. Each also experiences different forms of network constraint. These constraints are summarised in Table 9.2.

Table 9.2. Forms of Constrained Agency.
based on Gulati and Srivastava (2014, pp. 77-83)

RESOURCE	MOTIVATIONS: INSTRUMENTAL ACTION	MOTIVATIONS: EXPRESSIVE ACTION
	Actors aim to improve their structural position. Examples: pursuit of novel information and pursuit of influence.	Actors seek to legitimise and consolidate their existing structural position. Examples: search for identity confirmation and pursuit of positive effect.
CAPABILITY-BASED RESOURCES The use of skills, dispositions and cognitive resources that actors possess to move into advantaged structural positions.	**MANOEUVRING**[1] Using capabilities to acquire information or influence. Actors in disadvantaged structural positions will often be motivated to improve their standing. Example: effort to identify and claim new and emerging brokerage positions. Change: often produces change in structural position but does not fundamentally change the purpose or meaning attached to an actor's relationships. Constraint operates primarily through insight: network structure limits actor's understanding of how to navigate an advantageous course of action.	**FORTIFYING** Using capabilities to share sentiments and support or affirm identities. Actors seek to legitimise and consolidate structural positions they already occupy. Example: deployment of a novel kind of 'style' to affirm identities and relationships, use of emotional intelligence, and use of cognitive and emotional attributes. Change: typically does not entail a change in structural position or fundamentally alter the purpose or meaning of relations. May alter strength of ties between actors. Constraint operates primarily through action: network structure can limit actors' repertoires for making, consolidating or legitimising moves.
SYMBOLIC RESOURCES The use of cultural objects such as frames, world views, and narratives to shape and alter the meaning and purpose of social relations.	**REORIENTING** Shifting meaning structures to acquire information and influence. Example: use of collective action frames to improve structural position over time. Change: intends to produce a change in structural position, typically through acquisition and/or control of new information. Likely to change purpose and meaning attached to ties. Constraint operates primarily through recombination: network structure limits the number and variety of novel combinations of symbolic resources that can be assembled.	**ANCHORING** Shifting meaning structures to share sentiments and support or affirm identities. Example: use of a shared moral order to produce a sense of community among members. Change: consolidation of structural position, rather than change. Change in the purpose or meaning which can be attached to a tie. Constraint operates primarily through meaning: limiting the sense of significance and purpose that can be attached to a given action.

1. Gulati and Srivastava employ the US English word Maneuvering in their publication. For the purposes of consistency, this is replaced here with UK English, Manoeuvring.

As suggested in Section 6.5, the Integrated Property Developer (IPD) fortifies their central role in provision, employing existing skills and knowledge to consolidate their structural position and create a unique market identity. Fortifying centralises the flows of design

information, increasing the centrality of the IPD as shown previously. It does not seek to alter the purpose or meaning of relations between actants as the motivation of the instigating actant (focal actor) is to legitimise and consolidate existing relations. Such motivations limit network change to relatively minor reconfigurations that act to further reinforce the stability of the existing black-box of provision.

In contrast, the four CSOs are each motivated by their frustration with the existing SoP to pursue instrumental action, which offers greater potential for achieving changes in structural position. In all cases, the instigators and participants seek to assume a network position from which they are able to have increased influence over the flow and content of design information. The cases differ with regard to the resources employed, be they capability-based, symbolic, or a combination of both (see Figure 9.13).

Figure 9.13. Innovative Australian multi-unit SoPs classified by forms of constrained agency.

Instigated by professionals engaged in the existing multi-unit SoP in varying contexts, CitiNiche, Property Collectives, and The Nightingale Model each manoeuvre within the actor-network. Employing existing skills and resources, the instigators alter their structural position and professional role in provision. Each generates a unique brokerage

role via either the redefinition of their existing professional activities or the introduction of an additional, unique actant to the network. CitiNiche Pty Ltd, an additional actant, brokers between the previously disconnected developers, designers, and future residents. In this position, it controls the flow of design information between the consumption and production subsystems. However, it does not possess information sufficiently novel to ensure influence over other actants, whose positions in the SoP remain unaltered.

In contrast, Property Collectives, as the company providing professional support to Project Specific Development Collectives, establishes for itself a unique and influential brokerage position between the collective members, financiers, landowners, designers, contractors, and others. Property Collectives holds novel information and skills required by the collective members to realise their housing ambitions while remaining relatively disconnected from design decision-making. Lastly, The Nightingale Model also manoeuvres in the existing SoP, improving the structural position of the design team by modifying the role of the architect to architect-developer and enabling direct ties between the consumption and production subsystems. The Property Collectives and The Nightingale Model SoPs are sufficiently different from the existing system of production that it is not feasible for a project to easily reconfigure relations and revert to the existing SoP, as it is for a CitiNiche project.

Gulati and Srivastava suggest network actions employing a manoeuvring approach are constrained by lack of insight as existing network structures can limit understanding and hence the ability of actants to define or navigate alternatives. This correlates with the view of project instigators interviewed who acknowledged the necessity of accessing or combining multiple skill sets to deliver successful housing outcomes.

> *Without [A2] there I couldn't have done it, the financial aspects of the project were too daunting for me (Architect, A3)*
>
> *securing construction finance is a skill us architects don't have. (A12)*

Property Collectives and The Nightingale Model have combined existing network skills to effectively manoeuvre within the existing actor-network and have achieved their development intentions. CitiNiche, having proposed to broker between existing knowledge and skills held by others, does not provide novel or essential information to stakeholders and, following Gulati and Srivastava's framework, is hence constrained in its capacity to achieve its initial motivations. The actor-network mapping shows this, identifying CitiNiche Pty Ltd as a focal actor, but not a design mediator or Obligatory Passage Point (OPP), meaning it proposes an alternative actor-network around which it tries to enrol other network actants, but holds little or no control over the flow of design (or other) information. In contrast, the architect-developer in The Nightingale Model is both focal actor and design mediator. The Property Collectives actor-network places the Project Specific Development Collective in a primary role as a focal actor, mediator, and

OPP, with direct reliance on unique information provided by Property Collectives in its broker role. In Property Collectives and The Nightingale Model, the instigators have obtained a structural position that ensures the information they hold is essential to the operation of the network, increasing their influence on others.

Founded by a group of diverse households, some in building related professions, Urban Coup possesses a different range of capabilities than the previous three cases. It does not commence from a professional frustration with the existing SoP but is motivated by alternative frames, worldviews, and narratives. It takes instrumental network action using symbolic resources; which Gulati and Srivastava describe as reorienting, suggesting "[t]he most profound changes in social structure are likely to result from the Reorienting form of constrained agency" (2014, p. 82). Attracting member households and development partners to a collective action frame enables Urban Coup to change the design information flowing between actants, including the project design brief. The information in the project design brief is unique to the group and ensures they maintain influence in the network and improve their structural position in comparison with owner-occupiers in the existing SoP. Actor-network mapping identified Urban Coup Inc. as a focal actor, mediator, and obligatory passage point, indicating advantages to the control of unique information. The new information the Coup introduces to the actor-network enables changes in both network position and the purpose and meaning of ties. The main network constraint Gulati and Srivastava identify to reorienting is the limiting of the number and variety of network combinations. Urban Coup has faced numerous barriers to implementing their initial plans of self-development as other actants, as OPPs in the existing SoP, resist alternative network combinations due to conflicting worldviews and value sets. This has led to the proposal of an SoP that navigates these limitations via the recruitment of a not-for-profit developer. Without professional experience in multi-unit provision, Urban Coup has minimal capability-based resources to access in comparison with the other cases and needs to draw upon the knowledge and information held by other actants in the SoP. While they hold unique design information, they are constrained in the utilisation of that information to bring about network change until they enrol other key actants to share their collective action frame.

The Nightingale Model also seeks network action through reorienting and is unique among the four innovators studied in that it employs both capability-based and symbolic resources in its restructuring of the multi-unit actor-network. Seeking housing solutions that deliver improved liveability, sustainability, collaboration, and community outcomes in preference to maximum development profit, both the Urban Coup and The Nightingale Model seek to change network connections and design information flows. Combining multiple resource types The Nightingale Model has greater success in enrolling fellow actants to share their collective action frame than occurs with Urban Coup. Reorienting of networks can require incremental change, with interviewees from both groups

recognising that the changes they seek in structural position are likely to occur over time (A13, A7, A11); something more readily accommodated by the incremental, multi-project nature of The Nightingale Model than by the one-off project proposed by Urban Coup.

Employing Gulati and Srivastava's framework of constrained agency has provided insight into why some cases have achieved greater success, or progress, to date than others. The insights gained in this way correlate with the identification of key actants via the actor-network maps. All multi-unit innovators employ instrumental network actions, seeking changes in structural positions in the network. This differs from the Integrated Property Developer who fortifies their position reinforcing the existing SoP. Three cases, CitiNiche, Property Collectives, and The Nightingale Model, use capability-based resources to manoeuvre within the network, with the success of these shown to correlate with the criticality of novel information controlled instigators. Two, Urban Coup and The Nightingale Model employ symbolic resources to reorient the network to an alternative frame or worldview. One of these, Urban Coup, relies primarily on the effects of collective action frames with little access to capability-based resources while the other combines reorientation and manoeuvring (symbolic and capability-based resources), achieving more timely housing outcomes and enabling incremental improvement rather than a unique solution at a point in time. Network action in the existing multi-unit actor-network has more potential for disruption when instigating actors are motivated to instrumental rather than expressive action. In achieving instrumental action, the deployment of capability-based resources is more likely to produce timely built outcomes, but symbolic resources can enable the reshaping of the meaning of the network and its objectives. Combining the two types of resources to both manoeuvre and reorient the actor-network offers the greatest opportunity for profound network change.

Conclusion to Part Three: Australian Innovators

Part Three of the thesis has observed the Australian multi-unit innovators as a nested outlier case study (Thomas 2011a, 2011b) using multiple analysis techniques to provide increasingly detailed insights into their similarities and differences.

The introduction of the four CSO projects' SoPs in Chapter 6 identified similarities between them, including a common view that the existing SoP fails to provide desirable housing solutions to households embracing the multi-unit living promoted by strategic urban plans. The comparison of stakeholder diagrams (Figure 7.3) showed all four cases increased owner-occupier engagement in provision, simplifying provision by reducing the number of stakeholders, and increased connections across subsystems. They also showed differences in the location of risk and its impact on cost.

Chapter 7 provided more detailed insights into instigators' and participants' motivations and processes as well as barriers experienced in attempting to reconfigure the existing SoP. Thematic analysis of primary interview data differentiated multiple themes and sub-themes of motivations that influenced the alternative SoPs proposed. Innovators motivated by a desire for more community based and environmentally aware lifestyles pursued more direct design participation than projects instigated by ideologically motivated building professionals who seek to disrupt the current SoP over time. It also demonstrated the necessity to locate owner-occupiers in the SoP such that their participation becomes integral to development proceeding, otherwise, the existing SoP may prevail. However, this is dependent on the location of financial risk and land title, things which are difficult to modify due to the inflexibility of actants in the existing SoP, including financial institutions, legislation, and processes of land acquisition.

All innovators suggest improvements in housing affordability can be achieved by their alternative SoPs, but to date this is demonstrated only in the SoPs which either relocate risk to the future owners via self-development or avoid the need to engage with developers through alternative financing. The interview data identified barriers experienced in the CSOs actor-networks, with the most restrictive barriers related to the inflexibility of existing systems which are viewed as overly dependent on reflective practices, resistant to changes in established risk profiles, and comprised of fragmented packages of knowledge which limit actors' views of the network. Other barriers relate to participant's individual skills, access to knowledge, and the procedures of collective decision-making. These barriers undermine the intentions of some alternative multi-unit cases, forcing compromise. Additional barriers come from participants themselves, with

challenges related to knowledge acquisition, time commitments, and increased risk exposure shown.

One case confirmed the anticipated correlation between risk, design-input and cost savings, showing that by assuming all financial risk owner-occupiers were able to maximise their influence on their own living environments while realising development at true cost. Collectively, the other three projects show the location of risk is not the sole variable in this regard; all maintaining a risk profile to purchasers equivalent to the existing SoP while facilitating varying degrees of design input and cost savings. These each require instigators to enrol other actors in their unique alternative SoPs, to align visions, and provide motivation to others. Only one of these cases is close to realising a built project.

Chapter 8 gained further insight into the differences in the innovative SoPs using the actor-network mapping introduced in Part Two. Comparing the innovative cases to the existing SoPs identified the inflexible components of the network and showed innovators mainly implement change in the production subsystem. Visual and metric analysis of the actor-networks demonstrated these changes in production impact on the structural position of actants in other subsystems, influencing their capacity to act within the network. Increasing connections between owner-occupiers and the production subsystem reduced the influence of management subsystem actants on design, including financial institutions, market value, and development profit. The reduced focus on commodification and profit in some cases disconnects the cost incurred by owner-occupiers from market value, increasing the influence of strategic planning documents as their position in the network is advanced.

The actor-network mapping revealed differences between the nested cases which assist in understanding the varying degrees of success in delivering completed housing projects to date. All actor-networks show more human key actants (focal actors, mediators, and OPPs) in the network overall, and fewer key actants in the management subsystem. They all increase connection between the consumption and production subsystems. With the exception of one case which locates owner-occupiers central to production, owner-occupiers become connected to production either through direct bridging to a key project protagonist or via an additional actant placed in a brokerage role. Some cases employing a brokerage approach disrupt the existing actor-network less than others, leaving the structural position of key actants in the existing SoP relatively unaltered. In such cases it becomes challenging for instigators of the alternative SoP, including those acting as brokers of design information, to enrol others in their proposition. The greatest success in delivering built projects to date occurs when extensive network disruption is proposed and additional actants become brokers of unique information essential to network operation. In the cases observed here, this involved the proposition of an alternative finance model, not solely the proposition of an alternative design solution.

The different network actions taken in each case to reconfigure the existing SoP have been classified relative to constrained agency (Gulati & Srivastava 2014) defined by the combination of motivations and resources deployed. All cases seek structural network changes, unlike the Integrated Property Developer model (Section 6.5) which sought to reinforce the existing network. As such, they offer greater capacity for network change. Professional instigators all employ capability-based resources, utilising existing knowledge of the network to navigate alternative ties and flows of information. Capacity for network manoeuvring does not guarantee preferable multi-unit housing outcomes as it inevitably reflects instigators motivations. Improved built outcomes are most likely in cases employing symbolic resources, a common frame or view, motivating an alternative vision for multi-unit dwelling. While a common vision may be held by instigating actants, its implementation requires network knowledge and influence.

Based on observation of these four cases, it is concluded that the design visions of strategic planning documents and future multi-unit owner-occupiers are more likely to be realised when a combination of capability based and symbolic resources are used to disrupt the existing multi-unit SoP through instrumental network action. In particular, when disruption results in unique information being held by the future owner-occupiers, or their broker, rather than profit-seeking actants. From observing these cases, it is also suggested that in the pursuit of an alternative multi-unit housing SoP, incremental change is more feasible than individual 'ideal' projects which may not produce replicable or adaptable knowledge.

Part Two previously concluded design outcomes of the existing multi-unit SoP are predominately influenced by property developers, development profit, financial institutions, market value and tax legislation. Part Three has demonstrated that by reconfiguring the actor-network the influence of these actants can be reduced and that of previously uninfluential actants increased, including designers, owner-occupiers, and the project design brief. SoPs in which future residents act as a group or collective to define a project vision provide future occupants with the strongest capacity to influence design outcomes, although this varies with ability and willingness to accept risk. Shifting away from multi-unit housing as a commodity is shown to facilitate a marginal, favourable improvement in the structural position of strategic plans.

Part Three has shown the stabilised nature of the existing actor-network limits the capacity for actants to realise their ideal SoP and requires, sometimes undesirable, compromises. Part Four introduces alternative multi-unit housing systems from other nations to address the challenges faced by the Australian innovators, including those pertinent at project-level:

- land,
- financing,

- professional services,
- realising savings,
- balancing individual and collective decision-making,
- time, and
- balance design input and individualisation with costs and risks,

and those relevant to the strategic development of a viable alternative multi-unit housing SoP over time:

- information dissemination, and
- role of government and policy.

Part Four: International Multi-Unit Innovators

The Australian multi-unit innovators all sought to improve the capacity of owner-occupiers to contribute to design outcomes, increasing their agencement in the SoP. They demonstrated that reconfiguring the actor-network can improve owner-occupiers structural position in multi-unit provision, but also identified multiple challenges exist to realising the SoPs they propose.

The resistance of existing, speculative multi-unit black-boxes to the implementation of alternative actor-networks, including collective self-organised (CSO) housing, is not unique to Australia. This part of the thesis examines two international CSO housing sectors, one relatively mature, and the other in formation. It draws both positive and negative lessons from these international experiences, reflecting on how they have sought to overcome project-level and strategic-level challenges. This part of the thesis addresses Research Questions 3 and 4.

Research Questions:

3. What alternative multi-unit infill housing provision methods have been employed in Australia and internationally that facilitate owner-occupier involvement in provision through collective self-organisation?

4. What lessons can be learnt from these alternative provision methods to diversify multi-unit infill housing outcomes in Australia in the future and support collective self-organised development?

Chapter 10 introduces the two international case studies, Building Groups in Berlin, Germany and Collective Custom Build in London and other locations in the United Kingdom. Variations in the SoP subsystems across locations are identified before providing initial case comparisons. Chapter 11 then employs the two international cases to address the impediments to CSO housing in Australia, as identified in Part Three: Australian Multi-Unit Innovators.

Chapter 10. International Innovators

10.1 Selecting Cases

The international literature on Collective Self-Organised (CSO) housing includes publicly owned rental housing (social housing), not-for-profit rental housing, privately owned housing, and various combinations of these. In seeking international cases to inform the development of alternative multi-unit structures of provision (SoPs) in Australia, attention is given to privately owned CSO developments as they reflect the ambitions of the Australian alternatives previously examined.

Norway and Sweden are frequently identified as two countries with higher rates of privately owned co-operative housing than other jurisdictions, including by current governments advocating expansion of CSO housing (DCLG 2011; Egero 2014; GLA 2014; Ruonavaara 2005). Norwegian and Swedish co-operatives were predominately designed and developed by the state or development agencies without occupant involvement. Through legislative and funding changes over time they have morphed into private multi-owned or "tenant-owned" (Sørvoll & Bengtsson 2016, p. 3) buildings described as co-operatives, an ownership structure with a strong legacy due to a lack of legal alternatives.[15] Similar situations exist in former communist states such as Poland (Coudroy de Lille 2015), where most co-operatives represent a default housing tenure rather than a CSO sector. A small number of newer CSO developments exist in the Nordic nations, including some multi-unit infill projects (Korpela 2012; Sahleström & Spence 2015; Sandstedt & Westin 2015). However, literature reviewing these examples seldom distinguishes between the 75% of Swedish projects assisted by government funding (Labit 2015) and those developed privately. Another jurisdiction frequently cited in CSO housing literature, particularly in relation to cohousing, is Denmark, where the sector is dominated by low-rise dwellings (Skifter Andersen 1985). While the large volumes of literature from these jurisdictions provide insights into the social and environmental benefits of collaborative lifestyles, they do not provide fitting examples to address the provision challenges faced by Australian multi-unit innovators.

[15] Co-operative housing was the sole legal model for multi-unit housing in Norway until 1983 and Sweden until 2009 when titling systems for privately owned flats similar to strata titling in Australia were introduced (Sorvoli and Bengtsson 2016 p. 7).

Discussing the development of co-operative and mutual housing types in various European countries between the 19th Century and the present day, Bliss (2009) described three phases in the maturation of alternative housing sectors. Phase One involves grassroots, bottom-up, pioneering and experimental projects, such as those receiving the focus of empirical CSO research. Phase Two comprises replication and consolidation; the adaption of successful pioneering projects and emergence of an identifiable housing sector supported by revised policies and appropriate products and services. This stage often features the creation of regional or national federations representing the sector's interests and centralising information. Finally, Phase Three is the stage of formalisation and public recognition, "where specific provision is made in … legislation and housing systems" (Bliss 2009, p. 56) to enable integration as a normalised option in housing provision. Bliss' Phases provide a means of describing evolving housing sectors at a point in time, as well as a mechanism for reviewing literature.

The majority of empirical studies of CSO housing focus on individual, unique Phase One projects (Chatterton 2013; Droste 2015; id22 2012; Krokfors 2012; Scanlon & Arrigoitia 2015; Tummers 2015b). Phase Two literature pays attention to the evolution and specialisation of the professional roles performed by architects, planners, and allied professions to realise a CSO group's housing ambitions effectively and efficiently (Glass 2012; id22 2012; McCamant & Durrett 2011; Vestbro 2010b; Vestbro & Horelli 2012; Wankiewicz 2015). This includes the emergence of a unique professional role between the top-down policies introduced by municipalities and the bottom-up actions of community groups. Most commonly referred to as building coaches (Fromm 2012; Krokfors 2012; Tummers 2015b; Wankiewicz 2015), these intermediaries use knowledge and expertise collected from previous developments to support community groups in their CSO housing ambitions.

Few CSO housing sectors have reached Bliss' Phase Three, in which the management subsystem of the SoP is reconfigured. Of those which have, most are encouraged by government policies targeting particular demographics and research tends to focus on aspects of the sector specific to their needs. For example, second-half-of-life cohousing is actively promoted in Sweden, Denmark and the Netherlands (Egero 2014; Sandstedt & Westin 2015; Vestbro & Horelli 2012) and increasing in the United States (Glass 2012), with associated research examining the social and health benefits obtained in occupation (Brenton 2013; Jarvis 2015a; Labit 2015; Sandstedt & Westin 2015). Phase Three literature features very few examples of contemporary privately-owned CSO housing which, in any location, inevitably results from an SoP distinct from that of subsidised development. This lack of existing literature limits options in selecting cases from this final stage of maturation.

In selecting international cases from which to draw lessons applicable to the alternative multi-unit housing innovators in Australia, "fittingness" of cases (Lincoln & Guba 2000) is

paramount. All the Australian cases are privately-owned, strata titled, alternatives to mainstream provision to be realised without financial assistance from the government. Some are community-led and some professionally instigated; some integrate shared spaces and some do not.

Based on the review of international CSO literature, the two most fitting contemporary examples to inform Australians CSOs are the cases of Building Groups in Berlin and Collective Custom Build developments in the United Kingdom. The first of these has matured over almost two decades to reach Bliss' Phase Three, becoming a viable option for households seeking to purchase an inner city home. The second is in transition from Phase One to Phase Two under the influence of national and local policies purposefully incentivising a shift toward demand-led development. These top-down policies refer explicitly to the success of German building groups, amongst other examples, and as such the case provides insight into previous attempts to transfer learnings from Berlin.

10.2 Contextualising Cases

It is essential to recognise the differences between structures of provision and their contexts when engaging a system-embedded approach to compare international cases, as discussed in section 3.4. This section identifies variations in CSO housing projects' production and occupation subsystems via a literature review before comparing the management and exchange subsystems of the two case study locations with those of Australia.

10.2.1 Variations in Production & Consumption subsystems

Some scholars have sought to classify or categorise CSOs based on identifiable variations, both within and between locations. Korpela (2012) describes three categories of CSO housing by common ideals and the stage of members' collective action, be it in production and/or consumption. Vestbro (2010b) defines six, by variations in collective action (collaborative, communal, or collective) and ownership (private or co-operative). Others have emphasised the importance of different modes of initiation, such as community-led, professionally-led, or government-led initiatives (Ache & Fedrowitz 2012; Bresson & Denèfle 2015; Lang 2015b).

Categorising CSOs by selected variables diminishes the importance and validity of others, and may preference one approach over alternatives. For example, many practitioners and researchers espouse the long-term community benefits of CSO members being bonded by common ideas and values (Birchall 1988; Marckmann et al. 2012; Sahlström & Spence 2015; Scotthanson & Scotthanson 2005). In contrast, Tummers observes that for an increasing number of alternative housing initiatives "the primary goal is to build the project" (Tummers 2011a, p. 1). Jarvis suggests:

> *[a]ny attempt to categorize groups and projects in terms of who initiates and steers them risks creating false binaries that pitch one scale or form of participation as being more/less legitimate. (2015a, p. 205)*

This resonates with the earlier discussion of the lack of correlation between modes of initiation and design influence in the Australian Alternative Cases (Figure 8.2). Infinitely more variations in CSO Structures of Provision (SoPs) exist in the production and consumption subsystems. Variations identified in existing international literature include:

- the degree and type of end-user participation in design and the motivations of the group (Bektas et al. 2014; Brouwer & Bektas 2014);
- the degree of self-management, approach to ecology/sustainability, and distance from mainstream options (Tummers 2011a);
- whether projects are community or otherwise instigated (Jarvis 2015a; Parvin et al. 2011; Wallace et al. 2013);
- whether projects are self-built by members or construction is collectively commissioned (Brown et al. 2013; Parvin et al. 2011; Wallace et al. 2013);
- the degree of support from central or local authorities (Brunoro 2013; Ring 2013);
- the intended duration of collaboration (Junge 2006);
- legal structures (Chan 2010; Eyrich 2014; Jarvis 2015b; Sudiyono 2013);
- re-sale restrictions (Sørvoll & Bengtsson 2016);
- the cores values which bind future residents, and the decision-making processes used (Gerohazi et al. 2014).

Table 10.1 presents the identified CSO variables, grouped by the three key concepts of CSO housing employed previously by Tummers (2015a). Each variable can influence the design and function of the built environment, as a physical representation of community ambitions, values, and drivers (Brouwer & Bektas 2014, pp. 13-14). Each variable could be used, individually or collectively, to categorise CSO housing. Following Actor-Network Theory (ANT) principles, no variables are *a priori* viewed as more important than others and no point on the spectrum of possibilities is preconceived as more desirable than another. Hence, this research does not seek categorisation, but recognises multiple paths to CSO housing can be navigated. In doing so, some variables have the potential to override or limit the influence of others. For example, funding from authorities may impose restrictions on construction contracts (such as requiring or forbidding self-building) and projects instigated by a developer or other professional can limit households' involvement in early design stages.

This table of production and consumption subsystem variables is used to observe similarities and differences between the international cases in section 10.5.

Table 10.1. Variables in privately owned CSO housing projects identified in existing literature.

Co-	Motivations	financial	community	environmental	professional ethics
	Common ideals/values binding residents	no common ideals/values		common ideals/values	
	Stage of co-action	management subsystem	production subsystem	exchange subsystem	consumption subsystem
	Extent of co-action	collaborative	collective	cooperative	communal
	End-user participation in design	informing	directing	mediating	obligatory passage point
	Participation behaviour	passive			active
	Shared spaces	private unit no shared spaces	private unit shared external facilities and spaces	private unit shared external and internal spaces	private unit with common house
	Distance from mainstream options	no variance	small variance e.g.hobby space	moderate variance e.g.cohousing	extreme variance e.g.commune
Self-	Instigation	self-organised	architect instigated	developer instigated	governmental facilitation
	Degree of support from authorities	recognition with neutral action	planning provisions	short term finance /land assistance	financial grant
	Construction	self-build	self-organising	self-commissioning	
	Decision-making process	majority	proportional	modified consensus	consensus
	Degree of self-administration	100% internal administration	outsourcing of some services	outsourcing of most services	external administration
	Ownership	individual dwelling ownership/shared property rights (e.g. strata)		common ownership with right to occupy (e.g. cooperative)	
	Resale restriction	none	capital gains limited	sale only to members	market sale approval required
Eco-	Approach to ecology/sustainability	behavioural		technical	

10.2.2 Variations in Management and Exchange Subsystems

Australia's housing system is described by Burke and Hayward as "comparable in structure" to that of the United Kingdom in that both are "dominated by private markets and relatively low levels of government intervention" (2000, p. 13). If fittingness of cases for comparative housing research is considered by these parameters alone, Germany may not provide an appropriate comparison given Burke and Hayward go on to assert less structural similarity exists between Australia and continental European housing systems due to a more interventionist approach to housing policy and large social housing sectors. However, observing policies implemented to buffer Western European housing systems from the 2008 global financial crisis (GFC), H. van der Heijden found Germany implemented no direct housing measures while the UK government implemented "by far the greatest intervention" (2013a, p. 110). Observing alternative parameters, Stephens (2014) describes Australia as having a similar policy structure to that of Germany as housing is the responsibility of the state, or Länder, rather than the Federation. From yet another perspective, Bartholomew suggests Germany and Britain are "surprisingly similar" (2015 n.p.), having experienced comparable population and economic growth since the 1970s and having similar housing densities.

Similarities and differences exist between the contexts of the three cases. Previous studies have compared the UK and German housing systems (Ball 2012; Jones et al. 2012; Kofner 2014; Stephens et al. 2008; H. van der Heijden 2013a), Australia and the UK (Bentley et al. 2016; Jarvis 2015b; Scanlon & Arrigoitia 2015), and to a lesser extent, Australia and Germany (Blunden 2016; Easthope 2014; Easthope et al. 2014). Each compares and contrasts the housing systems relative to the contextual variables pertinent to the research question being investigated.

Given the complexity of housing SoPs it is necessary to understand the similarities and differences between the locations across multiple variables. As market trends, supply trends, financialisation, affordability, and taxation have been shown to influence multi-unit design outcomes in previous chapters, these are discussed here and in Table 10.2.

Existing Tenure and Dwelling Type

In contrast to Australia and the UK, Germany is traditionally a rental nation. Although experiencing an increase in owner-occupation due to a combination of social, taxation and policy drivers (Gerohazi et al. 2014) it has the second lowest owner-occupier rate in Europe after Switzerland (Ball 2012; GSW & GBRE 2014; Seemann et al. 2014), and is the only EU member with more households in private rental than owning (Pittini et al. 2015). Tenure is highly variable across the country, particularly between rural and metropolitan areas, with 85% of Berlin households renting in 2011 (Fitzsimons 2014). The social rental sector plays a less significant role in Germany than in other continental European nations, representing just 9% of housing stock nationally in the 1990s, compared with 36% in the Netherlands, and 20% in Great Britain (H. van der Heijden 2013a). Following policy

changes, the German social rental sector was reduced to just 4.2% of stock by 2014 (Kofner 2014), similar to Australia's 4.8% (Census 2011).

Due to the extreme contrasts between owner-occupation rates in Berlin and Australian cities (Table 10.2), some scholars would suggest it is inappropriate to apply learnings from one to the other. However, the differences in tenure types between locations are not of great significance to the research questions asked as potential owner-occupiers in all locations face similar challenges in obtaining a dwelling designed and constructed to their needs, regardless of the tenure of others. Although a smaller percentage of Berliners are homeowners than Australians or British, speculative construction dominates multi-unit housing development in all locations. Hence we can draw lessons from how the Berlin CSO sector has matured and overcome initial impediments in a supply-led sector dominated by investment purchasers.

Market and Supply Trends

An attribute of the German housing system identified in comparative literature is its stability. Similarly to Burke and Hulse's 2010 inquiry into the relative stability of the Australian housing system following the GFC, Kofner (2014) asked why the German housing market avoided the volatility experienced in other European nations and attributed its stability to three long-term features. First, the strong private rental sector, secondly, conservative mortgage-lending practices, and thirdly, the favouring of rental tenures by tax and subsidy systems. In contrast, the UK has experienced volatile house prices and reduced construction activity following the GFC (Ball 2012); exacerbating the mismatch between supply and demand and further escalating prices in high demand locations.

Germany's national housing market is also described as more responsive to changes in demand than that of the UK (Ball 2011; Kajuth et al. 2013; H. van der Heijden 2013a), which Bartholomew (2015) attributes to a less development-resistant planning system. German households tend to buy property later in life than their UK or Australian counterparts, and buy property less frequently (Eurostat 2011; Kofner 2014; Lindenthal & Eichholtz 2011; Seemann et al. 2014), prioritising long-term housing needs over housing as an investment. "The notion of a 'housing ladder', in which households buy as early as possible and regularly trade up to more expensive homes, is unfamiliar [in Germany]" (Jones et al. 2012, p. 30).

Financialisation, Taxation and Policy

Private rental has played a more active role in Germany than in neighbouring nations, comprising the dominant rental tenure since the early twentieth century (Fitzsimons 2014; Kholodilin et al. 2014; Knorr-Siedow 2008). This has been supported by a unitary rental housing strategy (Kemeny et al. 2005) which regulates in favour of the tenant

(Fitzsimons 2014), and a long-term tax and subsidy system which has been described as "tenure neutral" (Kofner 2014, p. 263) in that it does not subsidise homeownership as much as in other nations.

Having recently been ranked as the leading city for property investment opportunities in the country (GSW & GBRE 2014) and in Europe (PricewaterhouseCoopers & Urban Land Institute 2015), Berlin is receiving increasing attention but has not yet experienced the scale of international investment occurring in the other locations discussed here. The stability of Germany's property market assists in avoiding over-evaluation (Kholodilin & Michelsen 2015). However, Kajuth et al. (2013) identify possible over-evaluation of housing by up to 25% in metropolitan markets, including Berlin, and recent annual price rises greatly exceed that experienced pre-GFC. Newly built apartments, needed to meet growing demand, are most susceptible to over-evaluation (Kholodilin et al. 2014), leading Berlin, currently the most affordable of the three cases, to face financialisation challenges akin to Australia and the UK, where over-evaluation negatively impacts housing affordability and choice.

Table 10.2 shows the Australian multi-unit housing context has numerous similarities with the UK and Berlin cases pertinent to the research questions. It also highlights where contextual differences exist between the cases, informing comparison of the alternative multi-unit SoPs from each location.

Table 10.2. Comparison of International Management and Exchange Subsystems.

Bold banners (as above) indicate which case locations are comparable against each variable.

Existing tenure and dwelling type			
	Australia	Berlin/Germany	London/England/UK
Owner-Occupiers as percentage of total number of dwellings 2011	National 67% (1) Greater Sydney 65.2% (1) Greater Melbourne 69.6% (1) Greater Adelaide 67.9% (1)	Germany 45.4% (2) Berlin 15.3% (2)	UK 64.3% (2) Greater London 49.9% (2)
	Australia has experienced a slight reduction in ownership in recent decades, most significantly among younger households (3). Similarly, England has experienced a fall from 69.5% in 2002 to 62.5% in 2015 (4). A small but steady increase in owner-occupation is occurring in Berlin (5), encouraged by rapidly increasing rent costs (6) and changes in employment and pensions (7).		
Private rental housing as percentage of total number of households	National ≈ 25% (8)	Germany≈50% 2014 (2,5) Berlin ≈ 82% 2011 (2,6)	England 20% 2015 (4)
	All markets are experiencing private rental sector growth. In all locations, landlords are predominately individuals and small companies, not institutional investors (9).		
Social Housing as percentage of households	National 4.8% (8)	National 4.2% 2014 (10) Berlin 2.3% (10)	England 17% 2014 (11)
	All markets have consistently declining share of social rental housing (12).		
Percentage of dwellings located in multi-unit buildings	National 24.4% (8) Greater Sydney 41% (8) Greater Melbourne 29% (8) Greater Adelaide 24% (8)	Germany 70.4% (2) Berlin 91.6% (2)	UK 76.9% (2) London 93.7% (2)
	In all locations data includes townhouses, row houses and other occupied non-single-dwellings.		

Market and supply

	Australia	Berlin/Germany	London/England/UK
Market trends Pre-GFC	Nationally, a history of long-term capital growth with pre-GFC property boom.	No boom pre-GFC (13). Overall prices fell from 1995 and 2005, partly due to oversupply after reunification (14), but rose in some cities inc. Berlin (15).	Prior to GFC a property boom increased average prices by 2.2 times in a decade, the fastest long-term growth of average house prices in Europe (16).
Market perceptions of the role of housing	Both lifestyle and investment. Expectation of capital growth, with focus on role of home ownership in funding retirement.	Lower expectations of capital gains than in Australian or UK markets (17).	Expectation of capital growth and wealth creation (17). Market value prioritised over use value by decades of neo-liberal housing policy (42).
	Australia and UK have long placed importance on the role of home ownership in wealth creation and retirement funding, with desire to progress on the property ladder (17). Germany is experiencing an increasing role of home ownership in funding retirement due to changes in employment and pensions (18) and increasing rents (6). Berlin has experienced rent increases twice the national average (43).		
Market Response to GFC	Relative stability, with rapid return to pre-GFC borrowing, construction and inflation patterns (19).	Less impact from GFC than in other European nations (20,13). 5% annual price rises recorded in Berlin from 2011 to 2016 (20).	The UK had "the most dramatic housing market collapse of the major European economies", (21) and slow recovery (13).
Post GFC Residential Construction	Relatively rapid return to previous conditions.	Nationally, 7% drop in dwelling approvals 2007-2011 (16). Impact on Berlin less significant due to high demand (15). Continued growth forecast (16).	42% drop in residential approvals 2007-2011, the worst of all EU nations (16). Lowest build rates since 1929 (22). Industry recovery slow (13).
	In all case contexts, demand currently exceeds production (23).		
Existing Multi-Unit SoP	Dominated by speculative development. Majority of new multi-unit dwellings in capitals sold to investors for rental (24).	Nationally, nearly half of all new housing is produced for private rental, higher in Berlin due to higher private rental rates (25).	Dominated by speculative development. Less reliance on pre-sales means UK developers may carry higher risk (26).
	All cases dominated by Millington's developer types 3 and 4 "Those who build to sell for profit" and "Those who build to create investments for sale to others" (27).		
Market descriptions		Static market	Dynamic Market
	High, variable transaction rates.	Low, stable transaction rates	High, variable transaction rates.
	High rates of self-provision in free-standing housing.	High rates of self-provision in free-standing housing.	Low rates of self-provision in free-standing housing.
	van der Heijden et al. (2011) describe static and dynamic housing markets by rates (and variations) in existing dwelling transactions and extent of self-provision of new stock. They conclude Germany is a static system, while the UK is dynamic. The Australian market remained relatively stable following the GFC, as did Germany, but with high, variable transaction rates (Kent 2013) and high rates of non-speculative construction overall, it does not comply to the static/dynamic market division.		

Finance, Taxation, and Policy.			
	Australia	Berlin/Germany	London/England/UK
Mortgage Markets and LVR	Liberal mortgage market LVR 80.8% 2013 (28)	Conservative Mortgage Market LVR 70% 2010 (25)	Liberal Mortgage Market LVR 72% 2010 (25)
	LVR = Average Loan-to-Value Ratio for first home buyers. Neither case correlates directly with Australia. The German mortgage market is frequently referred to as less liberal than the UK (17), however in the risk averse period following the GFC, LVRs were similar to those of the UK.		
Housing Affordability Concerns	National 2015 median multiple of house price and income 6.4. Sydney 12.2, Melbourne 9.7, Adelaide 6.4 (29).	Housing costs 31% of income nationally (EU average 22.9%), Berlin higher (13). Price/income ratio rising since 2010 (30).	Nationally, median multiple of house price and income 4.6. Greater London 8.5 (29).
	In all locations households experience reduced access to housing and limited choice due to rising costs.		
Multi-unit Property Titling	*The Strata Titles Act (1961)* provides a dualistic systems of ownership in that "individual ownership of an apartment, and joint ownership of the land and common parts of the building are combined"(31).	Dualistic titling comparable to Australian strata defined by *The Condominium Act of 1951* (32). Cooperatives use a unitary title with co-ownership and "exclusive rights of permanent occupation to a particular apartment"(31).	Leasehold most common titling in the UK. Commonhold, a dualistic title, was introduced in 2002 (33). Advocates support commonhold although banks treat it cautiously (34). Fewer than 20 buildings UK wide were commonhold as of 2014 (35).
	All case locations have access to a dualistic multi-unit ownership system. In Australia and Germany, these are the most common forms of multi-unit ownership. In the UK the leasehold system dominates. Leasehold can be administered as a dualistic system where leaseholders form a freeholding company.		
Taxation Approach	Tax advantages of home ownership over renting are strong. Tax advantages of investment in property for rental are strong.	Tax system described as tenure neutral. Ownership not subsidised as much as other nations (36). Moderate tax benefits for investment.	Tax advantages of home ownership strong (16) and favour the wealthy (37). Moderate tax advantages in property investment for rental.
Rental Property Taxation	Generous negative gearing, allowing deduction of rental losses against other income streams. Mortgage interest included as an expense. Capital gains tax (CGT) payable only on investment properties.	Rental losses can be claimed against most other income types. Interest payments not an allowed expense (38). No CGT on any property held ≥10 years, payed on some other investments.	Negative gearing limited, with losses from property investments quarantined to income from real property. Substantial capital gains tax payable on investment properties only.
	UK and Australian taxation systems are similar in that they distinguish between owner-occupied and rental properties, with rental or investment properties treated similarly to other commodities. The German system treats both equally. However, the German and Australian systems both tax property more favourably than some other forms of investment. The UK property system does not (39).		
Rental Tenure Security	Limited security of tenure. No restrictions on rent rises between tenancies.	High Security of tenure (40). Restrictions on rent rises in and between tenancies in Berlin (6).	Limited security of tenure, minimal regulation of rent increases (37)
	Some Berlin landlords use modernisation upgrades to circumvent rent increase restrictions (41).		

References for Table 10.2

1 Australian Bureau of Statistics 2012
2 Eurostat 2011
3 Yates 2015
4 Department for Communities and Local Government 2016
5 PricewaterhouseCoopers & Urban Land Institute 2015
6 Fitzsimons 2014
7 Borsch-Supan & Quinn 2016; Eyrich 2014
8 ABS 2011 Census of Population and Housing data
9 Department for Communities and Local Government 2016; Seelig et al. 2009; van der Heijden 2013 90% of UK landlords are private individuals and couples Department for Communities and Local Government 2011 .
10 Kofner 2014
11 Department for Communities and Local Government 2014a
12 Ball 2012; Stephens et al. 2008; H. van der Heijden 2013; Yates 2013
13 Pittini et al. 2015
14 Ball 2012; Kajuth et al. 2013; Lindenthal & Eichholtz 2011
15 Bartholomew 2015 . Berlin's population growth is the second highest in Germany, 40K in 2011, Fitzsimons 2014
16 Ball 2012
17 Jones et al. 2012
18 The retirement of 85% of Germans is funded through the compulsory Public Retirement Insurance System Gesetzliche Rentenversicherung which, saw reforms in 2001, 2004, 2007 and 2009, increasing premiums, increased retirement age, and decreased pension payments. These changes have created future uncertainties, particularly for the 9% of the German workforce who are self-employed. For those self-employed who experience employment and profit fluctuations such as the construction industry, home ownership provides a tangible asset to support retirement. Comparing UK and German attitudes to home ownership, Jones et al. (2012) found German households more concerned with housing security in old age than housing wealth.
19 Burke & Hulse 2010
20 Dr. Klein & Co 2016; PricewaterhouseCoopers & Urban Land Institute 2015
21 Ball 2012, p. 66
22 Andre 2011
23 Gurran & Phibbs 2016; Hossmann et al. 2008; Initiative Neuer Kommunaler Wohnungsbau 2014; Lloyds Banking Group & Commision on Housing 2015; PricewaterhouseCoopers & Urban Land Institute 2015 The population of Berlin grew by approximately 20,000 households in 2012, with 5,400 new dwellings being completed (GSW & GBRE 2014) .
22 Birrell & Healy 2013; Martel 2013
25 H. van der Heijden 2013
26 Bartholomew 2015
27 Millington 2000
28 North 2013
29 Cox & Pavletich 2016
30 Kholodilin & Michelsen 2015
31 Lujanen 2010, p. 179
32 Wirtschaftsministerium Baden-Wurttemberg 1999 .
33 Lambert 2011
34 Kerimol 2012
35 Home Owners Alliance 2014; Lunn 2014
36 Kofner 2014, p. 263
37 Murie & Williams 2015
38 Daley & Wood 2016; Lindenthal & Eichholtz 2011
39 Department for Communities and Local Government 2011; Kofner 2014
40 Easthope 2014
41 Fitzsimons 2014; McKenny 2015; Oltermann 2014
42 K.Jacobs & Manzi 2016; Murie & Williams 2015
43 Fitzsimons 2014 In some districts price growth as high as 32.7% per annum 2012-2013 are recorded. Grow rates are highest along the S-bahn train line which rings the inner city GSW & GBRE 2014 .

10.3 Building Groups (BG), Berlin

The Berlin building industry experienced significant contraction in the recession of 2001-2 and by 2003 the Berlin Senate had cut funding to all housing construction projects in the city (Junge 2006; Ring 2013). After selling off over 100,000 city-owned apartments since 1998, the City of Berlin privatised its housing company (the Gemeinnützige Siedlungs-und Wohnungsbaugesellschaft Berlin mbH or GSW) in 2004, effectively withdrawing from housing provision (Initiative Neuer Kommunaler Wohnungsbau 2014). As the City of Berlin faced near bankruptcy in 2004, both state- and market-led housing construction had all but ceased. The Federal government's withdrawal from social housing subsidies in 2006 completed the shift from state-led to market-led housing provision which had commenced with the introduction of institutional investors into social housing in the 1970s (Knorr-Siedow 2008). As in other Western European nations, the reliance on private developers to initiate housing supply resulted in a decrease in new dwellings (H. van der Heijden 2013a).

Berlin is a city with an established community culture of opposition and self-help. During the late 1970s, "rehab squats" (Aust & Rosenbladt 1981, p. 36) emerged in abandoned buildings both as a response to housing shortages and as a protest to proposed building demolitions. The squatter movement advocated for housing policy changes in the West (Bodenschatz et al. 1983) and in 1981, a squat legalisation process was instigated by the Berlin Senate, providing renovation funding through a self-help housing programme (Holm & Kuhn 2010). Following reunification many neglected buildings were under-occupied in the East, with an estimated 25,000 vacant dwellings (Holm & Kuhn 2010), and squatting once again flourished. Many of these buildings were converted to co-operatives (Genossenschaften) and again financial incentives were provided under a policy of "cautious renovations" (Holm & Kuhn 2010, p. 650).

With its market-led housing construction industry in recession, a social history of co-operative living, and a local legacy of self-organised housing, Berlin became a site of network disruption, with network actants actively reconfiguring relations to establish alternative housing SoPs. Initially, the key actants were architects proposing CSO projects, described as "idealists who gathered experience, organised projects and inspired others" (B2) through existing networks in civil society. They developed new, privately-funded, demand-led housing for collectives of owner-occupiers, defying the industry downturn (Junge 2006). Located predominately in inner urban areas, the projects accommodate a diversity of household types, and by "developing without developers" (Junge 2006), achieve construction at "wholesale costs" (Haertel 2014). Dwellings are delivered at a financial saving of 20-25% in comparison with an equivalent market product by removing developer's profits, marketing costs, and marketing risk, (Eyrich 2014; Hamiduddin & Daseking 2014; Heuss 2006; Junge 2006; Ring 2013; Wirtschaftsministerium Baden-

Wuerttemberg 1999). Some groups achieve a square metre construction rate as much as 40% below commercial development when employing sweat equity (Chan 2010). These savings effectively lower the threshold for participation in home ownership but require households to take significant responsibility for development risk.

Pre-existing legal and ownership structures were relatively easily adapted to the needs of the new SoP (Ache & Fedrowitz 2012; Eyrich 2014; STATTBAU GmbH 2012). Booming from a handful of self-initiated projects in the early years, the CSO sector constituted 10% of all new residential building in Berlin in 2011 (STATTBAU GmbH 2012).

Reflecting the spectrum of variables identified in the international CSO literature, Berlin CSOs include both not-for-profit rental and privately-owned dwellings, multi-unit buildings with and without shared facilities, and both individual and common ownership. Groups of households often self-form around common interests or life stages, such as retirees, families, gardeners, eco-living enthusiasts, advocates for multi-generational living, or other common ideals. Projects frequently include communally owned spaces such as gardens, roof areas, entertainment spaces, guest quarters, workshops and storage spaces. Observers often assume them to be cohousing developments, and a portion of groups do adopt a cohousing ethos, but it is not a defining attribute of Berlin's CSO sector, which can equally constitute entirely private dwellings without shared spaces. As a demand-led building solution, the user group defines the design brief.

CSO housing is also present in other German cities. Most noticeably, it provides the primary building blocks for urban expansion districts in the southern cities of Tuebingen and Freiburg and contributed to the docklands regeneration in Hamburg (Hamiduddin & Gallent 2015; Junge 2006; Muller 2012). In these projects, each group builds to the requirements of a detailed urban master plan to realise entire neighbourhoods over time; including the neighbourhood of Vauban, designed to accommodate 5,000 residents (Hamiduddin & Daseking 2014). While the processes employed by government and industry in those locations can inform large-scale areas of brownfield development in Australia, Berlin is a more fitting case to draw lessons for the innovative Australian cases. Berlin projects engage in urban renewal, redeveloping existing urban neighbourhoods as promoted by Australian urban consolidation strategies and pursued by the Australian cases.

Berlin CSOs have received attention from international media (Bridger 2015; Chapman 2015; Lucas 2016) and governments of other nations over recent years (e.g. Wilson & Heath 2014). However, the variations between projects are seldom recognised, limiting the effectiveness of observations. The three most common terms used to describe Berlin CSOs are Baugruppen, "self-organised owner occupying building groups" (Droste 2015, p. 2) Baugemeinschaften (building collective), and Genossenschaften (co-operative). While Baugruppen is typically used to describe community instigated projects and Baugemeinschaften developer or architect instigated projects (Bridger 2015; Haertel

2014), this is not consistent with academic literature and the media frequently uses the terms interchangeably (see for example, opposite uses in Debarre and Steinmetz (2012) and Linz (2016)). Genossenschaften is a legal form of ownership (Haffner & Brunner 2014) which can apply to Baugruppen or Baugemeinschaften, and hence the three terms are not exclusive.

Genossenschaft (co-operative) projects receive a high level of media and political attention. In these privately-owned co-operatives the occupants fund around 30 percent of the project costs through shares, with the remainder funded by a loan in the name of the co-operative. During residence, members pay contributions to the collective loan and building management relative to the size of their apartment, an amount normally lower than market rental rates and which may be reduced over time. Genossenschaften typically place restrictions on the resale of shares and rights to occupancy, such as limits to profiting from capital growth and the requirement for new purchasers to receive approval from other members. Collective ownership and management can be a confronting proposition, particularly to households from cultures dominated by individual home ownership which affords relatively unlimited trading rights. Despite the disproportionate research and media attention they receive, Genossenschaften constitute only seven percent of building-groups in Berlin (Ring 2013). Similarly, only eight percent feature a high level of shared spaces, such as cohousing or communal living (Ache & Fedrowitz 2012, p. 398).

Over 70 percent of projects are privately owned under the *Condominium Act* (Wohnungseigentumsgesetz or WEG) of 1951, a legal form comparable to strata titled ownership in Australia (Wirtschaftsministerium Baden-Wuerttemberg 1999). These buildings tend to feature fewer shared spaces than co-operatives and seldom have a focal point such as a common house (Hamiduddin & Gallent 2015). They are typically financed by the intended owners forming a Civil Law Association (Gesellschaft des bürgerlichen Rechts or GbR), the simplest and cheapest legal form for building-groups to employ (Eyrich 2014; Ring 2013; Sudiyono 2013). Establishing a proprietary company (Gesellschaft mit beschränkter Haftung or GmbH) limits the liability of members, reducing personal risk exposure. However, it is more complex to establish and requires substantial capital at the time of creation (STATTBAU GmbH 2012; Sudiyono 2013). A GmbH structure is employed by less than four percent of groups (Ring 2013).

Over time, a portion of the sector has become less self-organised and more professionalised, with developers and project managers initiating projects. Professional services offered vary with each practice, but a typical process is one in which the developer identifies viable land for a project and secures an option to purchase. Following sketch design, the project is promoted to potential residents and a group coalesces around the proposed project and site and the design adapted to meet the preferences of group members. The group takes collective financial liability for site purchase and

construction costs. Construction is frequently project managed by the BG developer who charges a fee based on total project costs. The BG developer's risk is limited to incurring the preliminary costs of proposing a project which does not attract buyers, and professional risk as multiple households entrust them with administering the project on their behalf. These projects are realised in a shorter time frame than those with self-organising processes, and as the group members collectively finance construction they assume the financial risks of development and procure their homes at true cost rather than market price. Given the lack of consistency afforded by the terms used to describe German CSO housing, the remainder of this discussion employs the term Building Groups (BG). In doing so it recognises differences exist between community instigated and professional instigated projects and a diversity of legal forms are available.

10.3.1 Building Groups: Data Collection

The researcher conducted semi-structured interviews with six stakeholders in building group (BG) projects in Berlin in October 2014. Interview questions asked participants about their BG experiences, including impediments faced, changes they have witnessed over time, and their views on support needed by groups to realise their objectives. Interviews ranged from 50 to 110 minutes, were audio recorded and notes taken by the interviewer. All interviewees, listed in Table 10.3, agreed to be identified; however, for consistency, all have been provided with a pseudonym for use in analysis and discussion.

Table 10.3. Interview Participants: Berlin Building Groups.

	Project Level Actants							Strategic Actants			
Primary role/ name	Project Instigator	Resident	Future Resident	Architect	Project Manager	Group Member with relevant experience/profession	Financial Partner/developer	Facilitator	Urban Designer/Planner	Housing Advocate	Pseudonym
Architect: Silvia Carpanetto *	X	X		X	X	X					B1
Id22 Director: Michael Le Fond		X				X				X	B2
Architect: Ulrich Schop *	X	X		X		X		X			B3
BG Developer (coach): Ulf Maassen	X	X			X	X	X	X			B4
Architect: Claus Friedrichs *				X							B5
Urban Planner: Sabine Eyrich #								X	X	X	B6
Number of Interviewees: 6	3	4	0	3	2	4	1	3	1	2	

* All architects interviewed work for design firms active in the Netzwerk Berliner Baugruppen Architekten, a network of architects dedicated to the success of self-help housing models in Berlin.

State manager of urban regeneration agency supporting BGs (Stattbau Berlin).

All participants have experience in more than one BG project and most undertake multiple roles in the sector. For example, B1 is an architect specialising in building group design and delivery who has also been a founding member and resident of more than one group. The breadth of experience of interviewees provided insight into BG experiences which span the spectrum of CSO variables identified previously.

10.4 Collective Custom Build (CCB), UK

The housing markets of the United Kingdom and its capital are frequently described as being in crisis (Ball 2012; Banham et al. 2012; Edwards 2016; Greater London Authority 2014; KPMG in the UK & Shelter 2015; Watt & Minton 2016), manifest primarily through dwelling shortages and increasing unaffordability. This has been the case for an extended period, particularly in the country's south-east, and exacerbated by the global financial crisis after 2008 (Ball 2010). Political, economic, and social triggers have all been associated with the crisis (Bernheim & ADAM Architecture Limited 2014; Hill 2015; Jones et al. 2012; Lloyds Banking Group & Commission on Housing 2015), with additional pressures characteristic of global cities influencing London.

The UK housing market has a long history of speculative, supply-led provision across most densities and dwelling types, with a small number of large-scale companies dominating the industry (DCLG 2011; Lloyds Banking Group & Commission on Housing 2015; Shelter 2015). Speculative housebuilders are described by researchers as slow to innovate, conservative, risk adverse and delivering poor quality product (Andre 2011; Barlow et al. 2001; Franklin 2006; Kerimol 2012; Lovell & Smith 2010; Wallace et al. 2013), a view repeated by industry bodies and housing advocates (KPMG in the UK & Shelter 2015; NaSBA 2011; The Building and Social Housing Foundation 2009).

Similarly to Australia, the speculative supply of housing for anonymous households is presented by UK researchers as limiting diversity and choice (Brown et al. 2013), decreasing affordability (Ball 2012; Parvin 2008), and limiting improvements in housing quality and sustainability (Parvin et al. 2011). The Royal British Institute of Architects Future Homes Commission stated in their 2012 report (Banham et al. 2012) that the UK's housing needs are not being met in relation to either quantity or quality. In particular, they identified that development is undertaken to meet developers' profit objectives rather than the needs of the occupants or their communities (Banham et al. 2012; Brown et al. 2013; Burgess et al. 2010). A 2011 survey found 75% of households seeking to purchase a home would not willingly select a recently built dwelling due to poor design, size, and style (Graef 2012; Robert-Hughes 2011).

At the same time as Australian strategic urban plans are indirectly encouraging an increase in multi-unit speculative development, the UK government has introduced policies to develop alternative housing sectors into mainstream alternatives. *The*

Localism Act of 2011 (UK Government 2011), the 2011 Housing Strategy for England (DCLG 2011) and the National Planning Policy Framework of 2012 (DCLG 2012b) collectively aim to promote the expansion of housing production in the UK, including particular reference to the custom build and group custom build sectors. The 2011 Housing Strategy for England states an intent to "help custom home builders and enable the sector to become a mainstream source of housing provision" (DCLG 2011, p. 15), identifying the potential for custom built homes to contribute to economic growth and provide more affordable, sustainable and innovative housing. A collection of government programs has been implemented to support the intentions of the housing strategy. Reviewing the impact of the Localism agenda on UK housebuilding, Bradley and Sparling (2016) identifying positive benefits such as less community resistance to new housing, more small and medium sized builders, more infill or brownfield development, and more self-build housing. The UK policies relating more specifically to collective self-organised housing are discussed in Chapter 11 in comparison with the Berlin and Australian cases.

The British Department of Communities and Local Government (DCLG) has employed the term custom build in its policy documents since 2011 to describe housing constructed by or for individuals, households or groups of households for their own use. Various terms continue to be used in UK reports and literature regarding non-speculative housing production. For example, researchers Parvin et al. (2011) use the term 'self-provided housing', Wallace et al. (2013) use 'self-build' in their Lloyds Banking Group funded report, and a 2012-2015 project funded by the Economic and Social Research Council proposed the term 'self-procured' housing (Benson 2014). Providing an overview of UK 'community-led housing' literature, Lang (2015a) similarly notes a lack of consistent definitions, suggesting this reflects the current diversity of models being pursued and the emergent state of the sector.

The DCLG's 2014 Right to Build consultation paper sought to clarify the distinction between custom build and self-build, with the following statement:

> *Custom build housing typically involves individuals or groups of individuals commissioning the construction of a new home or homes from a builder, contractor or package company or, in a modest number of cases, physically building a house for themselves or working with sub-contractors. This latter form of development is also known as 'self build' (i.e. custom build encompasses self build). (DCLG October 2014 consultation p. 7)*

Use of both terms continues, including in the title of the *Self-build and Custom Housebuilding Act (2015)* and the name of the industry body formed in 2008 to promote alternative housing provision which changed its name from the National Self Build Association (NaSBA) to the National Custom and Self Build Association (NaCSBA) in late 2014. Other terms also emerge in the media, including reference to the 'built-to-commission sector' made by MP Richard Bacon who introduced the aforementioned act to parliament (DCLG 2015a), and 'citizen inspired housing' used by prominent housing

advocate Stephen Hill as an umbrella term to include also Community Land Trusts and other property reforms (Hill 2015). Taking a lead from the DCLG, Brown et. al. use the term Collective Custom build in their practice-based research and advocacy project (Brown et al. 2013). Here too, Collective Custom Build (CCB) will be used to describe CSO housing in the UK context.

A small number of CCB projects have been widely publicised. These include the Hockerton Homes completed in 1998 in rural Nottinghamshire (Brown et al. 2013; Franklin 2006; Stevens 2013); Ashley Vale, a development of predominately single-unit dwellings in Bristol (2002-present) (Broer & Titheridge 2010; Collinson 2011; NaCSBA n.d.; Wallace et al. 2013); Springhill cohousing in Stroud (2003) (Bliss 2009; Co-operatives UK 2008; Parvin et al. 2011), Forgebank Cohousing community in Lancaster (2012) (Brown et al. 2013; Cahn 2011; Lancaster Cohousing n.d.), and the Low Impact Living Affordable Community (LILAC, 2013) (Chatterton 2013, 2015; Mullins 2014), a self-planned and managed project in Leeds. Each of these projects introduces spatial, material, and/or sustainability innovations unknown in speculative development. None, however, are located in designated areas of urban consolidation, most are low density, and only one is located within an existing built-up area. The most recent, LILAC, was highly subsidised, receiving a variety of negotiated grants and unique financial contributions without which the founders acknowledge the development would not have been viable and hence is not directly replicable (Chatterton 2013, 2015).

Each of these projects is constituted and owned under different legal structures, they were each developed via a unique SoP which emerged to meet the demands of the specific project, and each provides insights into the impediments to CCB housing within the constraints of an existing supply-led SoP. The bespoke nature of each project SoP reflects their experimental, pioneering qualities and the lack of maturity of the UK CCB sector which is yet to emerge fully from Bliss' first phase of maturation. However, none of these projects meet the density or location selection criteria for cases previously set for this research, and, as low-density developments, do not provide insights into the impediments unique to multi-unit infill development.

Having recognised the UK CCB sector is both significantly smaller[16] and less mature than Berlin Building Groups (BGs), a search was conducted to identify specific infill projects in areas of urban consolidation during September 2014. Table 10.4 describes the six projects identified; five located in London and the sixth in Bristol.

[16] Overall the number of privately-owned or full-equity CSO developments in the UK is extremely low, with a 2009 report suggesting a total of less than ten individual projects across all densities (Bliss 2009; Lambert 2011).

Table 10.4. Description of CCB projects identified.

Copper Lane Cohousing, Stoke Newington, London.
6 households, 2 and 3 storey buildings on backland block with shared gardens and some communal rooms, including work at home office.
Collectively commissioned, private development. Commenced 2009, occupied 2014.
Older Women's CoHousing Project (OWCH), High Barnett, London.
25 homes for women over 50 years, 17 leasehold, 8 rented.
Developed in partnership with Hannover Housing Association (HHA), with site administered in occupation by the charity Housing for Women. Constituted as fully mutual company.
Group formed 1998, purchased site 2010. Construction 2015-2016.
Cohousing Woodside, Muswell Hill, London.
30 leasehold units of mixed size on 1 acre portion of a large former hospital site.
Mixed household community with some units restricted to 55+.
Entire site being developed by Hannover Housing Association (HHA)
Group formed 2011 around impending sale of site, partnered with HHA in 2012. Site works commenced June 2015, completion expected early 2017.
Constituted as non-profit making share company.
Final purchase prices not confirmed by HHA and selling agent until January 2016. Many members then left the group, after 5 years contribution, as final purchase prices exceeded their budget. Prices based on market value, not development cost. HHA constructed temporary display unit on site following traditional marketing practice.
18 April 2016, Cohousing Woodside website indicated only 9 of the 30 units were sold.
Hackney Cohousing Project, Hackney, London.
Group of local households formed in 2006. September 2011 identified a potential site owned by local authority. Commenced negotiations with the Local Authority and a Housing Association (HA) as development partners. Relationship with HA ended 2014/5 due to incompatible objectives. February 2015 Local Authority agreed to sell site to group. November 2015 group submitted final business proposal in partnership with a private developer, proposing shared equity with local authority. February 2016 local authority rejected proposal and moved to sell site to commercial developer. Project on hold.
Inhabit Homes, London. Initial project Peckham Rye, London.
Inhabit is an initiative of a well-established developer known for high quality infill projects, marketed as London's First Custom Build Developer.
Inhabit intends greater user engagement in spatial design and offers three finish options, including an empty shell for self-fit-out.
Initial project of five townhouses launched late 2014. The two largest remained unsold and were redesigned into four smaller apartments 11 April 2016.
In 2014 Inhabit began promoting an option for Group Custom Build, placing themselves in the position of a building coach or facilitator for multi-unit CCB development. No active groups identified on Inhabit website as of April 2016.
The Courtyard, Bristol.
2 townhouses and 4 apartments. Mixed-tenure cohousing. Self-finishing. Collectively commissioned project funded by 2 owner-occupiers and one private investor.
Completed mid 2014. First homes in Bristol with A ratings in energy efficiency and environmental impact. Achieved Zero Carbon rating without government subsidies (Bright Green Futures n.d.).

This list informed recruitment of stakeholders for an interview. At the time of interviews, one London project and the Bristol project had been recently completed and occupied; the remaining four were in various stages of development, from land purchasing to construction. At the time of writing, one further project was complete, two were in

construction, and one had ceased activities. Of the infill CCB projects identified in the UK, the majority are at the cohousing end of the shared space and co-action spectrums.

CCB advocates, researchers, and government departments all regularly refer to CSO programs in other European nations as examples, including building groups in Germany and Berlin (Bernheim & ADAM Architecture Limited 2014; Brenton 2013; Brown et al. 2013; DCLG 2015a; GLA 2014; Mullins 2014; NaSBA 2011; Wilson & Heath 2014). As such, the urban CCB projects identified collectively act as a case from which to gain insights into transferring multi-unit infill CSO ideas between locations.

10.4.1 Collective Custom Build: Data Collection

Literature examining custom and self-build housing in the UK is dominated by industry and policy directed publications, with Lang (2015a) observing little academic research has been completed on the topic. Reports have investigated various aspects of the existing producer and consumer divide and the challenges faced when attempting to act as a housing prosumer[17] within the constraints of the existing UK housing management subsystem. Studies have examined the role of profit in architectural design (Parvin 2008), the differences between existing provision models and how they influence dwelling design (Parvin et al 2011), the strength and weaknesses of the existing custom build market and how it can be expanded (Wallace et al 2013), a contextualisation of CSO housing in the UK through review of literature and project examples (Brown et al 2013), and research into the perspectives of self-build stakeholders (Benson 2014). The existing literature provides a substantial knowledge base concerning the UK case.

The researcher conducted semi-structured interviews with 12 stakeholders in urban infill CCB projects in November 2014. Interview questions asked participants about their CCB experiences including a public understanding of CCB, challenges faced by CCB groups on urban infill projects, the role of government policy, their views on support needed by groups to realise their objectives, and their hopes for the future of the developing CCB sector in the UK. Interviews ranged from 70 minutes to 120 minutes, were audio recorded and notes taken by the interviewer. Most interviewees agreed to be identified, for consistency, all have been provided with a pseudonym for use in analysis and discussion. Many participants have experience in more than one CCB project and undertake multiple roles in the sector, as shown in Table 10.5. The breadth of experience of interviewees provided insight into CCB experiences which span the spectrum of CSO variables identified previously.

[17] The term 'prosumer' was coined by Futurist Alvin Toffler in his book *Future Shock* (1970) and further expanded in *The Third Wave* (1980). Toffler described the proactive consumer or producing 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. By producing goods for personal consumption the prosumer challenges the predominant market separation between producers and consumers; a separation entrenched in the existing supply-led housing market.

Table 10.5. Interview Participants: UK Collective Custom Build.

Primary role/name/location	Project Level Actants: Project Instigator	Resident	Future Resident	Architect	Project Manager	Group Member with Relevant experience/profession	Financial Partner/developer	Strategic Actants: Facilitator	Urban Designer/Planner	Housing Advocate	Pseudonym
David Birkbeck (London) Design For Homes CEO										X	UK1
Levant Kerimol (London) Director of Private Consultancy 'Our London' supporting Community Commissioned Neighbourhoods Principal Regeneration Officer, Greater London Authority.				X				X	X	X	UK2
Stephen Hill (London, projects SE UK) Consultant Strategic Planner Facilitator of cohousing projects in SE UK Board Member National Community Land Trust Network Past board member UK CoHousing Network								X	X	X	UK3
Sam Brown (London) Architect assisting fledgling CSO self-build group, London Academic Researcher National Custom and Self Build Association (NaCSBA)				X						X	UK4
Toby Lloyd (London) Member Hackney Cohousing Group*	X		X			X		X		X	UK5
Maria Brenton (London) Board Member of UK Cohousing Network Consultant Advisor to Older Women's Cohousing Project Member Woodside Cohousing			X					X		X	UK6
Steffie Broer (Bristol) Director Community Development Consultancy Bright Green Futures Ltd proposing to act as CCB agent Owner and Resident, The Courtyard, Bristol	X	X			X	X	X	X			UK7
Ken Rorrison (London) Architect Copper Lane Cohousing				X							UK8
Patrick Devlin (London) Architect at firm seeking to facilitate cohousing information and group formation (building coach) Architect for CoHousing Woodside				X							UK9
Guz Zogolovitch (London) Property Developer, InHabit. Proposing role as coach to CCB groups Board Member NaCSBA	X						X	X		X	UK10
Mattias Wunderlich (London) Urban Designer, Middlesborough Urban Renewal Project Advocate of CCB as urban renewal tool	X								X		UK11
Planner, Middlesborough Borough Council	X							X	X		UK12
Number of Interviewees: 12	5	1	2	4	1	2	2	7	4	7	

* Interviewee also senior housing policy advisor for Shelter UK. Interviewed in capacity as cohousing member only.

10.5 Initial Comparison: CCB and BG

Researchers have described CSO residents from European nations and North America as tending to have a higher than average education level and more likely to be single and/or female than the general population (Bresson & Denèfle 2015; Gottschalk et al. 2000 cited in Gerohazi et al. 2014; Glass 2012; Korpela 2012; Labit 2015). This continues trends observed in both Scandinavian collaborative housing developments of pre- and post-World War Two and cohousing projects of the 1960s and 1970s, which appealed primarily to an educated middle class and the socially conscious (Horelli & Vaspa 1994; Sørvoll & Bengtsson 2016; Vestbro & Horelli 2012). These international observations relate also to the Australian Multi-Unit innovators who tend to be well educated, possess a socially and environmentally progressive mindset, and have the financial means to engage in home ownership.

Given such consistency across the cohort of households interested in pursuing CSO housing options, it was not surprising to identify that the motivations of stakeholders are similar across all three locations. The two main themes of financial and ideological motivation identified among Australian stakeholders, including the ideological sub-themes of community, environment, and professional ethics, are also dominant in the international cases.

> *I charge 2.5% fee on whole project cost. Developer in Berlin gets 20-30% in a good project. The cost difference is main advantage to people, together with input in the design. (B4)*
>
> *It is not only about the market, but the will of the people. (B1)*
>
> *We are seeking a neighbourly form of living, a social purpose… focus on the community-led model. (UK5)*
>
> *It is necessary to support the local community in ageing. (UK6)*

Like Urban Coup members, households in cohousing groups in the UK are motivated to self-organise by the absence of market housing able to meet their community desires, although some recognise they are self-developing through lack of alternatives rather than a desire to do so.

> *We are seeking something that doesn't exist so need to build for ourselves. I don't want to be a developer, I would prefer to just access it. (UK5)*

The motivating role of dissatisfaction with existing housing was more prominent among international interviewees than in the Australian cases; particularly in Berlin (B1, B2, B3, B5). One architect described an early project as "driven by outraged citizens pissed-off with market products, [dissatisfied] with the design of existing models" (B3). Others agreed the market offers few options and building groups are "a way to get what you're looking for" (B2). These comments concur with Ball's observation that when purchasing

in rental dominated markets, choice is typically more constrained than in markets with higher homeownership (Ball 2012). Unlike the project-level actants, strategic actants interviewed did not identify limited market options as a motivator for BG activity. Among architects interviewed in Australia and Berlin, all of whom had instigated CSO projects, professional ethics was identified as a motivation to seek an alternative multi-unit SoP (A1, A12, B1, B3, B5). Architects associated with CCB projects were not project initiators and did not express such views.

Research on German building groups by Hamiduddin and Gallent summarised the main motivations as "cost, customisation, or community" (2015 p. 15). The presence of these multiple motivations is also acknowledged by researchers in other locations, despite variations in housing markets and contexts (Brenton 2013; Jarvis 2015a; Krokfors 2012), and in many places, different driving forces (Tummers 2015b). The relative commonality of motivations for CSO housing across the three locations supports the fittingness of the cases for comparison.

All interviewees recognise multiple variables exist across CSO projects in their country and that the project(s) they are associated with represent just one means of realising CSO housing. Table 10.6 provides a summary of three different Berlin BG projects as representative of the collective experiences of the interviewees. Similarly, Table 10.7 summarises three distinct CCB projects representative of the interviewee's experiences. Both tables include primary data from stakeholder interviews and present the projects relative to the CSO variables identified previously in Table 10.1.

Comparing the BG and CCB projects across multiple variables identified five key differences. Differences in:

1. the degree of design participation enabled,
2. the extent of variation from mainstream design facilitated,
3. production methods,
4. consumption behaviours, and
5. the extent of disruption of the existing multi-unit SoP.

Each of these differences relates to how effectively the alternate actor-networks disrupt the existing black-boxes of multi-unit provision. The remainder of this section expands on each of these.

Table 10.6. Berlin Building Group projects described against CSO variables.

Spreefeld Berlin
Genossenschaft
Completed 2014
67 units 3 buildings

Ten-in-one
Baugruppen
Completed 2005
10 units 1 building

Newton
Baugemeinschaft
BG Developer Instigated
35 units 3 buildings

Co-	Motivations	financial	community	environmental	professional ethics
	Common Ideals/values binding residents	no common ideals/values			common ideals/values
	Stage of co-action	management subsystem	production subsystem	exchange subsystem	consumption subsystem
	Extent of co-action	collaborative	collective	cooperative	communal
	End-user participation in design	informing	directing	mediating	obligatory passage point
	Participation behaviour	passive			active
	Shared Spaces	private unit no shared spaces	private unit shared external facilities and spaces	private unit shared external and internal spaces	private unit with common house
	Distance from mainstream options	no variance	small variance e.g. hobby space	moderate e.g. cohousing	extreme variance e. g. commune
Self-	Instigation	self-organised	architect instigated	developer instigated	governmental facilitation
	Degree of support from authorities	recognition with neutral action	planning provisions	short term finance /land assistance	financial grant
	Construction	self-build	self-organising	self-commissioning	
	Decision-making process	majority	proportional	modified consensus	consensus
	Degree of self-administration	100% internal administration	outsourcing of some services	outsourcing of most services	external administration
	Ownership	individual dwelling ownership with shared property rights (e.g. strata)		common ownership with right to occupy (e.g. cooperative)	
	Resale restriction	none	capital gains limited	sale only to members	market sale approval required
	Approach to ecology/sustainability	behavioural		technical	

Table 10.7. UK CCB projects described against CSO variables.

Copper Lane. Collectively Commissioned Co-housing. 6 units. Completed 2014.

Blenheim Grove. Developer Led 5 townhouses. 2016

OWCH. Community instigated. Partnership with Housing Association 25 units. 2016

Co-	Motivations	financial	community	environmental	professional ethics
	Common Ideals/values binding residents	no common ideas/values		common ideals/values	
	Stage of co- action	management subsystem	production subsystem	exchange subsystem	consumption subsystem
	Extent of co- action	collaborative	collective	co-operative	communal
	End-user participation in design	informing	directing	mediating	obligatory passage point
	Participation behaviour	passive			active
	Shared Spaces	private unit no shared spaces	private unit shared external facilities and spaces	private unit shared external and internal spaces	private unit with common house
	Distance from mainstream options	no variance	small variance eg.hobby space	moderate eg.co-housing	extreme variance eg.commune
Self-	Instigation	self-organised	architect instigated	developer instigated	governmental facilitation
	Degree of support from authorities	recognition with neutral action	planning provisions	short term finance / land assistance	financial grant
	Construction	self-build	self-organising	self-commissioning	
	Decision-making process	majority	proportional	modified consensus	consensus
	Degree of self-administration	100% internal administration	outsourcing of some services	outsourcing of most services	external administration
	Ownership (individual or cooperative)	individual dwelling ownership with shared property rights (e.g. strata/ leasehold / commonhold)		common ownership with right to occupy (e.g. co-operative)	
	Re-sale restriction	none	capital gains limited	sale only to members	market sale approval required
	Approach to ecology/sustainability	behavioural		technical	

10.5.1 Design Participation

In both locations, community instigated projects offer more active participation in design than developer-led projects. The privately-funded, community instigated CCB projects (Copper Lane and The Courtyard) achieved a level of collective and individual input in design comparable to that of BGs. Like Property Collectives, the group members are land title holders and self-fund development. This places them in a position of authority in their actor-networks, enabling them to set the design brief and approving the final design before construction (UK8, UK7). In contrast, participants in CCB projects partnering with Housing Associations (HA) share design decision-making. Interviewees describe the process as frustrating given HAs have established, risk-averse practices which do not necessarily reflect the motivations of the member households (UK5, UK6, UK9). Interviewees associated with separate cohousing groups partnering with one HA identified concerns with a lack of continuity and interest on the part of HA staff. They initially received support from a senior figure in the organisation enthusiastic to integrate cohousing models into the organisation's practices; motivated by the opportunity to engage future residents in design, increase self-management in occupation, and reduce operational costs to the HA as freeholder (UK2, UK3, UK5, UK6). However, following that individual's departure from the organisation, enthusiasm for cohousing partnerships waned (UK2, UK3, UK5, UK6).

In one project, the cohousing group self-formed from a community action to prevent the sale of a former hospital site to commercial developers. The HA was awarded the large, profitable development contract on the basis that a small portion of the site be developed for the community-based cohousing group (UK6, UK9). The motivations for an HA to participate in CSO housing will influence both the development path taken and built outcomes (Hamiduddin & Gallent 2015; Hasanov & Beaumont 2016; Tummers 2015b). The HA partner's shift from enthusiasm for experimentation to contractual obligation and visible corporate responsibility has negatively impacted the design process and outcomes in this project (UK6, UK9, UK3, UK5).[18]

10.5.2 Deviation from Mainstream Design

An attribute of Berlin BGs promoted by CCB enthusiasts is the potential for projects to deviate from the generic dwelling designs of the speculative SoP. Desired variations may,

[18] This Cohousing project was in construction at the time of writing, with less than one third of units pre-sold (Table 10.4, page 218). UK9, the project architect, indicated the cohousing principle of reducing the size of individual dwellings to construct shared spaces was abandoned by the HA. Individual units in the cohousing area will be the same size as units on the rest of the (non-cohousing) site, avoiding perceived risk of deviating from standard design. The primary input by group members has been in the layout of the cohousing section of the site, the relationship between units, and the common house. As a result design and pricing of the common house proved problematic (UK6). Individualisation of bathroom functionality was intended (UK6), however as very few units were pre-sold at the commencement of construction it is likely this has not occurred as intended.

for example, be functional, spatial, relational, constructional, or environmental. Multiple innovative BGs have pioneered unique construction materials and environmental technologies and responded to the needs of specific interest groups. Employing any of the now mature building group SoPs in Berlin, projects are able to deviate as far from mainstream dwelling design as collectively desired, within limitations of planning and building regulations (B1, B2, B5). Households choosing to participate in a developer-led project tend to be "middle class, conservatives" (B4). They frequently seek shared play, storage, work, garden, and activity spaces, but do not tend toward cohousing, which is more common among self-initiated groups (B2, B4, B6), and in some projects do not desire more shared facilities than a typical multi-unit building (B4).

Despite five of the six CCB projects used for recruiting interviewees being described as cohousing, the projects completed and under construction at the time of writing suggest a reluctance to deviate significantly from mainstream spatial design. The privately-funded, self-developed cohousing project Copper Lane is the most individual, including an adaptable common area, gardens and rooftops shared by residents (Henley Halebrown Rorrison 2014; Merrick 2015), on a site designed to maximise enjoyment and lifestyle rather than financial return (UK8). The Courtyard in Bristol also has a common house, owned by a non-resident investor, to whom the resident households pay a collective rent. Its design allows for easy conversion into an additional, independent residential unit if desired, meaning this cohousing project does not deviate from mainstream spatial planning, although it is currently utilised in an atypical manner. The developer-led projects and those with not-for-profit development partners have not deviated from mainstream multi-unit design, but they do take more detailed consideration of residents' needs. This is reflected primarily in site design and, in some projects, build quality and atypical (but seldom innovative) material selections (UK2, UK3, UK4, UK5, UK8, UK9, UK11).

Berlin BGs commonly seek high environmental performance standards, with some described as "eco-pioneers in relation to environmental technology, levels of energy efficiency, water management etcetera" (B2). Some set new eco-standards for urban housing (B6), aiming for PassiveHaus or Zero Emissions certification, and some larger projects include on-site "energy houses" (B1) for lower cost local generation of heat, energy and hot water. Such investments "shift financial savings to the user so are not beneficial to developers" (B1). As architect Christoph Roedig commented, one of the main long-term benefits of self-development is that residents are more likely to invest in durable design and low operating costs (Ring 2013).

Equally, all CCB projects pursue significantly higher environmental ratings than speculative dwellings. Both privately-funded CCB projects achieved their environmental ambitions, with The Courtyard being the first multi-unit project in the UK to obtain zero emission housing certification without government subsidies (UK7). Groups partnered

with Housing Associations also originally intended to construct housing to PassiveHaus or Zero Emission standards, but found this a point of contention with their partners and were required to compromise the environmental ambitions for the project (UK3, UK6, UK9).

10.5.3 Construction

Benson (2014) describes three main modes of custom build (CB) procurement; self-build, self-organisation, and self-commissioning. Each offers the self-developing household different levels of financial benefits, involve different interactions with professionals, and require different skill sets. UK literature shows all three procurement modes are used in low-density custom builds (Benson 2014; Parvin et al. 2011), while self-commissioning dominates urban infill CCBs.

For privately-funded groups, this means employing the services of professionals to deliver housing to an agreed specification (UK1, UK12, UK4, UK9). It includes the outsourcing of design services and the contracting of construction on a fixed price contract (UK8, UK9). The use of a fixed price construction contract reduces the risk exposure of the contracting households in that the builder carries unexpected cost changes, within the bounds of the contract. Construction contract prices reflect this delegation of risk and unexpected savings remain with the contractor.

In contrast, building groups use a self-organising approach with an architect, BG developer, or site project manager employed to coordinate trades and costs throughout the construction process (B1, B3, B4, B5). In this SoP, the future owners/residents, as the carriers of financial risk, commence construction without a definitive final project cost, a process which carries the risk of over-spending due to unforeseen circumstances, but also offers significant potential for savings. This process is typical in Germany, where "architects, for example, have much more site-managing and coordinating responsibilities and are more likely to act as developers" (Tummers 2015b, p. 10). This process incurs real costs plus overheads, rather than negotiating a fixed price contract with a construction contractor. This system is made possible by supply and labour prices being more stable and predictable, cost estimators providing accurate pricing, and those commissioning construction comprehending that prices may vary (B1, B2, B4, B5). Importantly, financial institutions are also accustomed to this process. Compared with the UK and Australian traditional SoPs, the German model has fewer levels of profit-seeking influencing final costs, and in this way is similar to the Australian integrated developer SoP discussed in Section 6.5.

Commencing residential construction without a fixed price contract seems unfathomable to Australian stakeholders, with one architect interviewed stating:

> *… that's crazy. There is no way I would risk not having a fixed price contract, and banks wouldn't go for it either. (A12)*

It is possible construction costs in German BGs could exceed expectations, however all architects interviewed (A1, A3, A5) suggested the process assists in controlling costs as finish and fitting specifications can be amended during the course of construction in response to earlier cost variations; but participating households need to understand and trust the process. In one project, the communal kitchen and other common spaces remained incomplete at the time of occupation. Removed from the construction works contract to save costs, they were completed shortly afterwards by residents using opportunistically sourced materials and volunteer labour (B1, B2).

Regardless of the construction contracting used, CCB and BG projects can integrate a degree of self-finishing. Residents of The Courtyard applied material finishes, installed fittings, and completed landscaping works, realising significant cost savings (UK7). Some BG projects do not integrate items such as individual kitchens into the overall construction program (B2), installing them later to the owner's design and at the owner's cost. This reflects the practice of long-term tenants installing their own kitchens in German rental properties and offers yet another saving on initial construction costs. However, such items cannot be deferred indefinitely and the costs associated with individual finishing can represent a false economy (B1, B5).

10.5.4 Consumption

Government agencies and CSO advocates both identify CSO housing as offering residents positive advantages including mutual support and community engagement (DCLG 2015b; id22 2012; McCamant et al. 1994; NaCSBA n.d.; STATTBAU GmbH 2012). The extent to which residents benefit from these qualities is described by Berlin interviewees as varying with how the projects are administered during occupation (B1, B2, B4, B6). Genossenschaften are described as having the highest level of self-administration (B1, B2, B6), with minimal outsourcing of services and substantial voluntary contributions by residents to maintenance, gardening, financial management, and record keeping. Developer-led BGs tend to outsource administration more (B4), and self-initiated condominium-titles BGs sit between these two extremes, as determined by residents' preferences (B3, B6). This concurs with Lang's observation of Austrian CSO housing projects, where he credits community-initiated projects with an increased tendency for community interaction and suggests that in project-instigated communities "residents still live mainly as individual households" (Lang 2015b, p. 7). In all BG types, residents necessarily meet and interact as a community with a common interest, working together to their collective benefit.

The CCB projects similarly vary with regard to self-administration. The two self-funded, self-developed cohousing projects are administered entirely by residents, with specialist input from professionals such as lawyers and accountants as required (UK7, UK8). In these projects the property owners are both leaseholders and freeholders of the property, ensuring autonomy from third party interests. The projects involving Housing

Associations (HA) experience less autonomy in administration, with the HA maintaining freehold ownership (UK5, UK9, UK3). With these projects entering the occupation phase at the time of writing it is yet to be seen how, or if, the HA adapts their existing freehold management practices to reflect the cohousing ethos of the leaseholders. Differing most from the BG model of collective self-administration is the developer-led CCB project which delivers freehold terrace houses and does not require collective management.

Between the cohousing and individual dwelling ends of the spectrum sits the option for CCBs which share some resources and self-administer the building during occupation, but which do not promote a lifestyle shift to cohousing. This is the most common form of BG in Berlin and the majority of UK interviewees (UK2, UK3, UK6, UK7, UK12, UK4, UK8) suggested this as a CCB option but no projects of this type have been identified in urban infill in the UK.

10.5.5 Disruption of Existing Multi-Unit SoPs

CSO projects in the three case locations share common motivations; to achieve cost savings while designing dwellings to meet residents' needs, individually and collectively. Drawing on both literature and interview data, Figure 10.1 compares the alternative SoPs from the three locations relative to design input and individualisation, and costs and risks.

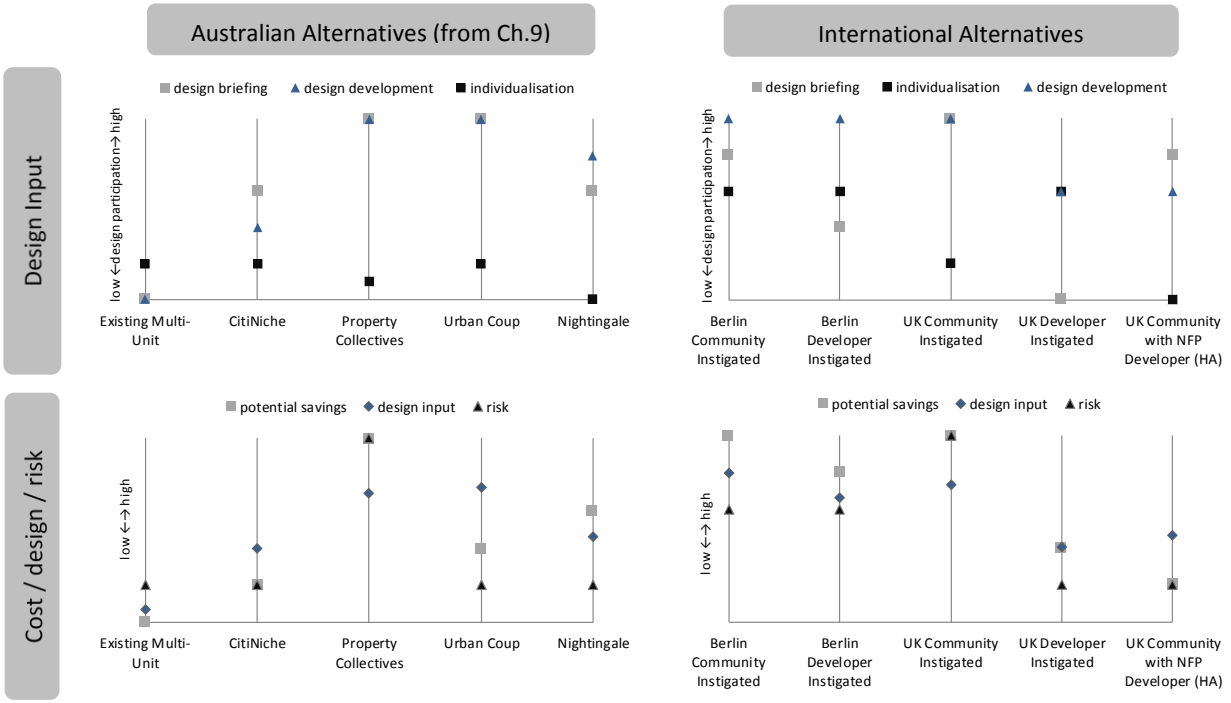


Figure 10.1. Comparison of Risk, Design, and Cost variations in Australian and International cases.

In Berlin, both community instigated and developer-led BGs enable high levels of design input by future residents and high potential cost benefits; attributes which have attracted international attention. Among the CCB and Australian alternatives, only the privately funded projects (Property Collectives, Copper Lane, and The Courtyard) have achieved an equivalent level of design influence and potential savings as the Berlin BGs. This emphasises the correlation between the location of financial risk and design decision-making.

The developer-led CCB offers dwelling individualisation equivalent to Berlin BGs but does so via very different mechanisms. BGs achieve individualisation by households self-organising some parts of construction, arranging some things themselves, taking some construction risk, and saving money. Developer-led CCB projects achieve individualisation via the bespoke design of interior spaces, potentially at high costs unless self-finishing is undertaken.

The only non-self-funded SoP proposed which achieves a high level of design input for future residents is that of Urban Coup. However, the SoP proposed remains unrealised and experiences of CCB groups partnering with not-for-profit developers in the UK suggest a less ideal outcome is likely. Among the non-self-funded projects, The Nightingale Model achieves the highest cost savings. The model adjusts investors profit expectations via limited profit arrangements, ensuring residents receive the benefits of unanticipated savings. The CCBs involving both for-profit and not-for-profit developers have not achieved adjustments to profit expectations and hence not realised the cost benefits experienced by BGs. This situation similarly applies to CitiNiche.

Chapter 8 divided the four Australian alternative cases into two groups, community instigated projects and project instigated communities, a divide which also exists in the international case locations. Figure 10.2 expands this division to recognise different funding sources and ownership structures.

Of the BG types, the community instigated, self-funded condominium-titled BGs are the most directly replicated in the other locations, with the UK and Australian examples following this approach coming closest to realising the design and cost saving benefits of CSO development. As the BG type which has received the most media in recent years, the co-operatively owned model (Genossenschaft) has not been adapted to the other locations due to a lack of suitable property titling alternatives (UK1, UK5), and a lack of market experience with co-operative ownership (A11, A7, A13). Neither has the developer-led resident-funded model (Baugemeinschaft). The management subsystems of the speculative multi-unit housing SoPs in the UK and Australia have resisted attempts to directly fund developer and architect-led projects by future residents (A12, UK10), requiring groups in both locations to partner with not-for-profit developers (A7, A8, A11, UK5, UK6).

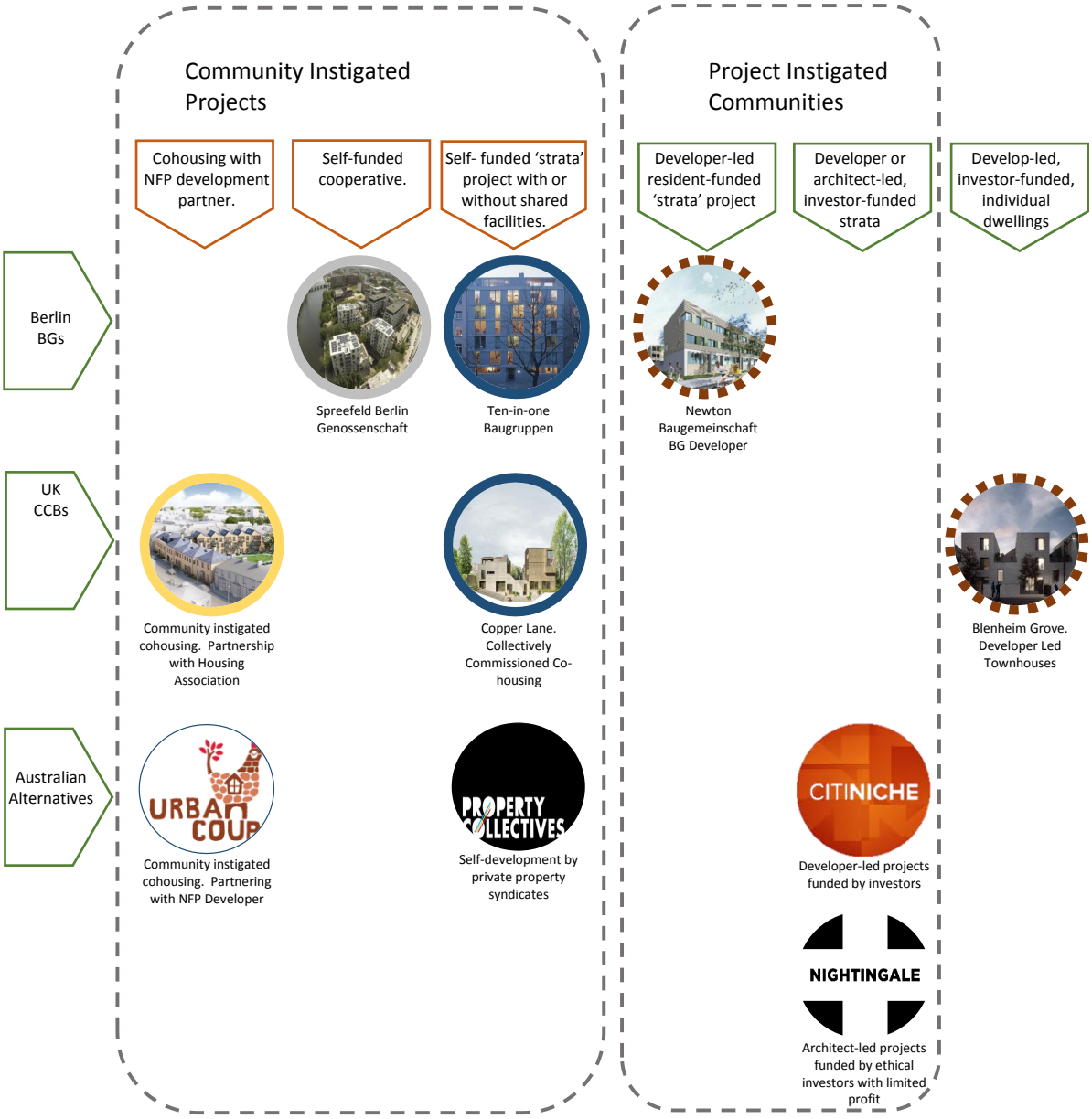


Figure 10.2. International and Australian project correlations.

A final observation from Figure 10.2 is the location of the developer-led CCB projects outside the CCB boundaries. This model lacks co-action by resident households during production, with the site design and exterior building design completed prior to their involvement. It produces individually titled dwellings which do not require collective action in consumption, and it is concluded that the alternative SoP advocated produces individualised dwellings not currently provided by the market but does not constitute CCB

or CSO housing. This is reiterated in the classification of cases by Gulati and Srivastava's forms of constrained agency in network action (Figure 10.3).

Using the capability based resources they possess, the CCB developer, like the Australian Integrated Property Developer, legitimises and consolidates their existing structural position to fortify their role in the actor-network. As Gulati and Srivastava observe, when taking fortifying action the network structure "can limit the actors' repertoires" (2014, p. 81) and minimal disruption of an established complex system is enabled. The ability of powerful, reputable, and well-resourced actants from the existing SoP to propose minor production variations as a CCB alternative raises risks associated with the CSO sector becoming over professionalised, a topic which is further discussed in Chapter 11.

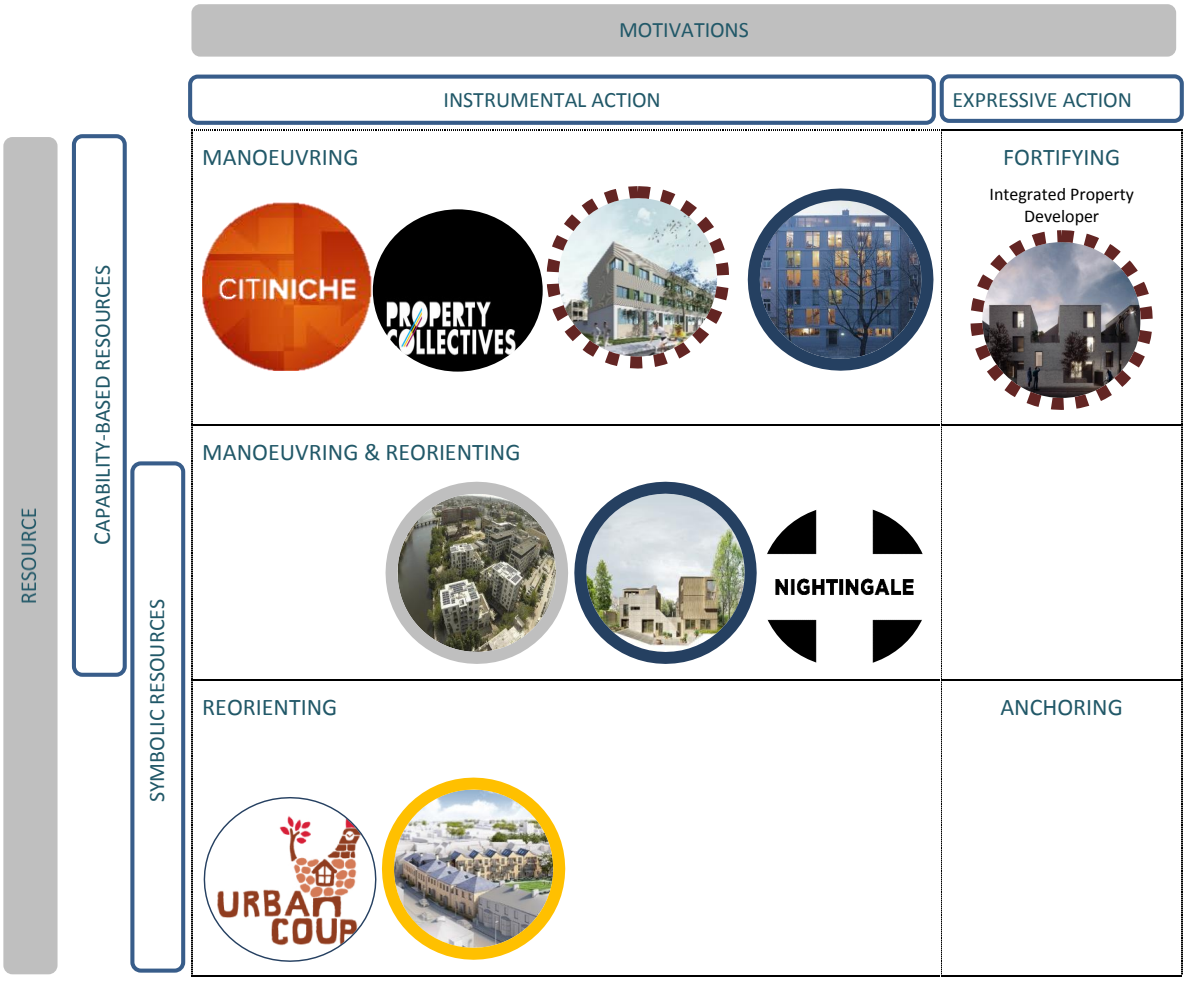


Figure 10.3. Example projects from all case locations classified by forms of constrained agency.

The BG developer, on the other hand, reconfigures the actor-network to improve their own structural position and, like Property Collectives (Section 9.2), takes up a new brokerage position. The community instigated, privately-funded projects with ideological motivations employ both capability based resources and symbolic resources to implement instrumental network action. By reorienting the objectives of the actor-network and manoeuvring themselves into a position of influence, the instigators of these particular projects have the greatest opportunity to implement profound network change. Figure 10.3 shows BG co-operatives (Genossenschaft), privately developed CCB cohousing, and The Nightingale Model in this potentially powerful network position. Additionally, baugruppen could also be included here as a group of households may or may not have a collective ideological motivation; where they do, the baugruppen SoP can also produce profound network change.

In all BG variations, the households are land title holders and must collectively approve the building and dwelling designs. They become focal actors, mediators, and obligatory passage points in the actor-network, stopping their project from reverting to the existing SoP; something which can feasibly occur in all UK and Australian projects where land purchase and construction is financed by a third party on behalf of a CSO group.

The SoPs of all community instigated projects require co-action in the management subsystem and seek to disrupt the existing actor-network, establishing unique network connections to facilitate their collective objectives. CSO groups with access to capability resources can successfully negotiate the management system in this way, with the potential to progressively modify actor-network relations over time. Self-formed CSO groups who possess purely symbolic resources struggle to acquire information and influence, and face the most challenges in disrupting the existing SoP and realising their housing ambitions.

10.6 Conclusion

This chapter introduced the two international case studies of multi-unit CSO development; the Building Groups of Berlin and the Collective Custom Build projects of the United Kingdom. It highlighted the complexity of a systemic approach to comparative housing studies and provided a comparison of the housing markets, construction practices, and relevant policies of each jurisdiction.

Using existing literature together with primary interview data from both locations, comparisons of the CSO cases emphasise the influence of the management subsystem on design outcomes, with direct correlations shown between the residents' capacity to influence design and their assumption of development risk. The existing UK and Australian management subsystems resist the relocation of risk to future residents,

leading to alternative SoPs which modify but do not disrupt the existing actor-networks and hence have limited capacity for innovation.

As early as 2006, discussing Berlin building groups, Junge described “developing without a developer” as having become a normalised option for Berliners. To normalise a similar option for Australian households, it is essential to address the impediments to Collective Self-Organised housing identified in Part Three: Australian Multi-unit innovators. The following Chapter draws further on the BG and CCB experiences with that ambition.

Chapter 11. International Lessons

This chapter employs the two international cases to address the project-level and strategic-level impediments to Collective Self-Organised (CSO) housing in Australia identified in Part Three. In doing so, it is notable that greater interconnections between project-level and strategic-level actants exist among the Building Group (BG) and Collective Custom Build (CCB) stakeholders interviewed than in the Australian cases. In both international locations, multiple actors actively engage with sector advocacy in addition to direct participation in a particular project or projects. Stakeholders undertake strategic-level advocacy in both professional and non-professional capacities, with the majority of interviewees (B1, B2, B3, B4, B6, UK1, UK2, UK3, UK4, UK5, UK10, UK11) indicating a sense of social responsibility to assist in developing CSO housing beyond the projects that benefit them individually.

Fewer project-level stakeholders in the Australian alternatives expressed an intention to engage in CSO housing beyond their individual projects, with the notable exception being A12, the instigator of The Nightingale Model, who endeavours to support other architect-developers to pursue similar projects.

> *Architects should be custodians of our city, not developers that care about profit and bottom line. (A12)*

11.1 Project-Level Lessons

11.1.1 Land

Berlin

During the pioneering and experimental phases of sector development, Berlin BGs experienced relatively easy access to developable land. Due to the unique political and property circumstances of the time, substantial numbers of buildings and land parcels across the city were underutilised (Syben 2013) and provided an opportunity for community groups to collectively engage in the regeneration of inner urban areas. The ongoing recession and building slow-down resulted in a "low perception of the worth of land" (B3). In early projects land costs constituted less than 20% of total project costs, enabling land purchase using members' funds prior to involvement of financial institutions (B3, Ring 2014). Land was typically privately owned and in areas of low demand (Junge 2006, p. 7). All Berlin interviewees expressed views in concurrence with

interviewee B3's assertion that "growth in Berlin occurred because there was land, and lots of it, to develop new ideas. So much space for new ideas".

Phase One BGs were typically of 6-20 units and continued to find land accessible as speculative residential development recovered from the recession, as the small sites of interest to building-groups were seldom economically appealing to developers (B1, B6, Junge 2006; Sudiyono 2013). More recently, with small sites filling up and property values rising, BGs have found themselves both competing with commercial developers to gain access to land (B4, B5, B6) and incurring higher land costs. This places pressure on total development cost and project viability, as well as exacerbating time pressures in land purchase negotiations, on which developers have the capacity to act more quickly than newly-forming BGs (B1, B2, B4, B6).

It was not until the Berlin BG sector moved toward Phase Three maturation that land access issues similar to those experienced by the Australian innovators emerged. This has encouraged some BGs to pursue difficult or marginal sites developers are less drawn to due to perceived risks (Heyden 2007), but this is not a long-term solution (B2, B3, B6). BG actants interviewed desire four to six-month option contracts when purchasing land, to confirm project viability and finalise group constitution (B2, B3, B4, B6). This is seldom favourable to private land vendors in high-demand markets and consequently, attention has shifted toward accessing state-owned land (B2, B4, B6).

In other German cities, large scale urban regeneration, urban expansion, and land disposal programs have used top-down frameworks administered by local authorities to actively encourage self-development by BGs. The Cities of Freiburg and Tuebingen release multiple adjoining sites collectively in new urban quarters. In Hamburg, 20% of all public land disposals are set aside for BGs (Novy-Huy & Large 2013), with requirements for projects to contribute to neighbourhood diversity. All three cities sell fixed price land at market value with purchase options ranging from 6 to 18 months. While public interest has exceeded the available land, a BG lodging a viable bid is likely to access a suitable plot.

Following advocacy from some building-group actants, the Senate of Berlin[19] passed a commitment in December 2007 to introduce a process for the disposal of state-owned land to BGs at fixed market prices (Netzwerkagentur GenerationenWohnen 2008). A concept based bidding process (B5) was introduced informed by those used in other cities (Droste & Knorr-Siedow 2012; Hamiduddin & Gallent 2015), with an initial four sites made available in 2008 (Netzwerkagentur GenerationenWohnen 2008). Land allocations are based on design propositions, project viability, and community contribution. This process prevents developers outbidding BGs for land, however the process is open to both BGs

[19] Berlin holds the unusual position of being a 'city state' and hence is governed by two layers of administration (Federal and State/City) as opposed to the typical three layers of administration as occurs in Austrlaian, the UK, and other German regions.

and housing companies, which interviewees view as inequitable (B6, B2). Interviewees described the current government land disposal process as ineffective, expressing concerns regarding the small number of sites made available (B2) and the undesirability or unsuitability of those sites due to financial, environmental and buildability constraints (B6). One stakeholder suggested the sites offered by the government to BGs were residual sites rejected by commercial developers and their unsuitability resulted in some remaining unsold, a fact some politicians see as demonstrating low demand (B4). Some stakeholders view the ongoing viability and affordability of the sector as dependent upon the effective distribution of publicly owned land (B2, B6). An opposing perspective, expressed by industry professionals, is that BGs need to be able to compete in an open development market without preferential treatment (B5, B4).

The Berlin land disposal program received positive international publicity following the 2013 completion of the BG 'R50-cohousing' which was nominated for the 2016 European Union's Mies Van der Rohe Award for architecture (Anderton 2015; Plassman 2012). However, the negative outcomes for the groups whose bids for the site were unsuccessful are less publicised. Interviewees shared multiple stories of BGs who had invested time, energy, money, and emotion in the preparation of bids for state-owned land only to miss out (B2, B3, B4, B5, B6). The urban planner interviewed expressed strong concerns about the prerequisite to submit a priced design proposal as this requires completion of design earlier than possible in a participatory design project and shows that the land disposal process does not align with the building-group model of development it seeks to support (B6). Others describe the process as excessively administrative and over demanding on applicants, requiring the engagement of professional services and incurring significant cost before securing a site (B3, B5). In one publicised situation, a community-based group identified a derelict, state-owned site suitable for development in 2012. After three years of negotiation the city listed the site for disposal and a viable bid was prepared with community investment of time and resources, but the site was eventually awarded to a private housing company, the former city-owned GSW (Bridger 2015; Rathaus Stern Projekt GmbH 2013, n.d.; Unknown 2015). The bids for these infill sites are necessarily bespoke and, unlike the programs run in the southern German cities, there is no pool of similar or substitutable sites to distribute among bidders (B6).

The land disposal system was described by some interviewees as a competition (B1, B2, B4, B6), with the government advocate interviewed commenting that "[i]f this structure of competitions continues it should be between building-groups not between building-groups and developers" (B6). All suggested the system needs refinement, however, the building-group community remains divided on the best approach. Some argue for the city to sell land at subsidised rates to BGs in recognition of resultant social benefits (B2), others advocate for land to be provided via ground leases or sold to not-for-profit land trusts, such as the charity Stiftung Trias, to avoid land speculation and ensure housing

affordability in perpetuity (B1, Droste & Knorr-Siedow 2012; Novy-Huy & Large 2013). At the other end of the debate, the BG developer interviewed argues BGs are a competitive means of housing development and questions why the government should sell land cheaply to future owners; “Why give them a gift?” (B4).

The challenges of accessing land in an increasingly high-demand market persist in Berlin, with all interviewees identifying it as a major challenge to this relatively mature BG sector and expressing a variety of concerns regarding the introduction of top-down land disposal frameworks.

UNITED KINGDOM

The CCB sector is emerging in the United Kingdom (UK) in a high-demand land and property market, with all interviewees raising access to land as a dominant barrier. Kerimol (2012), Benson (2014), and Hill (2015), among others, suggest government intervention in land processes is required in the UK to facilitate future housing affordability. Government support for custom build housing, has increased over recent years, with three key land initiatives implemented of relevance to CCB. Firstly, commencing in 2012, the Homes and Communities Agency (HCA) identified and released a small number of government-owned land plots across the country specifically for collective custom build. These have produced serviced plot schemes for free-standing, semi-detached and terraced houses, ranging in size from ten to 150 dwellings (DCLG 2014b). These sites are delivered in partnership with for-profit land developers and, as yet, none have delivered multi-unit housing on urban infill sites, let alone involved collective design input.

Secondly, the *Custom and Self Building Housing Act (2015)* requires local planning authorities to hold a register of local households seeking to self or custom build. Subsequent Acts are expected to be introduced to parliament detailing mechanisms for translating the register into custom build opportunities (Wilson & Heath 2014). In the meantime, the Department of Communities and Local Government (DCLG) has designated eleven local authorities as Right to Build Vanguards to trial ways of implementing custom build. Delivery methods proposed include the commercial development of authority-owned land into serviced lots by for-profit developers, partnering with social landlords and Housing Associations to construct pre-designed, self-finish homes, and redeveloping underutilised public sector land (DCLG 2014). Again, these government actions have not engaged with multi-unit development on urban infill sites.

Thirdly, The Greater London Authority (GLA), offered a single 800m^2 site for use as a CCB development via competitive tender. Described as a Custom Build Showcase project, it was to demonstrate opportunities for innovative infill development which enhance the existing London urban fabric and contribute to a design dialogue for a “new London vernacular” (GLA 2012, p. 2). The project prospectus suggests other sites across London will be made available over time, and describe a desired CCB process similar to that of

Berlin BG Developers, including the recruitment of households to participate in design and provision. The GLA awarded the contract to develop the site to The East Thames Housing Association (ETHA), a registered charity managing more than 1,500 homes. ETHA obtained planning permission for nine townhouses before placing them on the market in March 2015. Five will be sold on the open market, two sold with shared equity, and two retained by the association for rental. London's Deputy Mayor of Housing and Land, Richard Blakeway, described the project as an "innovative scheme … delivering spacious, good quality homes tailored to the needs of buyers on a range of budgets."(ETHA 2015). Flexible designs (Figure 11.1) enable households to modify interior spaces to suit their personal needs and initial residents will have the opportunity to engage in the spatial design of their individual dwellings within the constraints of the planning approval. Finalising the overall building design prior to engagement with future occupants reduces the benefits of CSO development identified in Chapter 1. The dwellings are generously sized, adding to the diversity of local housing, resulting in a minimum purchase price higher than the average in the area (Marquand et al. 2015). The benefits Blakeway commends are realised not by a replicable reconfiguring of the structures of housing provision (SoP), but via government subsidies and ongoing investment by the not-for-profit housing association who retain part ownership.

Figure 11.1. Marketing Brochure for GLA Custom Build Showcase Project.
(DNA Homes 2015, pp. 6,7&13).

Taking the risk averse path of awarding the site to an established Housing Association has undermined the ambition to demonstrate the viability of community-led CCB projects to industry. This project unintentionally acts to reinforce the perception that projects deviating from the dominant SoP require subsidies. In a 2015 Report to the incoming UK government, KPMG and Shelter UK suggest following the precedent of some German cities, recommending the allocation of 20% of land be set aside for custom builders (KPMG

in the UK & Shelter 2015). Were such land to be distributed in an equivalent manner to the GLA Custom Build Showcase, it would act to fortify the dominant network position of for-profit and not-for-profit developers, further increasing the barrier to accessing land currently experienced by community-led groups seeking to self-develop.

These three key government land initiatives have to date failed to initiate a single community-led multi-unit CCB development, such as those being pursued by the interviewees and have not facilitated occupant participation in building design. Given the broad ambition of the HCA to promote custom build housing across multiple dwelling types and densities throughout the country, it is not expected all government actions will target urban infill projects. However, the actions taken by the UK government and its departments to date focus solely on individual dwellings, despite ongoing references to continental examples of CSO apartment developments in their own publications. One interviewee suggested low-density projects are favoured for funding, despite government documents including "blocks of apartments commissioned by a group of people in an urban area" (DCLG2012) as one of the four types of custom build housing it seeks to promote, as they are politically less risky (UK4).

A key theme identified in the interviews is that CCB groups in urban areas face different challenges accessing land from those in sub- or peri-urban areas. Many interviewees expressed concern any future land disposal processes would, like these pilot programs, primarily support less difficult sub- and peri-urban projects while reinforcing the dominance of commercial developers and HAs (UK4, UK10, UK3).

Like their Australian and Berlin counterparts, many interviewees identified time for land purchase as a major barrier, with the majority desiring pre-sale contracts with delayed settlement conditional on funding and/or planning approvals (UK2, UK3, UK5, UK7, UK9, UK10, UK12), although some suggested this would make CCB groups even less competitive in the open land market and require government support (UK12, UK5). Architects and project managers interviewed suggested CCB groups would do better to avoid reliance on government assistance and build a self-reliant housing sector free of government bureaucracy (UK8, UK9, UK7). The majority of development industry professionals also suggested avoiding competition by pursuing sites speculative developers do not perceive as sufficiently profitable (UK8, UK9, UK10). These views differ from those of members of industry and community bodies who advocate for greater government action to address barriers to accessing land (UK1, UK2, UK4, UK6).

LESSONS

Both international cases, BGs and CCBs, have faced similar challenges accessing land to those identified by the Australian innovators, although at different phases in sector development. The challenge of accessing affordable land in a timely manner is acting to restrict the feasibility of pioneering multi-unit CSOs in Australia and the UK to an extent not experienced in Berlin. Having encountered fewer barriers to accessing land during

early phases of development, the Berlin BG sector has reached a phase of maturity in which it is more capable of addressing land challenges. BGs have adequate public recognition and have demonstrated sufficient successful outcomes to seek "specific provision in legislation and housing systems" (Bliss 2009, p. 56). As in any industry, diverse views exist among actants as to how the challenge best be addressed, but the sector has acquired sufficient influence over its own provision network to effect outcomes.

Drawing on German precedents, UK policies aiming to support the emerging CCB sector have, to date, unintentionally fortified the position of key actants in the existing speculative multi-unit SoP and fallen short of their ambition to directly engage residents in urban infill development. The provision of publically-owned sites (suitable for community-led CCB development) to Housing Associations does not significantly alter existing network structures and acts to exacerbate land challenges faced by households pursuing collective self-development.

In seeking to facilitate land access for community-led CSO projects in Australia, government intervention needs to ensure it manoeuvres the future residents into an improved structural position in the CSO actor-network; that it does not unintentionally fortify the position of key actants of the existing SoP; and that it does not create unfair or costly competition within the CSO sector. It is also important to acknowledge accessing land for infill development involves additional challenges to those experienced in sub- and peri-urban areas, and ensure interventions support CSO housing at a range of densities and locations which meet the needs of future residents.

11.1.2 Financing

BERLIN

The German lending environment is traditionally more conservative than Australia's, requiring large deposits and capping primary loans at a loan-to-value ratio (LVR) of 60%.[20] The banking sector comprises a large number of relatively small institutions, with one architect-instigated project undertaken from 2003 to 2005 seeking funds from 50 separate banks who all rejected the proposal. After purchasing the site using group members' equity, joint financing was secured through ten separate institutions (B3) as none were prepared to fund development costs in full despite a relatively low loan-to-value ratio for the completed project and zero marketing/settlement risk.

Early BG projects demonstrated the low-risk nature of the model and a small number of financial institutions developed suitable finance products, assisting the sector to move into Bliss' Stage Two: replication and consolidation. Two institutions engaged in funding building-groups are KfW and GLS Banks (B4, B6, Chan 2010; Ring 2013). Both are medium-

[20] Primary loans are frequently packaged with other purpose specific loans, e.g. green energy loans, to increase the LVR (RICS, 2012).

sized institutions with strong social and environmental lending policies,[21] providing preferential loan terms for buildings achieving or bettering the German Energy Agency's energy standards (MacDonald et al. 2014; Ring 2013; Schroder et al. 2011). The willingness of these two banks to engage with building-groups has played an important part in their success. KfW and GLS are both BG supporters, but they are selective as to the types of groups they fund. One interviewee who arranges finances for BGs' stated that of those two banks, "one says [it doesn't] work with groups who are self-organised due to time issues. Waste of time for bank" (B4).

Some large BGs have sourced funds from other mainstream financial institutions; possibly a sign of increased acceptance of the BG model. One example is Initiative Mockernkiez, the largest co-operative development proposed in Berlin with 400 dwellings planned and an initial budget of €80M (Initiative Mockernkiez 2013). The project was seeded in 2007, the site purchased in 2010, and construction of four of the planned 17 buildings commenced early 2014. Interviewees expressed concern regarding the escalating financial risks of such large projects (B1, B2, B3, B4, B6), with some anxious about the negative impact the public failure of such a large development could have on the capacity for smaller, less risky projects to access funding in the future (B2, B6, B4). Unfortunately, the Mockernkiez project suffered funding challenges shortly after interviews were conducted. With cost estimates increasing to €120M, the financial institution re-evaluated and requested additional equity (Chapman 2015). Work ceased on the partly constructed buildings in November 2014 (Long-Lendorff 2015). The project was refinanced to avoid bankruptcy, requiring the sale of a portion of the site (Berliner Morgenpost 2016), dismissal of the Executive Board, restructuring of the Management Board, and a reduction in the role of the general membership in project operations (Initiative Mockernkiez 2015). Construction recommenced in June 2016 (Initiative Mockernkiez 2016).

Mockernkiez's challenges have received significant media coverage, including a commentary published in an Australian design journal discussing alternatives to the existing Australian SoP which states:

> *Sadly, idealism seems to have been undone by poor management, inaccurate cost-estimates and the unfathomable decision to start constructing four buildings at once before financing was approved. For every success story, there's a cautionary tale – good intentions are not enough. The specifics of organisational, financing, management structures – and scale – matter. (Chapman 2015)*

[21] The KfW Bank (Kreditanstalt für Wiederaufbau) is the publicly owned Reconstruction Loan Company formed in 1948 to administer funds provided under the European Recovery Program and has a forty-year history of financing energy efficiency upgrades (Schroder et al. 2011). The GLS Bank (Gemeinschaftsbank für Leihen und Schenken or community bank for loans and gifts) is the only German member of the Global Alliance for Banking on Values (Hochstadter & Scheck 2014) and has focused on ecological, social and cultural projects since 1974, including communal living projects.

To date there is no direct evidence of this circumstance negatively affecting the funding of other projects. However, it does emphasise the care required in the upscaling of pioneering, experimental concepts as they progress toward Bliss' third phase of sector development. The 400 households planning to reside at Mockernkiez will not only be waiting three years longer than expected to move into their homes (Long-Lendorff 2015) but now find themselves less central to the SoP than originally intended. Under the renegotiated financial arrangements, the actor-network has reverted to being more akin to the existing supply-led development SoP than to the early, smaller BG SoPs. Fortunately, the project, building and dwelling designs were determined during the time in which the future residents retained decision-making influence. The challenge for Mockernkiez members will now be to realise their intended design under the oversite of the new financial arrangements and with additional profit-seeking actants.

Genossenchaft or Co-operatives, including housing co-operatives, existed in Germany prior to the CSO style BGs discussed here. Approximately 40 German housing co-operatives have established privately owned saving institutions which invest members' funds on medium- and long-terms, using it as development capital and returning interest at a higher rate than commercial banks (Lambert 2011). Such collective funding enables collective, not individual, property ownership. This model is well established and has been utilised over four decades to develop properties both with and without direct engagement with future occupants (Eyrich 2014; Heitel et al. 2015). Drawing on this history, Nürnberg's UmweltBank has engaged with BGs in Berlin (Bridger 2015) providing tailored finance packages which pool the individual mortgages of pre-sold units to fund construction. The debt is refinanced into individual mortgages following construction, enabling development of condominium-titled (WEG) buildings to proceed based on future occupants equity and capacity to service future loans, as advocated by Australian innovators.

Despite changes in attitudes from financial institutions, all interviewees involved in community instigated BGs stated funding for site purchase and development remains a barrier (B1, B2, B3, B5), with each group required to negotiate terms particular to their unique circumstances (B1, B2). Some project-level actants suggested administrative or legislative support is desirable in negotiating development finance (B2, B4). Strategic-level actant B6 expressed the contrasting view that "the banks are on board now, finance problems are on a personal level," highlighting not only the division between project-level and strategic-level actants view of the SoP but also the challenges first home buyers face in the global real estate markets. Some co-operatively owned BGs seek to increase access and affordability to younger members through mutual financing and the sharing of intergenerational equity. In one project discussed by interviewees, older, financially secure members purchased the land upon which to leverage loans in the name of the co-operative, enabling other households with little equity to participate (B1, B2).

The lending climate in the UK has tightened significantly post-GFC (Ball 2012). CCB interviewees identify similar barriers to accessing finance as those experienced in Berlin, with the exception of for-profit property developers moving into the CCB space. Interviewees involved in the two completed, privately funded cohousing projects acknowledge they relied upon substantial capital from the development group, far greater than that for a typical mortgage (UK8, UK7), and multiple streams of private funds were accessed by members to maintain cash flow during construction. Cash flow challenges were also observed in a UK study by Benson which identified that individual self-builders rely on loans from family and friends due to a lack of appropriate mortgage products (2015, p. 3). Informal exchanges of funds between members during development were also necessary for one project, requiring a high level of internal group trust (UK8).

Financial institutions are reluctant to fund CCB developments due to a perceived increased risk (UK1, UK2, UK3, UK4, UK5, UK6). Parvin (2008) identifies three main forms of risk in the UK speculative multi-unit SoP: planning risk, project risk and marketing risk. Interviewees suggest CCB projects inherently experience reduced marketing risk (UK3, UK5, UK8), and are able to reduce planning risk through the active engagement of future residents interested in positively influencing the surrounding area (UK3, UK11, UK7). As the CCB sector remains in an early phase of development, these theoretical risk reductions are yet to be demonstrated and financial institutions are not interested in developing appropriate products as they view the market as "too bespoke" (Wallace et al. 2013, p. 8).

To address this challenge, the Homes and Communities Agency (HCA) launched the Custom Build Homes Fund in July 2012; a revolving loan fund of £30M to support CCB schemes of five dwellings or more (HCA 2012). Providing low-cost loans for land purchase, site preparation, professional fees and other development costs, the objective of the fund was to "bring 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" (HCA 2012, p. 7). The Housing Strategy and Markets Division of the DCLG supplied information on the allocated funds, upon request, in May 2015 (Parke 2015; Shirley 2015). This information showed applications received totalled over £45M, with just £7M being allocated; all to small- and medium-sized construction and development enterprises, "providing serviced plots and construction of homes/self-finish homes" (Parke 2015). In total, the program funded 91 freehold homes; 42% detached, 33% semi-detached, and 25% terraces (Shirley 2015). Although a number of community groups initially indicated interest and lodged applications they all withdrew. The DCLG did not make available the specific reasons for application withdrawals.

In parallel, the Greater London Authority (GLA) administered a £5M loan fund titled Build your own home – The London Way, which had corresponding ambitions to demonstrate financial viability and catalyse future systemic change (GLA 2012; HCA 2012). The London fund prospectus emphasised user participation in dwelling design, acknowledging challenges specific to such projects exist:

> *The GLA is particularly keen to see community groups take advantage of this funding as this would help to fulfil a key pledge in the London Housing Strategy. For Custom Build we will prioritise applications which can demonstrate that they are genuinely community-led, as these are considered to face the greatest disadvantage in accessing development finance. (GLA funding prospectus p.5)*

This fund also closed in March 2015 and the GLA supplied information regarding funded projects, on request, in May 2015 (Danielewic 2015). Three projects received almost £4.7M of the £5M funding, £1.9M million being to the Custom Build Show Case project discussed previously in 11.1.1. The second project comprises townhouses instigated by a boutique for-profit developer on a pre-negotiated site, and the third the regeneration of an existing social housing site by its residents' association. At least two of the three funded projects did not have known future occupants at the time of design, and although they offer individual interior customisation they are not genuinely community-led projects as advocated in the prospectus. One not-for-profit community company was interested in the fund (Danielewic 2015) and a total of four community groups applied. Information provided by the GLA stated that one of these did not receive funding as their land purchase negotiations were unsuccessful, emphasising the importance of aligning solutions to the two key barriers of finance and land.

While advocating a progressive approach to CCB provision and encouraging industry to step outside its existing risk profile, the HCA and GLA funds were themselves inherently risk averse. Funding was available to "organisations able to satisfy the HCA as fund administrator that they are an appropriately constituted body, of good standing and with the capability to deliver their project" (HCA 2012, p. 7). This required applicants to be a registered charity, an incorporated body, or an industrial and provident society with previous property development experience. Applicants not fitting this definition were required to partner with a third party such as a Housing Association. Establishing development partnerships requires lengthy negotiations and, as shown in 10.5.1, diminishes the capacity for residents to influence their housing outcomes and realise the financial benefits of self-development. Additionally, the funds prioritised applications which had "secured at least outline planning permission" (HCA 2012, p. 8), effectively excluding all identified community-led groups seeking to develop not-for-profit CCB housing in London. Were these rules applied to a funding process in Australia, CitiNiche and Property Collectives would be the only Australian alternative cases eligible to apply

independently, but to do so would need to negotiate a site and predesign a generic building for preliminary planning approval, which falls outside the intended CitiNiche SoP.

Some UK interviewees were engaged with the loan funds at the time of interview. Project-level stakeholders described the funding processes as inaccessible, irrelevant, or ineffective. Excess bureaucratic complexity contributed to inaccessibility (UK2, UK5, UK6, UK3, UK7), with one interviewee suggesting the funds "didn't seem fitted to what we are trying to do" (UK6) and others identifying mismatches between the funding rules and the challenges faced by CCB actants (UK5, UK3). The funds were described as ineffective due to the prohibitive interest rate offered; as much as three to four times higher than those available to asset-rich Housing Associations with whom groups would be required to partner (UK3, UK4, UK6).

In contrast, the CCB developer interviewed successfully applied to the GLA fund and described it as "really helpful for small developers to access money, to make alternatives viable. It is making a difference, not a radical transformation, but a difference" (UK10). These diverse views reflect the different network perspectives of the actants and their development objectives. As an established (integrated) for-profit developer branching into the CCB sector, UK10 views the actor-network from a central, authoritative position enabling him not only to comply with the risk-averse funding rules but to utilise them to fortify his authoritative position and develop unique knowledge. In contrast, the funding schemes increase the complexity of the SoP actor-network for those seeking to undertake CCB development for their own use. To effectively reorient or manoeuvre the existing SoP to create their ideal SoP for self-development, it is necessary these actants have the capacity to alter their structural position in the network, to acquire or control new information (Gulati & Srivastava 2014). However, as one interviewee observed, the funding rules achieve the opposite, further distancing the future occupant as the fund administrators are "five levels of bureaucracy away from the person who wants to do something" (UK9).

Having not funded a single community-led project to procure land and develop housing for their own use, these funds have not achieved their stated ambitions. Importantly, they have not assisted in overcoming the barriers identified by CCB interviewees. Although it will be some time before complete reviews of the programs are undertaken, it is likely these funds will be shown to have unintentionally reinforced the dominance of the existing SoP in which for-profit and not-for-profit developers hold central positions of influence and determine dwelling outcomes.

LESSONS

Both international cases have faced similar financing challenges to those identified by the Australian Innovators. Financing solutions have become more available in Berlin as the BG sector has established capacity for replication and consolidation. A collective of households are currently able to access appropriate finance products to develop

condominium-titled (WEG) buildings for their own use provided each household has appropriate financial capacity; that being approximately equivalent to the financial capacity (equity, collateral, income) required to obtain a mortgage for an existing dwelling. While such loans are now accessible, they continue to require individualisation and skilful negotiation to meet the parameters of each project and are more difficult to establish than an individual mortgage or individual construction finance. Advances in financing BGs have been supported in Germany by civil society's experience of various forms of mutual and co-operative financing as well as mutual and co-operative ownership – both of which are unfamiliar in the Australian housing market focused on individual ownership and investment.

The financial solutions for both WEG buildings and Genossenschaften buildings in Berlin emerged through a bottom-up movement of BG members negotiating directly with financial institutions. The institutions now funding Berlin projects also drew on experiences in other cities, including those in which local authorities advocated for BG development. However, in Berlin itself, the financial solutions established to meet BG's housing did not receive direct government assistance. The bottom-up development of financial solutions through Phases One and Two of sector maturation in Berlin enabled the project instigators and their financial supporters to continually adapt to the shifting and changing SoP as BG members employed both capability and symbolic resources to establish influence within the actor-network.

The finance solutions for CSOs in Berlin and Germany are unique. No such system has emerged in the USA, for example, despite the increasing popularity of private cohousing. There, CSOs are typically funded by extremely high levels of household equity, philanthropic private investors, or partnership with a for-profit developer who assumes development risk and charges accordingly (Glass 2012; McCamant & Durrett 2011). Attempting to encourage the growth of a CCB funding sector similar to that in Germany, the risk-averse rules of top-down funding programs implemented in the UK have unintentionally fortified the positions of those actants central to the existing actor-network of provision, and funding provided to a small number of projects has not acted to increase occupant engagement in design.

In seeking to promote community-led CSO projects, any financial interventions by government needs to ensure it increases, rather than diminishes, the agencement of the owner-occupiers in the SoP actor-network; seeks to engage in an alternative SoP actor-network rather than adding complexity to the existing SoP; and avoids the creation of restrictive conditions which prevent alternative SoPs from adapting and changing over time, as an ideal future cannot always be predicted and is seldom fixed.

The Mockernkiez project provides an additional lesson; that as a CSO finance sector develops, upscaling too rapidly can lead to network failure and a forced return to default settings.

11.1.3 Professional Services

Fromm (2012) describes the provision of CSO housing as both challenging and time-consuming, suggesting all collaborative housing projects require professional organisational support, regardless of motivations or instigation. While many self-formed groups possess some relevant internal experience or skill, for those without such knowledge the complexities of one-time self-development requires input from others (Glass 2012; Tummers 2015b). Modern Swedish CSO groups frequently partner with housing companies to access existing knowledge (Vestbro & Horelli 2012) and many elder cohousing groups in the US employ advisors (Glass 2012).

One of the first professions to adapt to the needs of CSO projects in Berlin and the UK were lawyers, with specialist services now offered in both locations (e.g. Jakoby Rechtsanwälte n.d.; Wrigley Solicitors LLP 2013). The roles of some existing industry professionals have evolved to provide the support BGs require, and entirely new professional roles have emerged.

BERLIN

Innovative, self-formed building groups frequently include architects or other building industry professionals among their membership who act to guide their future neighbours through the experience of realising a project. In some small, early projects few additional professional services were required as these members undertook the roles of both architect and project/site manager (B1, B3, B5), something not unfamiliar in Germany, where the two roles frequently merge (see 10.5.3). Professional members of early groups frequently dedicated time to projects greatly in excess of fees charged (B1, B3, B5). Such situations occur when innovating in any profession as one establishes new modes of practice and find solutions to previously unknown challenges. However, when professional expertise is accessed from within the membership enduring power asymmetries can result between those who work in the BG industry and those who do not (Jarvis 2015b). Such differential influence was evident among the interviewed members of Property Collectives (8.2) and also identified by Berlin BG participants (B2, B3, B6). Berlin architect Andreas Ruby suggests such asymmetry is inevitable whether professional services are sourced from within or outside the group as different parties contribute different knowledge. He highlights a link between perceived power and financial rewards, with a need to ensure no member profits excessively:

> *…whoever works for the project and does things for it will be properly paid according to the rules of his/her own profession, but not beyond that, it doesn't have to be a profitable investment. Nobody needs to make a profit,*

because the idea is just pay for what we need… (Ruby interviewed in Chan 2010, p. 77)

Numerous architectural practices have developed a specialisation in BG projects, redefining their professional roles and processes previously established within the supply-led market (B1, B2, B3, B4, B5). There is a general consensus that BG projects align well with the classical notion of architecture bringing different interests and parameters together in the built environment, as well as the architect's moral role to produce "work to fit into society and context" (B3). The main changes to architectural practice required relate to meeting the needs of multiple clients within the limits of a reasonable fee structure (B1, B3, B5), and establishing new group facilitation processes for practical and legal aspects of provision (B1, B5).

All architects interviewed have been involved in multiple BG projects; with their first projects involving members of their own architectural practices and being self-managed. Having experimented with a variety of ways to manage construction, all now prefer working on projects with a project manager to reduce their own time commitment and liability, and to "ensure the distinction between design and construction roles" (B5). The architectural practices of B3 and B5 have both designed projects for building group agents, creating a previously unknown three-way dynamic in the actor-network of provision between the designer, the client group, and the BG agent acting on their behalf.

As BG projects have increased in size, architects have also developed unique inter-practice collaborations. The temporary, project-based partnering of architectural practices is not uncommon but is typically divided into work packages associated with stages of production or location. In contrast collaborations between the relatively small architectural practices specialising in building-groups have been based on material and/or spatial distinctions. For example, a BG agent employed three architects to work with three adjacent building groups, each with distinct spatial briefs to be accommodated in a single structure for construction, engineering, and documentation efficiencies (B5). In another example, three free standing six to eight storey buildings comprise a structural frame designed by architect B5, clad with a series of reconfigurable modular façade panels designed by architect B1, to accommodate the interiors designed for specific households by architects B5, B1 and a third practice. The entire site and process was project managed by a fourth architect. Professionals specialising in project management of community-initiated BGs have also emerged, adding another dynamic to the range of possible professional combinations in the SoP. These unusual combinations of tasks between multiple architects and between architects and other industry professionals "stimulate group dynamics within the [design] group, gives different design processes" (B5) which drives innovation in the sector.

The role of the BG agents/developers described previously (10.3) is another unique professional adaptation of the maturing BG sector. The BG agent interviewed (B4) works

primarily in one high demand area that has experienced significant regeneration following reunification. His projects are designed to be family friendly, are targeted to owner-occupiers and typically have around 20 dwellings. Approximately one-third of clients actively seek the social and community benefits offered by building-groups, the remainder seek an apartment in the neighbourhood and view the building-group process as providing an appealing alternative to speculative developments. The mixed motivations of group members place the BG agent in a unique professional role. As project instigator, this agent aims to "bring social ideals to the project and bring ideas to the group" (B4) including designs which incorporate shared facilities, feature high environmental ambitions, and promote social interaction. However, the agent's role is distinct from that of a traditional developer as they do not carry development risk, and final decisions regarding inclusion of the agent's ideas rest with the BG members. Agent B4 described multiple aspects of his role: "sometimes I am like a real estate agent but I don't sell something, I don't sell the apartment, I sell them into the group". He also identifies the moment the group purchases the land as a "big change point in the project … we are not developers anymore, once they buy land we are moderators" (B4). The BG agent role facilitates the involvement of a broader population in CSO housing, including those without specialist building design or development skills. A BG agent is a unique professional role which has emerged spontaneously and requires a unique combination of skill sets, including a thorough understanding of the existing multi-unit development SoP.[22]

Both project-level and strategic-level actants emphasised the importance of the BG sector maintaining its identity into the future (B1, B2, B3, B6). B6 observed that over professionalisation makes some BG projects "less and less distinguishable from speculative development", making it harder to communicate the benefits of BGs to new actors, agencies, and partners. This is of particular concern to those advocating for BG specific policy interventions (B1, B2, B6).

Opinions regarding the preferred level of professionalisation of the BG sector are varied, with some seeing a high degree of professionalisation necessary to ensure timely, high quality projects (B4, B6), and one suggesting the self-organised group model "mainly doesn't work" (B4). In contrast, interviewees involved with self-formed groups suggest professionalisation is increasingly financialising the sector (B1, B2) and focus should remain on the role BGs play in community development and urban renewal rather than their potential for wealth creation and profit (B1). The diversity of professional roles which has evolved in Berlin currently enable these ideologies to coexist.

[22] This discussion of BG agents is informed by the available literature and an interview with one BG agent. The emergence of the agent role is worthy of further research.

Benson describes UK custom builders as "amateurs in an otherwise highly professionalised industry" (2014, p. 16), noting that professionals are accustomed to working with other professionals. While Benson suggests professionals need to develop a capacity to accommodate and support non-professionals if custom build housing is to mature as a viable housing sector, the majority of interviewees suggested there is a need for professional agents or intermediaries to assist CCB groups to realise projects (UK2, UK3, UK4, UK5, UK6, UK7, UK11).

A niche market for private CCB coaches is beginning to emerge in the UK, although it remains in a preliminary stage. Services coaches offer vary considerably in scope and professionalism. They include people with previous project experience providing advice (UK6, UK3), design professionals facilitating participatory design sessions (UK2), a self-build broker who proposes to source land and initiate CCB projects (UK7), and an experienced developer initiating CCB infill projects as a niche risk sharing development process (UK10).

In the first of these roles, the professional holds unique knowledge required by the group members to achieve their ambitions, but their engagement does not necessarily improve the structural position of the CCB group in the actor-network of provision. It is dependent on the group to utilise the information provided by an advisor to advantage their structural position and generate a unique SoP network. The second role, of participatory visioning, planning, and design, is not unique to CSO housing. While professional guidance in group formation and design is desirable, similar services have a long history and do not in themselves provide an opportunity for network action capable of altering the existing multi-unit SoP.

The final two roles involve development professionals sharing cost and risk with future occupants, an actor-network change providing occupants with some degree of influence on design decision-making. However, in the proposed CCB developer model, power asymmetry exists between the decision-making actants, with the professional developer holding far greater capability-based resources than their amateur partner does.

A notable difference between the international cases is the lack of engagement in network change by UK architects. UK architects design for CCB groups, facilitate relationships between cohousing groups and their development partners, and generally advocate the benefits of CCB through industry bodies. Architects interviewed expressed the intention to promote CCB as a housing option (UK2, UK4), with one practice planning to facilitate CCB groups in the future, commencing with information sessions for interested households (UK9). However, unlike their German counterparts, UK architects have not employed their capability-based resources to improve the structural position of

their CCB clients. Most UK architects suggested government intervention is necessary to implement CCB housing in high-demand markets such as London (UK2, UK4, UK9).

The role of professional facilitators and agents for medium-density demand-led housing is appearing in the UK (particularly London) quite early in the gestation of the CCB community in comparison with the process in Berlin. The challenge for UK policy makers will be to avoid a rush to over-professionalisation before the public becomes aware of the innovative opportunities and positive social outcomes true demand-led housing provision can offer.

LESSONS

Advocates warn if for-profit developers dominate CSO sectors in emerging markets, the opportunity to increase housing diversity will be lost (KPMG in the UK & Shelter 2015), however, increased professionalisation is anticipated by all Berlin interviewees as the sector grows. As Heyden suggests:

> *It stands to reason that as long as the niche for this kind of construction project grows and enjoys an increasing amount of public attention, a corresponding number of enterprises will jump on the bandwagon – but without fully understanding the ramifications the contractual and financial structures underpinning any given project imply for the ensuing mesh of societal, structural and legal interrelationships. (Heyden 2007 n.p.)*

The Phase One professional services currently offered in the UK do not reconfigure the existing SoP sufficiently to ensure future residents gain additional influence on design decision-making. Instead, they invite future residents to participate in an existing SoP with some modification. In some situations, the professionals offering services are not integral to the operation of the network, and hence hold little capacity to influence network change, as observed previously in the cases of CitiNiche and Urban Coup. Berlin BG professionals facilitate more effective network change, be they architects, project managers or BG agents. They disrupt the actor-network of the SoP, making both themselves and the future residents indispensable to development proceeding; as has been observed in the Australian cases of Property Collectives and The Nightingale Model. This ensures residents can actively participate in design decision-making, and enables "the possibility for an alternative outcome that would not otherwise have existed" (Jarvis 2015a, p. 205).

The actants providing professional service roles in the two international locations have differing capacity to influence network change. Gulati and Srivastava suggest an actant's capacity to manoeuvre within networks to improve their structural position is constrained by insight (see Table 9.2), that an actant's "understanding of how to navigate an advantageous course of action" (2014, p. 81) is limited by network structure and the actant's view from their network position. In the existing German multi-unit SoP, it is feasible for the architect to engage directly with contractual management during construction, meaning they are more central to provision than their UK or Australian

counterparts are, prior to disruption. From their more central network position, German architects have a higher portion of network actants within a two-step reach and are hence more influential. Consequently, their network horizon extends further and they have a more extensive understanding of the network they act within. Like Australian architects, UK architects are employed by property developers, have minimal engagement with management, exchange and consumption subsystems, and hence less capacity for network action. This is also suggested by developer UK10, who states:

> *Architects [do] not understand the whole development process. Community groups need more support than to coalesce around an architect. (UK10)*

To effectively manoeuvre future residents into a network position of design influence, the experiences in Berlin and the UK suggest professional services required by CSO groups would ideally be provided by a network actant who has a complete as possible view of the existing network, who is integral to network operation, is employed as a consultant to the group, and shares common motivations and incentives with the future residents.

11.1.4 Realising Savings

BERLIN

Industry advocates attribute BGs with achieving construction at wholesale costs (Haertel 2014). By removing developer's profits, marketing costs, and marketing risk, dwellings are delivered at a financial saving of 20-25% in comparison to an equivalent market product (Eyrich 2014; Hamiduddin & Daseking 2014; Heuss 2006; Junge 2006; Ring 2013; Wirtschaftsministerium Baden-Wuerttemberg 1999). Equally, BGs can produce prestige developments when residents desire (Gerohazi et al. 2014; Haertel 2014), as the SoP responds to users' needs. Table 11.1 summarises the available savings as described by Junge (2006, pp. 23-24).

In agent initiated BG projects, the agent's fee is 2.5 - 3% of project cost (B4, B6), significantly less than the 20-25% profit usually sought by speculative developers. By charging a cost-based fee, the agent positions themselves in the actor-network as a consultant to the BG members, similar to the architects, engineers, or contractors who collectively act to serve the objectives of the future residents. This network position differs from that of speculative developers, shown previously to have incentives distinct from, even conflicting with, those of occupants (Easthope & Randolph 2016).

Table 11.1. Berlin Building Groups: Opportunities for cost savings.

Cost savings…	…facilited by
Reduced financing costs	end users providing financing rather than builder or developer. Financial institutions acknowledge reduced risk, recognised through lower interest rates.
Subtraction of developer profit	BG participants not risking losses due to property slump, as developers do. The end user is known and buildings are not built to sell for profit.
Elimination of bias towards the luxury market	future residents deciding on priorities for expanditure. Avoids the luxury bias is evident in areas of high demand due to reduced profit margins at the lower end of the market.
Omission of marketing costs	owner-occupiers developing for selves avoiding need for marketing.
Voluntary omission/control on costs	ability to opt out of features due to known needs gives control of cost of dwelling.
Lower taxes	acquisition tax applying only to land, not to building (Heuss 2006).

The potential for cost benefits is well demonstrated by BGs in the Hafencity urban renewal district of Hamburg, where the city sold sites to both building groups and commercial developers at the same fixed prices. The co-operatively owned BG projects realised in the area averaged €2,700/m^2 total development cost, compared with €6,000/m^2 market value for commercially developed properties (Junge 2006). Realising such savings requires the BG members, future resident households, to take responsibility for development risk. The historic stability and predictability of German construction costs reduces risk exposure in construction compared to Australia and the UK, however the State of Housing in the European Union Report (Pittini et al. 2015) identified increasing affordability challenges in new German housing with construction prices rising by 47% from 2004/5 to 2012/3 due to changes in building standards and energy efficiency.[23] These price increases emphasise the importance of alternative SoPs but increase risk of cost escalation.

UNITED KINGDOM

Advocates of CCB cite the cost savings realised by continental CSO housing projects as one of the benefits it can offer to the UK. As self-funded projects, The Courtyard, Bristol and Copper Lane Cohousing, London, both realised savings similar to those obtained by Berlin BGs (UK8, UK7), with the completed dwellings having significantly higher market value than costs incurred. These two completed projects employed architects and builders to

[23] Some Berlin BG actants not involved in project-level activities suggested technical solutions such as prefabrication or the use of "finish it off yourself" options be used to address increasing construction costs (B2, B6). In contrast those active in the construction industry indicated that these options are already offered but not recommended due to the relatively insignificant cost savings available (B1, B4).

realise their group living ambitions, with one using the labour of group members on site for further financial savings. The mechanisms by which these savings were achieved match those described in Table 11.1, with the exception of reduced financing costs. As in the German projects, sales tax is reduced, but for UK projects engaging a company structure during development, sales tax is levied twice; both when the company buys the land and when leaseholds of completed dwellings are transferred (NaSBA 2011), a cost imposition of the existing supply-led SoP in which a development company is not the final owner.

Housing Associations (HA) partnering with cohousing groups have varied little from their existing development model. Group members financially commit to the project very late in the process and the HA carries all risk until completed dwellings are sold to members. Final pricing for Woodside Cohousing was determined after the commencement of construction, and was based on market valuation rather than actual development costs (Brenton 2016), pricing numerous members out of the project and forcing the dwellings to be offered on the open market. Interviewees expressed concern that partnering with not-for-profit developers removes the opportunity for group members to develop at cost (UK3, UK5, UK6, UK9), regardless of the level of activity they are willing to undertake on behalf of the project (UK3, UK6). In the Woodside Cohousing project, the HA developer has elected to construct a temporary display unit (Cohousing Woodside 2016), again missing an opportunity for cost reduction. Additional evidence of the disjunction between actants' motivations is the HA's listing of the common house cost as additional to the unit cost, rather than as an integral component of the development.

Similarly, speculative developers entering the CCB market have varied their existing development practices very little. Interviewee UK10, "London's First Custom Build Developer" (Inhabit Homes n.d.), funds land purchase and construction costs, listing properties for sale at fixed prices pre-construction. Development profit targets of 20-25% remain, although this only applies to the completed shell should a purchaser choose to self-finish the interior (UK10). Advertised prices for the initial project of five freehold townhouses range from £600K (two bedroom shell) to £1.2M (four bedroom fitted-out), with the developer stating the shell price represents a 20-23% saving on open market value (Inhabit Homes 2015). However, Turner & Townsend (2016) report current average construction costs for completed medium standard townhouses in London to be approximately £2,500/m^2, indicating that at a purchase price of around £6,500/m^2, this shell price does not reflect the cost saving realised by Berlin BGs. After being listed for sale for over 12 months, the two largest townhouses had not sold and were redesigned as four smaller apartments in April 2016 (Inhabit Homes 2016). They remained for sale at the time of writing. This developer-led project does not promote or require collaboration between future residents in any of the SoP subsystems, reflecting the developer's motivation to enable cost effective individualisation of dwellings; to "make a private

sector alternative to speculative build … not trying to do community stuff" (UK10). Overall, this alternative SoP addresses stated customisation concerns, but it maintains a bias toward the luxury market and does not engage with the third motivation for CSOs identified by Hamiduddin and Gallent (2015) - that of developing a community.

LESSONS

Building Groups in Berlin and other German cities demonstrate the capacity for CSO housing to reduce the overall cost to residents of multi-unit infill developments. In doing so they provide households with greater dwelling choice and support urban consolidation:

> *without a building group project, some of the people who have done these building group projects in Berlin, they might have gone to the suburbs and built a single-family house there… Leads to developments in favour of the city but not supporting urban sprawl. (Ruby interviewed in Chan 2010, p. 78)*

The subsystem diagrams in Figure 11.2 indicate the location of risk in the six international alternative SoPs and indicate when future residents commit financially to development. The two self-developed BG actor-networks have extremely similar stakeholders and stakeholder participation across provision subsystems. As self-developers, the future owner-occupiers are the main carriers of development/finance risk. This is true also of the developer-led building groups. The only CCB actor-network which replicates this risk profile is the privately funded cohousing. The other two CCB actor-networks engage developers in provision, be they for-profit or not-for-profit, and future residents do not commit financially to purchase dwellings until later in the process. This leaves financial risk with another party, influencing final costs and designs. Without a shift in profit expectations, it is unlikely the financial savings achieved by Berlin BGs will be realised by SoPs which require partnering with developers, either for-profit or not-for-profit.

The other two CCB actor-networks place financial risk with a developer, as future residents do not commit financially to purchase dwellings until later in the process. This influences financial costs and design whether the developer seeks to profit from development or not.

To achieve the desired financial savings currently realised by Berlin BGs, CSO householders will need to accept higher risk exposure during the development of their dwellings. Unfortunately, barriers to this exist, with both UK and Australian residents interviewed demonstrating reluctance toward contributing significant funds in early staged of projects (A8, A9, A10, UK5, UK6).

A forward step is currently proposed by London developer UK10, who proposes future projects will engage occupants earlier in the production process to share risk, reducing costs to end users: "I can take less profit if I am not bearing all that risk" (UK10).

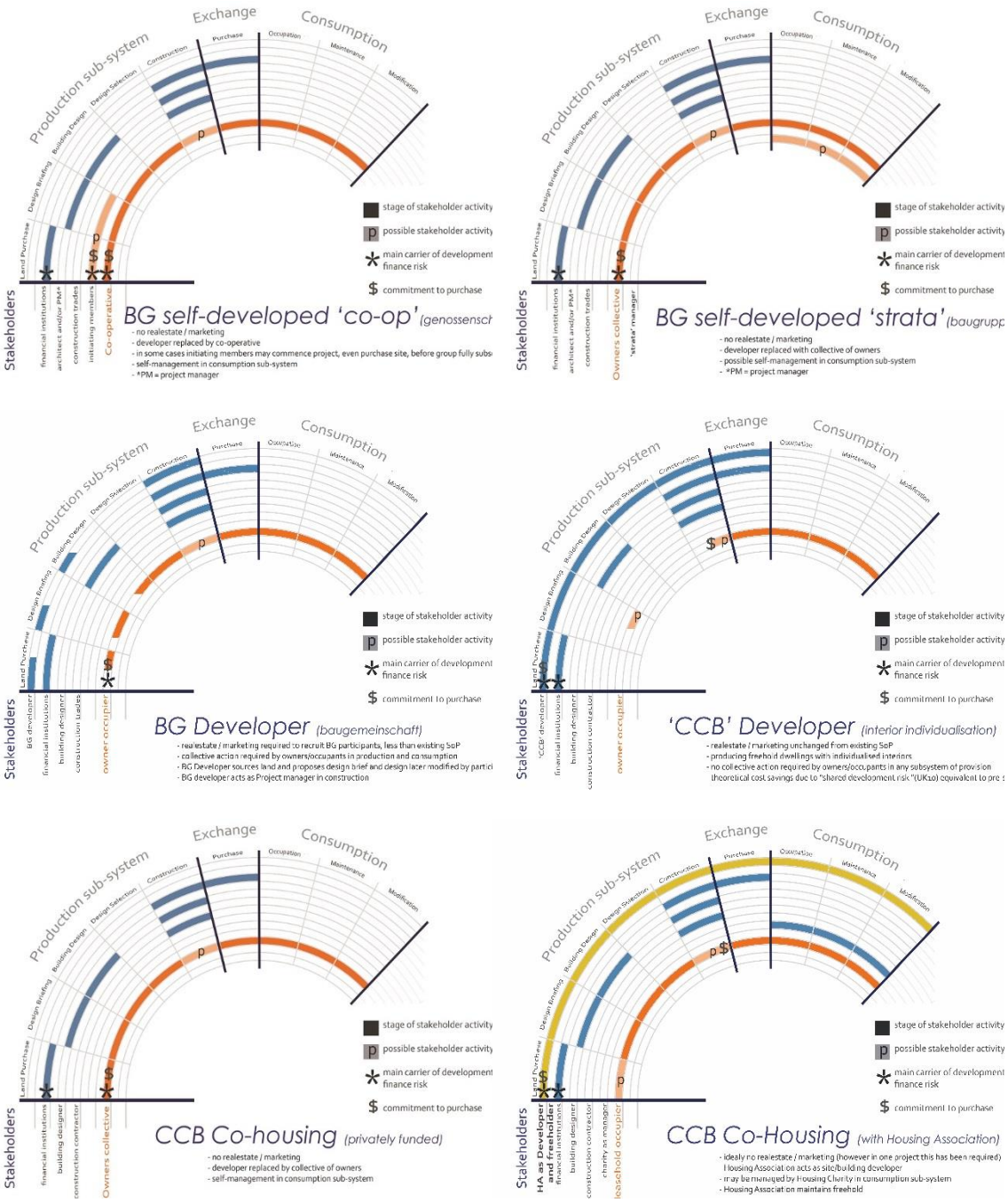


Figure 11.2. Comparison of stakeholders and stakeholder activity in alternative multi-unit SoPs. ^

11.1.5 Balancing Individual and Collective Decision-Making

It is recognised standardisation of design lowers production costs in multi-unit development. All CSO housing projects face the challenge of balancing individualisation and standardisation (Gerohazi et al. 2014); the desires of the individual and the needs of the collective.

BERLIN

Early Berlin building-groups provided an opportunity for households to realise more desirable alternatives to speculative development (B1, B2, B3, B5, B6). They represented a "value shift from quantitative to qualitative development" (B2) and required households to "invest in the group, in common ideals, in a transformation of society" (B1). Projects sought to meet occupants' needs in preference to creating marketable assets (B1, B2, B3, B4, B5), reflecting Ball's observation that Germans "traditionally take a long-term life-cycle view of entry into homeownership" (Ball 2012, p. 32).

Building-group architect Christoph Roedig states that for a project to succeed the group and its professional advisors must "[s]tipulate clear structures and rules. 'Anything goes' is asking for trouble" (Ring 2013 p149). All project-level actants interviewed saw a need to differentiate between group decisions and individual decisions (B1, B2, B3, B4, B5), although when discussing the translation of this to practice, one highly experienced interviewee observed there is "still no real system, we are reinventing each time" (B1). Architects expressed a preference to be involved in projects as early as feasibility stages (B1, B3, B5), with one preferring to engage initially with a small group of project initiators to develop a site response and set project aims before recruiting others to "buy-in" (B1) to the proposal. Following past conflicts in decision-making processes, B3 has consciously altered their design process, now proposing a sketch design before bringing people into the project.

The sector has evolved three distinct architectural responses to the challenge of balancing group and individual needs. Firstly, a trend toward larger projects is observable, achieving cost efficiency through generic substructures and modularised facades and wet areas. This reduces construction costs while facilitating a capacity for dwelling individualisation (B1, B2, B5). Secondly, some architects have consciously simplified construction detailing, using generic details to free up time for individualisation (B3). Thirdly, an architect increasingly engaged with agent-led BG projects (B5) has sought to value variation. Following the establishment of a generic dwelling design solution in consultation with the group, households can deviate from the base design via an individual contract with the architect. The contract bases architectural fees on hours worked rather than on a percentage of construction costs, meaning if design changes requested do not vary (or possibly reduce) construction cost the architects' time is valued.

BGs now attract interest from rental investors and households seeking short-term cooperation during provision to achieve their individual housing ambitions (Linz 2016). These participants further challenge the individual and collective decision-making processes. The commodification of housing and the motivation of seeking return-on-investment for investors is viewed by some of the more innovative building-group stakeholders as progressively reducing the differentiation between BG projects and supply-led speculative development; reducing the opportunity for community benefits due to a focus on the physical product (B2, B5, B3). For others, it demonstrates a desirable transition from alternative to mainstream housing provision with potential for growth (B6). Regardless of the level of professionalisation, all interviewees agree BG projects require members to recognise needs of other members and groups do not succeed if excessively individualised.

> *Members need group will: the will to be part of the group and recognise they are part of a group. Including the ability to discuss, to allow others to have an opinion in a common aim. (B3)*

LESSONS

Discussing collaborative planning, Healey (1997) proposed community happens between communalism and individual/material values. This conceptualisation of community is relevant to CSO housing in the UK and Australia, where one of housing's multiple roles is as a tool of individual wealth creation and communalist approaches to housing ownership are uncommon. Bliss suggests the emergence of the sharing economy provides an opportunity for alternative housing sectors to embrace the "cultural shift from individualism to collective, communitarian, ethical and environmental approaches – approaches which emphasise place making, a sense of belonging and a sharing of risk …" (Bliss 2009, p. 25). Individual collectivism, predicted to influence housing markets into the future (Bernheim & ADAM Architecture Limited 2014), is reminiscent of Berlin building groups emergence.

In Berlin, group members and professionals have navigated numerous methods of balancing the needs of the group and those of individual households, including technical and administrative approaches. Like the Australian alternatives, emphasis is placed on a shared vision or common goal (B1, B2, B3, B6) to inform decision-making.

The rapid growth of the sector and the increase in agent-led projects represents a move away from the "revolutionary attitude" (B6) of early groups and increasingly involves households described as "more individualistic rather than group focused, with an 'I'm paying' attitude" (B5).

Berlin architects employ different approaches to balancing group and individual needs which reflect the specific groups and the BG process they embark on. Importantly, these different approaches show dwelling individualisation is "not always a reflection of

engagement and involvement in building the community …" (B1). The evolution of the building-group as an alternative model of housing development required significant knowledge of the industry from key players as well as other group attributes such as "human resources, group will, ability to discuss, and trust" (B3).

In pursuing CSO housing in jurisdictions where it is not currently present, including both the UK and Australia, balancing individual and collective decision-making can be achieved through discussion and trust, but the challenge remains to determine location / network specific adjustment to professional practices to achieve this. This is an important area for further research.

11.1.6 Time

The time challenges experienced by Australian innovators also impact CSO projects worldwide. The time required for group formation and organisation adds approximately two years to development time compared to traditional projects in the same location (Brunoro 2013), although this can be much longer, with some projects in the UK and Germany taking eight to ten years from inception to completion (Gerohazi et al. 2014). Experiences in the US and Scandinavia suggest the longer the duration of the project, the fewer founding group members reside in the completed dwellings, making collaborative design difficult to achieve (Glass 2012; Vestbro & Horelli 2012).

BERLIN

The typical time taken for an agent-led project to be built and occupied is much shorter than for community instigated groups (B4, B5, B6, Ring 2013). Interviewees involved with both these types of projects question the feasibility of the time commitments required from members in community instigated groups (B1, B5, B3, B6). While knowledge has grown in the sector over time, the self-formed groups have not significantly benefited from efficiencies in process, with each project being sufficiently unique or bespoke to preclude time savings from replication. Agent-led projects were seen by some interviewees to offer sufficient improvements in project duration and hours required from consultants to promote a further increase in professionalisation into the future (B6, B5). Others perceived agent-led projects and time constraints, particularly those associated with land acquisition, as limiting innovation as groups avoid challenging sites or unconventional designs which might require additional investigation and feasibility analysis (B1, B2).

LESSONS

The SoP of a CSO housing project will inevitably influence the project duration, with the time challenges of group formation and organisation continuing to impact community instigated groups in Berlin's relatively mature CSO sector. While agent-led projects reach completion more rapidly, they are typically less innovative and one SoP is not necessarily

preferred by all interested households, as "…a resident-led practice … provides a realistic and qualitative solution for highly committed citizens" (Tummers 2015a, p. 14).

11.2 Strategic-Level Lessons

Over time individual BG projects and stakeholders have tested ideas, learnt lessons, shared experiences, and navigated initial barriers. Public awareness of BG projects has increased, building trust, and the "process is becoming easier as [stakeholders are] building personal experience and knowing what will work" (B4). Observed at a national or city level, CSO housing remains a marginal sector, but in some European regions and neighbourhoods, it represents a significant portion of new construction, as much as 30% in some Southern German cities (Gerohazi et al. 2014).

All Berlin interviewees concur the sector has a "strong future, with evidence of high demand" (B5). As numbers increase, CSO housing challenges the dominance of the existing market players and observers predict they will influence entire urban housing markets over time (Brouwer et al. 2014; Korpela 2012). Commentators present the predicted growth as favourable, providing an opportunity to realise multiple benefits ranging from "radically different living arrangements" (Gerohazi et al. 2014, p. 47) to economic opportunities in emerging markets (Brouwer et al. 2014).

Project-level and strategic-level actants alike applaud the positive contributions of CSO housing to the urban realm (B1, B2, B3, B5, B6). All actants identify both social and physical benefits of CSO housing extending beyond immediate participants, with investment in and care for place reaching beyond site boundaries to affect surrounding areas (B3, B6, B1, B2, UK2, UK3, UK5), particularly from self-initiated group projects (B1, B2, B6). Strategic urban actant B6 effectively conveyed the collective view with the following statement:

> *…they have regeneration effects related to social uses and activities … a general openness to the community: socially and architecturally. They have new architectural styles, active ground floors. Investor projects are more like gated communities, generally larger projects with little ground floor interaction. (B6)*

Having commenced as discrete projects, Berlins BGs have demonstrated the capacity of multi-unit infill CSOs to contribute to strategic urban consolidation visions. Table 11.2 thematically groups the attributes of BGs described by interviewees[24], indicating correlations with the social and environmental ambitions of Australian strategic urban plans.

[24] Given the relative immaturity of the UK CSO Housing sector, UK interviewees were unable to provide useful, independent descriptions of the strategic-level benefits of CSO housing other than to draw on known experiences in other locations, including Germany and Berlin.

Table 11.2. CSO Housing and Urban Consolidation Agendas.

Berlin interviewees described CSO housing as providing . .		As one example of an Australian Strategic Urban Plan, The 30-Year Plan for Greater Adelaide seeks to . . .
… to residents and neighbours…	… higher architectural standards than speculative development.	"…ensure the changing face of our city is co-ordinated and of the highest quality." (p. iv) place "emphasis on good design and creating unique places. The Plan proposes an improvement in the quality of new housing design…" (p. 62) "…ensure there is a mixture and diversity of housing types and promote a high level of choice to cater for changing needs of new and existing residents including the ageing population, families and professionals." (p. 57) "Provide opportunities for the people of Greater Adelaide to have meaningful input into the planning of changes to the development of their neighbourhoods and the region." (p. 59) "…achieve a greater mixture of dwelling types to cater for the changing make-up of the population." (p. 63) "…creat[e] vibrant mixed-use spaces." (p. 62) "…value and protect Adelaide's heritage places and areas." (p. 58)
	… innovative and diverse design solutions.	
	… dwellings designed for user's lifestyles and needs.	
… to neighbourhood and city…	… a diversity of smaller and bigger scale projects to make neighbourhoods spatially and socially active.	
	… heterogeneous development with a variety of activities and initiators.	
	… interesting solutions to building reuse.	
… to industry…	… eco-investment examples.	"…driv[e] sustainability, environmental protection and resilience to climate change." (p. 56) "…create the conditions for Adelaide to become resilient to the impacts of climate change." (p. 59) "…provide for 15,900 green-collar jobs and the development of new green industries." (p. 66) increase accessibility and affordability of housing to "improve liveability, but also give South Austrlaia's economy a major economic advantage." (p. 65) "…a continuation of the State Government's policy that 15 per cent of all new housing in significant developments is affordable housing, which will further add to liveability and competitiveness." (p. 65) "…promote a liveable and affordable lifestyle for new and existing residents by maintaining competitive house prices…" (p. 58)
	… examples the speculative market can follow.	
	… demonstration of socially inclusive housing models.	
… to housing sector…	… knowledge development … architectural, financial, ecological solutions, neighbourhoods.	
	… a new democratic housing model which advantages people not investors.	

Reflecting the attributes of BG housing in Table 11.2, The Berlin Housing Strategy for 2020 recognises BGs as positive contributors to more sustainable urban renewal (Droste 2015). As strategic urban plans begin to acknowledge a role for CSO housing projects in realising their future visions the sector is "becoming more mainstream" (B4). Many interviewees view such normalisation of the sector as desirable, influencing positive change in the existing speculative SoP (B3, B4, B6). In contrast, other stakeholders presented mainstreaming as a corruption of original ideals (B1, B2, B5), and had concerns that

normalisation would reduce the current flexibility in process and limit capacity to adapt to group members' unique housing visions (B1, B2).

While some interviewees saw more efficient business models of BG production on the horizon (B4, B5), others expressed a desire to defend the BG *status quo* from "profit-seeking enterprise" (B2). Thinking ahead, one of the most experienced BG interviewees suggested the sector may divide in the near future; spinning off a new mainstream alternative to the existing SoP informed by BG experiences to date, while more innovative participants continue to seek incremental evolution in parallel (B1).

These diverse views from stakeholders in a relatively mature CSO housing sector suggest dual purposes for strategic-level activity in emerging CSO markets. First, to support early, innovative stakeholders in progressing new ideas by assisting them to overcome impediments and build trust; second, to facilitate mainstreaming of emergent SoPs as feasible alternatives to speculative provision, described by Bliss as "formalisation and public recognition" (2009, p. 56), without inhibiting ongoing innovation. With these dual purposes in mind, lessons from the Berlin and UK cases can assist Australian Innovators in overcoming the strategic challenges identified in Part Three.

11.2.1 Intermediaries and Information Dissemination

As identified by the Australian innovators in Part Three, strategy-level challenges include accessing information to realise alternative multi-unit ambitions. International literature and interviews indicate that once accessed, the dissemination and trustworthiness of this information will pose an equal challenge. Discussing Austrian cohousing, Wankiewicz highlights the importance of intermediary bodies in disseminating information and transferring confidence between actants, suggesting they "can extend and transfer cohousing expertise" (2015, p. 59) to enhance project development and governance (Figure 11.3). He includes as intermediary bodies professional, and community stakeholders and organisations, suggesting "informing, raising awareness and transferring know-how" (2015, p. 59) is a shared responsibility of all parties.

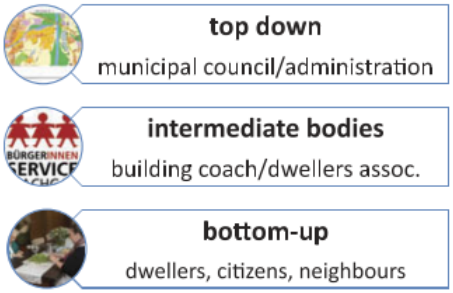


Figure 11.3. Linking top-down with bottom-up.
(Wankiewicz 2015, p. 59)

Researchers in both the UK (Hill 2015) and Germany (Droste 2015) also identify the importance of intermediary bodies, and Krokfors emphasises the need to enable

> *…simultaneous top-down and bottom-up processes, … bypassing the plethora of market oriented or institutionalised players of normal housing production and opening the field to new actors. (Krokfors 2012, p. 311)*

Intermediaries' hold and share knowledge, enable growth, and facilitate replication, an attribute of Bliss' second phase of sectoral maturation. They may also "gain broader leverage" (Chatterton 2013, p. 1669) to implement change in the existing actor-networks.

BERLIN

In the initial phase of BG development in Berlin, there was a lack of information available to potential participants, relevant authorities, and institutions. One means used to overcome this lack was to access relevant knowledge from other locations. Professionals experienced with BG projects in southern German cities were employed to share their knowledge with interested parties and assist project delivery (B5, B4). Active stakeholders and professionals developed essential knowledge, relying heavily on the knowledge brought forth by individuals from project to project (B1, B2, B3). Architects interviewed prefer to work with other professionals and households already familiar with BG development to increase efficiency, improve outcomes (B3, B5), and enable "constructive group dynamics" (B1). In a recent project with approximately 100 residents "probably less than half have not been involved with a previous project" (B2). This situation demonstrates the dependence of the sector on knowledge acquired and held by individuals and professional practices; limiting expansion and inclusivity.

In 2007 early BG architects established the Berlin Network of Baugruppen Architects (Netzwerk Berliner Baugruppen Architekten, NBBA) to share knowledge among professionals and to disseminate knowledge more broadly. The NBBA is recognised as having played an important role for BG architects (B5, B1, B6), but perceived as ineffective in representing sector issues to authorities, institutions, and the public; with architect B5 asserting "building-groups [have] no lobbying power, developers do". The NBBA is no longer identifiably active, with most recent website updates in 2012.

In 2008 the Berlin Senate's Department for Urban Development and the Environment together with the consultant urban development agency, Stattbau Berlin, established The Netzwerkagentur GenerationenWohnen (Network Agency for Generational Living, NGW). The initial activities of the agency were to "collect knowledge and make the [building-group] process more transparent" (B6). This reflects the fact that by 2008 numerous BG communities were resident in their completed dwellings, had received multiple awards from the architecture and design community, and interest from international media was building prior to city or state engagement in the sector. The collection of information on past projects and presentation of the sector in a cohesive light through publications has assisted the agency to grow confidence in the sector over time (B6) and recruit new

partners. "It [the agency] now has more willing partners, including financial institutions, due to good examples" (B6).

The NGW currently provides information and advice to the public, produces publications, supports public awareness activities, and facilitates connections between partners to realise projects (B2, B6, Droste 2015; NGW 2008). For example, the agency assisted in developing early partnerships for the previously discussed Mockernkiez project. The NGW supports a broader range of BGs than those which are the focus of this research, aiming to "meet with authorities and act as a voice for the sector. Gives the whole thing more weight" (B6).

Interested public can also access general information from civil society groups such as id22: Institute for Creative Sustainability, which promotes experimental urban sustainability, including cohousing, and convene information days. Project specific information is available from professional agents and managers who advertise proposed projects (e.g. Haertel 2014; Linz 2016), and CoHousing Berlin (LaFond & Haertel 2016) hosts a comprehensive central portal providing information on proposed and completed projects as well as linking the public with multiple BG professionals.

UNITED KINGDOM

In the UK, instigators and members of CCB projects can access local information and resources from two main intermediary bodies, The UK Cohousing Network (UKCH), which focuses only on projects with a cohousing agenda (UK Cohousing Network 2016a), and the National Custom and Self Build Association (NaCSBA). Formed in 2008, NaCSBA is a member run association of housing actors seeking to promote "self build and custom build as a form of housing delivery that can make a significant contribution to home building in the UK" (National Custom and Self Build Association 2016b). NaCSBA promotes a variety of custom build SoPs, from rental to shared equity and privately owned, and from the individual rural homes which dominate the sector (Benson 2015) to urban CCBs. Unfortunately, the information they provide reflects the market dominance of individual housing and information specific to urban infill CCB is limited by the lack of UK precedents. The NaCSBA information portal, developed with support from the DCLG, references dozens of international CSO housing projects, including German BGs, but features only two UK projects. One is the five townhouse project led by boutique developer InHabit Homes discussed previously (11.1.4); and the other, a community land trust with support from the Bristol City Council to be developed on donated land with government subsidies (NaCSBA 2016a). NaCSBA identifies no self-developing urban CCB housing groups succeeding without external government subsidies in the UK. NaCSBA advocate for policy change and led the Government-Industry Self-Build Working Group, producing a plan to support growth in the CCB sector (NaSBA2011).

Numerous interviewees are active participants in one or both of UKCH and NaCSBA, including past and present directors of both organisations. Some interviewees had also been involved in The Mutual Housing Network, an umbrella body formed to represent multiple and diverse alternative housing organisations[25] via policy advocacy. The Mutual Housing Network is currently inactive and has not achieved its original ambitions. In a 2015 report, housing advocate Stephen Hill (UK3) suggests that to be effective such alliances need

> *"a much more ambitious programme than furthering the interests of the organisations … [they need] to engage any relevant organisation, as well as the public directly, to create a strong voice for the demand side in the formulation of housing policy." (Hill 2015, p. 84)*

LESSONS

In each case location, intermediary actants have emerged from bottom-up activities. The initial intermediaries are the professional consultants and industry actants who provide services and support to innovators, as discussed in 11.1.3. The NBBA and NaCSBA subsequently emerged from collaboration between these professionals, seeking to connect with both top-down and bottom-up actants as described by Wankiewicz. Based primarily on sharing knowledge among a small number of members and providing a public platform to disseminate their collective activities, the NBBA did assist in the maturation of the sector through information sharing (B1, B5). As the sector has matured and other intermediaries formed, the NBBA no longer has a significant role to play (B4, B6).

The NaCSBA has established channels for effectively directing information up to top-down actants, however less than half of UK interviewees identified it as contributing to or engaging with their specific projects. The organisation receives funding from membership fees paid by for-profit industry members and is viewed by some interviewees as an advocacy and advertising platform representing the interests of industry, not necessarily those of future residents (UK7, UK8, UK9). Architect UK4, suggests NaCSBA "needs to change if it is to fill the role of go-to organisation for individuals, groups, councils, etcetera." [26]

Established at the instigation of the Berlin government, the Network Agency for Generational Living (NGW) is an intermediate body formed from above. The NGW avoids "interfering" (B6) in the evolution of the bottom-up building group sector, encouraging groups to interact with its services as need be, but never requiring them to do so. Most interviewees do not have direct, regular contact with the agency (B1, B3, B4, B5) and some

[25] The Mutual Housing Group was formed in 2010 as a coalition of representatives from the UK Cohousing Network, the Confederation of Co-operative Housing, the Community Land Trusts Network, the Community Gateway Network, the Development Trusts Association, the National Federation of Tenant Management Organisations and NaCSBA (UK Cohousing Network 2016a).

[26] A research project between The Nationwide Foundation and NaCSBA commenced in 2014, with outputs to include recommendations to NaCSBA about what sector needs from it as a sector body (UK4). This research is in progress.

BG architects are not aware of its role or ambition (B3, B5). Actants in both community-led and agent-led groups receive the agency with little enthusiasm. In particular, interviewees involved with early BGs note the agency is not innovative, describing it as

> *… developing conservative administration systems [and] missing the dynamics of the building-group community. (B1)*

BG advocate B2 describes NGW as providing

> *…a nice contribution but doesn't change anything. [It is] not government but more or less works for government. They could shake things up more. It's publicity, but no real action. (B2)*

The collective passion for self-help housing solutions was seen as incompatible with top-down action (B1, B3, B5), with the assertion that the NGW is not a suitable advocate for housing led by civil society, "the city can't do that, people do" (B1). The Berlin reluctance to relinquish independence stands in contrast to industry calls for policy intervention and funding support from the government in the UK.

Intermediary bodies have emerged in each location, however, their capacity to bring together top-down and bottom-up actants varies. Figure 11.4 shows the exchange of information through intermediaries in each of the SoPs, expanding on Wankiewicz's previous figure (Figure 11.3) and showing the connections between top-down and bottom-up actors are both complex and adaptive. In both cases, the high level, strategic intermediaries with the capacity to influence top-down policy makers are advocating on behalf of multiple housing types and tenures, not just urban infill CSO housing.

A group of young urban families desiring to build privately owned affordable homes, for example, are not well serviced by the strategic intermediaries in either case. As evidenced by the recent UK funding schemes (11.1.1), government support is predominantly provided to the custom build markets of freehold serviced plots and self-finish homes, leaving CCB marginalised within the already marginalised custom build sector. Political and social agendas also influence the activities of NGW, which in 2014 focused on building new partnerships to deliver affordable housing units for rental (B6) as 65 percent of households who approach the agency are seeking a home to rent (Eyrich 2014). This leaves the young families wanting to build affordable homes for themselves in either Berlin or the UK dealing directly with the project specific intermediaries, architects, agents, and consultants, to self-develop via an experimental SoP. These observations emphasise the necessity to ensure these important intermediaries, project-level actants in the multi-unit SoPs, are adequately resourced and able to promote trust in CSO housing processes.

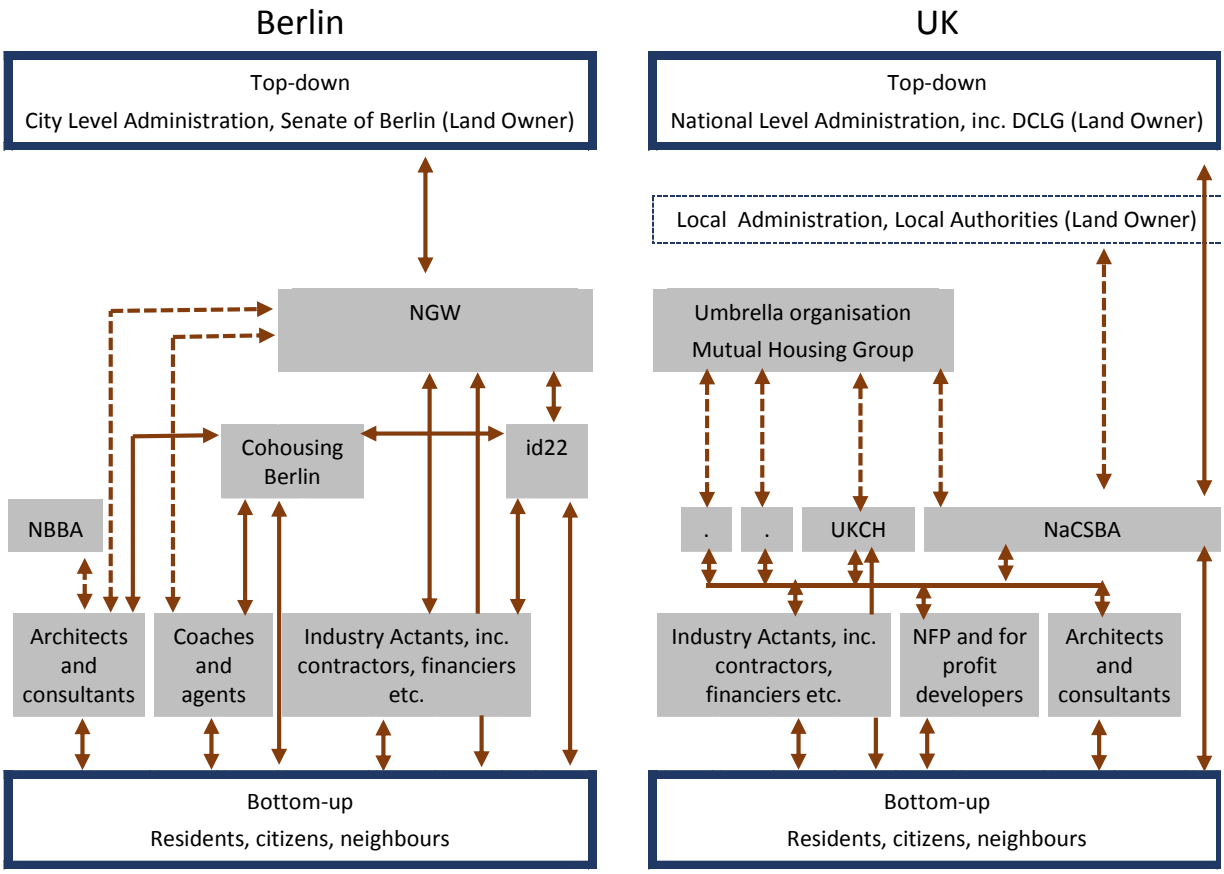


Figure 11.4. Intermediary Information Exchange between top down and bottom up actants.

Berlin architect B1 argues CSO housing sectors need to maintain their bottom-up roots. She acknowledges dissemination of information by authoritative agencies reduces insecurities about an innovative approach to housing, but suggests "sharing a meal at a friend's [building-group] residence builds more trust" (B1). Neither case provides Australia with a definitive solution to establishing an ideal network of intermediaries, but together they have provided some cautionary lessons and show:

- Intermediaries emerging from bottom-up network action are essential to CSO project development and remain so throughout the process of sector maturation.
- Early intermediaries established for sharing knowledge can become unnecessary during sector development and hence emerging SoPs should not be dependent upon their ongoing presence.
- The most desirable intermediaries are those which maintain an active connection with residents and communities and build trust.

- Top down intermediaries must engage with multiple and diverse solutions, not only those that are market dominant, preferred by industry stakeholders, or politically motivated.

11.2.2 Role of Government and Policy

Following Bliss' three phases of maturation of alternative housing sectors, formalisation through legislation and regulation is expected in the final stage, following innovation, replication, and consolidation. The privately-owned BG sector in Berlin matured in this way, with initial projects occurring independently of government support or funding. However, experiences across locations differ, with government involvement occurring as early as Phase One of CSO housing sectors in other European countries, including Austria (Temel et al. 2009), Belgium (Tummers 2015b), and France (Debarre & Steinmetz 2012), as well as other German cities (Ache & Fedrowitz 2012; Hamiduddin & Gallent 2015).

Early intervention occurs where government agencies identify specific unmet housing needs (Brenton 2013; Gerohazi et al. 2014) or where there is a shortage of affordable land preventing CSO instigators from advancing through the initial phases independently (Knorr-Siedow 2008). Government support for CSOs is frequently contingent on achieving specific government goals. For example, CSO groups in Strasbourg, France purchasing land from the local council receive price reductions directly linked to the environmental performance of the proposed building design (Debarre & Steinmetz 2012). The municipality in Helsinki invests in CSO cohousing projects to meet its goal of diversifying market offerings, with supported projects subject to restrictive resale covenants to prevent speculation and maintain affordability (Korpela 2012). Elder cohousing groups can access government funding for social housing in the United States (Glass 2012), Denmark, and the Netherlands (Brenton 2013; Gerohazi et al. 2014). Municipalities experiencing affordability challenges, such as Munich and Hamburg, support CSO groups on the condition of providing cheaper accommodation for key workers or families (Gerohazi et al. 2014; Knorr-Siedow 2008). Administered by the city administration's Development and Environment Department, Hamburg's Agency for Building Co-operatives facilitates six-month settlement terms for BG groups (Muller 2012) and assists with searches for privately owned land appropriate for BG development (Gerohazi et al. 2014). Additionally, it provides low-interest loans for co-operatively titled projects, effectively reducing equity required to obtain finance and increasing access to participation (Junge 2006).

The possible contributions of governments in CSO development are summarised by Bresson and Denèfle (2015) as providing advice, providing support, facilitating land access, and providing approvals. Ache and Fedrowitz describe government contributions as being either soft or hard, noting that in relation to CSO housing "[c]ities are acting

mostly, but not only, with soft measures" (2012, p. 409) and advising that to advance the sector beyond a marginal movement more substantial, harder measures are required.

Germany and Berlin

Having observed 26 German municipalities engaged with BGs of various forms, Ache and Fedrowitz (2012) identify local municipalities as central actors in the process of realising a group's housing ambitions. They describe the municipality of Freiburg as contributing to BGs via both hard and soft measures, providing organisational support and access to land. Both the Freiburg and Tuebingen municipalities support BGs via all four means identified by Bresson and Denefle, including preferential treatment in the *Rahmenplan* (Local Development Framework) and execution of the *Urban Development Act* (Junge 2006). However, neither land prices nor construction costs are directly subsidised. Land prices in Tuebingen's well-publicised development of a new neighbourhood on a former army barracks site were in fact above average market values per m^2 (Junge 2006). The ongoing expansion of this development model as a commercial enterprise in other city precincts demonstrates the capacity for CSO housing to achieve successful results without direct subsidies, provided responsible authorities remove barriers. Tummers emphasises that removal of barriers in these locations was not achieved by single or discrete interventions, but required embedded change across the management system:

> *Both the substance of planning, such as the size of plots in the Masterplan, and the process of planning, supporting the formation and development of Baugruppen, have been transformed over the years to embed the strategies in a structural way. (Tummers 2015b, p. 10)*

In contrast to these Southern German examples, building groups commenced in Berlin from a "100% ground up" (B3) movement "exclusive of government support" (B1) and the success of building-groups there is described by interviewees as a product of the place and time, not government involvement.

> *Land was available and affordable and people make it happen. It is thriving despite government. (B2)*

Architect B3 recollected that the attitudes of elected officials were less than supportive in the initial phase of experimentation, with a 2004 Senate Minister describing one project as "a luxury problem – I am not interested" (B3). Over time this attitude shifted and now "the Senate of Berlin loves baugruppen" (B2), with BGs having been incorporated in the policy goals of the city's 2011-2016 Housing Policy and Urban Development Strategy (Droste 2015). Additionally, BG housing is referred to in the Senate's Housing Plan for 2025 (Senatsverwaltung fur Stadtentwicklung und Umwelt 2014) as key to diversity and inclusion in regenerating areas. Nonetheless, BG actants interviewed do not feel supported by city administration and question if practical impacts are being realised. "Berlin city has goodwill – but to what end?" (B4).

In Berlin both soft and hard measures exist, with the Network Agency for Generational Living (NGW) providing support and advice (11.2.1), and the city commencing a land disposal program (11.1.1). Two of the five project-level actants interviewed had not directly engaged with these services. Those who had, viewed the government measures as primarily administrative (B2, B5, B3), adding an additional layer of bureaucracy (B3, B5), and adding to existing impediments rather than alleviating them (B2).

Those actants in strategic positions and working primarily with developer-led projects suggest hard government measures are required, although BG agent B4 asserts developments are viable without government assistance.

> *guaranteeing loans to encourage more financial institutions to be involved (B2)*
>
> *facilitating the master planning of large brownfield precincts to deliver sites suitable in size for building-groups as is done in southern cities and Hamburg (B5)*

In contrast, actants from community-led projects focussed on soft measures:

> *greater support for information dissemination and networking (B1, B6)*
>
> *to "have more trust in democratic powers and individuals and new ideas"…"be more open minded"…."Trust and recognise [building-groups] as a secure way" (B6)*
>
> *to "enable emergence" (B2)*
>
> *"to remove barriers to people being active with ideas, to allow democratic and self-help activities" (B6)*

These ideas emphasised building groups should not become institutionalised or their SoPs become homogenised or fixed.

UNITED KINGDOM

The raft of housing and planning policies, plans and programs launched in the UK in recent years aims to reconfigure the management subsystem to increase dwelling production, diversity and affordability, with custom build housing as just one of numerous levers proposed to realise these aims. The 2011 Housing Strategy for England stated the national government's intention to double the size of the custom build housing sector across the country, including group or collective custom build, which "can make custom build more affordable, especially in areas with high land values where higher density housing might be most appropriate" (DCLG 2014d, pp. 31-32). The later housing strategy of the Greater London Authority (GLA 2014) reinforces the objectives of the national document, with both levels of government introducing custom build land registers and administering land disposal and funding as discussed in 11.1.1 Land and 11.1.2 Financing.

Government intervention in the UK custom build sector aims to provide short-term financial help and reduce barriers, to demonstrate the sector can be independently viable in the long-term (DCLG 2012a; GLA 2012). The DCLG identify the critical barriers as access to land, access to finance for land purchase and construction, and frustrations with regulatory regimes (DCLG 2014d, p. 7) and have implemented both soft and hard measures in an attempt to address these. The primary soft measure is the development of the Self-Build Portal in collaboration with NaCSBA (NaCSBA n.d.) which is of assistance to individual custom builders, but does not yet provide advice or support specific to the challenges of collective custom build due to the lack of innovative precedents. Hard measures include the CCB funds and land programs discussed in 11.1.1 Land and 11.1.2 Financing.

Interviewees were generally positive about the intentions of the policy agenda but less positive about specific actions. Concerns were expressed regarding the effectiveness of programs such as the Custom Build Homes Fund, which was perceived as highly bureaucratised and not providing a benefit which would outweigh the effort of participation (UK7, UK5, UK6, UK10). There was also concern that the prescriptive compliance criteria for government assistance could limit the incremental evolution critical for ongoing innovation (UK2). All interviewees acknowledged that the policies are new and their full effects are yet to emerge, however, many anticipate impact will be seen mainly in low-density developments (UK2, UK3, UK5, UK4), describing the policies as having a "rural tinge" (UK2) and not specifically addressing the issues faced in urban contexts.

Strategic-level actants suggest the policies will need to be adapted to effectively support CCB projects in urban areas (UK1, UK2, UK3, UK5). Project-level actants had not experienced any project specific benefit from the policies (UK5, UK8, UK6, UK7), with one suggesting they do not address the challenges faced by CCB groups (UK9), despite this being their primary objective. Both strategic- and project-level actants identified the disjunction between national policy makers and individual projects as problematic (UK2, UK3, UK7, UK9, UK10), suggesting application and interpretation of plans and policies at the local administration level was inconsistent (UK2, UK7, UK10, UK3, UK9), adding to, rather than reducing, barriers.

Custom builders in the UK, collective or otherwise, have for some time benefited from a Value Added Tax (VAT) exemption for all new self built dwellings (DCLG 2012a). During 2014, two further financial interventions were made in direct support of custom build. Firstly, exemption from the Community Infrastructure Levy since 2014 (DCLG 2014c), and secondly, exemption from Section 106 affordable housing contributions for small projects

of up to ten dwellings (NaCSBA 2014).[27] Together these exemptions can amount to savings of tens of thousands of pounds for a single dwelling unit.

These policy actions focus mainly on financial incentives and simplification of planning approval processes (DCLG 2012a) to reduce impediments. In doing so, they make minor modifications to the current SoP, leaving the existing key actants in their positions of authority. The government policies "merely tinker" (UK9) with a sector that requires "revolutionary impact" (UK2) leaving the alternative exposed to unintended consequences from apparently disconnected interventions. For example, in 2016 the government introduced an increase in Stamp Duty Land Tax payable by corporate vehicles to encourage home ownership over investment (HM Treasury 2016). For a privately-funded CCB group or cohousing group this attempt to reduce demand from investors results in a 3% price increase for CCB owner-occupiers; an additional cost which counteracts the custom build specific tax incentives (UK Cohousing Network 2016b).

Of the 59 policies included in The London Housing Strategy of 2014, two specifically relate to collective custom build housing, one of which proposes a disruption of the existing muti-unit SoP in that it encourages new actants to enter the network.

> *Policy 59 The Mayor will encourage small and medium-sized builders to enter the London market, including for custom and self-build housing. (GLA 2014, p. 89)*

Reflecting on past experiences, including that of the inter-war years which saw high rates of housing construction by a large number of small and medium-sized building firms, this policy presents an opportunity to reconfigure the relationships between existing actors including planning authorities, housing associations, developers, designers and users. However, as interviewees observed, shortly after this policy was introduced, "small developers and Housing Associations are starting to deliver volume building labelled as custom build. The policy is getting hijacked by developers pretending to be custom build" (UK7) and taking advantage of the associated tax exemptions. Strategic-level actant UK1 warns such a situation would remove the possibility of substantial costs savings to owners and risk reverting back to the supply-led SoP.

All interviewees were pleased that the government is aiming to make the public aware of CCB, as a housing option. Around three-quarters supported government subsidies for CCB projects in some form, with one arguing the non-housing benefits to the occupants, neighbours and society of better designed, more socially minded housing outweigh the costs of subsidisation (UK7). The remaining participants did not see subsidisation as necessary and some questioned the value of any form of subsidisation (including land

[27] Eligible developments must have fewer than ten dwellings and a floor area of less than 1,000m^2.

sales systems) for CCB groups comprised of relatively well-off households (UK3, UK10, UK11).

A resident of a recently completed project stated that the best thing government and council did "was to leave us alone, to not say no" (UK7). This view was common among interviewees from bottom-up organisations, who see government's ideal role as an enabling one (UK1, UK2, UK3, UK4, UK5, UK7). UK3 advises policies should be less constricting and more empowering, "politicians need to give away some power to citizens to allow them to act". In contrast, interviewees from bureaucratic and professional organisations called for harder measures from the government and its agencies, ensuring greater certainty through policy, prescription, and legislation (UK9, UK10, UK12).

Australian Stakeholders on Government & Policy

Government action through legislation can play one of three roles in alternative housing sector emergence:

1) Encouragement: define the sector and "make specific provision for them in national housing systems and strategies" (Bliss 2009, p. 56), including encouragement through special tax treatment or financial assistance;
2) Neutrality: recognise the sector, legislating their existence without providing preferential treatment;
3) Constraint: not recognising the sector and limiting development.

Australian CSO stakeholders identified current government legislation, developed for the existing SoP, as unintentionally constraining the emergence of their ideal SoPs (A7, A12, A13), including financial constraints imposed by *Australian Consumer Law* (A12, Section 8.3.3).

While Urban Coup members made the loudest calls for government intervention, their not-for-profit development partner (A11) expressed reservations:

> *[It] would have to be really clearly articulated as to why the government is getting involved… the debate would have to be framed as to why they are intervening, not just doing a deal. As a general member of the public, I would expect to be able to understand what the rationale was to be providing assistance. (A11)*

Similarly, most interviewees mention it is not government's role to facilitate private housing development (A1, A2, A11, A12), but acknowledge many present and past policies effectively do. Reflecting on past hard policy measures taken in Australia, stakeholders in the existing multi-unit SoP interviewed (Part Two) observe three main outcomes. First, that programs providing financial incentives to address specific concerns directly influence tenure balance.[28] Secondly, financially motivating policy levers drive supply but

[28] For example, the National Rental Affordability Scheme was observed to increase investment purchasers' uptake of infill housing, further increasing rental tenure dominance (PD1, PD2). In contrast, the South

not quality, mainly impacting on the lower end of the multi-unit market where it primarily benefits investors.[29] This view concurs with Radford and Sarris's earlier observations that the main objectives of housing-related grants are not in themselves related to housing outcomes, but their "primary purposes are to maintain economic activity and employment" (2002, p. 23). Thirdly, interviewees observe direct grants[30] seldom provide direct benefits to end users (AD1, P1), but are "leveraged by developers" (AD1) to increase profits. Having increased the commodification of housing, promoted rental tenure, and negatively influenced quality, possibly without realising savings, the track record of hard government measures in the existing multi-unit SoP does not align with the objectives of CSO instigators.

Overwhelmingly, Australian CSO stakeholders suggested the government would ideally encourage CSO development (A2, A3, A4, A5, A7, A8) or, at a minimum, avoid constraint: "facilitate or get out of the way" (A8). Most focused on soft rather than hard measures, with the most common call being a state level agency (or intermediary) to fill the "knowledge deficit" (A8), "provide a framework, show it as an option" (A6), and build trust (A5, A7). Strategic actant A13 proposed such an intermediary could broker between actants, linking groups with opportunities, developers, builders, land owners, and not-for-profit organisations.

Industry professionals (A1, A12) cautioned government involvement would likely subvert the intentions of instigators and add bureaucracy, as witnessed in the UK case. Along with architect A3, they proposed a relatively neutral policy stance is appropriate in the long-term, but suggested initial encouraging interventions would help build trust and enable demonstration.

Calls for hard measures by state and/or local governments came only from stakeholders in projects yet to realise dwellings and strategic-level actants, who called for the facilitation of access to land and interventions to reduce risk. Numerous interviewees raised the potential for governments to "put aside" (A8) land for CSO groups (A11, A1, A13, A7), but many also questioned the rationale for such an intervention in private housing provision (A2, A11, A5, A7). Articulating a view also expressed by others, A11 identified a land disposal system akin to those of German cities would justifiably advance the policies of urban renewal, regeneration, and consolidation by taking:

Australian Affordable Homes program promoting home ownership among eligible middle-income households was described by one property developer as "shift[ing] the market. The one with Affordable Homes in Marden. That project is all owner-occupiers" (PD2).

[29] Interviewees associated such outcomes with state-based Stamp Duty exemptions and concessions applied to new apartments in some urban consolidation areas, such as the inner ring areas of Adelaide (2012-2016) (PD1, SD1, AD1, P1, P2) and negative gearing of investment properties at a national scale (PD1, AD1,P1).

[30] Such as stamp duty exemptions and the First Home Owners Grant.

> *a more nuanced view of land value, [considering] other benefits that can be derived from the site … beyond dollars … positive effect on the broader community. (A11)*

With regard to risk reduction, a small number of interviewees saw benefit in the provision of tailored loans or financial guarantees by state government to demonstrate the advantages of CSO housing development to financial institutions (A13, A7, A9); a stance reminiscent of the UK policy interventions to date. Additionally, many interviewees called for preferential treatment in planning approval to reduce development risks and time delays (A9, A11, A2, A12, A2, A8, A7), despite planning risk not being identified previously as a CSO-specific impediment.

> *At planning, we should not be in the same queue as developer.s (A12)*

Together the Australian CSO stakeholders touch on all of the possible contributions of government identified by Bresson and Denèfle (2015): providing advice, providing support, facilitating land access, and providing approvals. However, none provide specific suggestions of particular government actions which would improve their individual project experiences.

Strategic-actant A13 observed government can seek to support and assist CSO groups, removing barriers such as perception of financial risk, but it is not a government role to create the sector: "no government can initiate demand-led housing where there is nothing currently."

LESSONS

The literature and interviews from both Berlin and the UK concur that government policy in this area has two main objectives, the first being to remove barriers to innovative self-formed bottom-up groups building for themselves, the second being to promote and facilitate expansion of demand-led housing provision as a trustworthy alternative to supply-led provision. Experiences in Berlin also indicate it is critical to continue to support self-forming groups over time as ongoing innovators, ensuring opportunity for the resultant housing to continue to evolve with occupant needs and providing ongoing impetus for professional facilitators to continually seek improvement.

The current UK policy approach is one of top-down enablement of bottom-up development which will take time to filter through the national planning system before its impact is measurable. Whilst stakeholders support the policy intentions, they identified a disjunction between the stated intentions and the conservative programs implemented. The catalyst funding programs were viewed as overly bureaucratic, more suited to developers than community-based groups, and failing to address the barriers experienced by stakeholders. To date, UK policies rely on existing stakeholders' knowledge and capital without making changes to the existing SoP sufficient to build trust and social capital. Discussing market disruption, Sargut and McGrath (2010) identify

cumulative experience of existing stakeholders as capable of both enabling and disabling alternatives; and network analysts Mandell and Keast (2007) have shown overly cautious modification of networks leaves them vulnerable to "revert[ing] to more conventional methods and reliance on "business as usual"" (p. 593)when confronted with unpredicted challenges.

A substantial difference between the two cases is the time at which government intervention or assistance has occurred. The late-stage interventions in Berlin sought to support a CSO sector which had emerged and developed its own, revolutionary SoP. In contrast, no such SoP yet exists in the UK and government intervention there seeks to nurture one while avoiding risk exposure; an approach which reinforces the roles of current dominant actants in multi-unit provision and fails to support innovative alternatives.

Neither case provides Australia with definitive guidance as to how different levels of government can best support multi-unit CSO housing, but together they have provided some cautionary lessons and show:

- ideally, a combination of both hard and soft policy measures is required to address the range of barriers experienced by stakeholders, with different needs existent at project and strategic-levels;
- policy measures must recognise the interactions between barriers to CSO development, addressing these from an integrated, network wide perspective;
- it is essential to avoid reinforcing the dominance of existing actants and ensure future residents are key actants in new SoPs;
- government interventions must be more than modifications to the existing SoP, but avoid prescribing a fixed, ideal alternative;
- in encouraging alternative housing provision, policy should employ cautionary approaches to avoid unintentional constraints; ideally achieving policy neutrality over time;
- policies incentivising or encouraging CSO projects need to recognise the unique challenges faced in inner urban areas to realise the strategic aims of consolidation.

Conclusion to Part Four: International Innovators

International experience provides us with an important frame of reference for considering the Australian experience. Comparing actor-networks of the innovative Australian projects in Part Three identified future residents' capacity to realise a collectively desired multi-unit future varies with their structural position in the SoP, land ownership during development, and capacity to assume financial risk. The international CSO housing cases have reinforced these previous observations, again identifying the need to reconfigure, not just alter, the existing black-box of speculative multi-unit provision to facilitate a viable CSO housing sector.

Motivations to engage in CSO housing are consistent across the case studies, and so too are many of the barriers and challenges experienced in realising housing outcomes. Chapter 11 provided lessons from the international case studies to address the individual project-level and strategic-level impediments to CSO housing developments in Australia identified in Part Three. A number of additional insights arise from the case studies which carry influence over the emergence of alternative SoPs. These are relevant to implementing network action and establishing a long-term, viable CSO housing sector where none currently exists.

Network Action Resources

In the three case study locations of Australia, Berlin, and the United Kingdom, CSO instigators identify a number of failures or controversies in the dominant multi-unit SoP: failure to meet the living requirements of a portion of the market, failure to deliver quality multi-unit homes at affordable prices, and more. Such failures result in controversies, or disagreements, between actants; between use value and market value, home and commodity, desire for the "new forms of housing" and "new urban form" (GSA 2010, p. 85) promised by strategic urban plans and desire for profit. Such controversies have motivated actants in all locations to reopen the black-box of housing provision, attempting to alter the meaning of relations with and between other actants to reorient the actor-network to a different "world view" (Gulati & Srivastava 2014, p. 83). Reorientation of networks employing such symbolic resources is constrained by existing network structures and the variety of network assemblies they allow.

In all case locations, network actants seeking multi-unit innovation have been more likely to achieve their desired housing outcomes when they possess (or are able to access directly) the capability-based resources to manoeuvre themselves into a network position which increases their agencement, or capacity to act. From such a position they become focal actants, deploy their symbolic resources to enrol others in their proposed alternative

SoP, align interests, and enact translation (Callon 1986a). Participants in Berlin CSOs and the privately-funded projects in the UK directly engaged professionals to act in their collective interest; collectively becoming focal actant, mediator, and obligatory passage point in a new actor-network.

Parallel SoPs

The relatively mature Berlin CSO housing sector demonstrates the capacity for multiple actor-networks of provision to co-exist. Berlin CSOs enrol professionals experienced in the existing SoP actor-network alongside new actants; engaging stakeholders previously unassociated with (possibly failed by) speculative multi-unit provision. The existing black-box and alternative SoPs exist in parallel, with numerous Berlin professionals concurrently enrolled in the actor-networks of both, creating potential for information flows over time. As Hamiduddin and Gallent state: "[m]aximum benefit will be derived from this model if it is seen as one route to delivering the homes that communities need amongst a jigsaw of alternatives" (2015, pp. 17-18).

In contrast, most CSO housing actor-networks in the UK enrol existing actants including for-profit developers and Housing Associations. Enrolled in both speculative and CSO housing actor-networks, these institutional actants move between the different action frames and world views (Gulati & Srivastava 2014) of the two networks, and do so less effectively than individuals. As such, CSO housing groups found themselves competing with conflicting world views of powerful actants enrolled in their own SoP. The Berlin CSOs have created a new actor-network of multi-unit provision which circumvents the need to engage housing institutions or profit-seeking actants from the existing black-box. Some UK projects have created actor-networks as a variation of the existing black-box rather than as a parallel alternative. Enrolling institutional actants whose core business activities measure housing outcomes and investment benefits from the world view of the existing SoP led to the compromising of ambitions in UK projects.

Risk Reluctance

UK projects tend to enrol institutional actants due to an entrenched reluctance among existing stakeholders to deviate from known risk profiles. In both UK and Australian projects, CSO groups willing to assume development risk are often prevented from doing so by the constraints of the existing SoP despite access to appropriate capability-based resources. Risk extends beyond financial concerns, as discussed in Part Two: The Existing. Sharam et al. (2015b) identify reluctance on the part of Australian financial institutions to fund alternative development due to associated business risk, with one lender stating:

> *If something goes wrong and it all gets totally stuffed up and we lose a million dollars we don't want to be on the front page of the [newspaper] suing couples because they've tried to do the right thing and we're the bad guys. (Sharam et al. 2015b, p. 5)*

Complex layers of risk exist within development actor-networks, and appear to limit innovation in multi-unit SoPs in all three locations, contributing to the dominance of the existing black-box. The Berlin actants have succeeded in shifting both risk and risk perception, as expected in the later stages of sector maturation. This may also reflect a revaluing of risk due to the absence of profit-seeking in the CSO housing SoP. Further study of other non-profit-seeking CSO housing sectors would be required to validate this.

INTERVENTION

It is advisable to exercise precautionary principles, to attempt to anticipate unintended consequences when implementing change in complex systems and actor-networks. However, in the UK and Australian CSOs, excessive caution on the part of multiple actants has inhibited progress. In both cases intervention from an influential actant is required to break the cycle of risk reluctance and demonstrate CSO infill housing viability. Previous funding programs by the UK government with similar aims fell short of effecting change, as discussed in 11.2.2.

Interventions by government inevitably require clear definitions to determine eligibility. Interventions in early phases of sector maturation can unintentionally limit future options by defining parameters before alternative combinations of alternatives are explored. For example, the processes of group formation, constitution, decision-making, financing, and ownership structures have incrementally developed in Berlin and Germany over time as experience and knowledge have increased. The Berlin Building Groups are highly diverse, meeting the needs and ambitions of households, and continue to evolve over time. The actor-network(s) which enable them to provide housing is sufficiently flexible to accommodate groups navigating bespoke paths through the CSO variables identified, as shown in Table 10.6. The case studies have not provided definitive guidance to Australian CSOs regarding accessing suitable land and finances for development (11.2.2*),* but they have emphasised that there is no single or ideal CSO housing SoP, and any land or finance interventions by government should avoid prioritising one CSO solution over others. An SoP prioritised by legislation or eligibility restrictions risks becoming locked-in, resisting controversy from rivals and generating an additional multi-unit black-box.

Thesis Conclusion

Chapter 12. Conclusion

Concerned with the mismatches between Australian strategic plans for consolidation, household preferences, and existing multi-unit housing (1.1-1.3) this research is premised on the assumption active engagement of residents in multi-unit housing provision can reduce these mismatches, as evidenced by experiences in a range if international contexts (1.4-1.6). Conclusions to the Thesis Parts Two, Three, and Four have addressed the research sub-questions outlined in the Introduction, which collectively sought to respond to the primary question:

What are the impediments to collective self-organised housing provision in Australian urban consolidation?

12.1 Impediments to Emergent Self-Organisation

Collective Self Organised (CSO) housing seeks to disrupt the existing Australian multi-unit housing Structure of Provision (SoP). For most participants, Australian and international, CSO housing also seeks to address the mismatch between speculative multi-unit housing design and their households' needs or preferences. Instigators proposing alternative SoPs must problematise (make controversy around) the existing black-box of provision; modify existing actants or relations, recruit others to share their vision, and negotiate resistance from existing network actants and relations. Examining the existing Australian multi-unit SoP(s) in comparison with innovative alternatives in Australia, Berlin, and the UK, the Thesis has identified multiple impediments to collective self-organised housing provision in Australian urban consolidation.

Collating the findings of the preceding thesis parts through an Actor-network lens identifies five primary impediments:

- Agencement and asymmetry
- Uncertainty
- Alignment of interests
- Mediation and participation
- Controversy and competition

12.1.1 Agencement & Asymmetry

An actant seeking to disrupt an existing actor-network requires the capacity to influence their alters and, frequently, other actants with whom they have no contact in the existing SoP. Part Two: The Existing showed owner-occupiers have little capacity to influence change in the existing SoP, with property developers and market value holding the greatest authority in the network. It also showed architects (design team) having less influence on design decisions than those providing development finance (financial institutions and development investors). Latour states:

> *[t]hose who are powerful are not those who 'hold' power in principle, but those who practically define or redefine what 'holds' everyone together. This shift from principle to practice allows us to treat the vague notion of power not as a cause of people's behaviour but as the consequence of an intense activity of enrolling, convincing and enlisting. (Latour 1986, p. 273)*

In the existing SoP, land and finance holds everyone together as the two key resources required for development. Access to these resources are the primary barriers to CSO housing projects in all three case locations. As the 'holders' of land and finance, property developers, investors and financiers are focal actants, mediating almost all information flows, and taking the bulk of decisions within the network. They have enrolled, convinced, and enlisted other actants in an SoP based on short-term investment in housing as a commodity.

In contrast, CSO housing initiators seek to enrol actants in an SoP prioritising long-term investment in housing as home and community infrastructure. As seen in the Australian innovative projects, alternative SoPs which avoid the need to re-enrol existing, powerful actants are more successful in achieving their housing ambitions as the future residents become focal actants in design decision-making. This is consistent with the international cases, which also show the inverse: that when CSO groups partner with (not-for-profit) developers or Housing Associations (HA), they struggle to assert influence over their development partners. Such partners are influenced by the practices of their existing SoP and maintain power through continued control of land and finances during development, as well through their existing industry knowledge.

ANT analysis and network reconfiguration focusing solely on powerful actants can lead to a "blindness to other possible ways in which networks might develop" (Gad & Jensen 2010, p. 58) as key actants' interests limit capacity for innovation or alternative reassembly despite the interests of others in the network. The international CSO projects which have succeeded in achieving housing outcomes distinct from that provided by the speculative market are those which have reconfigured and reprioritised the actor-network and increased the power to act (agencement) of actants who previously held little influence. Those projects which re-enrolled existing powerful actants unintentionally fortified existing structural positions and priorities. This analysis suggests that to achieve their collective housing ambitions, CSO groups of households and/or their

professional consultants must improve their own structural positions in the actor-network of provision, increasing their agencement. Ideally, they would also avoid re-enrolling key actants whose existing business practices do not share their motivations or 'matters of concern,' and 'hold' power in the actor-network by controlling access to land and/or finances as the essential resources of development.

CSO housing instigators contend with asymmetries of knowledge, power, and agencement. Due to administrative layers of management and risk shifting, the UK and Australian residents are more distant from the production subsystem than their German counterparts and these asymmetries pose more significant challenges. Due to differences in the scope of existing professional practice across locations, Australian and UK architects are also less central to design and provision than their German counterparts, and hence less able to disrupt the actor-network on their clients' behalf.

Implementing a CSO housing sector in locations where the existing multi-unit actants 'hold' required resources, controlling them to meet their own motivations, requires actants who not only have the capacity to act, but also the will to deploy that capacity to move beyond "preservation strategies" (London et al. 2015, p. 7) and enrol others in realigning network motivations. Hence, challenges lie in combining existing power with the will for change. This was demonstrated in Parts Three and Four of the Thesis where the case studies employing both capability-based resources and symbolic resources (Gulati & Srivastava 2014) in combination were shown to hold the greatest potential to execute desired network disruption.

12.1.2 Uncertainty

Influenced directly and indirectly by actants both within and without, the multi-unit SoP is (like any complex system or network participant) vulnerable to unintended consequences of network disruption. Disruption of the existing SoP inevitably increases uncertainty, and this is frequently perceived as risk. In seeking to alter the structure of networks, CSO housing instigators modify the roles and responsibilities of actants. In particular, they place themselves and their consultants/professionals in previously undefined roles with undefined boundaries, possibly losing access to necessary network knowledge. The uncertainty of actants responsibilities in untested SoPs diminishes potential participants' confidence in their roles, adding to existing risks.

The cases observed have taken two slightly different approaches to handling uncertainty. Early innovators in all three case study locations took the approach of collective risk exposure. This required establishing cohesive, participatory processes among participants who shared 'matters of concern' regarding housing ambitions. In most cases, professional actants such as architects were also future residents, placing industry knowledge and expertise within the client group and increasing their collective agencement in the network. Together, participants willingly and cautiously confronted

uncertainty, with an awareness that both professionals and future residents may be required to adapt to the emerging actor-network in progress. Collective risk exposure enables the reconfiguration of network structures to an extent that neither individual households nor professionals could achieve alone and encourages high levels of design innovation.

The second approach also involves collective risk exposure, but does so with greater distinction between consulting professionals and residents, and within a more defined actor-network. Typically, professionals with extensive knowledge of the existing SoP propose and define an alternative SoP in detail prior to recruiting participants (enrolling actants) in their proposal. The instigating professionals do not assume financial risks of development but recruit others to do so, be they future residents (Berlin developer-led CSOs) or third party investors (The Nightingale Model). The location of professional knowledge outside the resident group reduces group cohesion, returning to a commercial interaction with professional consultants and reintroducing asymmetry to the network. This approach enables resident participation primarily through consultation but, without an established collective frame or 'matter of concern,' tend towards less innovative design solutions. In mature CSO housing sectors, this approach draws on the preceding experiences of less risk averse projects.

Some self organising groups fail to define a collective approach to handling uncertainty and these commonly struggle to achieve their housing ambitions (e.g. some UK cohousing groups, Urban Coup). Additionally, those who choose to avoid uncertainty by enrolling key existing actants modify the existing SoP rather than disrupting it. This can result in a built housing outcome, but may not realise the full benefits of CSO housing discussed in Chapter 1 (e.g. Cohousing groups partnered with HAs).

CSO group members in all case study locations were partly motivated by frustration with the lack of opportunity to directly participate in housing provision. They sought to redistribute decision-making in the SoP to include future residents and reduce network asymmetry. However, to achieve this objective the collective of future residents must be willing to engage with a greater level of uncertainty than that afforded by existing speculative SoPs.

Government initiated services providing support, funds, and/or information to CSO housing groups in the case study locations have not been as successful in reducing uncertainty in the SoP as those which are industry initiated. Policy attempts to reduce uncertainty in the UK have been shown to unintentionally fortify the existing actor-network. However, municipal support programs and government policies encouraging CSO housing also exist in other locations, including other German cities, and their effectiveness in reducing uncertainty is worthy of further research.

12.1.3 Alignment of Interests

As focal actors, CSO housing innovators aim to enrol actants to a proposed actor-network, to align the interests of others with their own (Callon 1991, p. 135). Susan Smith described owned homes as "a hybrid of money, materials and meanings" (Smith 2008, p. 521), each of which are of varying degrees of interest to different stakeholders. Part Two has shown key design decision-makers in speculative multi-unit provision prioritise the financial aspects of housing over materials and meanings. CSO housing stakeholders from all three case study locations were motivated, in part, by a desire to redistribute the interests of the network to meet residents' housing ambitions. The Nightingale Model states this most explicitly by embracing the equal prioritisation of financial return, sustainability, and liveability in development (Figure 7.2). This is a challenging task, given the fact the majority of human actants in the production subsystem participate for monetary reward.

To enrol professional actants (developer, property investor, construction contractor, etcetera) in an actor-network whose primary objective is to meet the residents' interests in materials and meanings of homes, it is necessary to also meet their business' profit objectives while avoiding conflicts between the two. Berlin CSO housing groups (or their agent) achieve a balance between actants' interests by directly contracting all consultants and trades on a cost-plus or fee basis; agents or CSO developers themselves also receive a fee based on project costs. Working directly for the future resident group without the requirement to carry risk beyond that applicable to their usual business practices, consultants and tradespeople act in the interest of their employer. This can occur only where the resident group engages with a high degree of uncertainty, accepting collective risk exposure.

In contrast, when a group seeks the certainty of fixed-price contracts they dislocate risk to other actants (e.g. all Australian and most UK cases sought fixed-price construction contracts, shifting risk to the contractor). Actants carrying risk on behalf of the CSO group seek higher remuneration. Their interests cannot be fully aligned with those of the resident group as the requirement for financial risk management influences their practices, with minimisation of costs resulting in higher profits.

This actor-network understanding of enrolment and translation suggests the capacity to enrol actants in CSO housing SoP's, to share a common vision and minimise conflicts of interest in production, relates directly to group members' willingness to accept collective uncertainty and risk.

12.1.4 Mediation & Participation

In seeking an alternative to the housing produced by the existing multi-unit SoP, CSO group members desire the capacity to "transform, translate, distort, and modify" (Latour 2005, p. 39): to mediate dwelling design and function to meet their needs and

preferences. The capacity for future residents to mediate design varies across the CSO housing actor-networks studied and directly relates to agencement and uncertainty.

Groups who hold control of land and finances are design mediators across all three case study locations. As a citizen group holding the majority of decision-making positions in the SoP, they reach the top rung of Arnstein's (1969) ladder of citizen participation and are also obligatory passage points, meaning development cannot proceed without their approval. Groups without control of these essential resources achieve opportunity for consultation only, a much lower rung on the participation ladder. Members' desires may, or may not, be addressed in the design, which does not require their agreement for development to proceed. Final decision-making rests with key actants in the existing SoP, who Dotson, discussing CSO housing in southern Germany observes "inevitably fall back on their own technological frames and persistent traditions" (Dotson 2016, p. 153).

Between these extremes sit two proposed CSO housing actor-networks in which the residents become partners in development. Partnership affords the capacity to "negotiate and engage in trade-offs with traditional powerholders" (Arnstein 1969, p. 217), particularly when resources are co-invested. These SoPs currently remain untested.

The level of design mediation and participation desired by future residents varies both among and between groups and not all pursue the highest level of participation possible. In some projects, consultation may be sufficient to obtain the desired benefits of CSO housing. In devising CSO housing actor-networks, it is essential to consider this link between capacity for design mediation (disruption) and control of resources to meet future residents desired level of participation.

12.1.5 Controversy & Competition

The failure of dominant systems can provide opportunity for innovation where that failure radically alters the agencement of existing actants. Berlin's economy was in crisis at the time CSO housing projects emerged there. Within an almost inactive construction industry, CSO groups faced little resistance to realising their housing ambitions, although significant effort was required to enrol financial institutions in the new SoP. While the Australian and UK housing sectors can be described as failing as they do not meet the needs of a sector of the population, CSO groups in these locations face greater challenges than the Berlin building groups that preceded them.

Existing structures of housing provision can be problematised from multiple perspectives, concerns, or controversies, leading to often conflicting propositions for change as evidenced by existing housing studies literature. Ball asserts no perfect housing system can be designed, suggesting:

> *The point instead is to start devising forms of housing provision . . . so that new political groupings can coalesce around them to push for substantial*

> *change. Only in this way is it possible to start giving people greater control over that vital aspect of their lives. (Ball 1983, p. 391)*

Where existing, dominant housing SoPs are achieving successful economic outcomes for influential actants, alternative SoPs proposed to address controversies of importance to only a minority of stakeholders generate competition. Competition, in which the "structures, institutions and practices" (Lawson 2006, p. 86) of the exiting SoP resist change. The case study of Berlin's now mature CSO housing sector shows such competition need not be problematic in itself, in that the CSO sector does not seek to displace the existing SoP or compete with it for market share. The CSO alternatives exist in parallel to speculative provision, addressing the needs of households silent to, or economically less advantageous to, the existing SoP.

In early phases of maturation, CSO innovators face competition as they seek to enrol knowledgeable actants from the existing SoP in their alternative vision. The UK projects demonstrate the reluctance of existing stakeholders to deviate from established practices. The more mature sector in Berlin has overcome this, with professional actants self-selecting to engage predominately in the alternative SoP. Once established as a viable housing sector, the primary competition between the CSO and speculative SoPs exists in the land market, where the existing SoP maintains dominance.

All housing systems are contingent (Ball 1986; Ball & Harloe 1992; McNelis 2014), progressively evolving over time and vulnerable to collapse as external influences change. The co-existence of multiple multi-unit housing SoPs adds to housing diversity and enhances industry resilience as one sector may flourish at times when others face downturn.

12.2 State-Organisation of Self-Organisation

Current Australian housing policy is interested in liberal individualism and supporting capitalist development (Burke & Hulse 2010; K. Jacobs 2015). The majority of policies informing housing outcomes are managerial, targeted at ameliorating housing challenges both generated and problematised by existing, dominant housing SoPs, including that of multi-unit infill development. Policy typically reinforces existing structures of provision in support of existing influential actants economic interests through targeted subsidies and taxation interventions (Burke & Hulse 2010; Gurran & Phibbs 2015; K. Jacobs 2015). The asymmetry of knowledge in the existing actor-network provides key actants with the power to override the interests of others, to problematise housing in line with their own interests, and offer greater certainty than alternative SoPs. In doing so they hold greater capacity to act (agencement), influencing policy to maintain existing black-boxes.

The interests of Australian CSO housing innovators differ from those of key actants in the existing SoP, prioritising housing and social benefits equally with economic benefits.

Following K.Jacobs et al (2003), for CSO advocates to progress their interests in alternative housing solutions it is necessary to construct a convincing problematisation, coalesce support, and advocate the implementation of institutional measures for change. However, while actants in all three case study locations would appreciate government assistance in negotiating experienced impediments to implementation, most express some reluctance toward government/state intervention which may bring prescriptive solutions and compliance restrictions.

Chapter 11 drew on the international case studies to provide lessons for the progression of CSO housing in Australia, responding to the challenges identified in Part Three. It observed policy interventions by municipal and national administrations as resulting in unintended outcomes by introducing additional key actants, reducing innovators' agencement, increasing knowledge asymmetries, and being reluctant to engage in uncertainties. They were also shown to fall short of fully aligning with the interests of the CSO housing sectors they sought to support.

It was identified in 11.2 that strategic-level actants supporting alternative housing SoP have the dual roles of enabling innovation and normalising alternatives. The Australian CSO housing innovators are currently constrained by existing actor-networks and the industry practices, policies, and legislation that have evolved to suit them. Ideally, a multi-unit infill CSO housing system would operate in Australian cities in parallel with the dominant speculative model, without preferential treatment provided by the state.

Initial encouragement is required to overcome existing impediments to achieve normalisation and maturation. At a minimum, this requires recognising the existence of a non-speculative multi-unit housing sector through appropriate legislation. Legislative definition may protect the emerging CSO housing sector from the unintended consequences of future policies or legislation introduced in response to problematisations in the speculative multi-unit SoP, and possibly exempt them from existing provisions which impede change. Recognition would also avoid speculative developers co-opting future interventions designed to encourage a CSO housing sector.

To enable ongoing innovation over time, SoPs should remain open and interactive, able to accommodate the multiple variables identified in CSO housing sectors (Table 10.1). The legislative differentiation of multiple SoPs would enable implementation of target interventions, and concurs with a recent call for Australian "policy-makers to tailor policies to a more diverse audience, and in doing so, improve future adaptive capacity" (Shearer et al. 2016, p. 16): capacity to reconfigure the multi-unit housing network, adapting the Australian dream to the 'new forms of housing' and 'new urban form' advocated by urban consolidation strategies.

12.3 Contribution

This research contributes to the existing and ongoing multi-unit housing debate in Australia. It provides a unique representation of the existing SoP(s) based on a literature review and primary data which aids in identifying barriers and opportunities to reduce current mismatches between strategic urban plans, housing preferences, and available products. It peers into the currently locked-in black-box of multi-unit provision in Australia and, through comparison with actual and proposed alternatives, identifies opportunity for future change to diversify housing outcomes and subsequently increase household choice.

More specifically, it has:

- experimented with a unique means of utilising Actor-Network Theory (ANT) in system-embedded comparative housing research, including the provision of seven factors to address in the design of ANT-informed housing research (2.2.5) and eight factors to address in visualising actor-networks of housing provision with Social Network Analysis (SNA) software (2.3.4) which can be adapted for use in other housing locations, types, or tenures (see also 1.3).
- identified a set of variables in international Collective Self Organised (CSO) housing which has the potential to inform project specific planning across multiple locations, and to provide a basis for further research or categorisation (Table 10.1).
- examined Australian alternatives to the existing multi-unit SoP(s) to explain why innovations sought by instigators are not always achieved and identify barriers to change.
- drawn lessons from international examples to provide project-level and strategic-level insights to encourage a collective self-organised multi-unit SoP in Australia and in other jurisdictions.

12.3.1 ANT/SNA Mapping Contribution

Chapter 2 showed the use of an Actor-Network Theory (ANT) lens in housing studies has both supporters and critics. In combination with concepts from SNA and network analysis, ANT has provided a substantial contribution to this research, permitting a conceptualisation of housing as a heterogeneous socio-technical system.

Focusing on flows of design information as the intermediary of concern, this research has demonstrated ANT's capacity to combine with, and advance, long-established theoretical constructs of housing. Ball observes "… contradictions between the spheres of consumption, exchange and production [are] important causes of change in structures of

housing provision" (Ball 1986, p. 162). Viewed from an ANT perspective, such contradictions in housing SoPs constitute controversies, triggering problematisation and translation by powerful (focal) actants capable of recruiting others in an alternative network. The understanding of change in actor-networks via the multiple stages of translation (Table 2.2) provides a means of progressing Ball's Structures of Housing Provision beyond the relatively static description of existing practices, or black-boxes, to the conception and comparison of possible alternative futures.

Having determined the use of SNA software for the comparative analysis of case studies (following Thomas) as an appropriate method of studying housing actor-networks via an ANT lens (Chapters 2 and 3), the resultant mappings provided unique views of the SoPs. Housing researchers have previously proposed the use of network analysis to identify key players in production (Nicol 2013) and consumption (Heitel et al. 2015) subsystems, and to compare typical and alternative cases (Nicol 2013). However, no completed precedent exists as guidance. The ANT/SNA mapping employed in this research engaged in a degree of trial-and-error, observing multiple network views and SNA metrics in pursuit of new network knowledge.

The mapping has provided the research with five unique observations of the existing multi-unit housing actor-networks. First, it enabled the combination of an extensive literature on Australian multi-unit housing provision and design into a single, visual representation of design information flows. Secondly, using ego-networks, it provided an understanding of actants' network horizons, highlighting the different views held by different actants and how these influence their capacity to act (agencement) and to conceive alternates. In particular, the mismatch between an actant's sphere of concern (e.g. an owner-occupier's concern for dwelling design and function) and their sphere of influence. Thirdly, both visual and metric analysis identified key actants in the SoPs, with SNA literature providing an understanding of properties afforded to actants by their structural position. This metric analysis enabled comparison between actants' capacity to act or influence information flows. Fourthly, mapping within the context of the Australian subsystems of housing provision, provided by Burke and colleagues (Burke 2012; Burke & Hayward 2000; Burke & Hulse 2010), identified conflicts, and disconnections between actants from different subsystems. It also ensured the analysis remained focussed on the multiple subsystems of provision rather than reverting to focusing on the resultant architectural artefact, as is often the tendency in architecture and built environment research. Finally, the mapping interacted successfully with primary data collection, both informing interview questions and providing structural network explanations of interviewees' observations.

In comparing alternative or proposed SoPs (6.5 and Chapter 9) the ANT/SNA mapping provided analytical insights unavailable via other means. Mapping multiple alternative SoPs, the researcher can identify actants (and their relations) which remain unaltered,

identifying the human and non-human actants which act to restrict network change. Using SNA metrics allows alternative networks to be compared, identifying network changes more likely to achieve desired outcomes or address identified challenges. As suggested by Cambrosio et al., network mapping is not a definitive measure, but an open ended outcome which can be used as "starting points for further, more specific inquiries into different aspects of the overall endeavour" (Cambrosio et al. 2004, p. 357). Through the identification of actants and their associations in the actor-network of a 'black-box', the SNA/ANT mapping built an understanding of how the existing stabilised network produces the outputs it does, and how it may be reconfigured to produce alternative outputs; creating space for design innovation. The combination of actor-network mapping and SNA tools has identifying opportunities for network analysis and intervention which are of value not only to multi-unit housing provision, but also to any other design arena which requires the un-locking of a stabilised 'black-box'.

12.4 Further Research

Self-organisation in the built environment is currently being researched internationally by scholars focusing on public space, housing, urban design, and planning, with Dutch planners Boonstra and Boelens suggesting that by "acknowledging self-organization, planning will open up to all the multiplicity and pluralism present in society, and thus move away from the dilemmas concerning participation, geographical, institutional and procedural inclusion" (2011, p. 117). For housing, self-organisation by civil society "blur[s] traditional boundaries between housing production and consumption" (Stone 2015, p. 102). This research has focussed on design decision-making networks in self-organisation. Revisiting the same case studies inquiring into the capacity for "producer-consumer cooperatives" (Whyman 2012) or "prosumers" (Toffler 1980) to address existing inclusion dilemmas in housing provision would provide an alternative reading of the structures of provision.

Building specifically on the outcomes of this research project, further research is required to:

- Test the working hypothesis generated from the case studies that CSO participants' agencement in design is directly linked to land ownership through the investigation of further international case studies.
- Investigate the role of new professionals (agents/CSO developers/brokers) emerging internationally to serve CSO housing groups, examining the diversity of services offered, location of risk, and perceived effectiveness. This would inform the future development of such roles in Australia.
- Investigate the professional roles of architects, project managers, and others in mature CSO housing sectors internationally to determine how they differ

from existing professional roles and, hence, what additional professional skills are required to progress CSO housing in Australia.

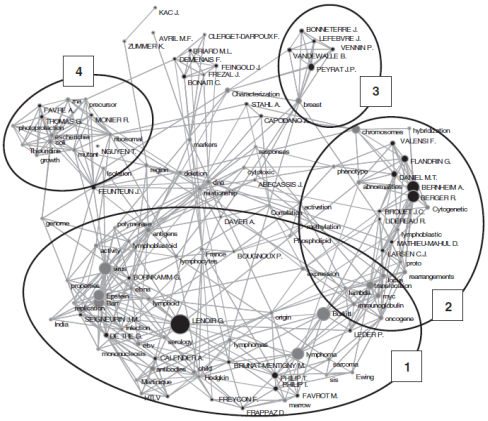
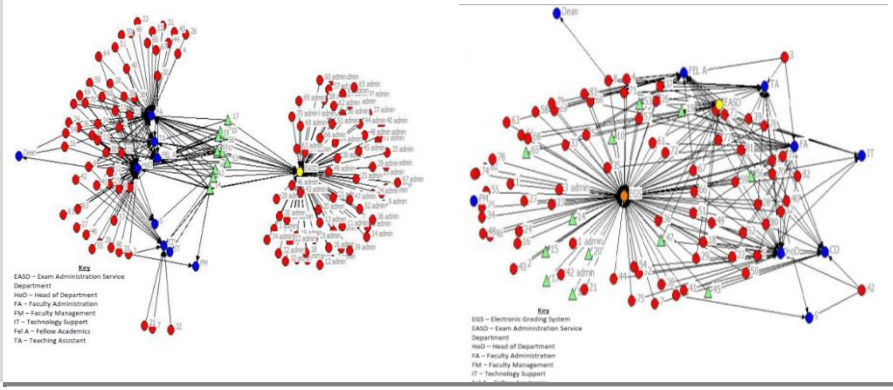
- Undertake research into unsuccessful CSO housing groups in Australia who have abandoned their collective housing ambitions to determine if the reasons for their lack of success correspond with the challenges identified by current instigators.
- Re-examine these case studies, together with others as appropriate and over time, to determine which of the CSO housing variables identified here have the greatest potential to enable design disruption, providing target points for intervention in the actor-networks which leverage maximum gain.
- Continue to develop and test the ANT/SNA mapping methods introduced here to analyse other housing systems and other network intermediaries.

And, most important to the progress of collective self-organised multi-unit housing in Australia, commence investigations to inform a proposed legislative definition of this housing sector, realising differentiation and recognition.

Appendices

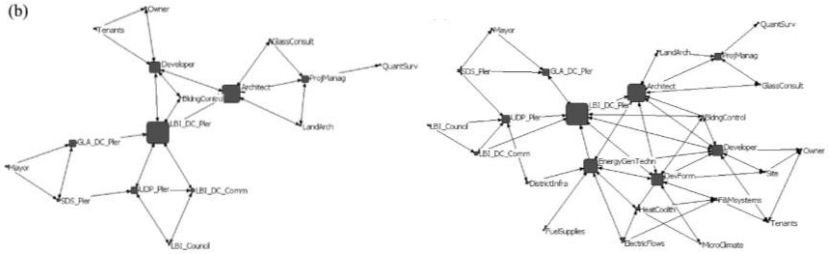
Appendix A. ANT/SNA Mapping Examples

Table A- 1. Summary of past studies involving SNA mapping of heterogeneous (ANT) networks.

	Field/Discipline Study Type Subject	Mapping purpose	Mapping software
Cambrosio et al. 2004; Bourret et al. 2006	Science and Technology Studies Case study of network evolution Biomedical research networks.	Semi-quantitative maps of co-authorship and co-word relations between institutes, researchers, key terms and research over time.	Reséau-Lu
	Heterogeneous map of Co-authorship and co-word relations in biomedical research (Bourret et al 2006 p. 445). 		
Carroll 2012, 2014; Carroll et al. 2012	Service Network Innovation Case study/evaluation of network change to university assessment system	Providing abstract representations of a socio-technical network to enhance description	UCINet and NetDraw
	Comparative Mapping of university grading system before (left) and after intervention (right) (Carroll 2012a p146 and 150). 		

	Field/Discipline Study Type Subject	Mapping purpose	Mapping software
Rydin 2013	Planning Practice Case study	to "map relationships illustratively and provocatively" (p. 27).	UCINet

Mapping human actant network (left) and heteregeneous network (right) (p. 30 and p. 33).



Spinks 2015	Building Production Case study of energy efficient office building.	SNA analysis of system strengths and weaknesses in a network which identifies the relevance of material entities and their effect.	ATLAS.ti. (author highlights limitations of the software and recommends future use of UCINet in Spinks 2012).

Ego-net of a single actant, the building ecologist (Spinks 2015 p. 141).

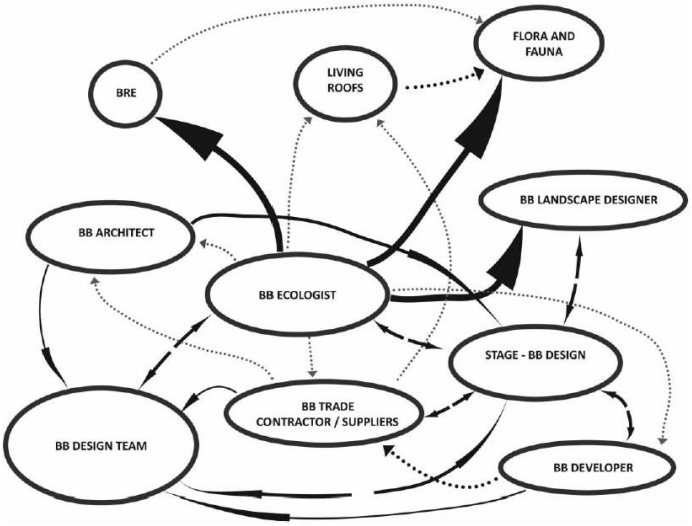


Table A- 2. Techniques previously used to map heterogeneous networks with SNA Software.

	Cambrosio et al. 2004; Bourret et al. 2006	Carroll 2012, 2014; Carroll et al. 2012	Rydin 2013	Spinks 2015
Actants mapped	YES	YES	YES	YES
Non-human actants mapped?	YES. as significant in number as humans/human institutions • Key words/themes • Antibodies (topic of research in research network being examined)	YES. only one non-human actor, that being the technology under observations. No non-human in initial network	YES. selected actants viewed as important by researcher based on document review • Energy infrastructure, • Energy fuels • Energy flows • Building shape • Microclimate • Energy management systems	YES. critical material entities as relevant to human centred ego-networks E.g. For base building ecologist: • Sustainable building rating tools • Living roofs • Flora and Fauna • Building design
Staging of mapping?	YES. 2006 first mapped humans (co-authorship), the non-human (thematic co-word maps), then combined heterogeneous maps giving multiple configurations for analysis	NO	YES. Initial mapping human only. Non-humans added in subsequent mapping. Staging neither rationalised or beneficial to analysis	NO
Temporal component in mapping?	YES. Maps used for data sourced over different time periods to show change	NO	NO	NO
Ties/flows/links differentiated?	NO. ties binary and directionless. Focuses on frequency for metrics	YES. strength and direction	NO. all equal weight and bidirectional	YES. strength and direction

Table A- 3. Methods previously used to analyse heterogeneous networks with SNA Software.

	Cambrosio et al. 2004; Bourret et al. 2006	Carroll 2012, 2014; Carroll et al. 2012	Rydin 2013	Spinks 2015
Analysis of whole network?	YES	YES	YES	NO
Analysis of Ego-networks used?	NO	NO	NO	YES
Comparative component in analysis?	YES. compares changes in developing network over time.	YES. two maps used to compare network pre / post administrative change.	NO	NO
Visual analysis used?	YES. interpreting relational network patterns and clustering. E.g. human at centre of many non-humans or vice versa. Compared over time.	YES. relational, unweighted comparison of pre- and post-network change. Employs SNA pattern descriptions (eg cliques).	YES. as description	YES. visualisations used to assist description.
Correlation established between SNA visualisation and ANT definition/terminology?	NO	NO. only descriptive correlations between network science and ANT. Not linked to ANT vocabulary.	NO	NO correlations with ANT beyond conceptualisation of materiality.
Metric analysis used?	YES	YES to compare pre- and post-network change.	YES	NO
Correlation established between SNA metrics and ANT Definitions	YES. high betweenness= OPP	NO. SNA metrics related to service system properties eg efficiency, equality.	INDIRECTLY. high betweenness score = 'central actors', but central actors not defined in ANT terms.	NO
Disjunctions between SNA and ANT in method/analysis utilised		ANT informs the data mapped, but SNA mapping does not feed-back to an ANT analysis.	Locates power and labels actants as focal actors Obligatory Passage Points (OPP's) without referring to network or metrics.	
Other	Intended to compliment other ethnographic approaches. Starting point for further enquiry.	Metrics separated from visuals.	Emphasises role of SNA as one component of an ANT study.	Primarily an SNA analysis with material objects added.

Appendix B. Interview Documents

Stage One/Key Case Interview Guide

Title:	Unlocking the black-box of medium-density housing provision in Australian urban regeneration.
Ethics Approval Number:	H-2014-012

ROLE

1. How would you describe your role in current medium-density housing provision (MDHP)?
2. How long have you acted in this capacity?
3. Were you previously involved in the building sector in an alternative capacity? If so, what?

NETWORK MEMBERS/ACTORS

4. In your current role, what other stakeholders do you have the most interaction with in MDHP? And how would you describe these relationships? (e.g. authority based interactions, regulatory, participatory, advisory, exploratory, innovative etc)
5. Other than the above, what other actors/stakeholder are involved in MDHP currently?

NETWORK CONNECTIONS

6. Having identified a number of MDHP stakeholders, where/when do the main connections between these stakeholders occur in the MDHP process?

Note: Questions 4-6 will be recorded in a diagram during discussion as well as being audio recorded. If participants initiate discussions of 'non-human' roles during questions 4 and 5 (such as policies, legislations, planning documents, building codes etc) they will be encouraged to include these as actors/stakeholders. Questions 7 – 9 will continue to employ the diagram as a means of discussing interconnections, flows and power within the MDHP network.

7. Of all the stakeholders you have identified which do you think
    - influence decision-making processes the most? If multiple, who decides what?
    - determine the type of houses being built? (i.e. no of beds, size, carparks, etc)
    - make design decisions?
8. Given the diagram of MDHP relationships developed from questions 4-6 where/with whom would you locate
    - the greatest control of finances/flow of finances?
    - the greatest control of development decisions/flow of information relevant to development decisions?
    - the greatest control of design decisions?
    - the greatest risk/flow of risk?

9. What policies/regulations/codes influence MDHP outcomes (beyond those applicable to detached suburban housing)? What influences do they have? Positive/negative? Do you ever see an attempt by industry to 'work around' these? How/example?

ALTERNATIVES

10. What experiences have you had in your role in MDHP in which you have sought to do something outside the box? Was this possible? How/why not?

Participants to be shown the preliminary MHDP actor-network mapping developed previously based on the literature review.

11. Discuss the preliminary actor-network mapping. Does anything we have discussed/drawn today contradict the map? Are there any aspects of the map which do not represent your experiences of MDHP?
12. Have you ever worked on a MD project where the end occupants were provided with an opportunity for input into the building design? Where? When? How was this facilitated? Do you think it was successful? How did the lived environment/built outcome differ from the typical MD?
13. What do you think are the barriers to increased owner/occupier input into MDHP? How could this be improved? Do you think there would be any benefit in doing so?
14. Any other comments – do you think there are any important aspect of the existing MDHP networks which we have not discussed?

Given that a snowballing recruitment method may be applicable, it is anticipated additional stakeholders may be identified. As a result, additional questions may be required. The researcher will inform HREC should any significant deviation from the above questions arise.

Stage Two/Alternatives Interview Guide

Title:	Unlocking the black-box of medium-density housing provision in Australian urban regeneration.
Ethics Approval Number:	H-2014-012

INTRODUCTORY QUESTIONS FOR ALL PARTICIPANTS:

How would you describe your role in alternative medium-density housing provision (AMDHP)/ case study name (XXXX)?

How long have you been involved with XXXX?

TOPICS/QUESTIONS FOR SPECIFIC STAKEHOLDERS

A single participant may undertake more than one stakeholder role, in which case they will be asked all relevant questions. Where individual participants are in multiple groups questions will be re-ordered for continuity

PROJECT INSTIGATORS

1. As the project instigator, what motivated you to seek an AMDHP solution?
2. What do you think are the main features of the AMDHP system you propose/employ in comparison to existing MDHP? Why, in particular, are these the facets of the existing MDHP you identified as requiring change?
3. Who do you think will be/are the residents of XXXX? In what way does/will XXXX meet their needs differently to the existing MDHP system?
4. Is XXXX intended primarily for owner-occupiers (O/Os)?
5. What degree of design input by O/Os did XXXX intend to facilitate? Was this/is this being achieved?
6. Are there features of existing MDHP that you sought/seek to change but feel unable to? What are these and how do they impact your work?
7. When do you see as the main obstacles to O/O tenure in MD in Australia?
8. What other obstacles have you experienced in the process? (legislative, financial, council, other stakeholders, perceived risk etc).

FINANCIERS/ DEVELOPERS/ PARTNERING NGO's

9. Describe your role in XXXX. How has this differed from your role in existing MDHP projects? (different relationships/links in network)
10. From the perspective of your organisation how does XXXX differ from existing MDHP?
11. From your stakeholder perspective are these differences advantageous? Risky?
12. Why was your organisation interested in being involved in XXXX?
13. Do you see this AMDHP solution as replicable and expandable?
14. Could replication/expansion of this AMDHP solution be facilitated by changes to existing processes, policies or legislation? (e.g. financial, legal, planning, building codes etc.).

DESIGNERS/ARCHITECTS

15. Describe your role in XXXX. How has this differed from your role in existing MDHP projects? (different relationships/links in network).
16. How has your engagement in XXXX differed from your role in previous projects under a typical MDHP system?
17. From your stakeholder perspective are these differences advantageous? Risky? Less predictable?
18. Why were you/your organization interested in being involved in XXXX?
19. To what extent does XXXX offer/intend to offer the O/Os to have input into the design process?
20. Please explain how this has been/is being integrated into the design process? Has it had an impact on time requirements for development? Cost implications?
21. Do you see potential for greater O/O design input? Is there a limit? Why?

GOVERNMENT STAKEHOLDERS (Planning Authorities/Local Council/State Government Architect with AMDHP experience)

22. When did you/your organization first experience AMDHP projects?
23. What local projects have you had direct contact with? Do you think those projects faced any additional obstacles in passing through the policy and procedural requirements of development in comparison with a typical MD project?
24. Do you AMDHP projects as requiring greater intervention by your organisation? Do they require your organisation to reconfigure relationships with other stakeholders? If so, is your organization able/willing to facilitate this?
25. What is you organisation's view of such projects? What can they offer to our cities from a government perspective?
26. What do you see as your organisation's role in facilitating AMDHP if any?

OWNER/OCCUPIERS – ALL

27. How did you become involved with XXXX? Why were you inspired to become involved?
28. What stage was the project at when you became involved?
29. Did you know any other O/Os in the project prior? Do you know everyone now?
30. What are your motivations for residing in MD housing?
31. What are your ideal aspirations in relation to living at XXXX? What do you think it can offer you that existing MDHP cannot (or does not)?
32. Do you feel there is adequate knowledge/support in the industry/government to support your community in achieving its housing aims? Barriers?

OWNER-OCCUPIERS OF PROJECTS IN PROGRESS

33. How would you describe your current residence? Free standing? Multi-unit? Suburban? Urban? Same area as XXXX?
34. What is your current housing tenure?

35. How would you describe the experience to date of being involved with the design and planning of XXXX?
36. Could you run me through a brief chronological history of the project from your perspective? How it came about, who you have worked with along the way, what relationships have been formed with other stakeholders/potential stakeholders in the project?
37. To date, how have you been involved in the design of XXXX? How have your design consultants/ architects integrated (plan to integrate) individuals' design input?
38. What stage would you say the project has reached at this point in time? What next?

OWNER/OCCUPIERS RESIDENT IN COMPLETED PROJECTS

39. Where did you reside prior to the completion of XXXX? What was your housing tenure at that time?
40. Did you intend to become an O/O of XXXX when you became involved in the project? (i.e. had you ever intended it to be an investment property?)
41. Could you briefly run me through the chronological history of the project from your perspective? How did it come about? who you have worked with along the way, what relationships have been formed with other stakeholders/potential stakeholders in the project?
42. Generally, how would you describe the experience of being involved in the planning, design and construction of XXXX?
43. More specifically, how did your design team integrate your individual input/design wishes? What was the agreed process for achieving this?
44. Does living at XXXX differ from your previous living environments? How? Positive/negative?
45. Would you do it all again? Recommend others to do it? Why/why not?

CONCLUDING QUESTIONS FOR ALL PARTICIPANTS:

46. What do you see as the fundamental differences between existing MDHP and AMDHP as proposed by XXXX?
47. What do you see as the government role in promoting AMDHP? (this should have already been covered for Government group)
48. Do you see XXXX as a NEW MDHP solution? Or an alternative iteration of the existing? If you had free reign how you reconfigure the existing system and why?
49. Are there any other attributes of XXXX which you would like to discuss?

Given that a snowballing recruitment method may be applicable to some cases, it is anticipated additional stakeholders may be identified which are not listed above. As a result, additional questions may be required. The researcher will inform HREC should any significant deviation from the above questions arise.

Appendix C. Multi-Unit, not Medium-Density

This project examines the provision of housing in existing urban areas, specifically areas designated by strategic urban plans for densification, intensification, or consolidation. In describing such development, strategic plans frequently employ the term Medium-Density Housing (MDH). Most jurisdictions define MDH purely by a measure of dwelling units per hectare (du/ha), while the Brisbane plan uses the sole measure of height (Table A- 4). Among the strategic plans and planning policies employing du/ha to distinguish between low-, medium-, and high-density development, the means of measurement are not consistent. South Australia and New South Wales employ comparable measures of 'net residential site density' and 'development density', considering only the site area dwellings occupy. Victoria uses a net residential hectare measure which "includes lots, local streets and connector streets but excludes encumbered land, arterial roads, railway corridors, government schools and community facilities and public open space" (DTPLI 2013, p. 197). The Western Australian measure of gross urban hectare includes all urban land. Urban planning requires a variety of density measures, with prescribed net and gross urban densities essential in areas of urban expansion, but in areas of urban consolidation, site based measures are most relevant. Even using equivalent site based measures variations exist between states, with New South Wales describing MDH as 25-60 du/ha compared to South Australia's 35-70 du/ha.

Table A- 4. MDH definitions from a selection of Australian jurisdictions.

Location	***Definition of Medium-Density Housing***
Queensland	*Height of up to 5 stories (Brisbane City Plan, 2014).*
New South Wales (NSW)	*Development density between 25 and 60 net du/ha (NSW Dept of Planning, 2011).*
Victoria	*Medium-density housing is about 21–80 dwellings per net residential hectare, though most commonly is between 30–40 dwellings per net residential hectare (Plan Melbourne, 2014).*
South Australia (SA)	*35-70 du/ha net residential site density (The Planning Strategy for Metropolitan Adelaide, 2010).*
Western Australia (WA)	*15 units per gross urban hectare (Directions 2031 and beyond, 2010).*

Additionally, contradictions in MDH definitions occur within individual jurisdictions. As one example, The 30-Year Plan for Greater Adelaide defines MDH as a residential site density of 35-70 du/ha but prescribes a desired gross density of 25-35 du/ha in transit corridors with MDH. This latter measure is cited to be in line with "the international standard for sustainable density" of "about 35 dwellings per hectare" (Government of South Australia 2010, p. 18) as proposed by Hall's 2001 review of consolidation literature entitled "Sustainable Cities or Town Cramming?" (Hall 2001). However, Hall's 35 du/ha recommendation is in fact net density, so the strategic plans can be seen to not only contradict themselves, but contradict the literature upon which they are constructed.

The multiple measures of density and multiple definitions of MDH not only cause confusion, but arguably render the definition ineffective, even within a given location. The confusion makes it difficult for urban infill to effectively achieve the strategic plan of more sustainable future communities, as a common vision among stakeholders is unattainable.

Some plans defining MDH purely by du/ha expend effort to demonstrate that medium- or high-density does not necessarily mean medium or high rise. Yet this attempt at clarification adds further confusion, with South Australian planning documents describing medium-rise as four to ten stories while New South Wales describes it as four to five stories.

A number of Australian strategic planning documents emphasise the fact that MDH does not necessarily mean apartments but can be "detached, semi-attached, attached or multi-unit" (DTPLI 2013, p. 197). The Government of South Australia 'Understanding Residential Densities Handbook' (Government of South Australia 2011) provides examples of medium-density housing within the defined density range varying from single-storey, semi-detached Torrens titled houses to two-storey strata titled units. Three-storey town houses, single-storey row cottages and high-rise apartments are all included as examples of high-density housing, having densities over 70 du/ha. The exclusive use of density to describe infill housing does not effectively define dwelling type and adds confusion to public debates which frequently flare around infill development proposals.

With regard to the strategic ambitions of community, vibrancy and transport efficiencies, it is important to note that du/ha does not indicate the number of people per hectare. Density measured as du/ha can be increased 800% by the reuse of a single, large house block as a site for eight units. However, this may represent a four to five person household being replaced by eight single person households, an increase in person density of only 60-100%.

The housing of interest to this project could be described as 'multi-owned properties', a term employed relatively recently in academic literature and defined by Johnston as:

> *…a property type consisting of at least two lots tied to a communally owned property with an incorporated entity created to govern. Often referred to as strata title, community title, unit title, high rise, subdivisions with owners corporations, private housing estates, condominiums and common interest developments. (Johnston 2015 n.p.)*

However, this definition focuses solely on legal and management attributes of housing and could equally include townhouse duplexes in greenfield development and 100 storey residential towers on an urban redevelopment site.

Extending beyond descriptions of density and titling, this research is interested in other housing attributes including ownership, provision methods, development size, and location. In seeking to address the collective consolidation ambitions of Australian strategic urban plans, the future urban housing type relevant to this research project is:

(1) located on infill sites in urban areas designated for consolidation,
(2) privately owned properties,
(3) in strata or community titled projects of 4-60 dwellings,
(4) three-storey or higher, and
(5) with a land use of 75-150 square metres per dwelling (site density of 65-130 du/ha).

This definition of multi-unit infill housing is representative of projects occurring in areas of urban consolidation around the country as unused and underutilised land is progressively redeveloped. It is a housing type typically constructed by small to medium scale speculative developers.

The terms 'medium-density housing' and 'multi-owned properties' are both relevant to this research but do not provide adequate definition of the housing of concern. The term 'multi-unit infill housing' is used for the remainder of this thesis, and is now understood to refer to a range of dwelling types as defined above.

Appendix D. Actor-Network Revision

It is acknowledged that in the generation of the initial actor-network mapping, subjective interpretations of literature are inevitably made by the researcher. While the aim is to generate an accurate, working representation of a complex socio-technical network, a slightly different representation of the network could (and would) be generated from the same literature by another individual. Hence the interview data is used to refine the initial mapping through the inclusion of views from multiple stakeholders.

Network-Wide Observations

Observing the initial actor-network mappings (Table 4.2, p. 92) all interviewees agreed with the prominence of the actants identified by Social Network Analysis (SNA) metrics. In particular, the prominence of the property developer in determining the types of dwellings being built was noted by all, with one developer describing their role as "the conductor of the orchestra" (PD1). Other network attributes agreed by all interviewees were the distancing of the dwelling occupants from key decision-makers, and the prominence of the real estate industry in determining the types of dwellings built.

> *…interestingly enough there's no consumer group in there. And I think the consumers' and end users' needs are being driven by the developer and his expertise in the marketplace, understanding what he thinks the market wants and what will sell. (AD3)*

> *In the development businesses the marketers are listened to quite strongly, despite in my experience sometimes a lack of any life experience, and lack of any real depth of experience. They're a bit of a false prophet… That information isn't collected in any statistically valid kind of way. (PP2)*

> *…so the selling agents often have more influence on what's offered to the market than they perhaps should… (AD3)*

Interviewees made visual observations related to network structure. These included the convergence of design information toward the property developer as the key protagonist and decision-maker, and the position of the local planners and real estate/marketing industry as bridges between otherwise disconnected subsystems. These unsolicited observations of network structure demonstrate the representation of the SoP through network mapping provides useful insights and enables stakeholders to take a broader view, looking past their personal project horizon.

Some features of the initial network mapping received less agreement, including the almost universal questioning of the design team as a key decision-maker, suggested in the mapping by a high betweenness value. Stakeholders stated the design team rarely had input into the design brief, which is generated via market analysis and project feasibility assessment prior to engagement of designers.

> *…with design decision, we will be influenced by the information supplied by everyone else. (AD2)*

> *I certainly wouldn't aggregate [design briefing] to anyone else. I wouldn't say to my architect, 'You go away and design me this beautiful building. Bring it back in four weeks time, whatever. Whatever the current thinking is in the profession. Bring it on.' You wouldn't do that. … An architect needs a good client who knows what he's talking about. Otherwise, they'll just randomly do what they think is a good idea 'cause of the last conference they went to. (PD1)*

Stakeholders without direct engagement with financial institutions expressed surprise that they were not shown as more prominent in the mapping. Planners, urban designers and architects reinforced the belief that financial institutions limited housing options by refusing to fund projects that vary from the norm, with the general absence of three bedroom apartments resulting from financial institutions' influences. In contrast, those directly engaged in project financing recognised that while financial institutions do influence housing outcomes to an extent, their degree of influence fluctuates with economic circumstances, and relates directly to market value and risk perception, both shown as prominent decision-making influencers in the mapping.

Interviewees questioned whether the local planner acts in the production or management subsystem, with general agreement they act in both. Differing views were expressed regarding the role of local planners, noting they act in a strategic capacity when developing local planning documents, and in a project-specific capacity as administrators of such documents. Most interviewees also drew comparison between local planning documents and urban design master plans in relation to the provision of design frameworks, but acknowledged the different type of information provided by each and the difference in their authoritative capacity.

Strategic-level stakeholders were initially unsure as to why tax legislation would hold a prominent position in the SoP, but quickly self-identified the multiple ways in which various taxes influence decision-making. In contrast, project-level stakeholders immediately agreed tax legislation directly influences numerous decisions made throughout the SoP by multiple actors, each considering how the tax environment impacts their personal activities within the network.

These examples of differing views expressed by stakeholders demonstrate the way in which the SoP is seldom viewed in its entirety, with individual stakeholders primarily aware of the influences exerted upon their own role within the network and rarely obtaining a global perspective. They also highlight the point articulated by one interviewee that the mapping visually emphasised the fact no single actant is all powerful in multi-unit provision; that housing emerges from a collection of complex direct and indirect decisions each made by actants in their own interests.

> *There are all sorts of conflicts of interest and all sorts of contradictions in all the decisions, so the new perceive the next person's needs to be…The bank might want the housing to be a certain type so that it will make more money…the builder might want to do fifteen units, not ten, because ten isn't worth their while. All these decisions are not directly related to the actual dwelling and how it functions, but they're related to someone else's interest in their part of the process. These are indirect decisions that have an influence on the housing, what actually gets built; what it is, how it looks, how it functions, where it's located. All these more than just*

being little decisions, they're often indirect decisions that determine what's built and that makes it even further from the original vision, if there was one. (PP2)

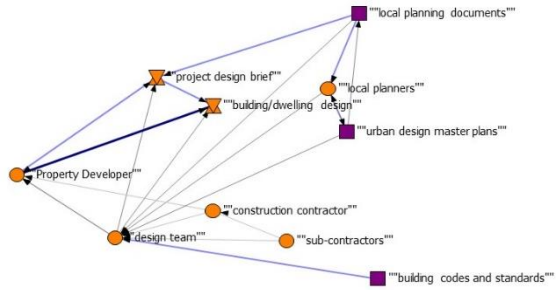
It is the intention that the actor-network mapping being developed here will incorporate multiple actants views to provide a more global perspective, essential to understanding the complexity of these 'little decisions'.

Ego-Centric Observations

As part of the interview, the ego-centric diagrams generated by interviewees were compared to the ego-networks of the initial actor-network mapping. Generally, the initial ego-networks generated by the researcher prior to the interviews correlated with the interviewees ego-diagrams. The types of connections with other stakeholders described by interviewees in their individual ego-diagrams were used to confirm the descriptions/strengths allocated to ties in the initial network mapping. As an example the ego-centric diagrams of two architects interviewed are shown in Table A- 5 along with the initial ego-network.

Such comparisons were made for all stakeholder diagrams. The similarities and differences identified were used to refine the actor-network mapping. The generally positive correlations between the two sets of diagrams are seen to validate the initial mapping techniques employed.

Table A- 5. Comparing ego-network map for the design team with interviewed architects' ego-centric diagrams.



Design Team (including architects and specialist consultants) show in initial ego-network mapping as receiving information from human actants

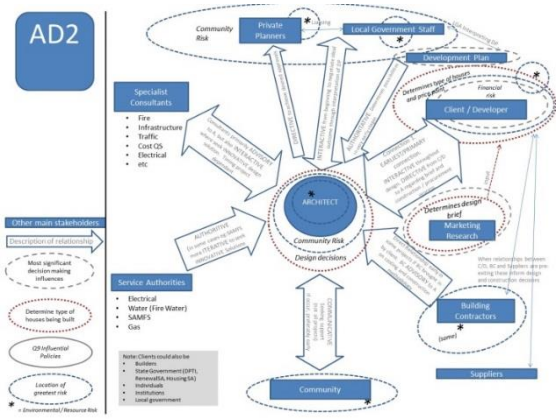
- Local planner
- Construction contractor
- Sub-contractors
- Property developer

non-human actants

- Local planning documents
- Urban design master plans
- Building codes and standards

and providing design information to

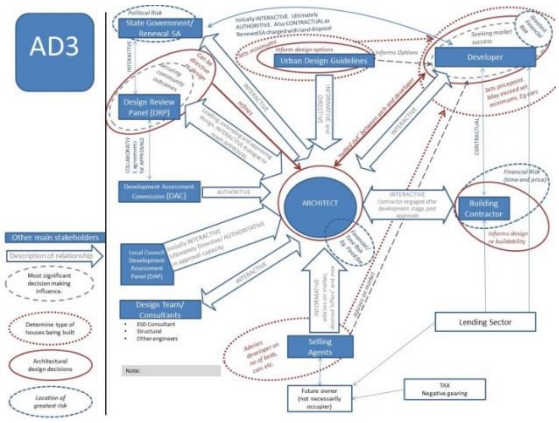
- Local planners
- Property developers
- Project design brief and
- Building/dwelling design



AD2 included all human actants identified in the ego-network above. The direction of information flow to these corresponded also with the ego-network.

Like most interviewees, the inclusion of non-human actants was less comprehensive, with the omission of building codes and standards, project design brief and building/dwelling design. But these were all identified and their role discussed during the interview. The most commonly identified non-human actants were local planning documents and urban master plans.

AD2 added service authorities as an actant providing them with information. This was corroborated by others, mainly developers, and added to the mapping as discussed in Table A-5. AD2 also discusses connection with community occuring in some projects, but not typical. As this was not highlighted by other architects interviewed, this tie was not added to the mapping.



AD3 produced an ego-diagram which strongly correlates with the ego-network. Differences observed relate predominately to the fact AD3 is recalling the design and construction of a multi-unit project in a large scale urban renewal project administered by the state development authority. Hence, local planners are replaced by the state level approval authority (Development Assessment Commission) and the state administered Design Review Panel, and local planning documents are replaced by the site's urban design guidelines. Accounting for these substitutions, the diagram again presents an almost direct correlation to the ego-network in regard to human actants. Differences arise in that the subcontractors are not shown and the relationship with the construction contractor is indicated as two way. This reflects the particular contracts established for the project.

Network Revisions

Where individual stakeholders identified connections between actants for inclusion or removal, support for change was sought both in the responses from other interviewees and the previously reviewed literature. A selection of the changes to the initial mapping is listed in Table Table A- 6 as examples.

Table A- 6. Examples of changes made to the initial network mapping.

Change	Example
Removal of an actant	Planning appeals tribunal: Planning appeals tribunals exist in the majority of Australian states to hear appeals against planning decisions, as lodged by interested parties. Tribunal powers and third party rights to appeal vary by jurisdiction. While planning appeals are frequently referred to in the reviewed literature and can lead to delays and increased project costs, the tribunals themselves were not referred to by interviewees. Review of the literature indicated the majority of articles and reports referring to the planning appeals as a barrier to innovation and influencing design outcomes are located primarily in one state jurisdiction. Planning appeals tribunals are important mechanisms for the review of decisions but have been removed from the actor-network mapping as the influence on design outcomes is seen to be adequately represented by the actant 'costs of planning approval delays', which can be seen to include (but is not limited to) the processes of planning appeals tribunals. Building certifiers: Building certifiers were included in the initial mapping, tied only to building codes and standards. The mapping suggested they had no impact on design decision-making processes beyond that attributable to the codes and standards themselves. No stakeholders interviewed identified building certifiers as actants in the multi-unit SoP.
Changes to actant properties	Local planner: moved to management subsystem, with indication of connection to production subsystem. As discussed previously. Property law: changed to property titling law: focusing the actant description to address specifically the component of property law which differentiates multi-unit development from single occupancy development (Sharam et al. 2015). Real estate/marketing industry: merged with project marketing agent to form marketing consultants, and real estate agent changed to selling agent. More concisely and accurately represents the relationship with consultants and agents described by interviewees. Concurs with reviewed literature.

Table A-6. continued.

Addition of actant and associated ties to alters	Property depreciation: identified by interviewees, impacts on project/investment feasibility and return on investment for actants in both the production and occupation subsystems. Property depreciation was not specifically highlighted in the reviewed literature and the addition of this actant by interviewees suggests an opportunity for future research. Land owner: included by a number of interviewees, mainly developers, strategic planners and others directly engaged in land acquisition. Seen as having impact on design though the purchase price sought for developable land. Suppliers: identified by actants from the production subsystem. Relationships between developers, construction contractors, and material suppliers identified as having impact on design through pricing and construction technologies. Also seen to limit innovation through reluctance to engage with alternative technologies and construction systems. Service infrastructure authorities: identified by actants from the production subsystem, seen to limit feasibility on particular sites through approval mechanism, as well as having significant impact on project cost.
Deleted ties	Design team to project design brief: as discussed previously.
Added ties	Marketing consultants to project design brief: All interviewees identified this direct connection and it is included in addition to those marketing consultants and property developers. Construction costs to project design brief: Initial project feasibility analysis identifies a maximum construction cost beyond which a project becomes undeliverable. Hence maximum construction costs inform the project design brief.
Tie strengths changed	Strength of tie from stamp duty to owner occupier: decreased from two (sets boundaries to future actions/decisions) to one (provides input for action /decision). Strength of stamp duty to private investment owner remains at two. This change reflects the differing impacts policies have on the different cohorts of purchasers. Where negative gearing, stamp duty and depreciation individually, or collectively, make investment ownership unappealing an investment purchaser will seek an alternative: the financial implications set boundaries to investment activities. In contrast, owner occupiers seeking a home make more emotive decisions, and while taxation will determine price limits for households they are less likely to override use value, as they do for investment purchaser.

Appendix E. Identifying Key ANT Actants with SNA Mapping

Here, an ANT lens is employed to identify actants within the network who are more 'prominent', 'influential' or 'important' than others. This is done employing the ANT vocabulary defined earlier in Table 2.2 (page 55). Hence, here we seek to identify focal actors, mediators, obligatory passage points, and immutable mobiles in the network.

Borgatti discusses in detail the challenges to determining "key players" in a network, demonstrating that "off-the-shelf centrality measures are not optimal" (2006, p. 21). Social Network Analysis (SNA) researcher Friedkin (1991) also identified that centrality measures are frequently too generic to address particular analysis goals, advocating the need to develop specific measures to answer specific questions or problems. Given the ties in the SoP mapping represent flows of information, not social ties, and are both directional and weighted by 'strength', no single centrality metric is able to effectively define ANT actants directly. Rather, it is necessary to combine SNA metrics with visual observations and network knowledge as described in Table A- 7. The process of defining ANT characteristics proposed here is described in detail in this key case to demonstrate how the technique is to be employed in subsequent cases.

All SNA metrics referred to in this process have been generated with the use of Ucinet 6.586 software (Borgatti et al. 2002).

Table A- 7. Defining ANT Network Characteristics through correlation with SNA Metrics, Visual Observations, and Network Knowledge.

FOCAL ACTOR: one who acts to align the interests of a diverse set of actors with their own interests (enacts translation)	
SNA Metric/s	• high(est) in-degree and/or • highest out-degree and/or • high centrality and/or • highest two-step reach. In-degree and out-degree measures recognise design flow weighting (strength of ties). Flow betweenness centrality (Freeman et al. 1991) is used in this case due to the network ties being both directed and weighted, and to reflect the intermediary under consideration. An actor's two-step reach is the number of other actors (alters) they provide information to directly or as a third party.
Network Knowledge	The researcher can employ network knowledge to discount an actor from being a focal actor provided consideration is given to why the high metric value exists.
Execution	Highest indegree identifies the property developer and development profit as focal actors. Highest out-degree are market value and urban design master plans. In both in-degree and the out-degree cases the identified actors have values which greatly exceed that of the actor in third ranking. Local planners, design team, selling agents, marketing consultants, and financial institutions all have high flow betweenness values. The design team has a high flow betweenness as well as a moderate in-degree. They are however discounted as being a focal actor as the design information flows with which they are engaged are known to normally occur after the development of the project design brief. This is supported by the stakeholder interviews. All actors identified by the above SNA measures also have high two-step reach, reinforcing the validity of the SNA measures utilised. In addition, financial risk, local planning documents, and tax legislation have high two-step reach. Given they also have moderately high out-degree measures which reach multiple subsystems, they too are included as focal actors.
Focal Actors Identified	Property developer, development profit, market value, urban design master plans, local planners, selling agents, marketing consultants, financial institutions, risk perception, local planning documents, tax legislation.

Table A- 7. Continued.

MEDIATOR: actors who 'transform, translate, distort and modify'	
SNA Metric/s	• high in-degree and significantly lower out-degree • and/or high authoritative sources measure • together with capacity for translation The difference between in-degree and out-degree values demonstrates an actor's role in assessing design information and modifying or consolidating that information for implementation. Such modifications are inevitably informed by the actants individual motivations. Kleinberg's (1999) measure of Authoritative Sources identifies both hubs and authorities, where authorities supply credible information and hubs provide connection to authorities. Although originally developed for web analysis, Fouss et al. (2004) demonstrate its application to relational networks.
Visual Observation	The researcher can be informed by the actor's location in the network, identifying whether or not the actor engages in mediating information across subsystems.
Network Knowledge	Some actors with high in-degree and low out-degree do not hold the capacity to act as mediators and are excluded.
Execution	Development profit and property developers have the highest difference between in-degree and out-degree values. The property developer, as the highest in-degree actor in the system gathers design information from a diverse range of sources (actors) and translates this information to guide ideal outcomes from their unique actor-perspective. Also with a moderately high difference between in- and out-degree values are design project brief, building dwelling design and design team, financial institutions, owner occupiers and private investment owners. Design project brief and building dwelling design represent the reification of the design information flows as an artefact and as such are not seen as mediators. Owner-occupiers and private investment owners gather information from numerous sources, hence their high in-degree. However, their one outward flow of design information is to the selling agent and has a weighting value of just one (provides input/opinion for design decision-making) and hence does not represent a modification of design information for implementation. Market value has by far the highest hub weight, followed by urban design master plans and construction costs. Given that the market value has an in-degree of zero it is not seen as a mediator. Development profit and property developer have authority weights far greater than any other actant in the network. As a direct numeric product of external inputs, development profit in itself is not capable of translation. Information collated by calculation of development profit is mediated by the property developer through the project design brief. Visual observation shows marketing consultants sit in a unique position in the network, as gatekeeper for the sole human pathway of information from the occupation subsystem to the production subsystem and as such are seen to be a mediator. (In building projects where the marketing consultants and selling agents are not discrete entities, but unified, this position would be held by the selling agent.)
Mediators Identified	Urban design master plans, construction costs, property developer, design team, financial institutions, marketing consultants, local planning documents.

Table A- 7. Continued.

OBLIGATORY PASSAGE POINT: A situation that has to occur for all of the actors to be able to achieve their interests, as defined by the focal actor (Callon 1986)	
SNA Metric/s	Here the aim is to determine which actors hold power in relation to obligatory passage points. For example, for a multi-unit project to proceed funding must be obtained, for which financial institutions and development investors must be satisfied in relation to risk and return. As such, the development investors and financial institutions are shown as the key decision-makers in this regard, and included as obligatory passage points. No specific SNA metrics are employed, however it is highly likely in most networks that OPPs are associated with focal actors which have been previously determined.
Visual Observation and Network Knowledge	Having previously established focal actors, the mapping provides the opportunity to view the focal actors in relation to their alters and, in combination with network knowledge, observe points in the network where multi-unit projects may become unfeasible or are unlikely to proceed.
Execution	The location of OPPs with financial institutions and development investors has been observed above. Similar observations are made for development profit and market value. Ultimate responsibility for a project proceeding lies with the property developer who must be satisfied with the risk profile of the project. Projects must also meet the requirements of Urban Design Master Plans, which often involve multi-party negotiations and design modifications. Master Plans do not exist for all project locations and while they have been identified in the network mapping as the location of an OPP, where a Master Plan is not in place this applies to local planning documents.
OPPs Identified	Market value, development profit, financial institutions, development investors, urban design master plans, local planning documents, and property developer.
IMMUTABLE MOBILES: Relatively stable actants contributing to a network's irreversibility, (Latour 1993)	
SNA Metric/s	Immutable mobiles are typically documents or artefacts which are relatively stable. They may also be enrolled 'black-box' actants and can be associated with other networks. Although they are unlikely to be values such as 'use value,' which can change both spatially and temporally, it is possible for some values or perceptions to become sufficiently entrenched as to contribute to irreversibility. All actants with a zero or low in-degree are potential immutable mobiles.
Visual Observation	Low in-degree can be observed either through the SNA metrics or visual examination. The type of actor is also evident visually.
Immutable Mobiles Identified	Values and perceptions including risk perception, financial risk and political risk. All text actors except local planning documents as they are updated with community consultation relatively regularly and offer some room for negotiation and reversibility on a project specific basis. (building codes and standards, state strategic plan, tax legislation, property titling laws, legislated financial policy, stamp duty tax, capital gains tax, negative gearing, property depreciation, residential tenancies legislation, work place regulations).

Appendix F. SNA Network Data

Existing Multi-unit SoP (TPD)

TRADITIONAL	freeman degree centrality in	freeman degree centrality out	flow betweenness	flow betweenness (n)	2 step reach (ego net out)	hub	Authority
building codes and standards	0	9	0	0	14	0.077	0
building/dwelling design	14	0	0	0	0	0	0.268
capital gains tax	1	3	0.333	0.014	10	0.059	0.01
community	0	5	0	0	15	0.031	0
construction costs	9	8	31.632	1.345	18	0.286	0.043
cost/risk of planning approval delays	0	4	0	0	17	0.166	0
development profit	22	7	115.087	4.893	19	0.238	0.524
financial institutions	13	9	137.603	5.85	28	0.237	0.205
financial risk	0	10	0	0	30	0.214	0
Property Developer	27	8	44.838	1.906	12	0.2	0.546
land owner	0	2	0	0	2	0	0
legislated development contributions	0	4	0	0	10	0.186	0
legislated financial policy	3	3	4.433	0.188	11	0.055	0.01
local government elected members	5	5	17.824	0.758	12	0.037	0.038
local planners	14	10	259.211	11.025	25	0.184	0.215
local planning documents	7	11	74.065	3.149	28	0.252	0.111
market value	3	16	37.442	1.592	30	0.487	0.059
negative gearing	1	2	0.333	0.014	8	0.04	0.01
neighbours	0	2	0	0	10	0.022	0
owner occupiers	10	1	39.4	1.675	3	0	0.206
political risk	0	3	0	0	0	0.004	0
private investment owners	14	1	47.4	2.015	3	0	0.228
project design brief	15	5	116.243	4.942	11	0.109	0.295
property depreciation	1	2	1.33	0.057	16	0.067	0.01
property titling laws	0	5	0	0	11	0.039	0
rental occupiers	1	0	0	0	0	0	0.002
risk perception	1	3	1.6	0.068	22	0.093	0.009
service and infrastructure authorities	0	4	0	0	14	0.06	0
site purchase costs	2	4	20	0.85	10	0.186	0
stamp duty	1	3	0.333	0.014	10	0.059	0.01
state government elected members	1	2	5.667	0.241	8	0.004	0
state planning authority	3	10	17.7	0.753	14	0.111	0.003
state strategic plan	6	5	17.386	0.739	13	0.03	0.042
sub-contractors	4	5	6.619	0.281	16	0.038	0.017
suppliers	0	2	0	0	13	0.011	0
tax legislation	0	8	0	0	21	0.116	0
urban design master plans	9	14	116.657	4.96	30	0.387	0.05
urban designers	3	2	5.993	0.255	10	0.009	0.028
use value	0	2	0	0	8	0.018	0
workplace regulations	2	4	1.619	0.069	9	0.018	0.014
design team	14	6	254.203	10.808	20	0.182	0.215
development investors	6	2	2.552	0.109	15	0.097	0.089
marketing consultants	1	5	173.204	7.364	22	0.101	0.003
selling agent	2	3	205.004	8.716	15	0.039	0
construction contractor	9	5	63.723	2.709	20	0.079	0.082

FLOW BETWEENNESS CENTRALITY OBSERVATIONS

Network Centralization Index = 9.667%

DESCRIPTIVE STATISTICS FOR EACH MEASURE

		1 FlowBet	2 nFlowBet
		---	---
1	Mean	36.389	1.547
2	Std Dev	65.752	2.796
3	Sum	1819.439	77.357
4	Variance	4323.330	7.815
5	SSQ	282373.688	510.446
6	MCSSQ	216166.500	390.763
7	Euc Norm	531.388	22.593
8	Minimum	0.000	0.000
9	Maximum	259.211	11.021
10	N of Obs	50.000	50.000

Integrated Developer SoP (IPD)

INTEGRATED							
	freeman degree centrality in	freeman degree centrality out	flow betweenness	flow betweenness (n)	2 step reach (ego net out)	hub	Authority
building codes and standards	0	7	0	0	20	0.146	0
building/dwelling design	13	0	0	0	0	0	0.312
capital gains tax	1	3	0.367	0.02	10	0.069	0.008
community	0	6	0	0	25	0.068	0
construction costs	6	8	18.57	10.28	15	0.336	0.031
cost/risk of planning approval delays	0	4	0	0	14	0.194	0
development profit	22	6	66.96	3.707	21	0.212	0.592
financial institutions	12	6	43.5	2.409	24	0.179	0.189
financial risk	0	5	0	0	26	0.124	0
Integrated Property Developer	31	11	259.4	14.63	23	0.299	0.485
land owner	0	2	0	0	2	0	0
legislated development contributions	0	4	0	0	9	0.216	0
legislated financial policy	3	3	3.1	0.172	9	0.052	0.01
local government elected members	5	5	11.56	0.64	11	0.03	0.038
local planners	10	8	197	10.91	25	0.139	0.155
local planning documents	7	9	48.04	2.66	26	0.2	0.078
market value	3	16	25.94	1.437	31	0.537	0.048
negative gearing	1	2	0.167	0.009	8	0.047	0.008
neighbours	0	3	0	0	22	0.062	0
owner occupiers	10	1	18.65	1.033	*19*	0.044	0.233
political risk	0	3	0	0	9	0.004	0
private investment owners	14	1	21.98	1.217	19	0.044	0.259
project design brief	14	6	8.189	0.453	20	0.203	0.344
property depreciation	1	2	1.967	0.109	14	0.078	0.008
property titling laws	0	5	0	0	9	0.037	0
rental occupiers	1	0	0	0	0	0	0.002
risk perception	0	3	0	0	24	0	0
service and infrastructure authorities	0	4	0	0	11	0.093	0
site purchase costs	2	4	13	0.72	9	0.069	0
stamp duty	1	3	0.367	0.02	10	0.002	0.008
state government elected members	1	2	5.333	0.295	8	0.036	0
state planning authority	3	7	14.03	0.777	13	0.023	0.007
State strategic plan	6	5	16.07	0.89	12	0	0.019
sub-contractors	4	4	9.107	0.504	21	0.053	0.044
suppliers	0	2	0	0	21	0.047	0
tax legislation	0	6	0	0	23	0.092	0
urban designers	3	2	5.863	0.325	9	0.008	0.022
urban design master plans	9	11	43.37	2.401	28	0.301	0.044
use value	0	2	0	0	8	0.021	0
workplace regulations	2	4	1.94	0.107	20	0.097	0.027

FLOW BETWEENNESS CENTRALITY OBSERVATIONS

Network Centralization Index = 13.624%

DESCRIPTIVE STATISTICS FOR EACH MEASURE

	1	2
	FlowBet	nFlowBet
	----------	----------
1 Mean	18.965	1.050
2 Std Dev	48.540	2.688
3 Sum	834.462	46.205
4 Variance	2356.142	7.224
5 SSQ	119495.875	366.368
6 MCSSQ	103670.258	317.847
7 Euc Norm	345.682	19.141
8 Minimum	0.000	0.000
9 Maximum	259.414	14.364
10 N of Obs	44.000	44.000

FOCAL actors								
	freeman degree centrality in	freeman degree centrality out	flow betweenness	flow betweenness (n)	2 step reach (ego net out)		hub	Authority
market value	3	13	26.68	1.898	25	64%	0.42	0.065
urban design master plans	9	14	98.277	6.99	27	69%	0.417	0.057
construction costs	9	8	27.287	1.941	16	41%	0.294	0.048
local planning documents & procedures	7	11	63.558	4.52	26	67%	0.278	0.122
development profit	21	7	108.63	7.726	17	44%	0.24	0.507
Property Developer	27	8	35.921	2.555	11	28%	0.224	0.561
local planners	14	10	236.086	16.791	25	64%	0.205	0.24
design team	16	6	234.083	16.649	19	49%	0.2	0.264
financial institutions	11	7	108.726	7.733	23	59%	0.198	0.172
financial risk	0	9	0	0	25	64%	0.193	0
legislated development contributions	0	4	0	0	9	23%	0.182	0
project design brief	15	6	48.303	3.435	18	46%	0.182	0.312
site purchase costs	2	4	17	1.209	9	23%	0.182	0
cost/risk of planning approval delays	0	4	0	0	15	38%	0.165	0
CitiNiche Pty. Ltd.	1	5	9.336	0.664	23	59%	0.147	0.002
state planning authority	3	10	15.467	1.1	14	36%	0.126	0.004
tax legislation	0	6	0	0	17	44%	0.117	0
development investors	5	2	1.952	0.139	14	36%	0.101	0.077
building codes and standards	0	9	0	0	16	41%	0.091	0
construction contractor	9	5	50.224	3.572	20	51%	0.087	0.077
service and infrastructure authorities	0	4	0	0	13	33%	0.065	0
legislated financial policy	3	3	4	0.284	8	21%	0.046	0.009
sub-contractors	4	5	6.198	0.441	18	46%	0.044	0.02
local government elected members	5	5	15.25	1.085	12	31%	0.042	0.043
community	0	5	0	0	15	38%	0.035	0
property titling laws	0	5	0	0	8	21%	0.033	0
state strategic plan	6	5	15.152	1.078	12	31%	0.033	0.049
neighbours	0	2	0	0	10	26%	0.025	0
owner occupiers	10	2	89.322	6.353	12	31%	0.024	0.184
capital gains tax	1	1	1	0.071	8	21%	0.017	0.01
stamp duty	1	1	1	0.071	8	21%	0.017	0.01
use value	0	1	0	0	8	21%	0.017	0
workplace regulations	2	4	1.841	0.131	9	23%	0.017	0.016
suppliers	0	2	0	0	13	33%	0.011	0
urban designers	3	2	5.543	0.394	10	26%	0.01	0.031
state government elected members	1	2	5.333	0.379	8	21%	0.005	0
political risk	0	3	0	0	9	23%	0.004	0
building/dwelling design	14	0	0	0	0	0%	0	0.312
land owner	0	2	0	0	2	5%	0	0

Network Centralization Index = 14.938%

DESCRIPTIVE STATISTICS FOR EACH MEASURE

	1	2
	FlowBet	nFlowBet
	----------	----------
1 Mean	31.440	2.236
2 Std Dev	56.858	4.044
3 Sum	1226.174	87.210
4 Variance	3232.848	16.354
5 SSQ	164632.391	832.808
6 MCSSQ	126081.063	637.792
7 Euc Norm	405.749	28.858
8 Minimum	0.000	0.000
9 Maximum	236.086	16.791
10 N of Obs	39.000	39.000

Urban Coup

FOCAL actors								
	freeman degree centrality in	freeman degree centrality out	flow betweenness	flow betweenness (n)	2 step reach (ego net out)		hub	Authority
Urban Coup Inc.	3	14	97.179	6.557	23	58%	0.506	0.029
project design brief	12	10	18.753	1.265	15	38%	0.46	0.223
urban design master plans	9	12	85.172	5.747	23	58%	0.366	0.055
local planning documents & procedures	7	11	87.878	5.93	25	63%	0.263	0.091
local planners	11	10	220.268	14.863	23	58%	0.245	0.165
development profit	8	6	50.9	3.435	16	40%	0.235	0.04
financial institutions	11	7	180.271	12.16	23	58%	0.199	0.094
financial risk	0	7	0	0	25	63%	0.176	0
design team	17	7	243.082	16.402	18	45%	0.174	0.408
NFP Housing Provider as Developer	27	4	5.569	0.376	7	18%	0.172	0.657
construction costs	9	8	105.003	7.085	16	40%	0.149	0.047
building codes and standards	0	9	0	0	15	38%	0.122	0
tax legislation	0	4	0	0	15	38%	0.111	0
construction contractor	9	5	149.987	10.121	18	45%	0.101	0.076
market value	3	11	140.893	9.507	21	53%	0.098	0.055
sub-contractors	4	5	7.105	0.479	17	43%	0.052	0.023
service and infrastructure authorities	0	4	0	0	13	33%	0.045	0
Purchase Price	2	5	14.269	0.963	11	28%	0.039	0.001
cost/risk of planning approval delays	0	4	0	0	14	35%	0.038	0
state planning authority	3	7	16.9	1.14	14	35%	0.033	0.002
local government elected members	5	5	15.941	1.076	11	28%	0.032	0.045
legislated development contributions	0	4	0	0	6	15%	0.025	0
site purchase costs	2	4	18	1.21	6	15%	0.025	0
legislated financial policy	3	3	3.633	0.245	8	20%	0.024	0.004
state strategic plan	6	5	19.829	1.338	12	30%	0.024	0.013
community	0	5	0	0	14	35%	0.023	0
neighbours	0	2	0	0	10	25%	0.018	0
property titling laws	0	5	0	0	8	20%	0.017	0
workplace regulations	2	4	1.522	0.103	9	23%	0.017	0.02
capital gains tax	1	1	0.5	0.034	8	20%	0.011	0.009
use value	0	1	0	0	8	20%	0.011	0
stamp duty	1	1	0.5	0.034	8	20%	0.01	0.009
suppliers	0	2	0	0	13	33%	0.01	0
urban designers	3	2	5.1	0.344	9	23%	0.009	0.026
Total Development Cost	15	4	109.884	7.415	6	15%	0.007	0.076
political risk	0	3	0	0	9	23%	0.004	0
owner occupiers	13	1	87.759	5.922	5	13%	0.002	0.127
state government elected members	1	2	5.667	0.382	8	20%	0.001	0
building/dwelling design	19	0	0	0	0	0%	0	0.516
land owner	0	2	0	0	2	5%	0	0

Network Centralization Index = 13.896%

DESCRIPTIVE STATISTICS FOR EACH MEASURE

	1 FlowBet	2 nFlowBet
1 Mean	42.289	2.854
2 Std Dev	65.326	4.408
3 Sum	1691.562	114.140
4 Variance	4267.435	19.430
5 SSQ	242231.906	1102.897
6 MCSSQ	170697.375	777.196
7 Euc Norm	492.171	33.210
8 Minimum	0.000	0.000
9 Maximum	243.082	16.402
10 N of Obs	40.000	40.000

Property Collectives

	freeman degree centrality in	freeman degree centrality out	flow betweenness	flow betweenness (n)	2 step reach (ego net out)		hub	Authority
urban design master plans	9	14	84.378	6.335	26	68%	0.485	0.087
Project Specific Development Collective	23	10	103.741	7.788	13	34%	0.353	0.515
local planning documents & procedures	7	11	56.364	4.231	25	66%	0.346	0.169
construction costs	9	8	28.846	2.166	13	34%	0.271	0.066
local planners	14	10	205.033	15.393	24	63%	0.265	0.338
Total Development Costs	17	6	62.498	4.692	16	42%	0.22	0.343
project design brief	11	5	10.864	0.816	11	29%	0.201	0.284
state planning authority	3	10	14.733	1.106	14	37%	0.197	0.007
financial risk	0	9	0	0	24	63%	0.192	0
local government elected members	5	5	14.26	1.071	12	32%	0.167	0.062
design team	16	6	203.306	15.263	18	47%	0.148	0.401
building codes and standards	0	9	0	0	14	37%	0.146	0
financial institutions	11	6	134.009	10.061	21	55%	0.134	0.096
legislated development contributions	0	4	0	0	7	18%	0.134	0
site purchase costs	2	4	15	1.126	7	18%	0.134	0
cost/risk of planning approval delays	0	4	0	0	1	3%	0.128	0
construction contractor	9	5	53.716	4.033	18	47%	0.109	0.086
tax legislation	0	4	0	0	15	39%	0.102	0
owner occupiers	8	2	46.75	3.51	13	34%	0.1	0.085
service and infrastructure authorities	0	4	0	0	11	29%	0.068	0
sub-contractors	4	5	5.601	0.421	16	42%	0.067	0.033
community	0	5	0	0	15	39%	0.056	0
Development Advisor/Agent Property Collectives.com.au	0	1	0	0	13	34%	0.05	0
state strategic plan	6	5	14.202	1.066	10	26%	0.05	0.083
neighbours	0	2	0	0	10	26%	0.039	0
legislated financial policy	3	3	3.5	0.263	8	21%	0.028	0.006
workplace regulations	2	4	1.744	0.131	9	24%	0.023	0.029
property titling laws	0	5	0	0	8	21%	0.021	0
market value	3	2	14.694	1.103	8	21%	0.019	0.086
urban designers	3	2	4.873	0.366	10	26%	0.017	0.044
suppliers	0	2	0	0	13	34%	0.015	0
state government elected members	1	2	5	0.375	8	21%	0.009	0.001
capital gains tax	1	1	1.25	0.094	6	16%	0.008	0.01
stamp duty	1	1	1.25	0.094	6	16%	0.008	0.01
use value	0	1	0	0	6	16%	0.008	0
political risk	0	3	0	0	9	24%	0.007	0
building/dwelling design	14	0	0	0	0	0%	0	0.149
land owner	0	2	0	0	2	5%	0	0

Network Centralization Index = 13.606%

DESCRIPTIVE STATISTICS FOR EACH MEASURE

	1 FlowBet	2 nFlowBet
1 Mean	28.569	2.145
2 Std Dev	51.927	3.898
3 Sum	1085.611	81.502
4 Variance	2696.391	15.198
5 SSQ	133477.375	752.314
6 MCSSQ	102462.852	577.508
7 Euc Norm	365.346	27.428
8 Minimum	0.000	0.000
9 Maximum	205.033	15.393
10 N of Obs	38.000	38.000

The Nightingale Model

	freeman degree centrality in	freeman degree centrality out	flow betweenness	flow betweenness (n)	2 step reach (ego net out)		hub	Authority
urban design master plans	9	11	98.723	7.022	27	69%	0.379	0.073
total development cost	20	9	110.626	7.868	18	46%	0.319	0.403
Architect as Developer and design team leader	29	10	232.061	16.505	13	33%	0.315	0.648
local planning documents & procedures	7	9	58.581	4.167	24	62%	0.291	0.142
construction costs	9	8	40.469	2.878	15	38%	0.287	0.072
building codes and standards	0	9	0	0	18	46%	0.242	0
financial institutions	11	7	109.46	7.785	22	56%	0.236	0.157
project design brief	12	5	19.04	1.354	16	41%	0.235	0.28
local planners	14	8	221.206	15.733	23	59%	0.204	0.316
financial risk	0	8	0	0	25	64%	0.198	0
state planning authority	3	10	14.867	1.057	13	33%	0.187	0.007
legislated development contributions	0	4	0	0	9	23%	0.161	0
market value	3	4	21.824	1.552	17	44%	0.161	0.071
site purchase costs	2	4	15	1.067	9	23%	0.161	0
cost/risk of planning approval delays	0	4	0	0	14	36%	0.149	0
tax legislation	0	6	0	0	18	46%	0.149	0
ethical development investors	5	2	0.25	0.231	15	38%	0.13	0.082
limited % ROI	0	4	0	0	12	31%	0.129	0
sub-contractors	4	5	5.81	0.413	19	49%	0.1	0.056
owner occupiers	8	2	58.427	4.156	18	46%	0.093	0.072
construction contractor	9	4	57.281	4.074	18	46%	0.086	0.135
service and infrastructure authorities	0	4	0	0	11	28%	0.07	0
local government elected members	5	5	14.605	1.039	11	28%	0.061	0.05
community	0	5	0	0	14	36%	0.053	0
legislated financial policy	3	3	3.733	0.266	8	21%	0.047	0.01
state strategic plan	6	5	13.686	0.973	9	23%	0.043	0.081
workplace regulations	2	4	1.619	0.115	8	21%	0.038	0.048
neighbours	0	2	0	0	9	23%	0.037	0
property titling laws	0	5	0	0	8	21%	0.034	0
suppliers	0	2	0	0	12	31%	0.021	0
urban designers	3	2	4.683	0.333	9	23%	0.015	0.038
Purchase Price	3	2	12.317	0.876	8	21%	0.014	0.096
state government elected members	1	2	5.33	0.379	8	21%	0.009	0.001
capital gains tax	1	1	0.75	0.053	8	21%	0.007	0.015
stamp duty	1	1	0.75	0.053	8	21%	0.007	0.015
use value	0	1	0	0	8	21%	0.007	0
political risk	0	3	0	0	9	23%	0.006	0
building/dwelling design	12	0	0	0	0	0%	0	0.35
land owner	0	2	0	0	2	5%	0	0

Network Centralization Index = 14.835%

DESCRIPTIVE STATISTICS FOR EACH MEASURE

	1 FlowBet	2 nFlowBet
1 Mean	28.823	2.050
2 Std Dev	55.021	3.913
3 Sum	1124.102	79.950
4 Variance	3027.286	15.314
5 SSQ	150464.281	761.137
6 MCSSQ	118064.156	597.238
7 Euc Norm	387.897	27.589
8 Minimum	0.000	0.000
9 Maximum	232.061	16.505
10 N of Obs	39.000	39.000

Appendix G. Figure Enlargements

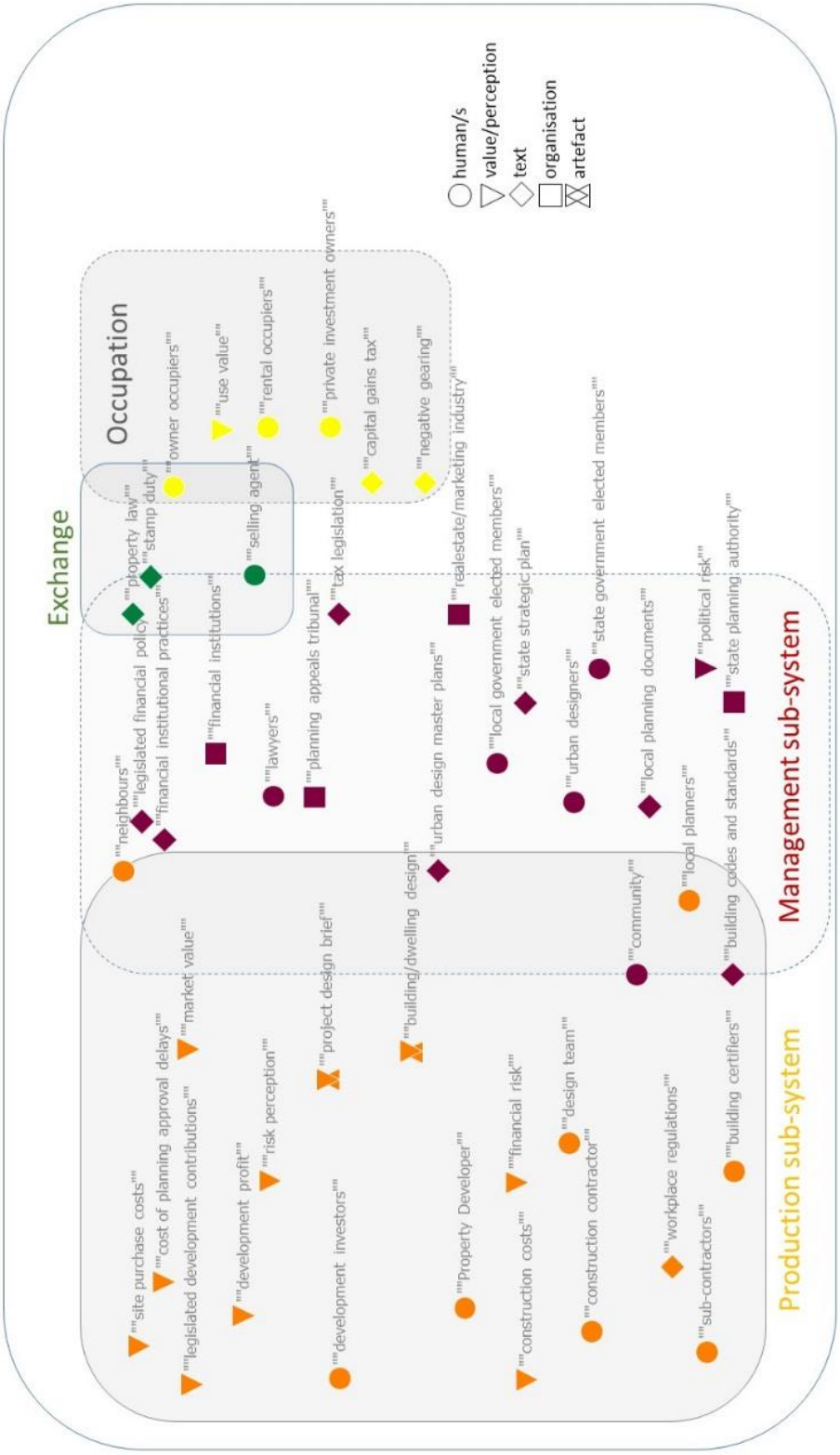


Figure 4.1. Initial Mapping of 'Black-Box.' Actors shown by Subsystem and Type. Page 87

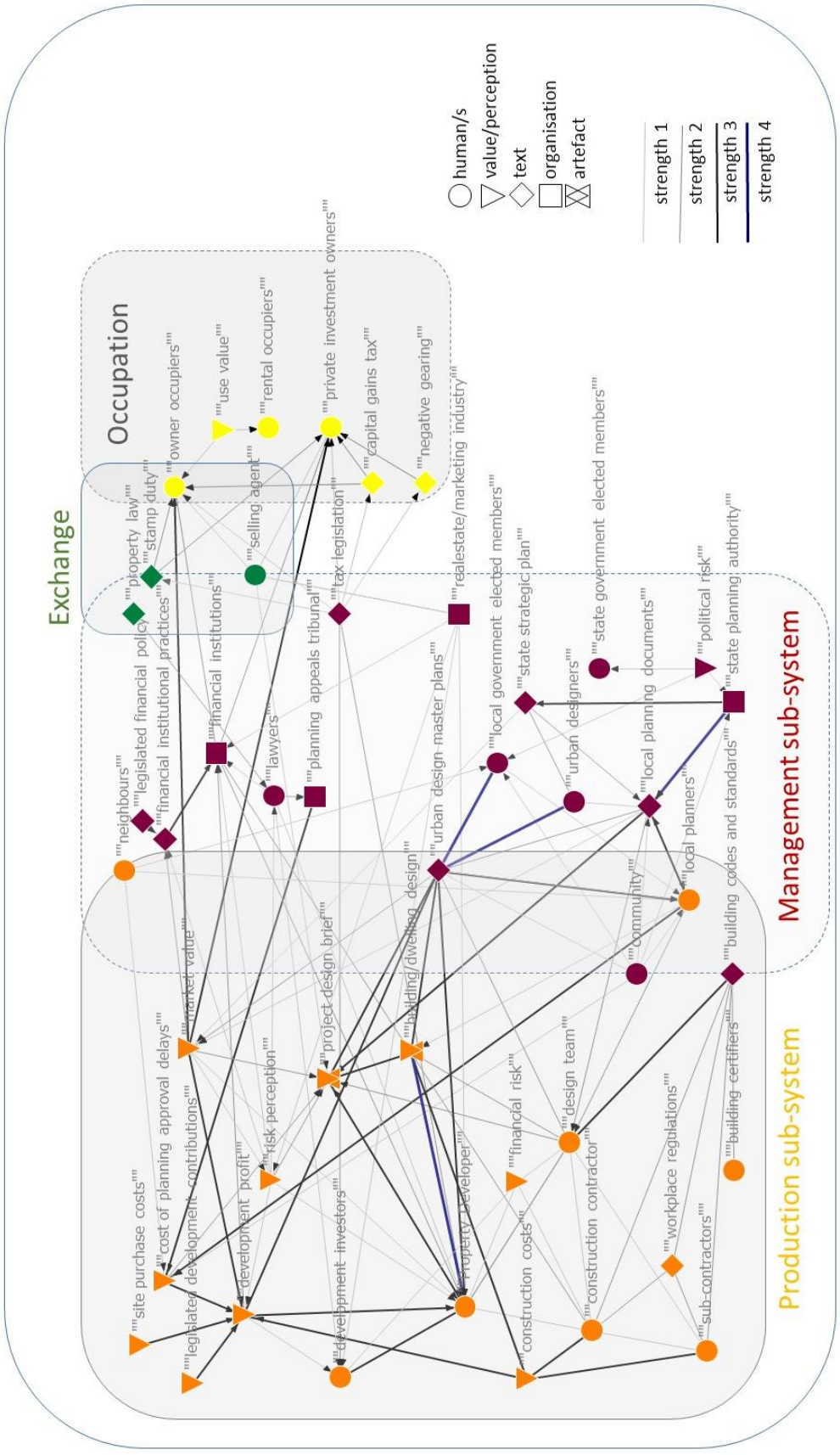


Figure 4.2. Mapping showing Actants and Flows of Design Information by Direction and Strength. Page 88

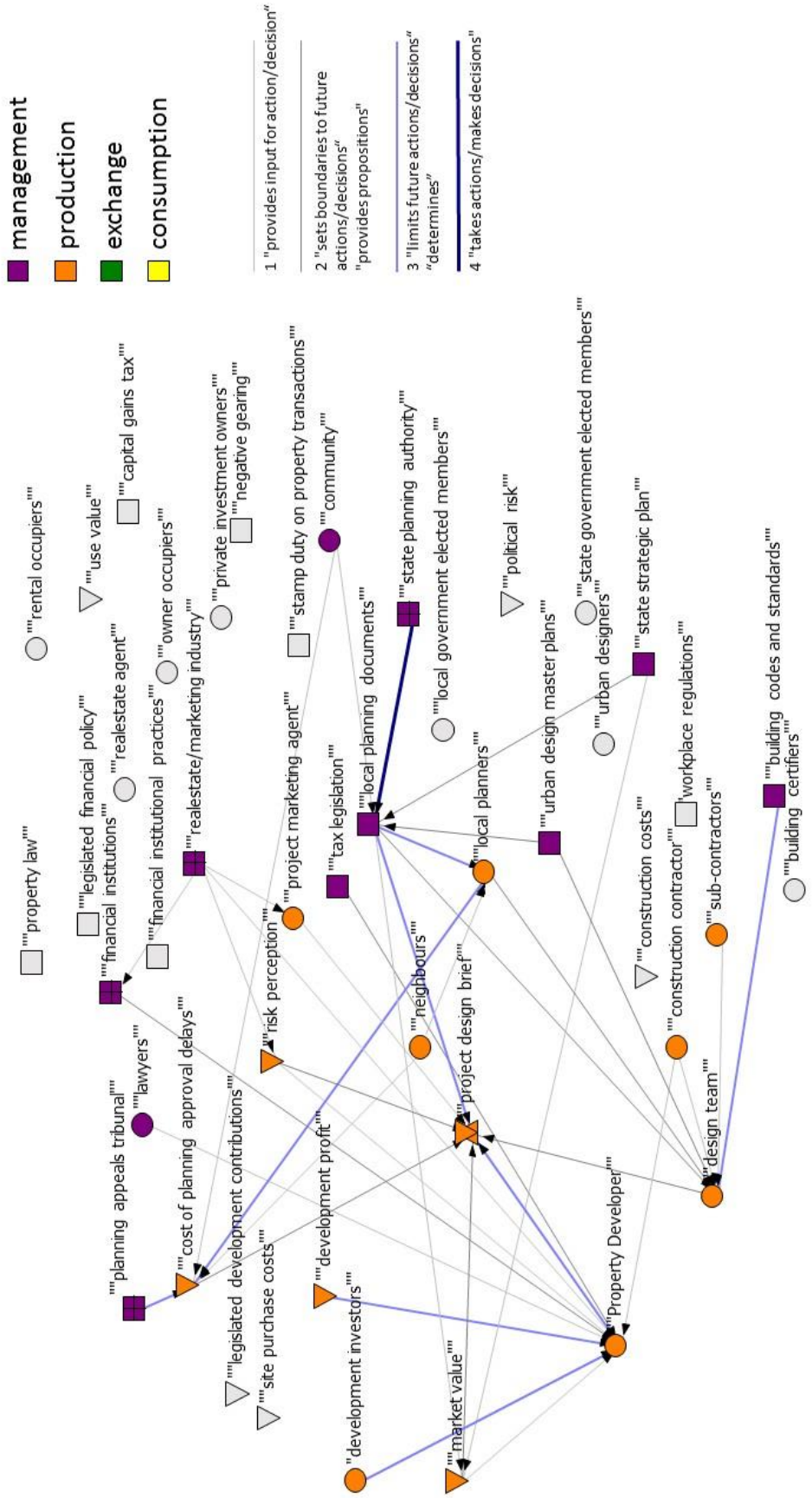


Figure 4.4. Two-step Ego-network for Project Design Brief.
Page 90

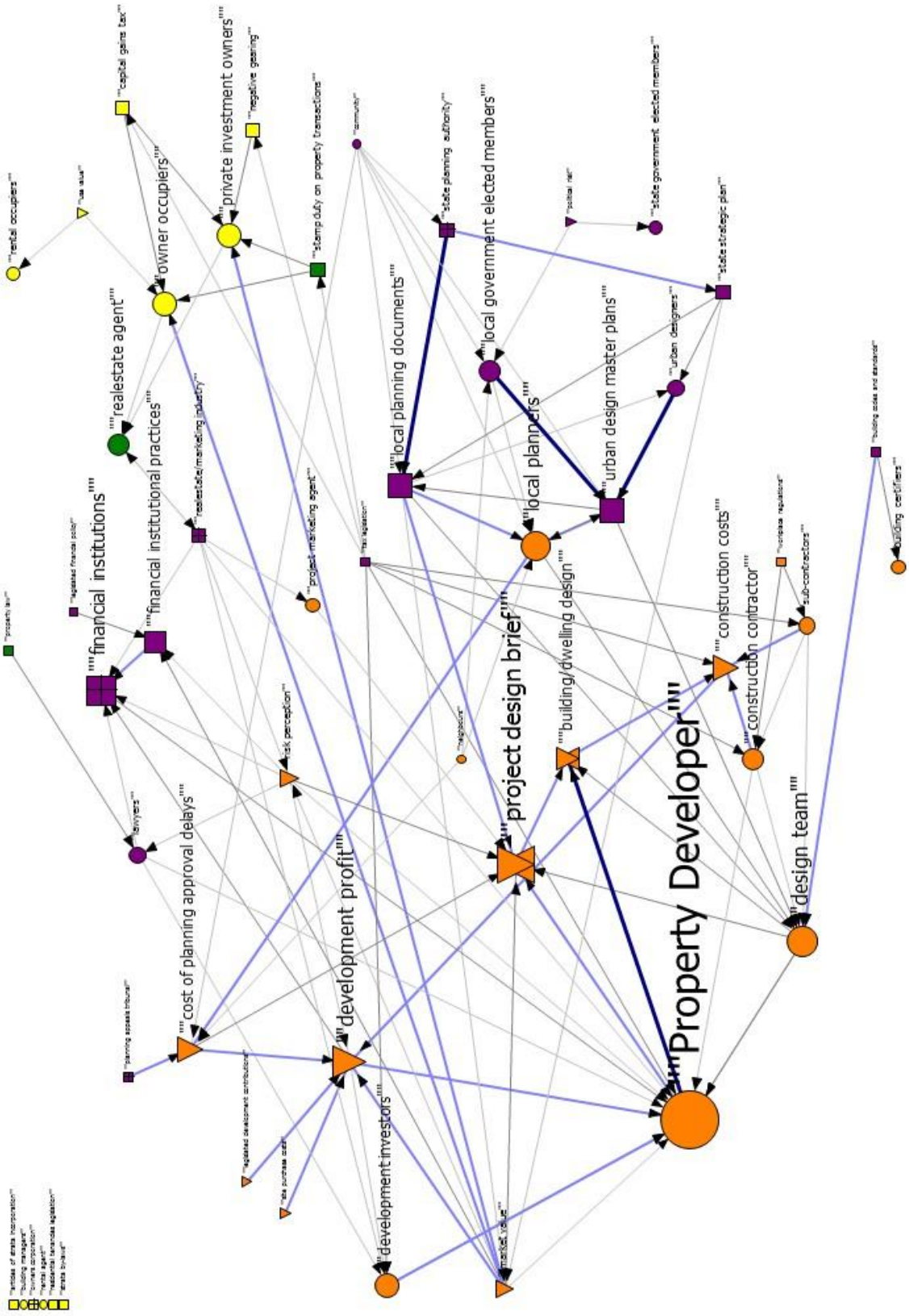


Table 4.2. Initial mapping showing Actant properties of In-degree. Page 92

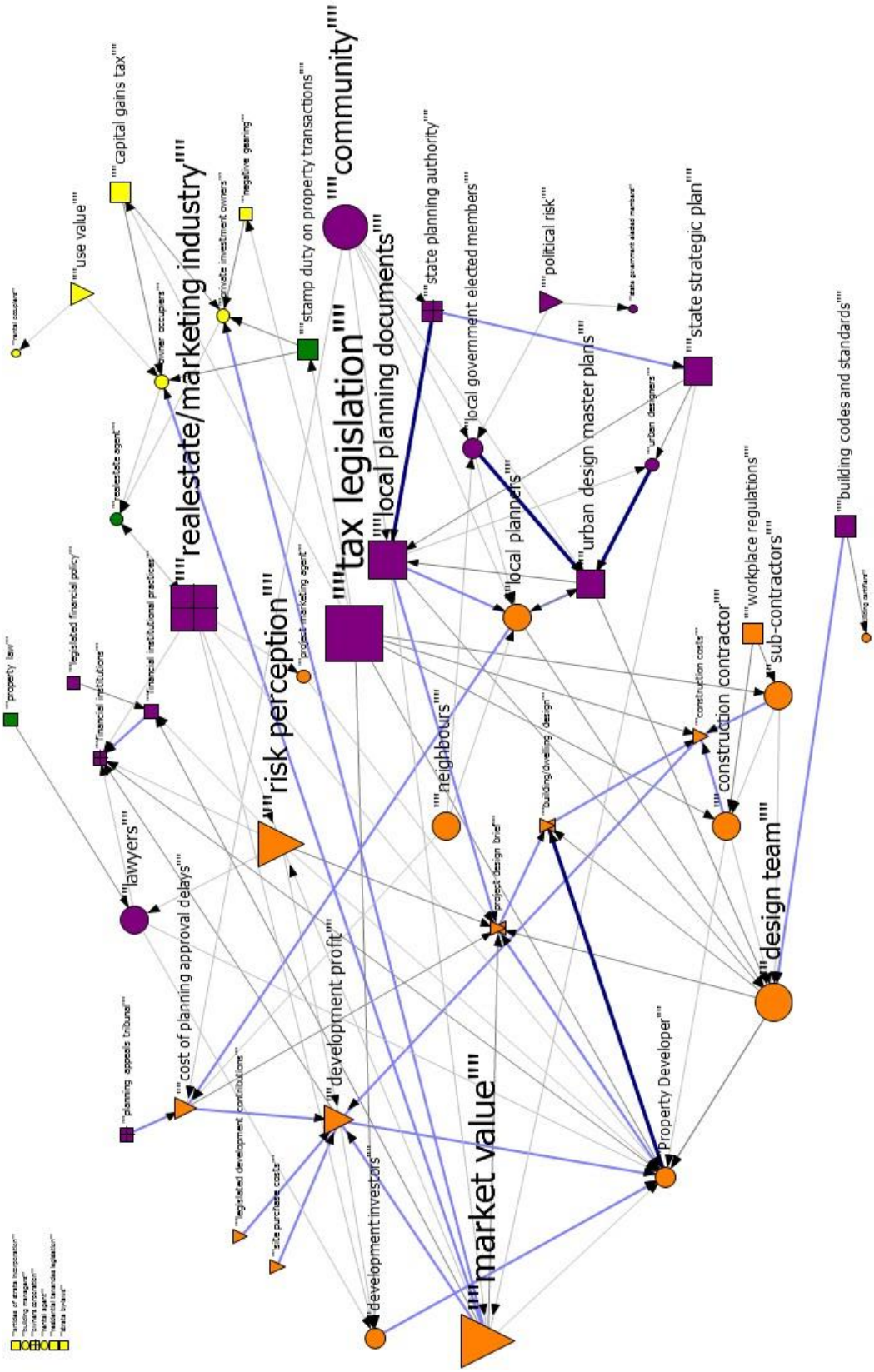


Table 4.2. Initial mapping showing Actant properties of Out-degree. Page 92

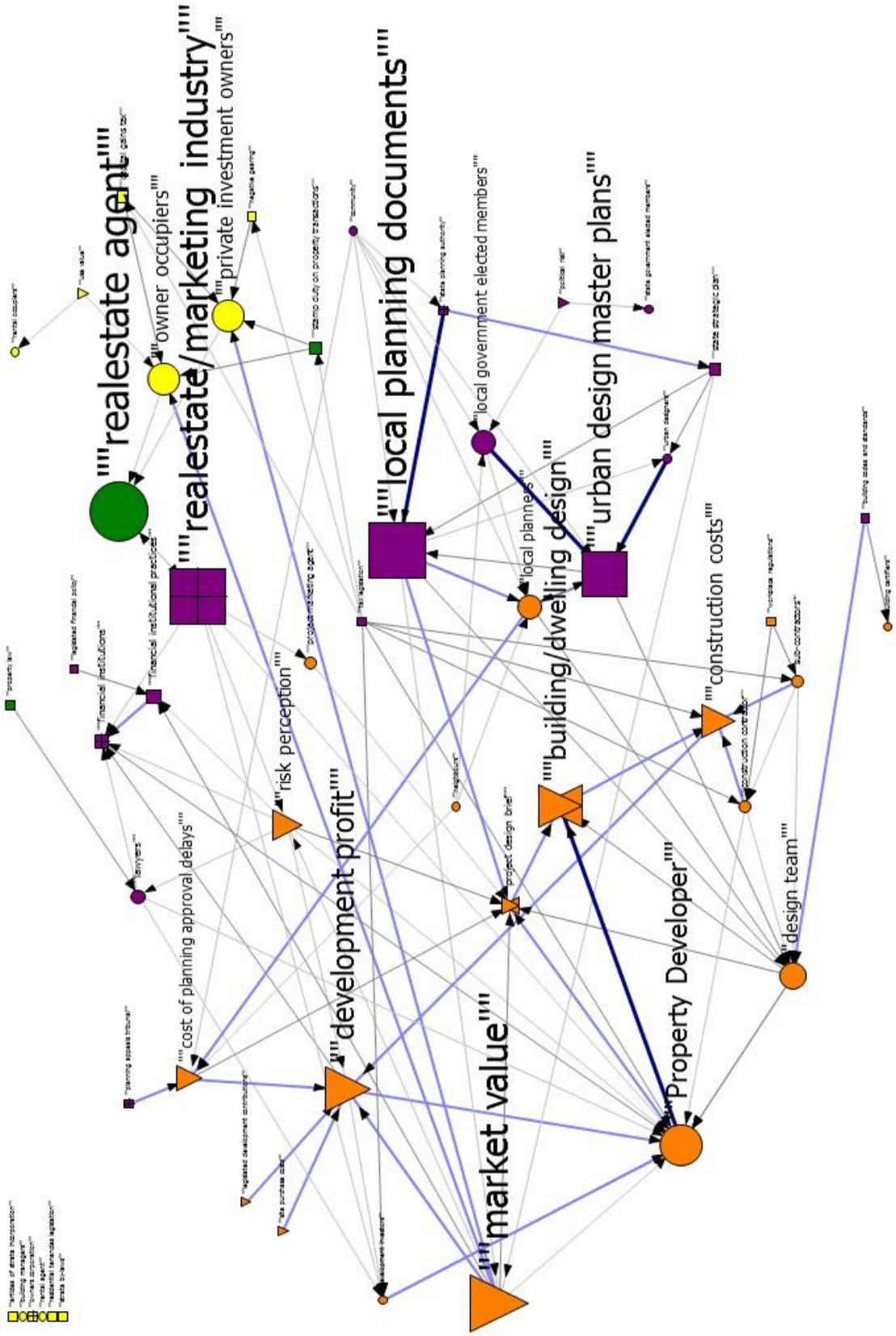


Table 4.2. Initial mapping showing Actant properties of Betweenness. Page 92

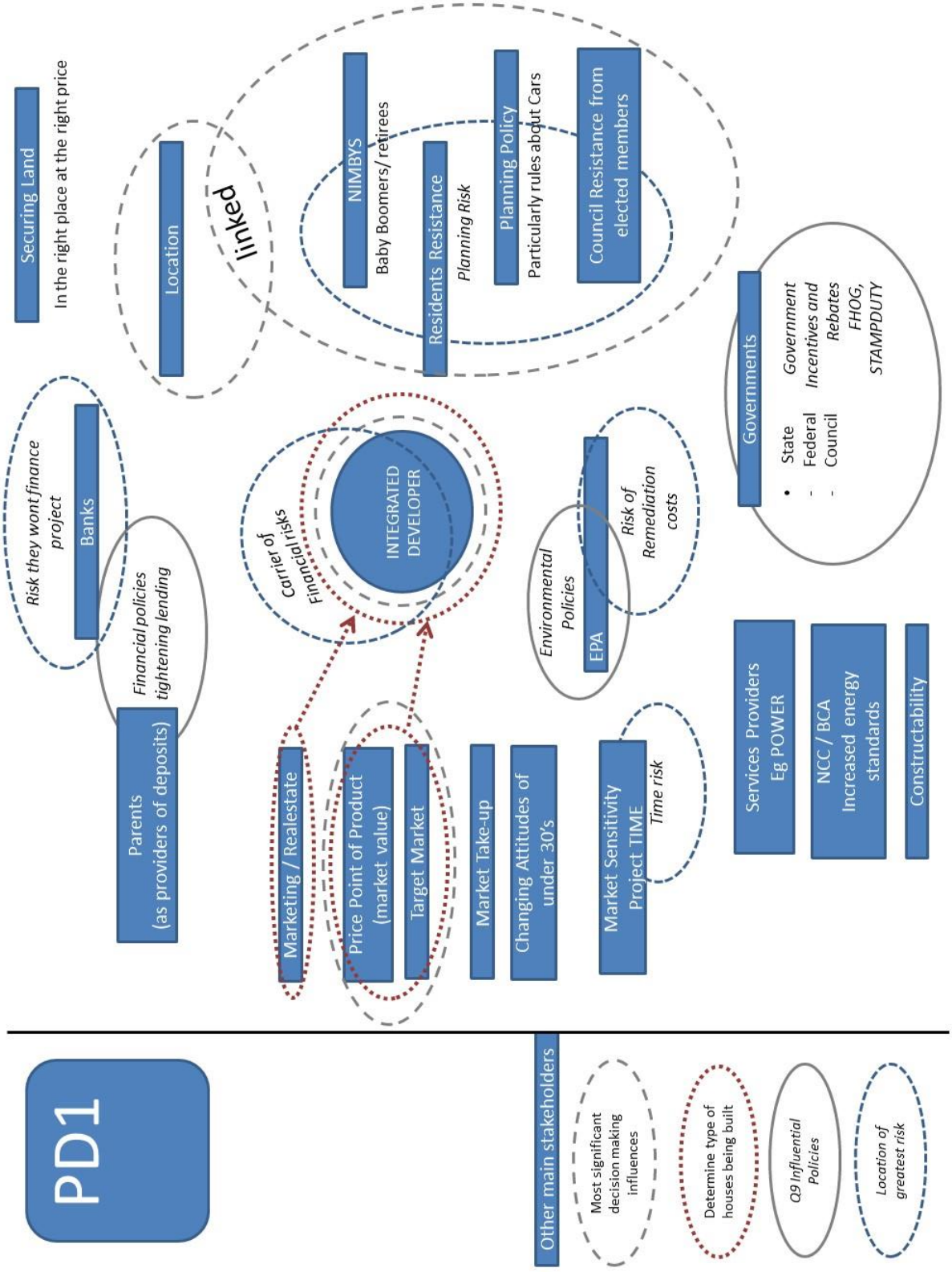


Figure 5.2. Ego-centric Diagrams. Page 98

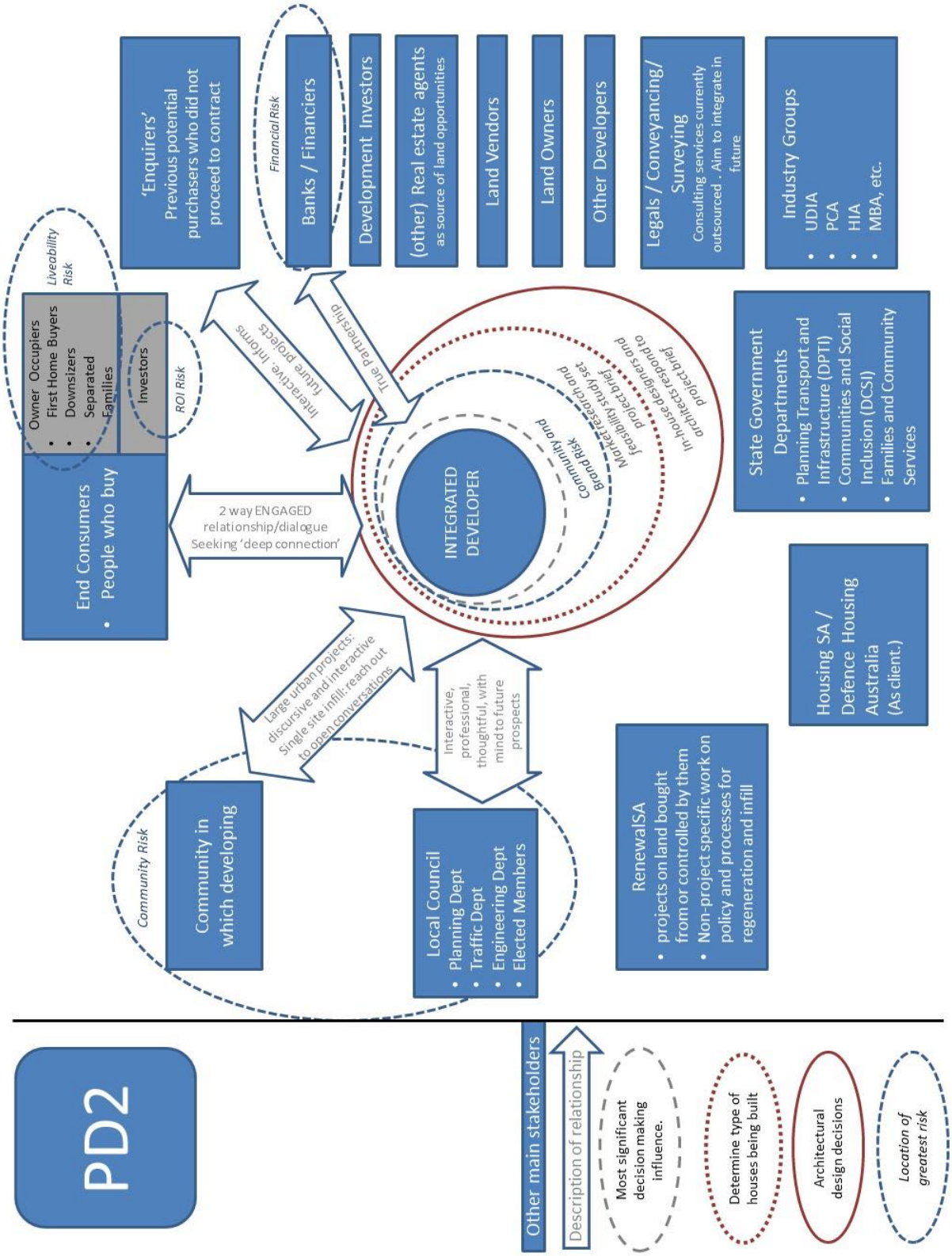


Figure 5.2. Ego-centric Diagrams. Page 98

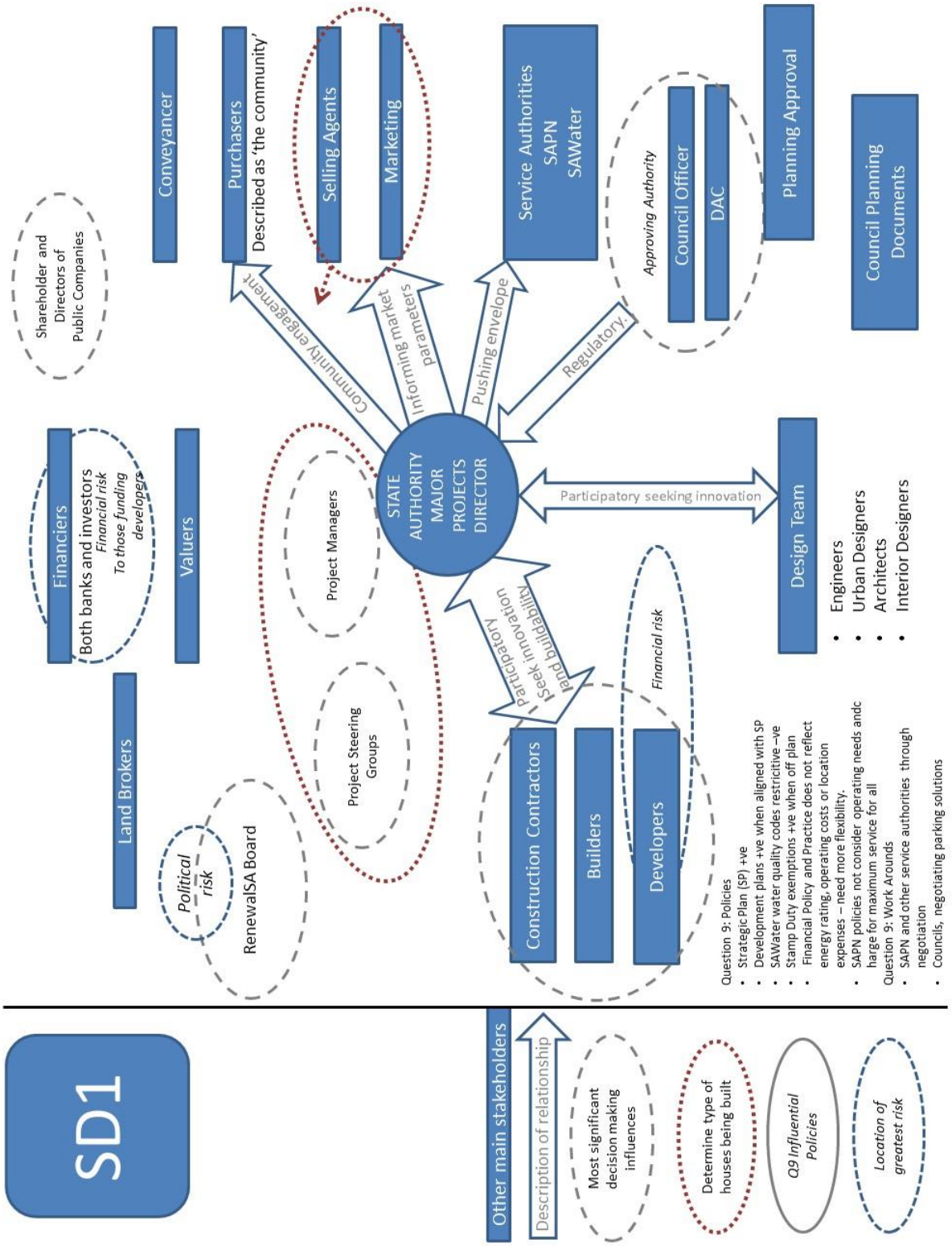


Figure 5.2. Ego-centric Diagrams. Page 98

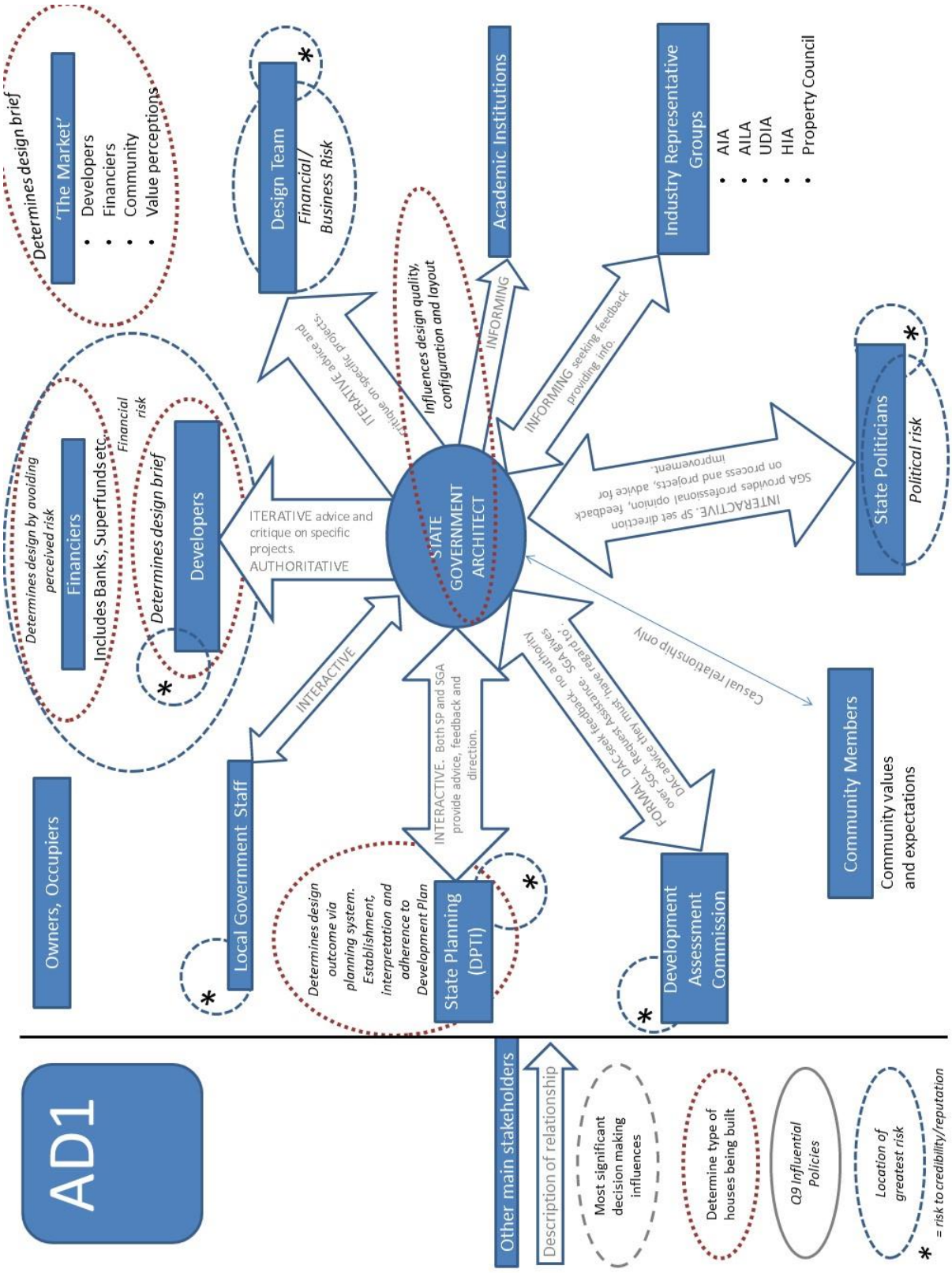


Figure 5.2. Ego-centric Diagrams. Page 98

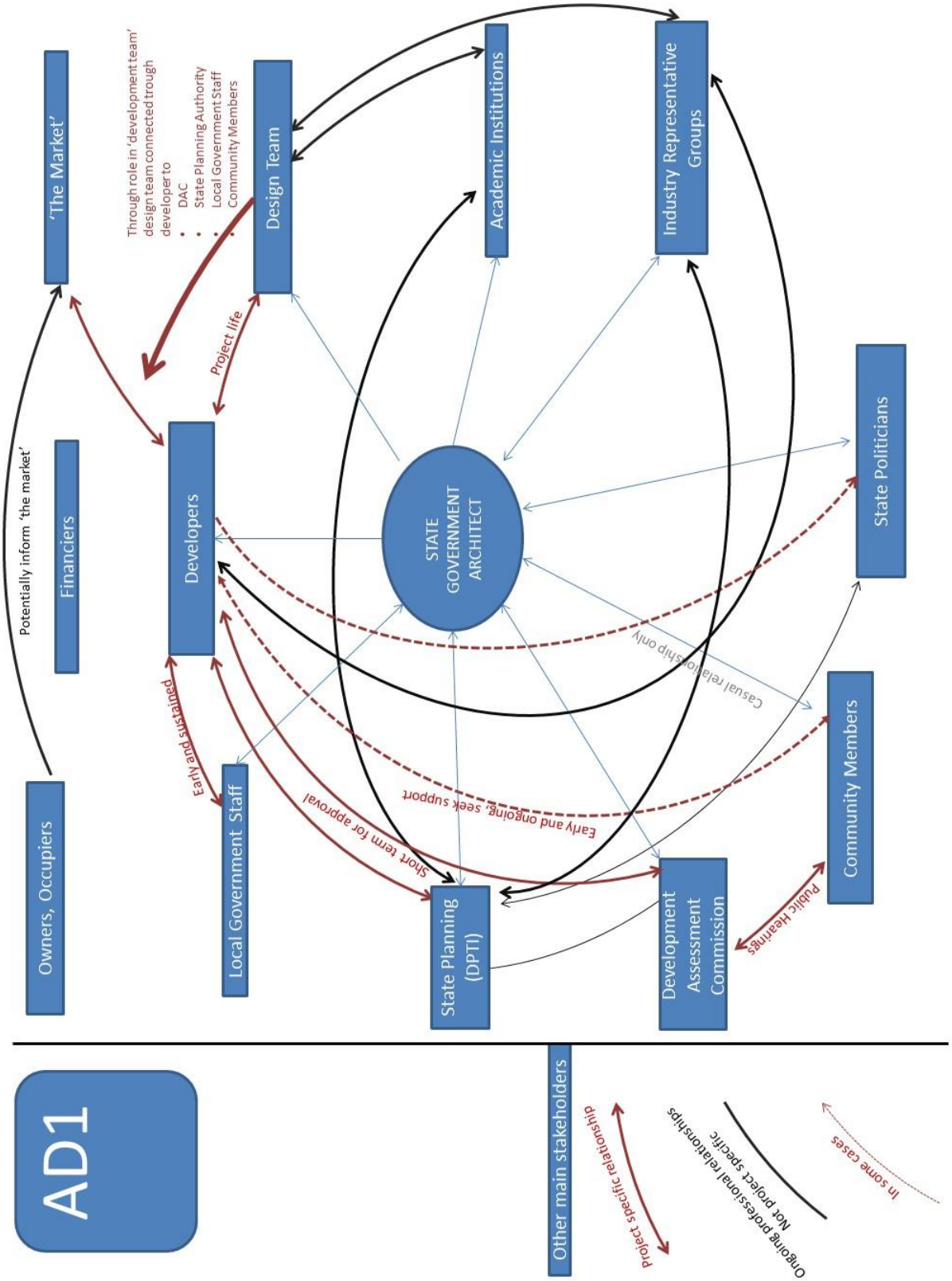


Figure 5.2. Ego-centric Diagrams. Page 98

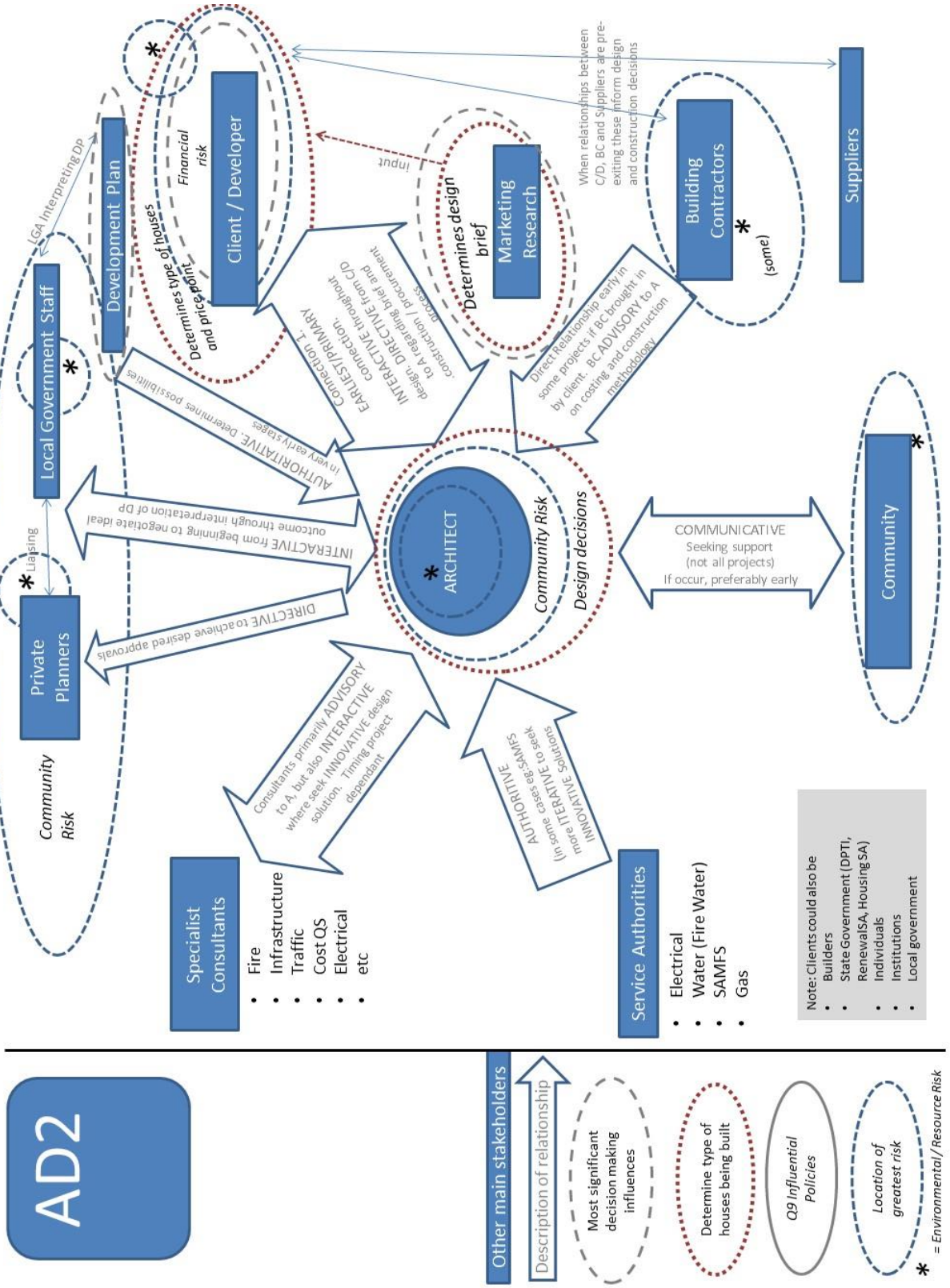


Figure 5.2. Ego-centric Diagrams. Page 98

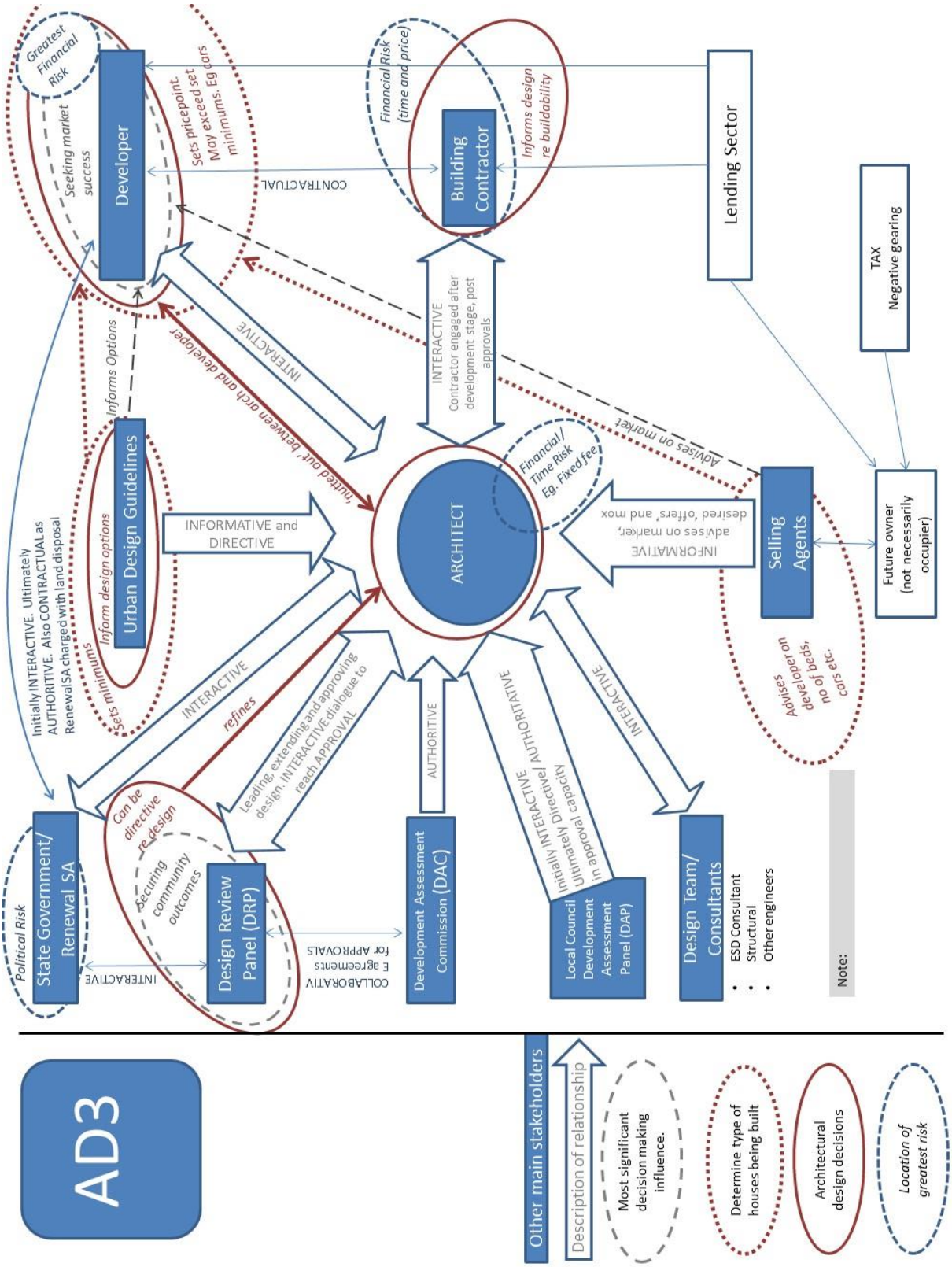


Figure 5.2. Ego-centric Diagrams. Page 98

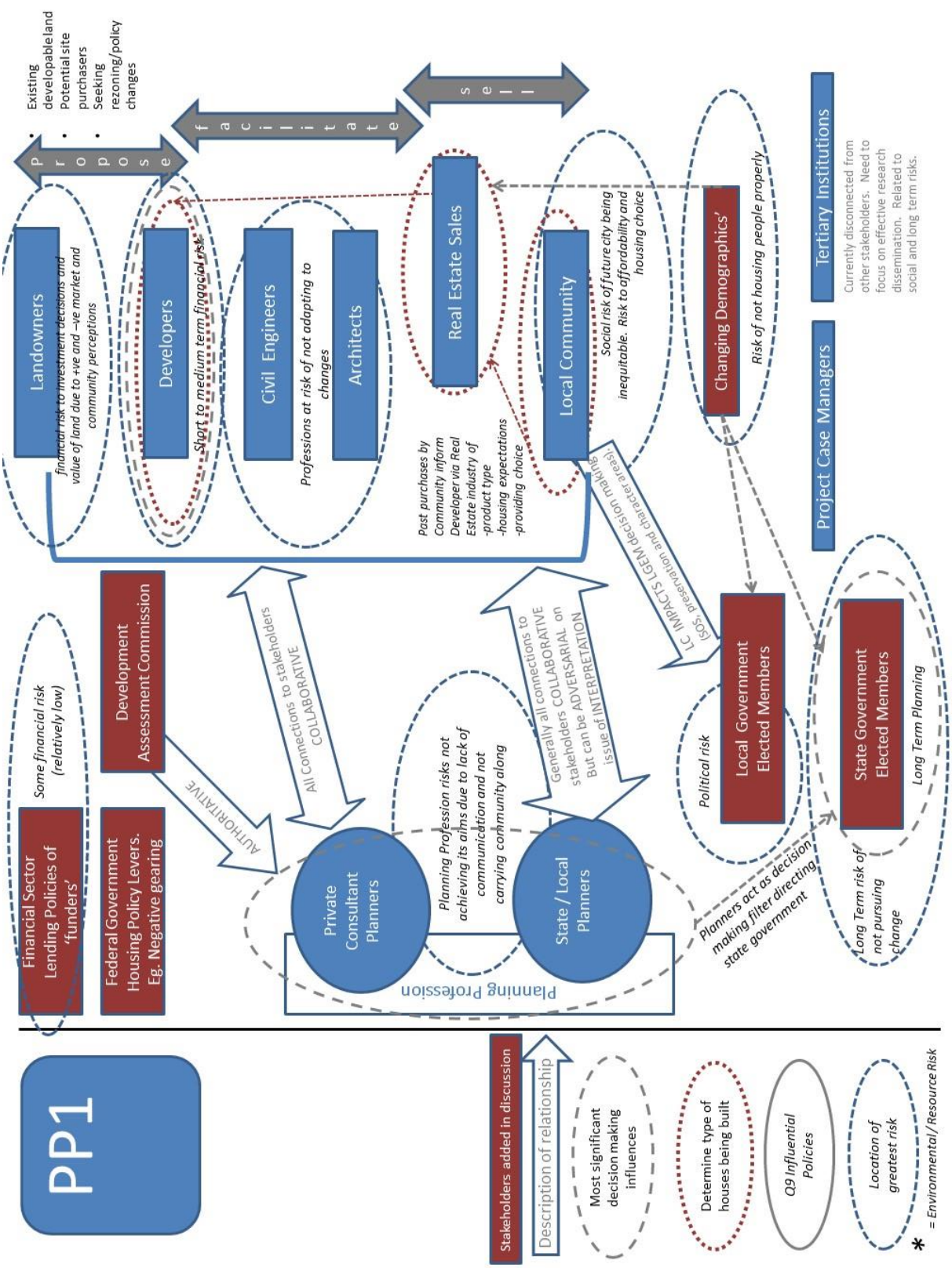


Figure 5.2. Ego-centric Diagrams. Page 98

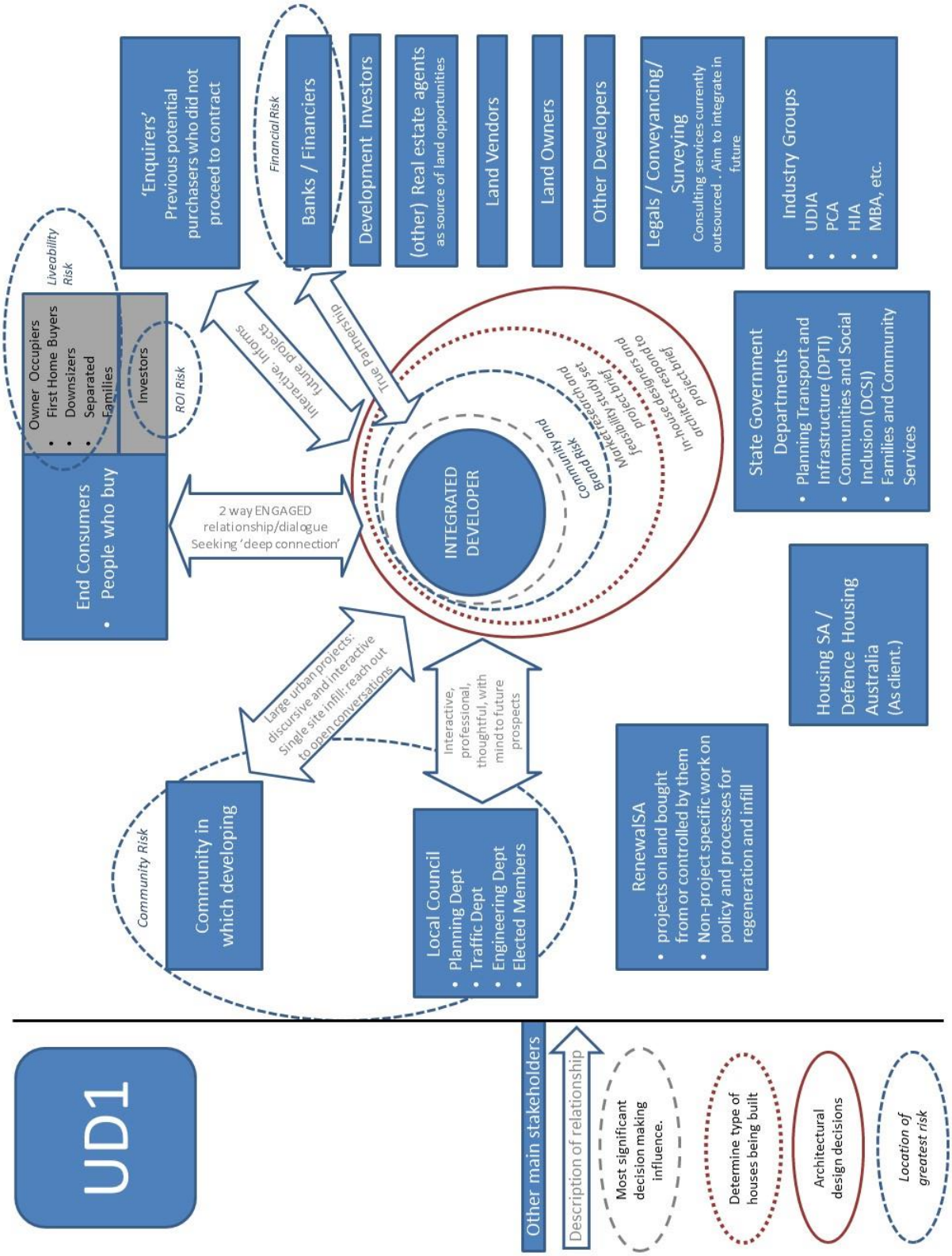
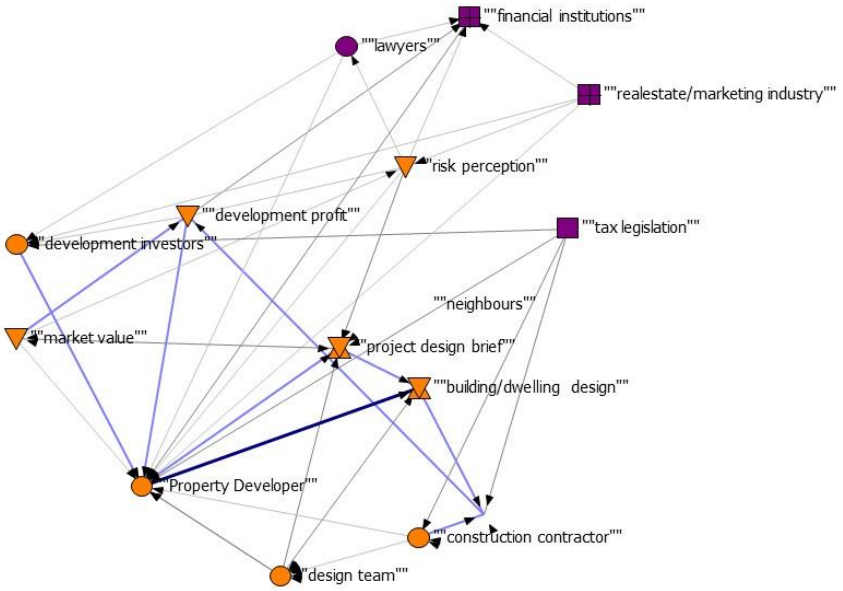


Figure 5.2. Ego-centric Diagrams. Page 98



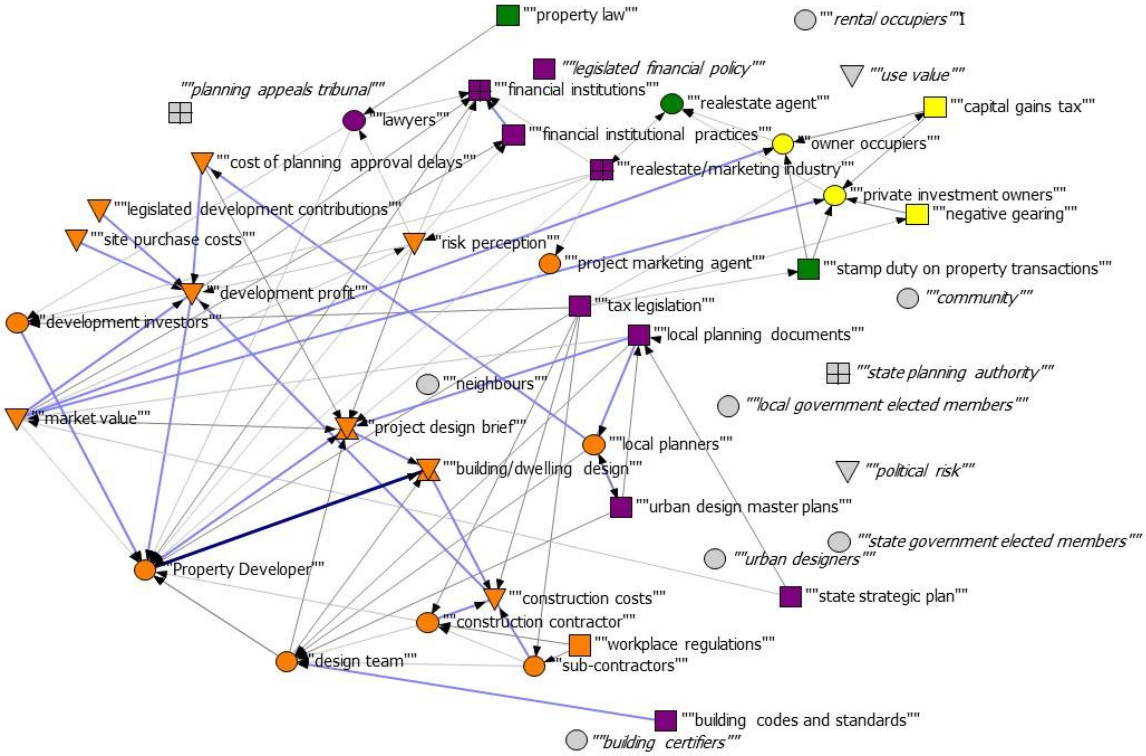


Table 6.1. One-step and Two-step Ego-network Diagrams used in Interviews. Property Developer. Page 112

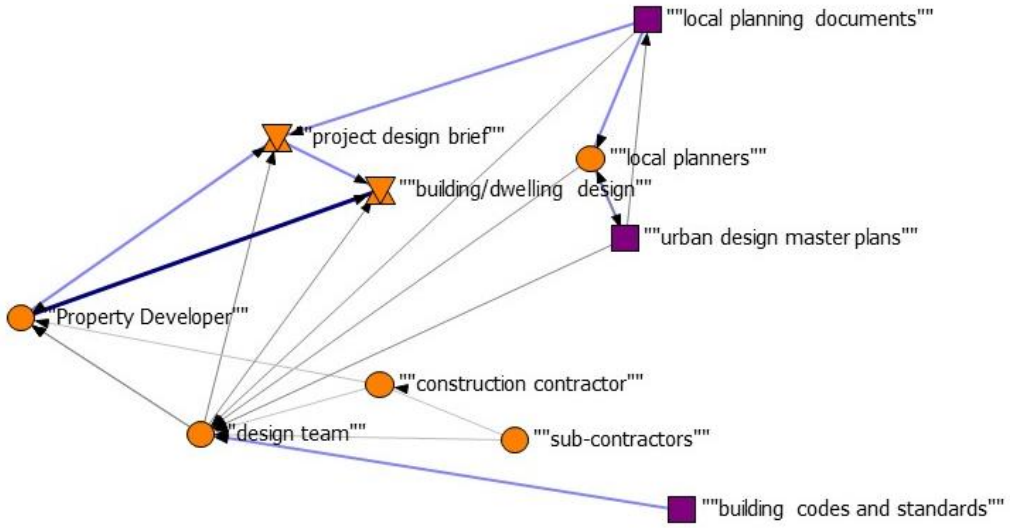
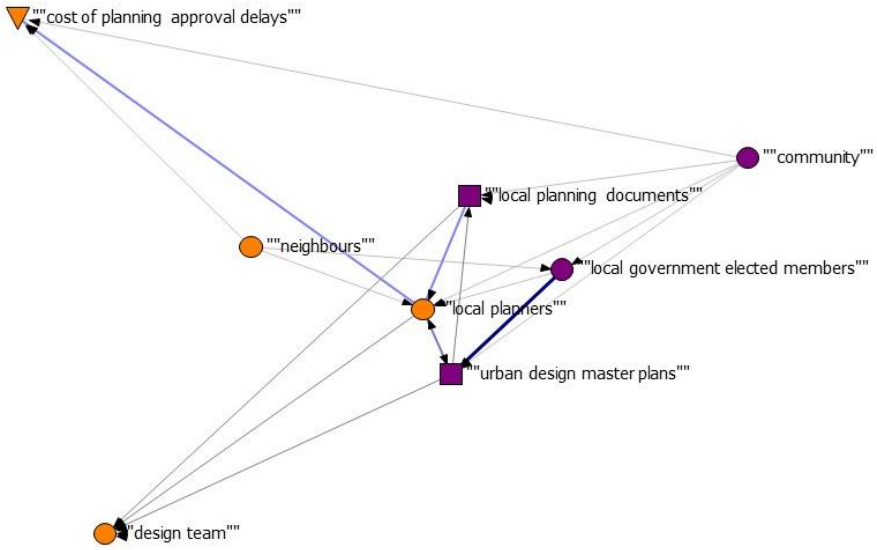


Table 6.1. One-step Ego-network Diagrams used in Interviews. Design Team. Page 112



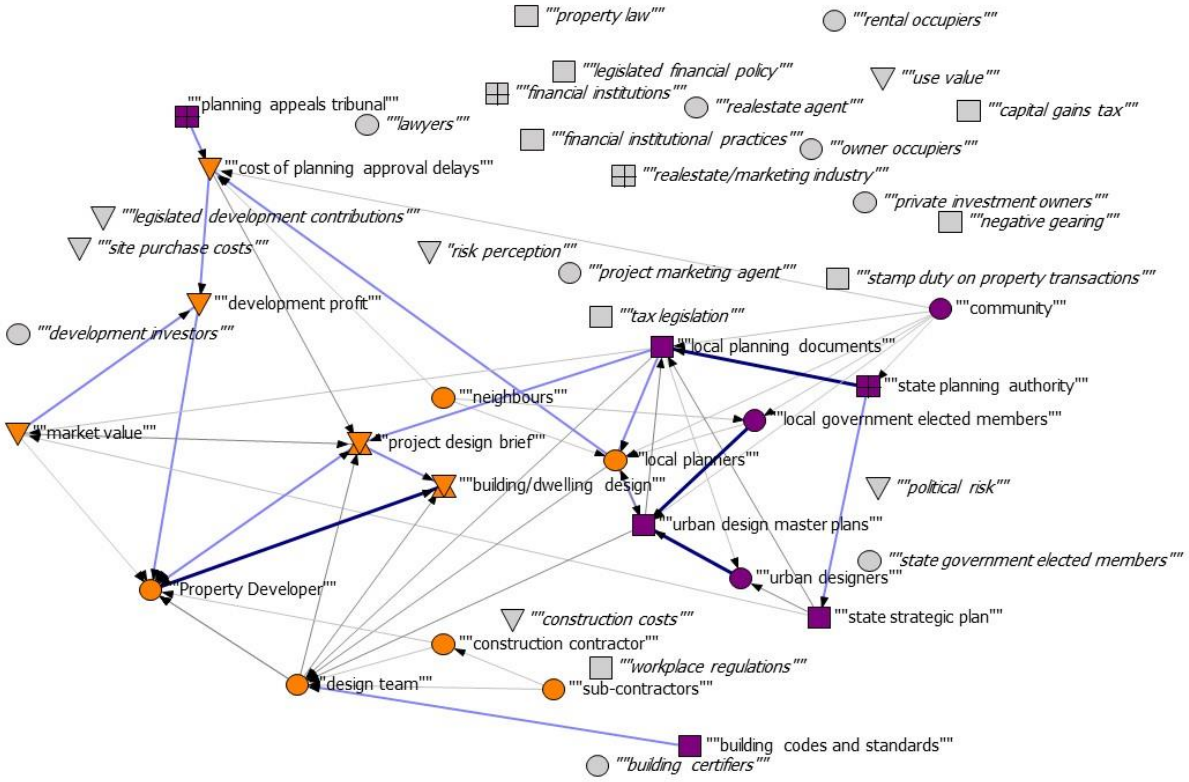


Table 6.1. One-step and Two-step Ego-network Diagrams used in Interviews. Local Planner. Page 112

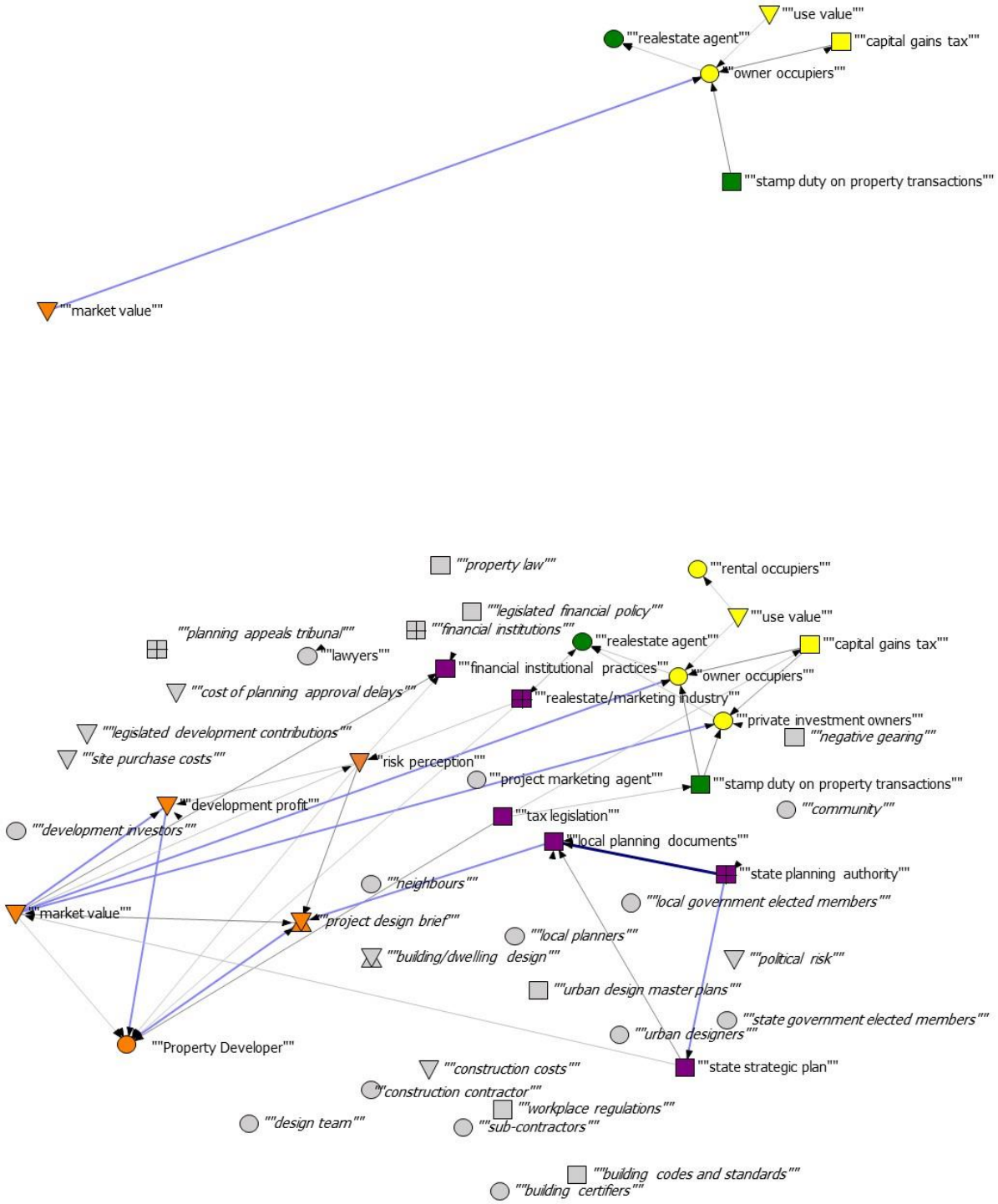


Table 6.1. One-step and Two-step Ego-network Diagrams used in Interviews. Owner Occupier. Page 112

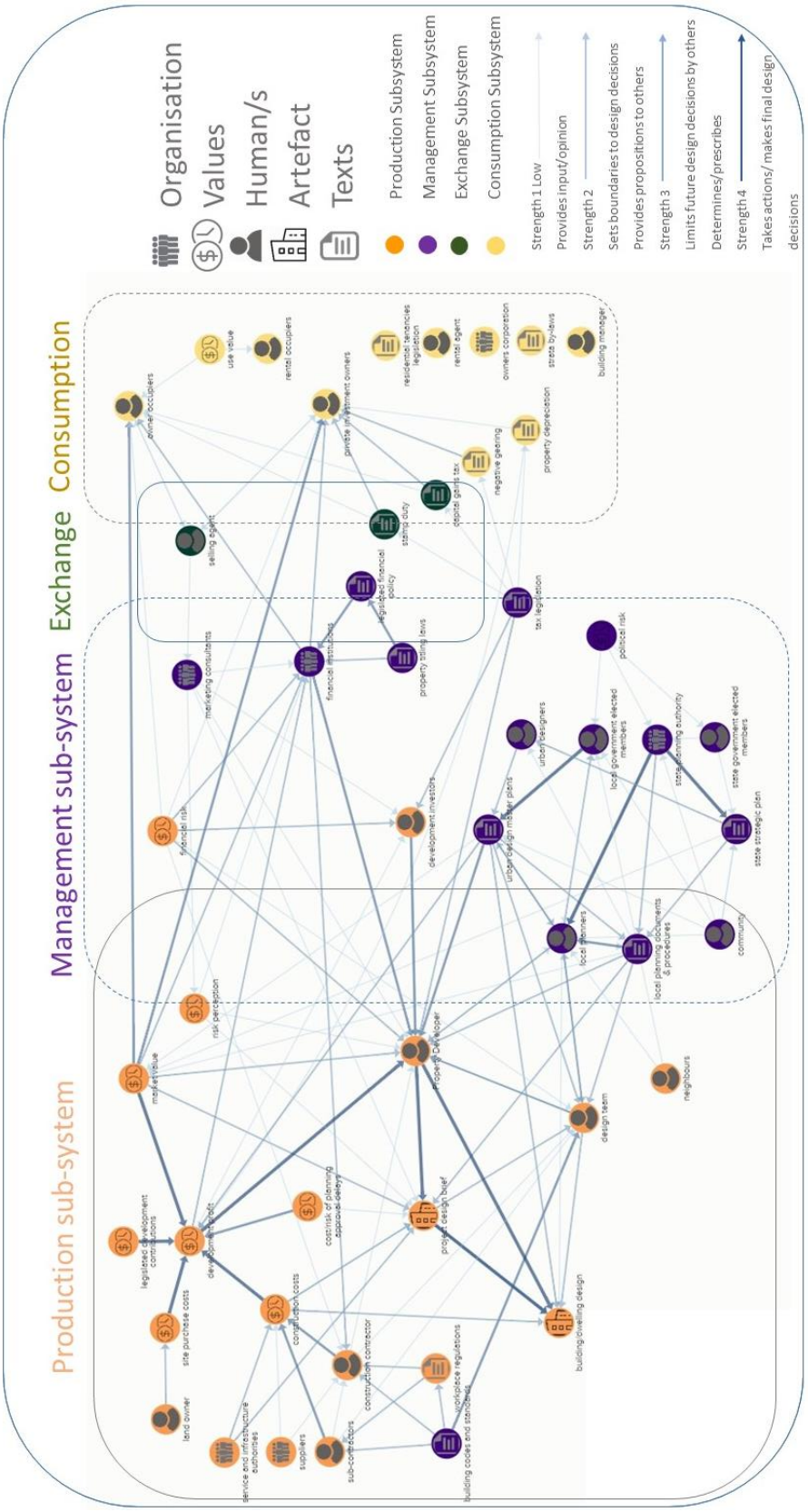


Figure 6.1. Existing Multi-Unit SoP: Traditional Developer.
Page 114

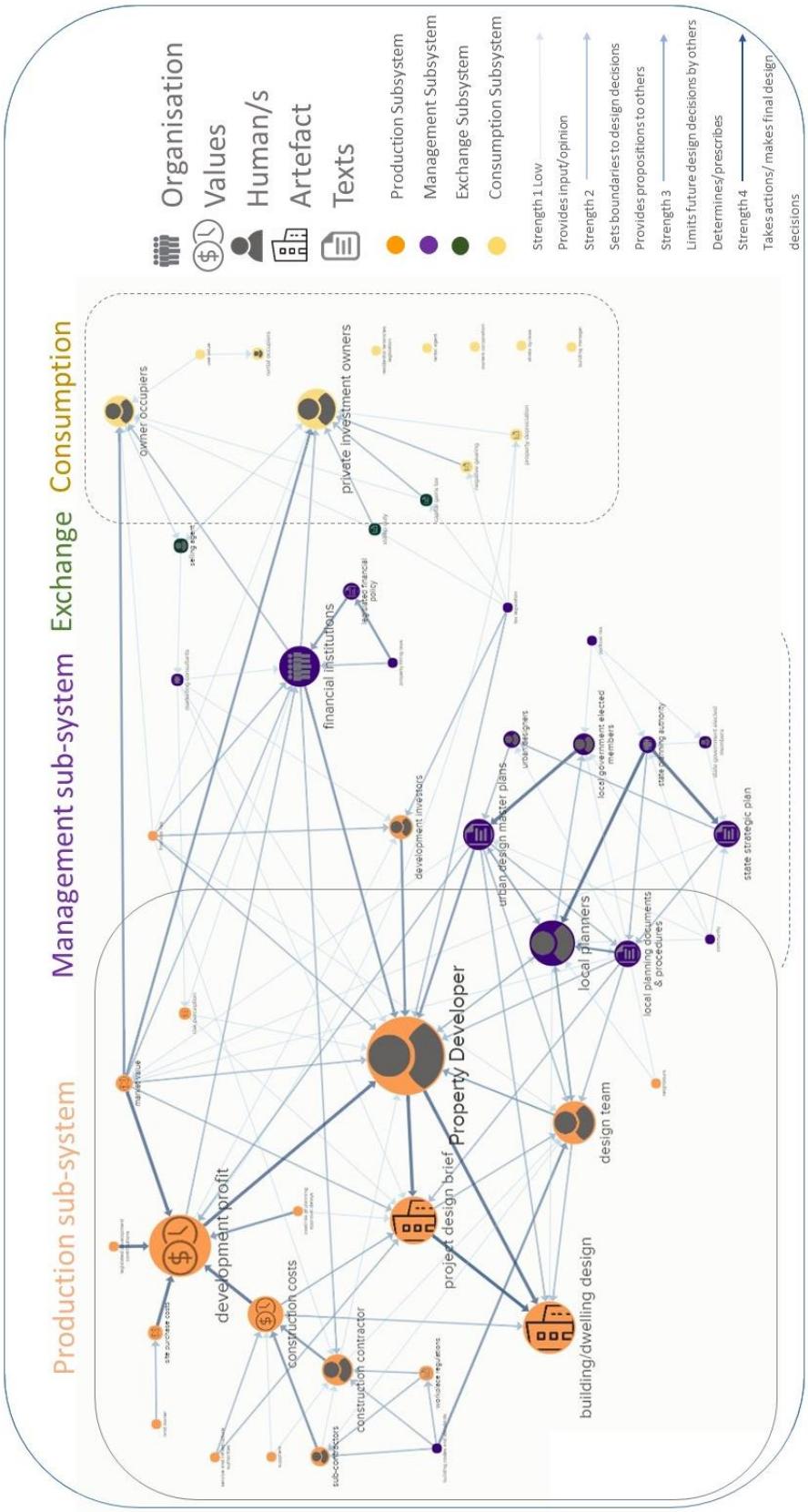


Figure 6.2. Existing Multi-Unit SoP: Icons sized by in-degree. Page 114

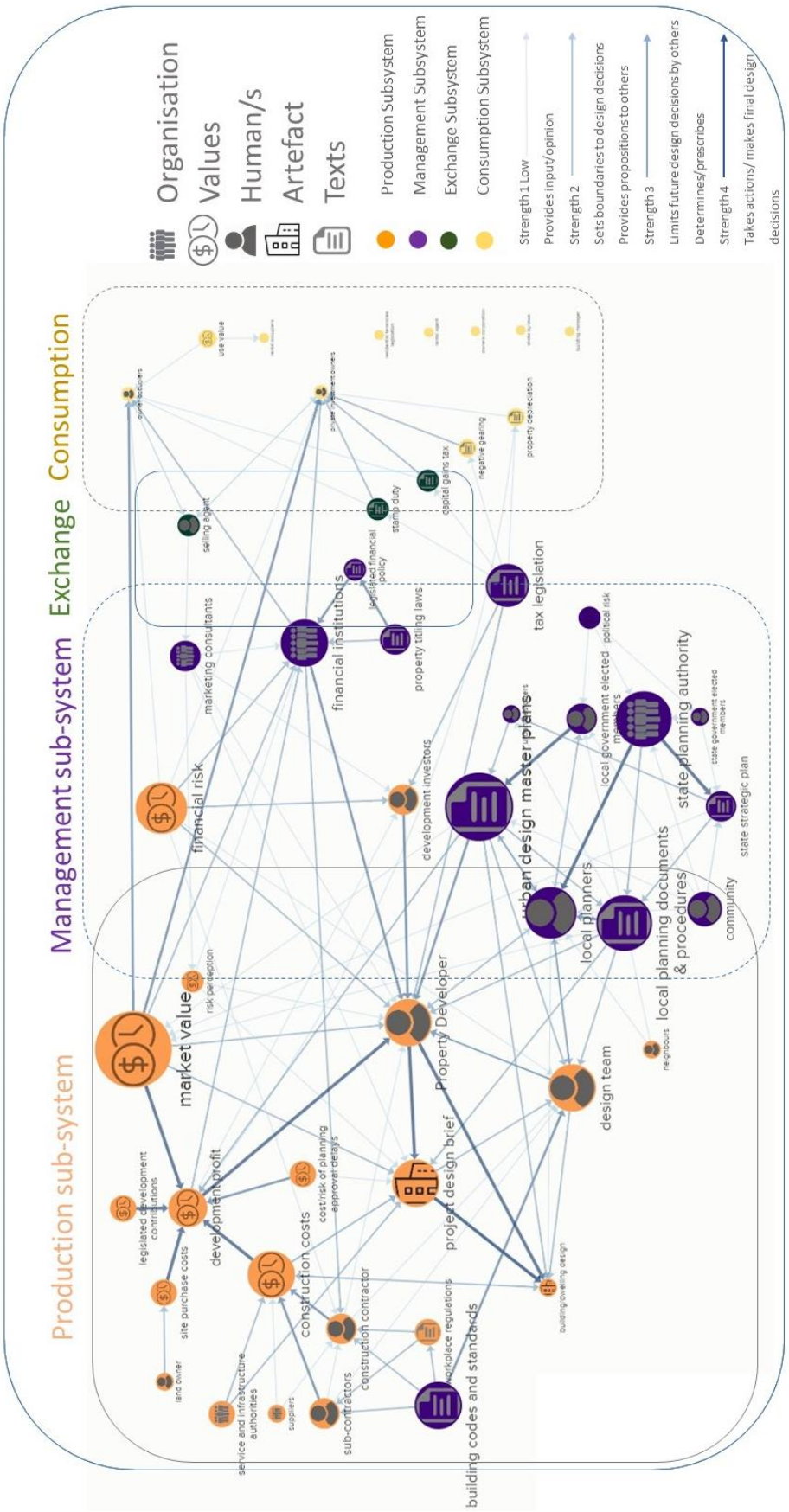


Figure 6.3. Existing Multi-Unit SoP. Icons sized by out-degree. Page 115

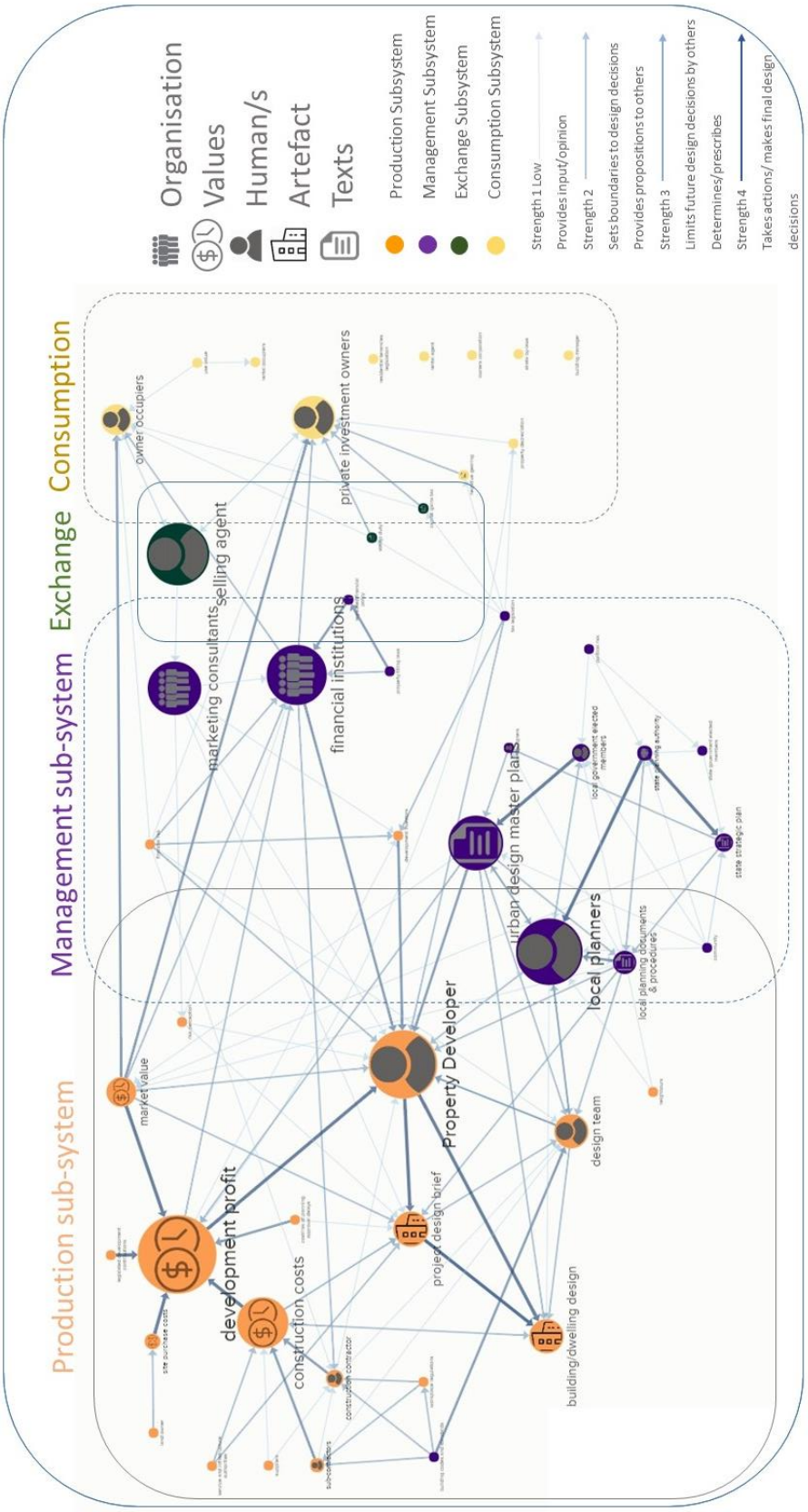


Figure 6.4. Existing Multi-Unit SoP: Icons sized by betweenness centrality. Page 116

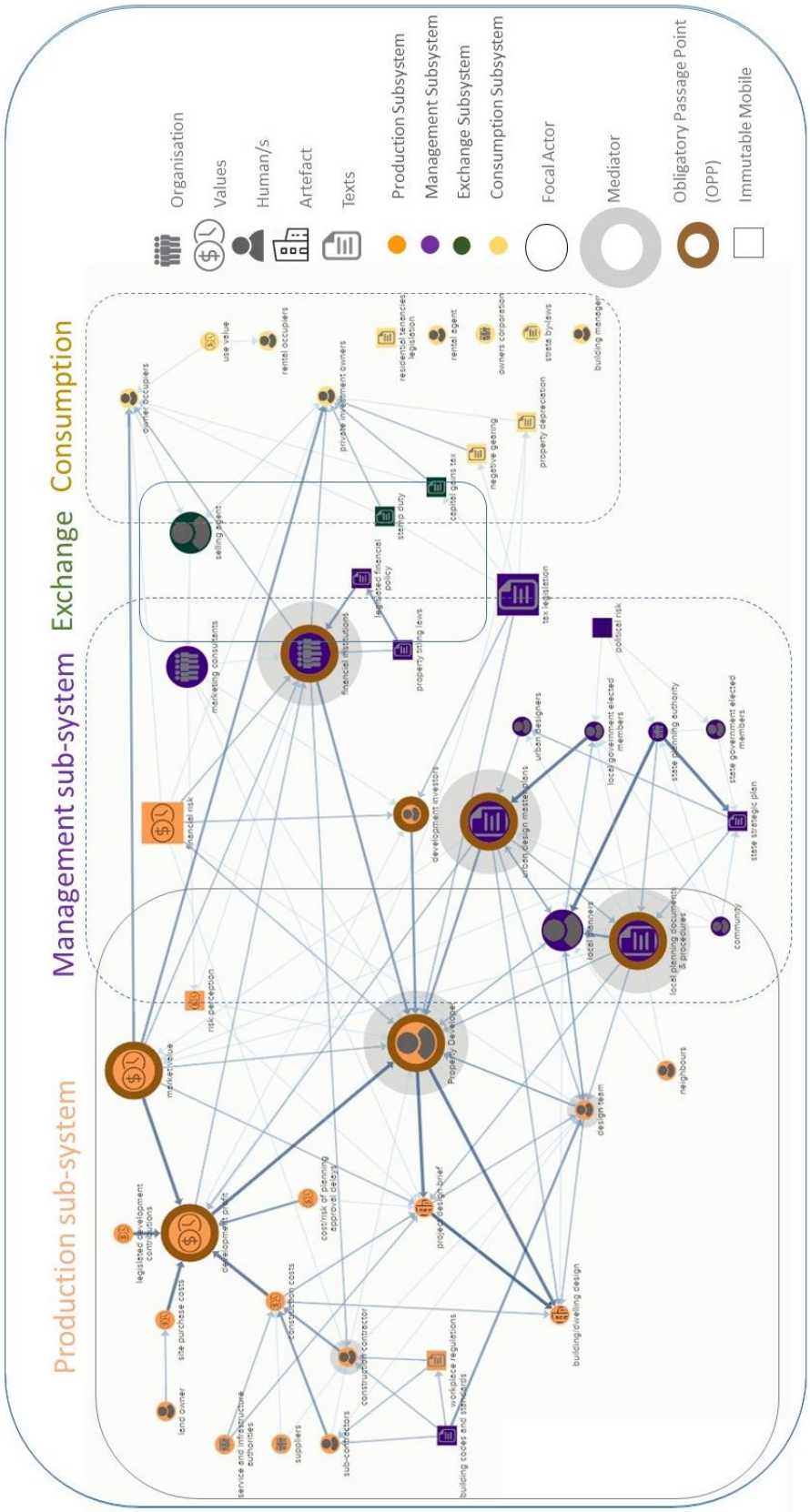


Figure 6.5. Existing Multi-Unit SoP. ANT Mapping. Page 118

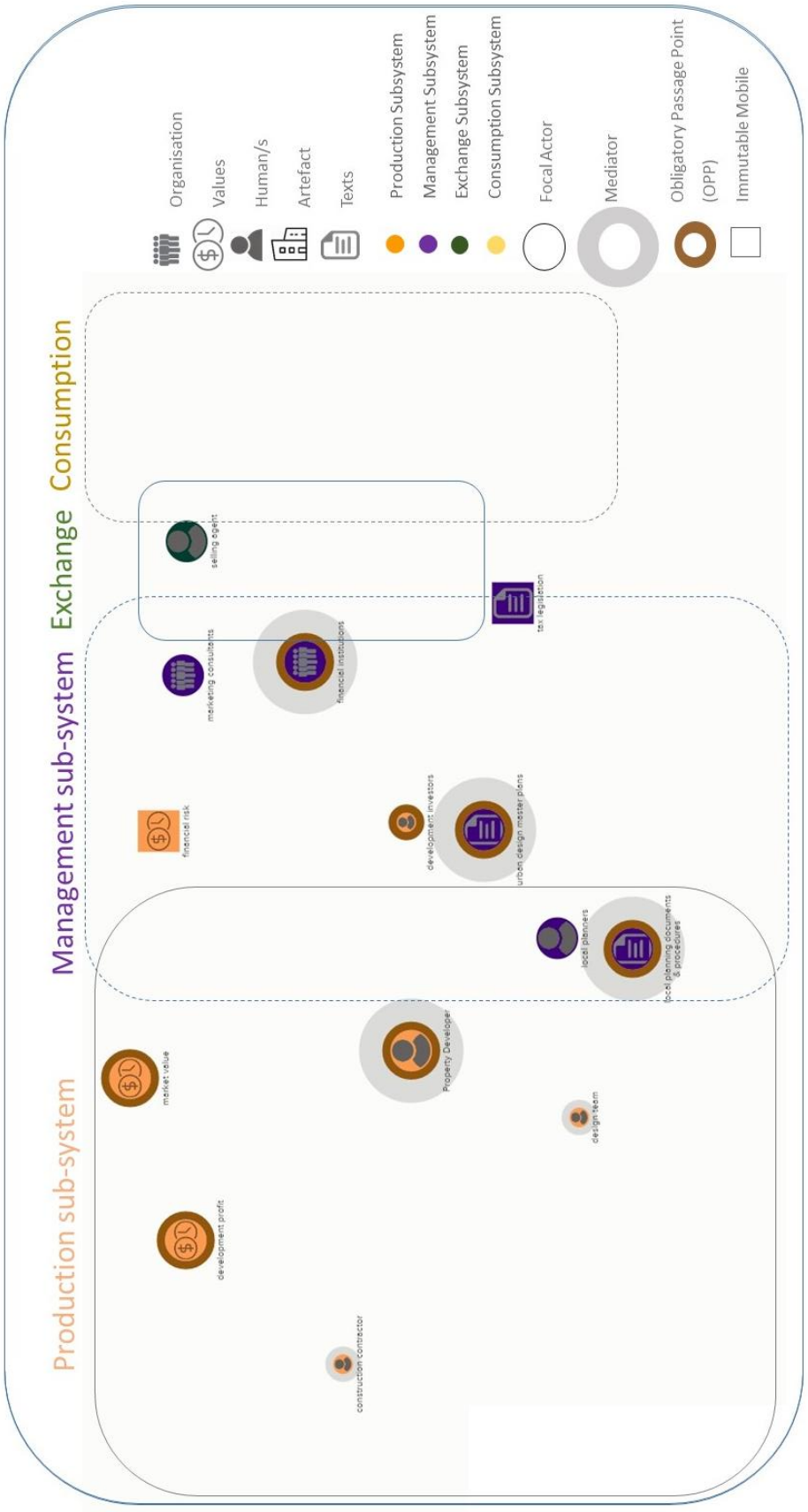


Figure 6.6. Existing Multi-Unit SoP: Key ANT Actants. Page 119

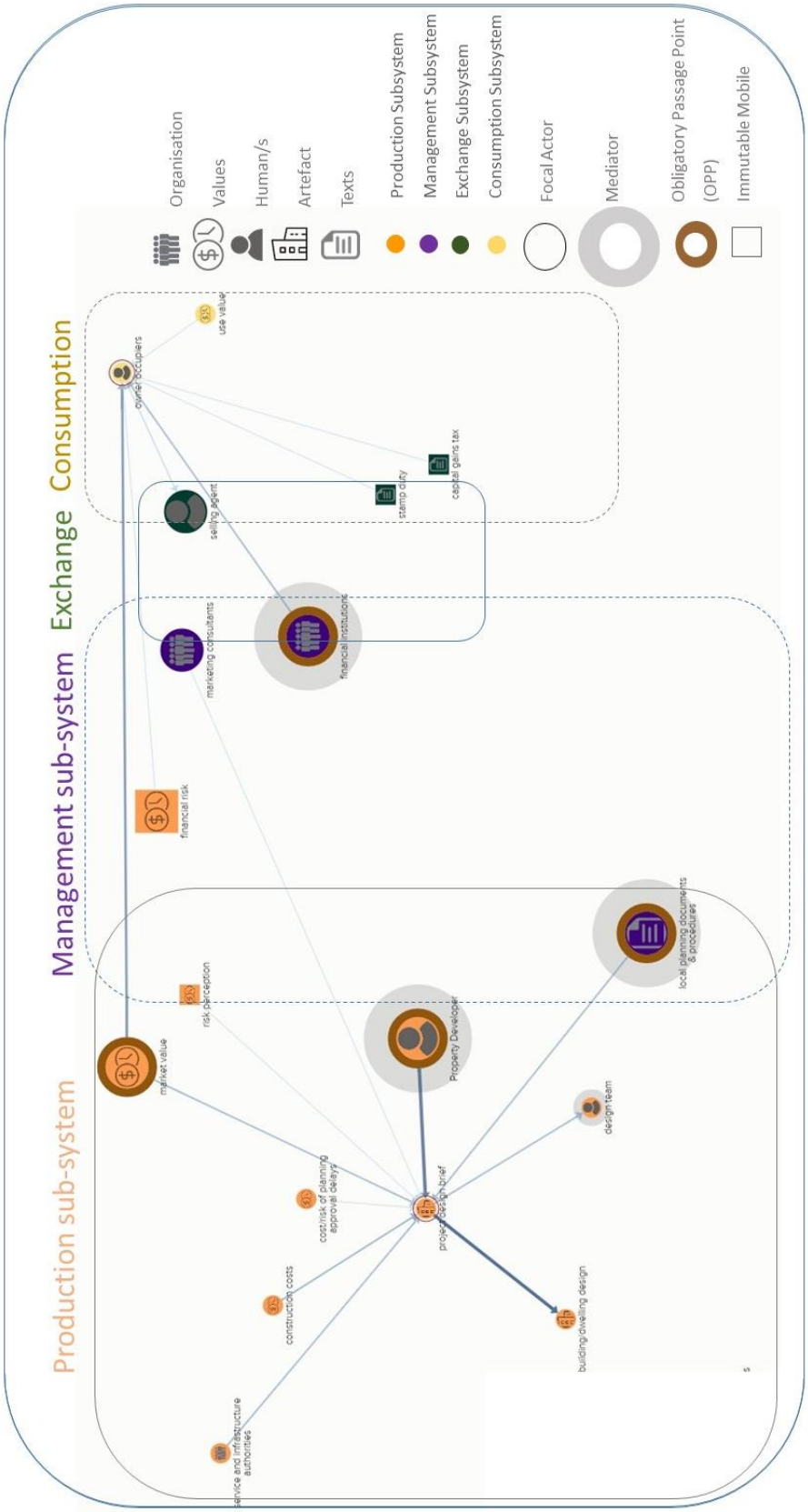


Figure 6.7. Existing Multi-Unit SoP. Path Diagram from owner-occupier to project design brief. Page 120

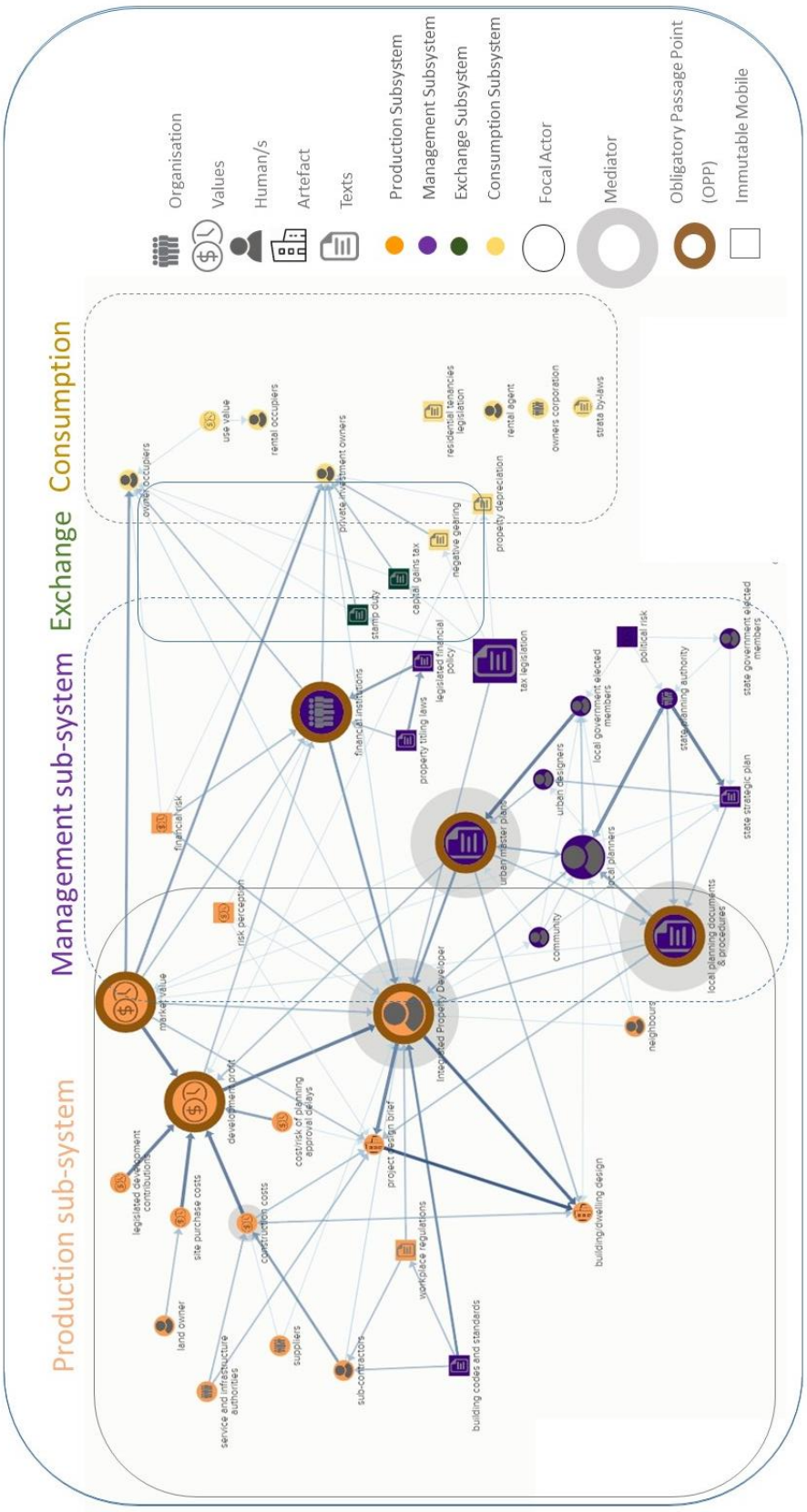


Figure 6.8. Actor-Network of Integrated Property Developer (IPD). Page 122

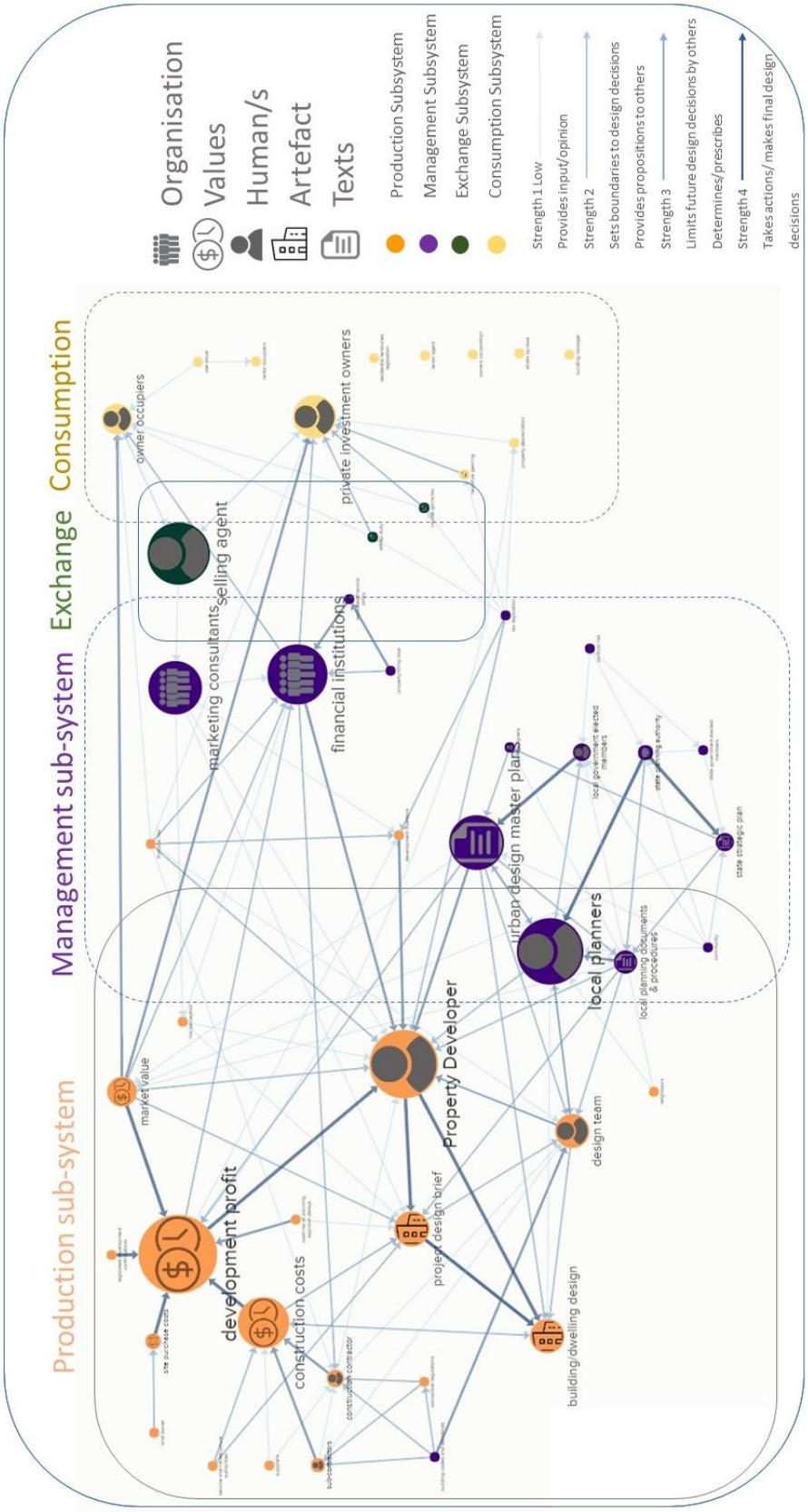


Figure 6.9. Traditional Property Developer SoP: Actant icons sized by betweenness centrality. Page 123

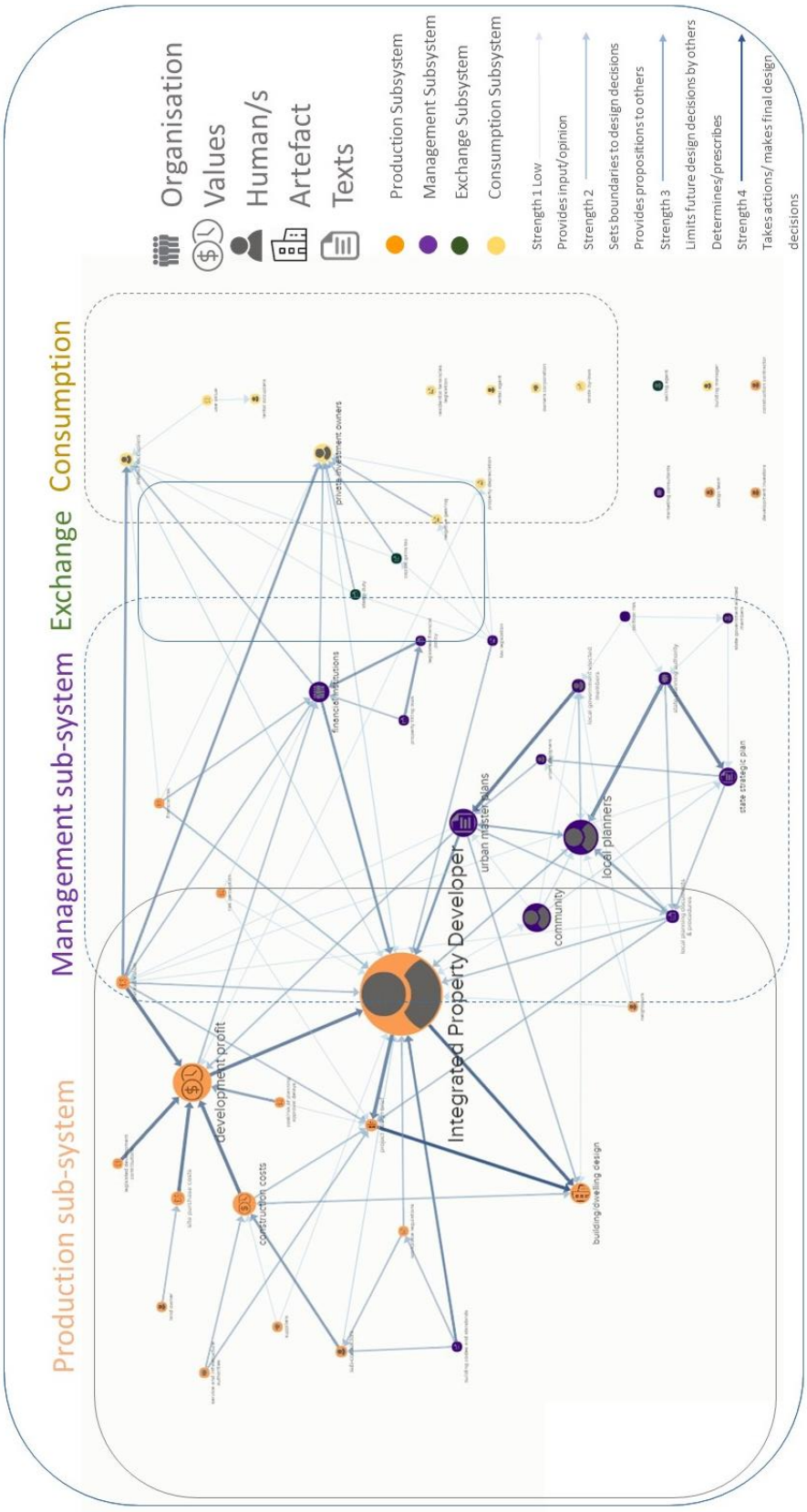


Figure 6.9. Integrated Property Developer SoP: Actant icons sized by betweenness centrality. Page 123

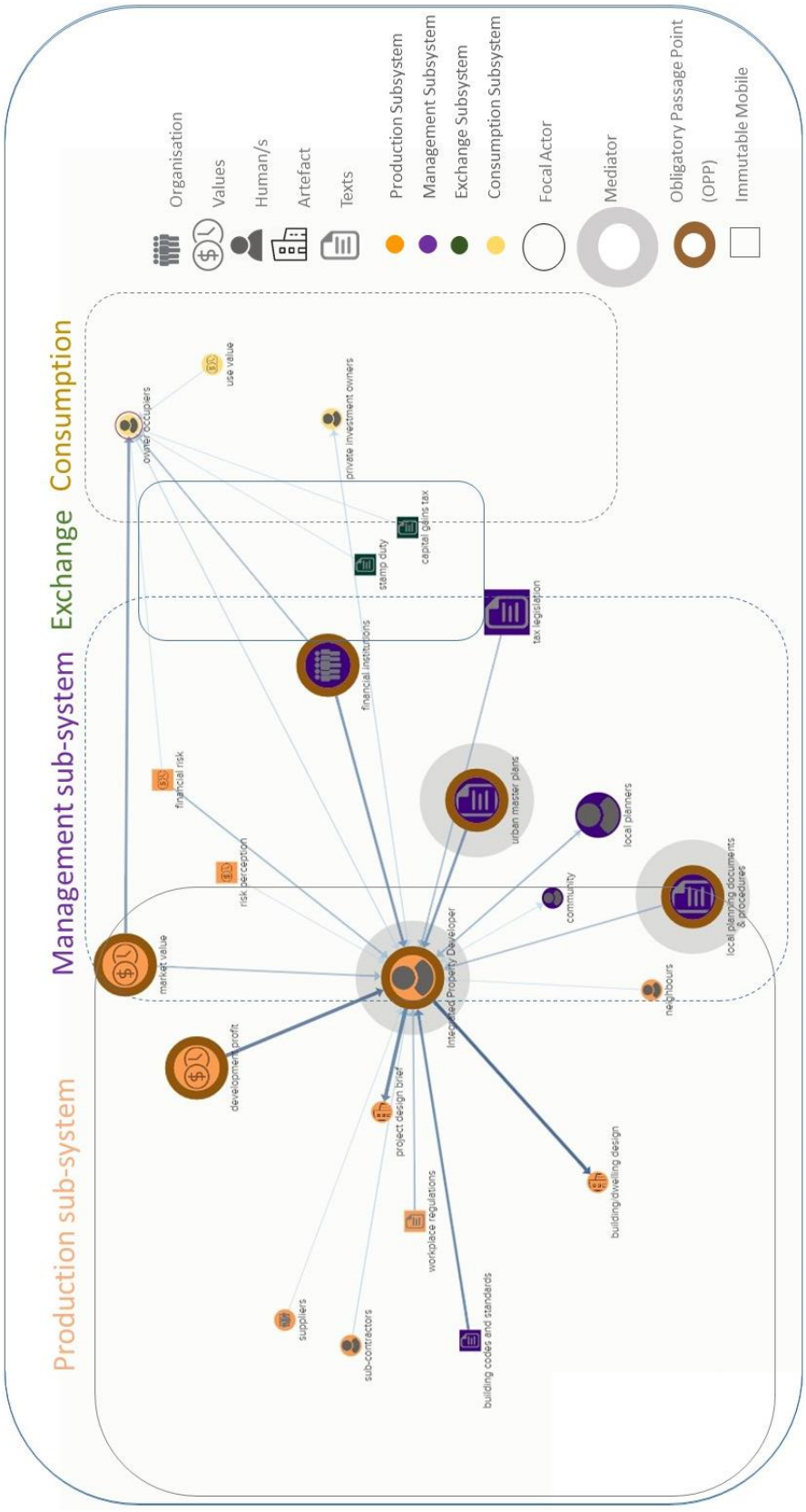


Figure 6.10. Integrated Developer. Flow path owner-occupier to developer. Page 124

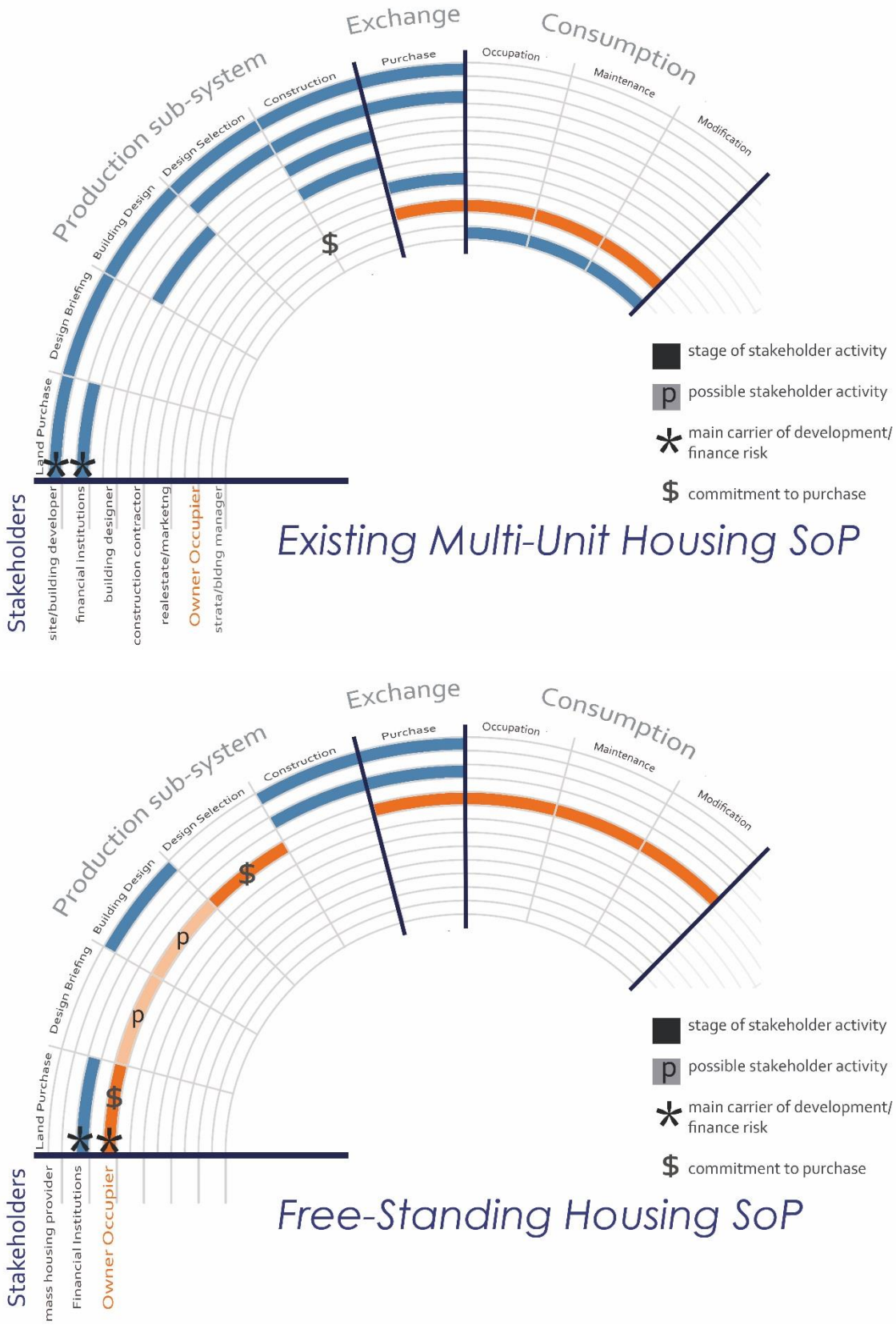


Figure 7.3. Stakeholders and stakeholder activity in existing multi-unit SoP and existing freestanding housing SoP. Page 151

Figure 7.3. Stakeholders and stakeholder activity in CitiNiche and Property Collectives SoPs. Page 151

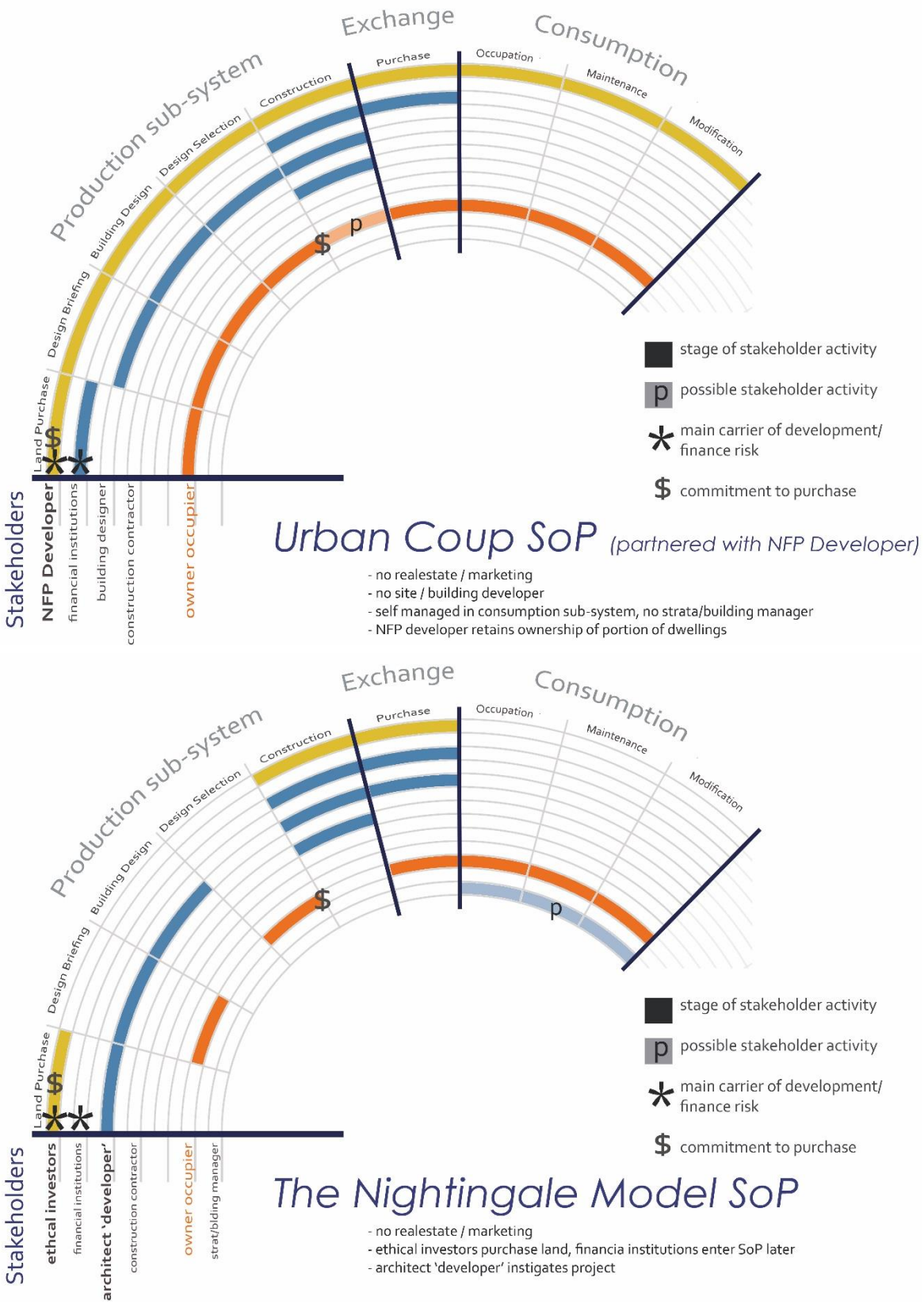


Figure 7.3. Stakeholders and stakeholder activity in Urban Coup and The Nightingale Model SoPs. Page 151

Traditional Property Developer

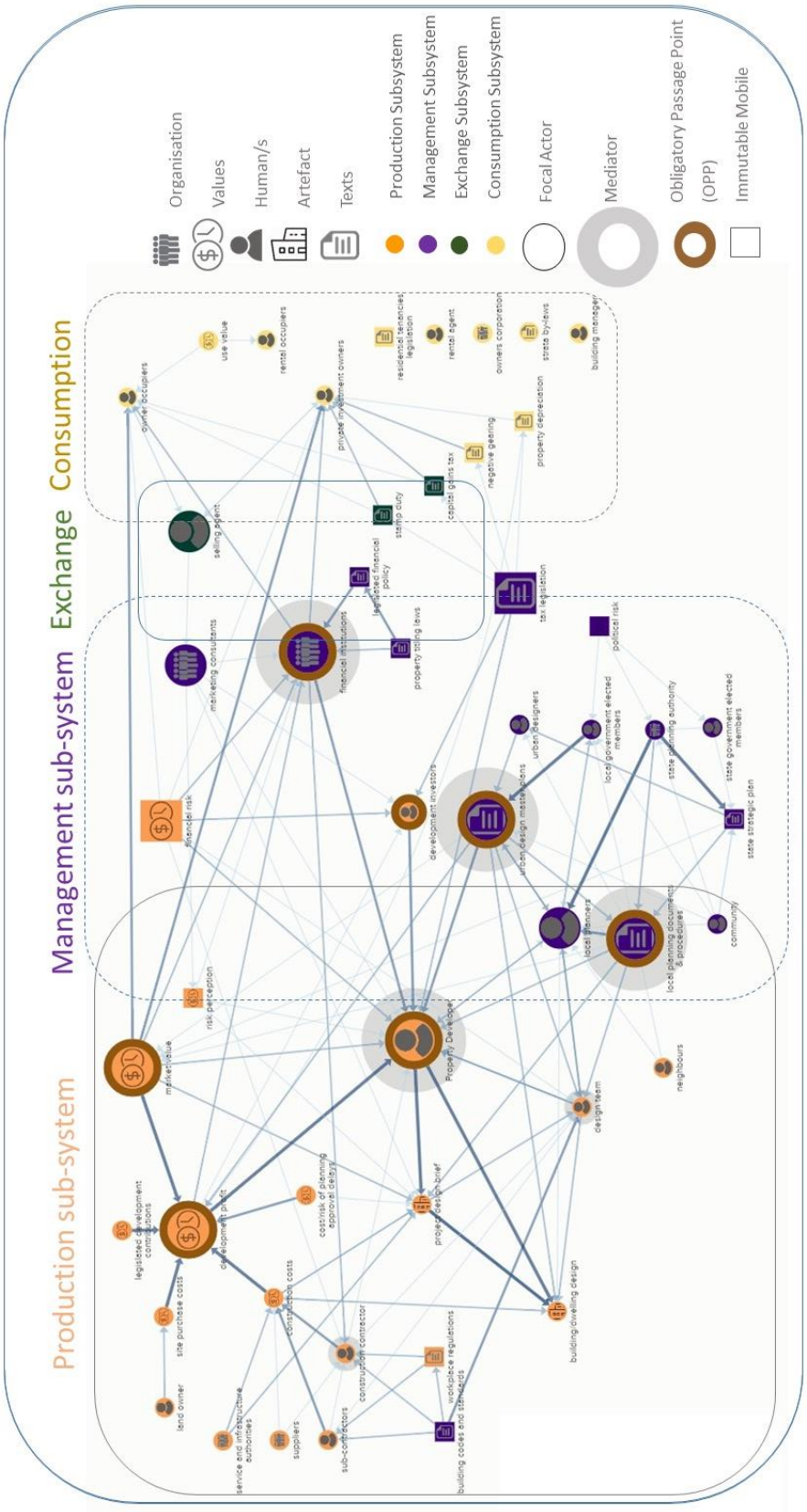


Figure 9.1. Actor-network maps of existing and innovative multi-unit structures of provision. Page 173

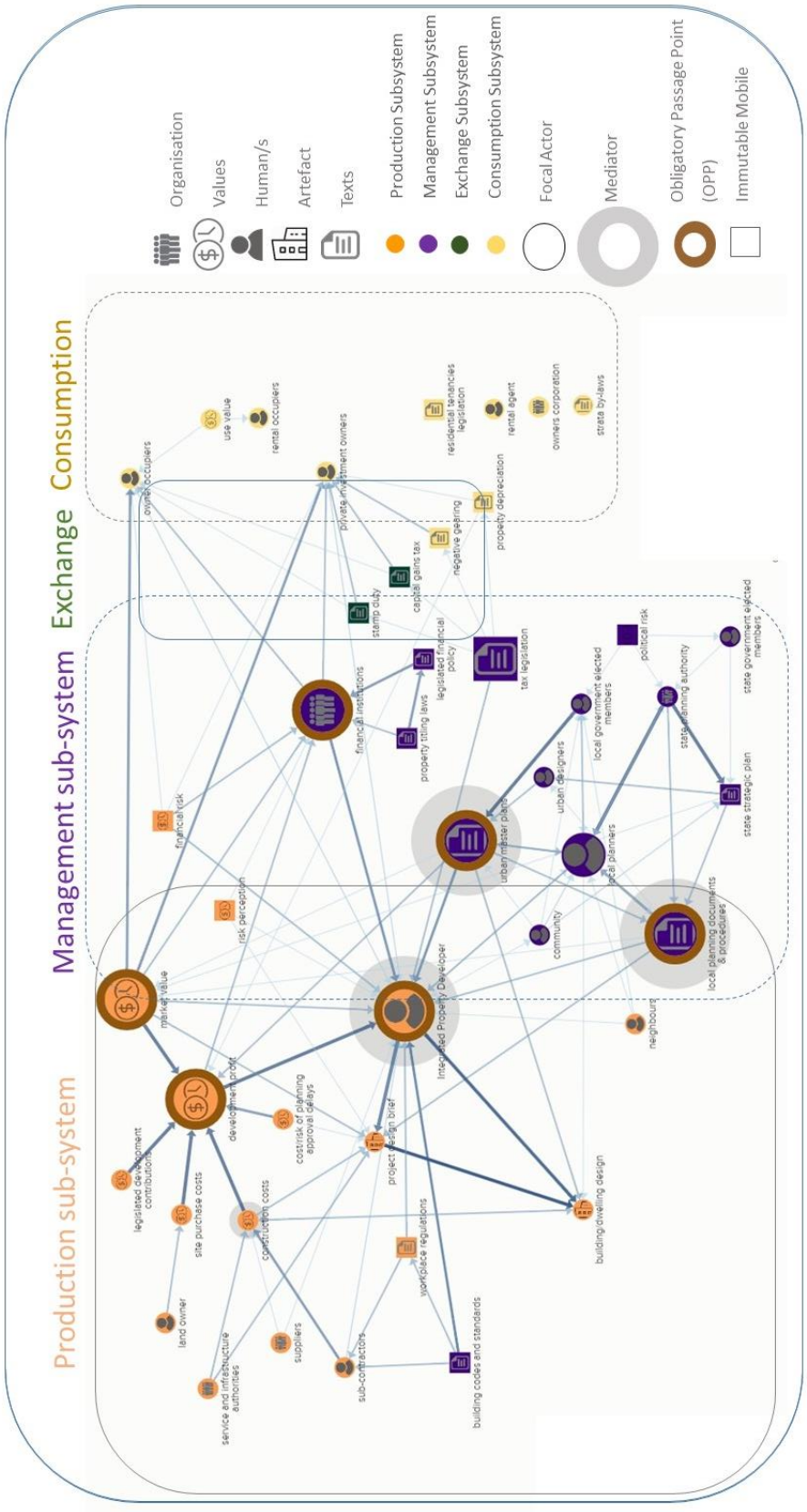


Figure 9.1. Actor-network maps of existing and innovative multi-unit structures of provision. Page 173

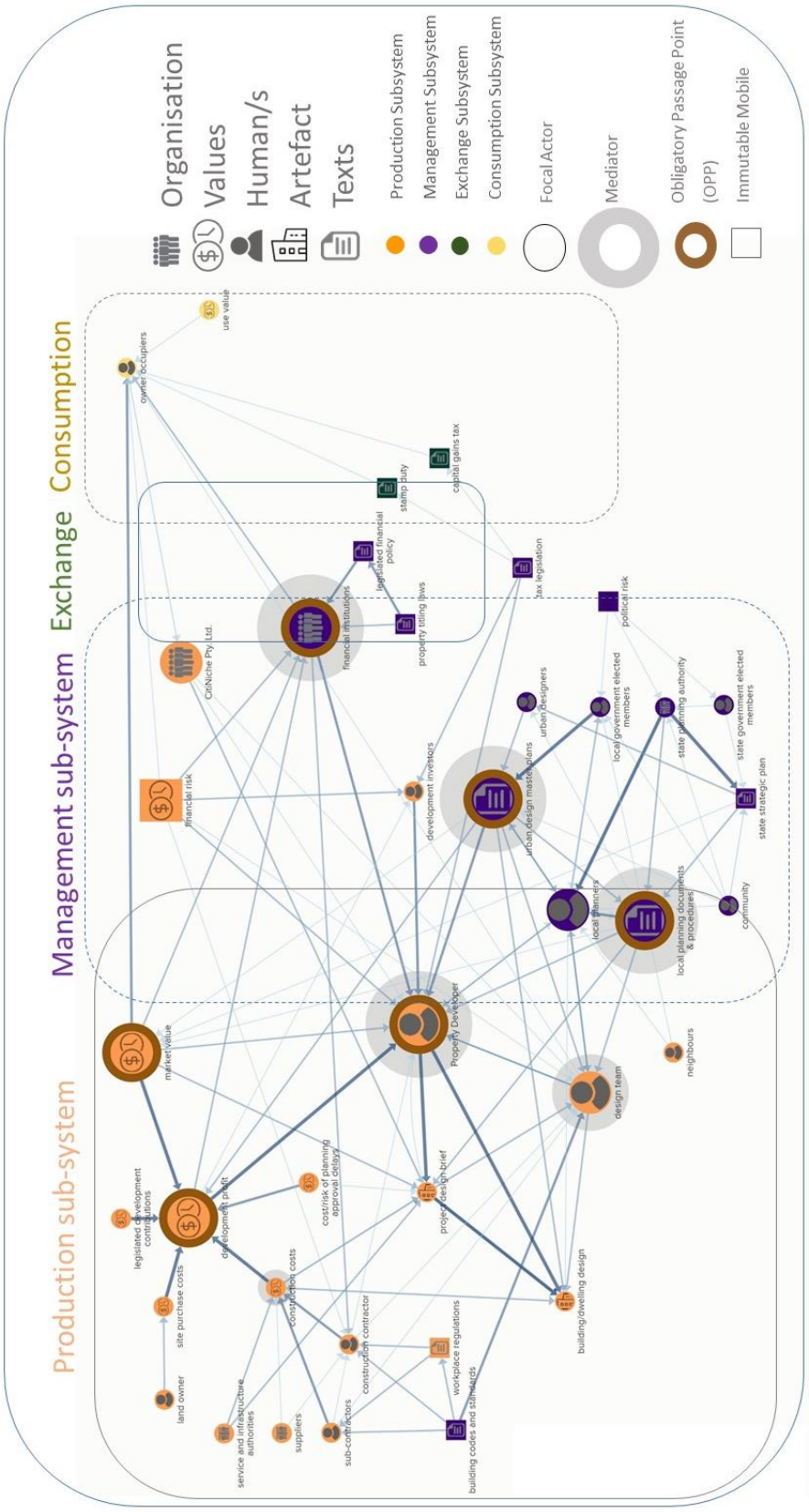


Figure 9.1. Actor-network maps of existing and innovative multi-unit structures of provision. Page 173

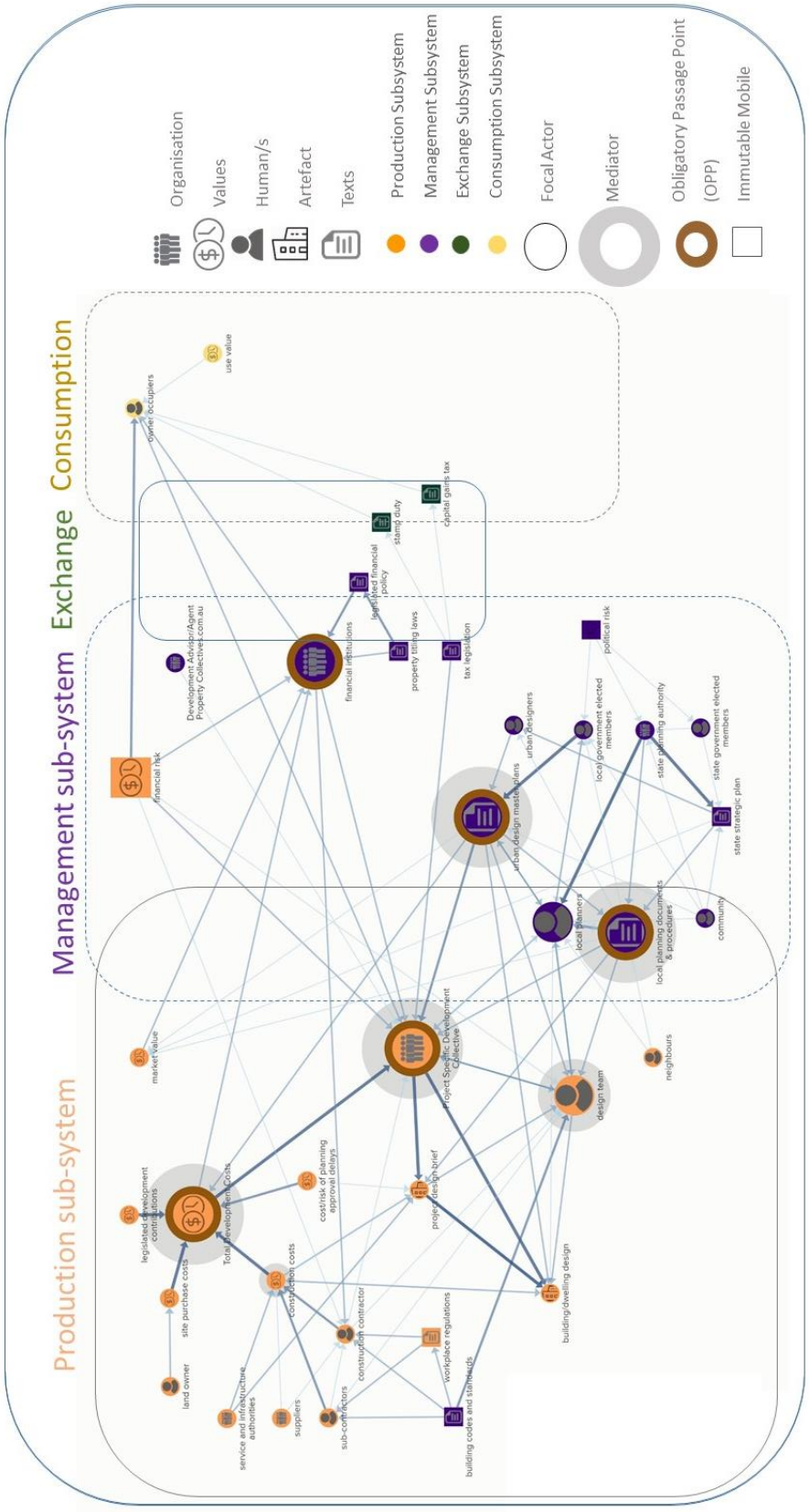


Figure 9.1. Actor-network maps of existing and innovative multi-unit structures of provision. Page 173

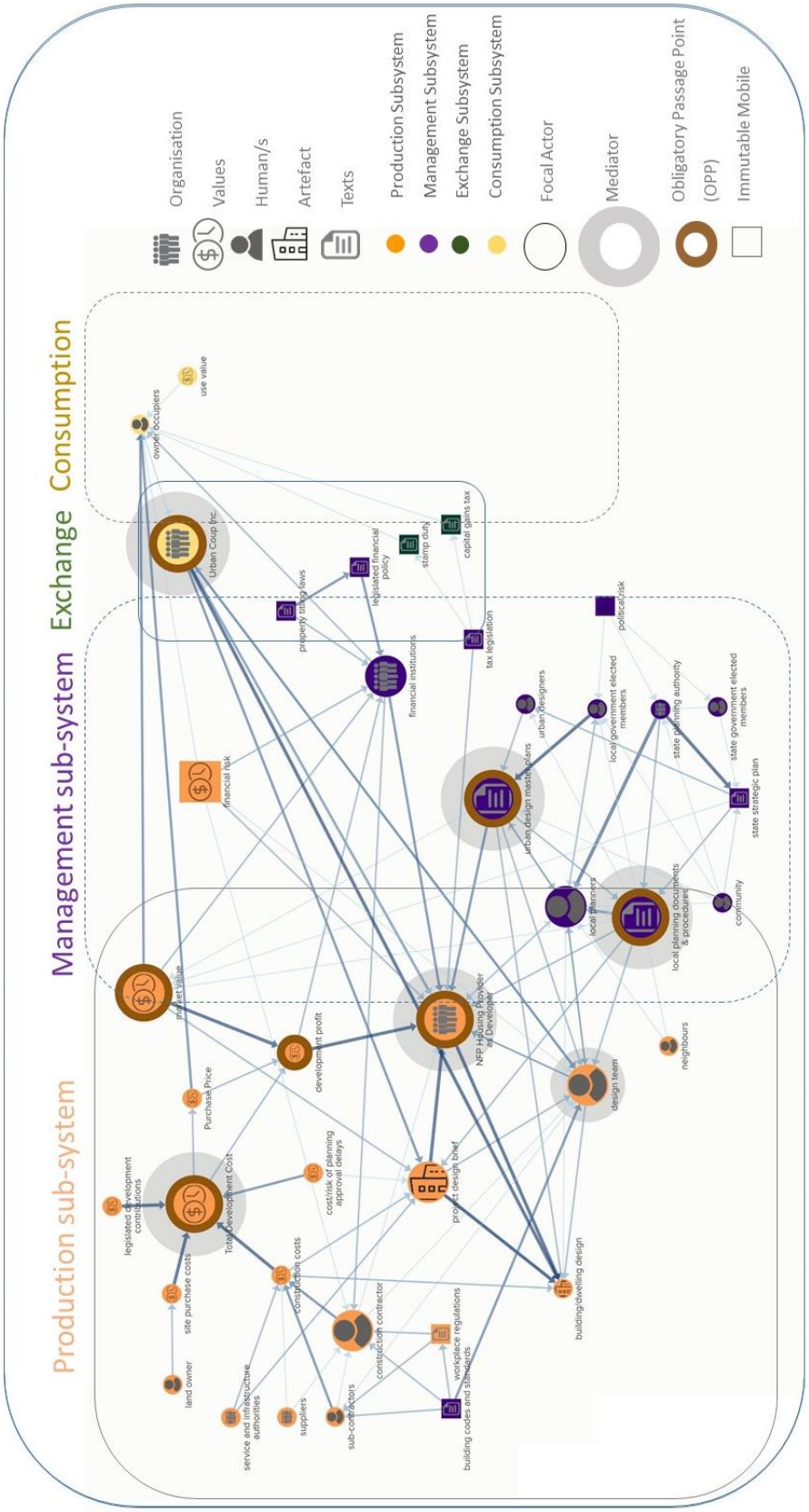


Figure 9.1. Actor-network maps of existing and innovative multi-unit structures of provision. Page 173

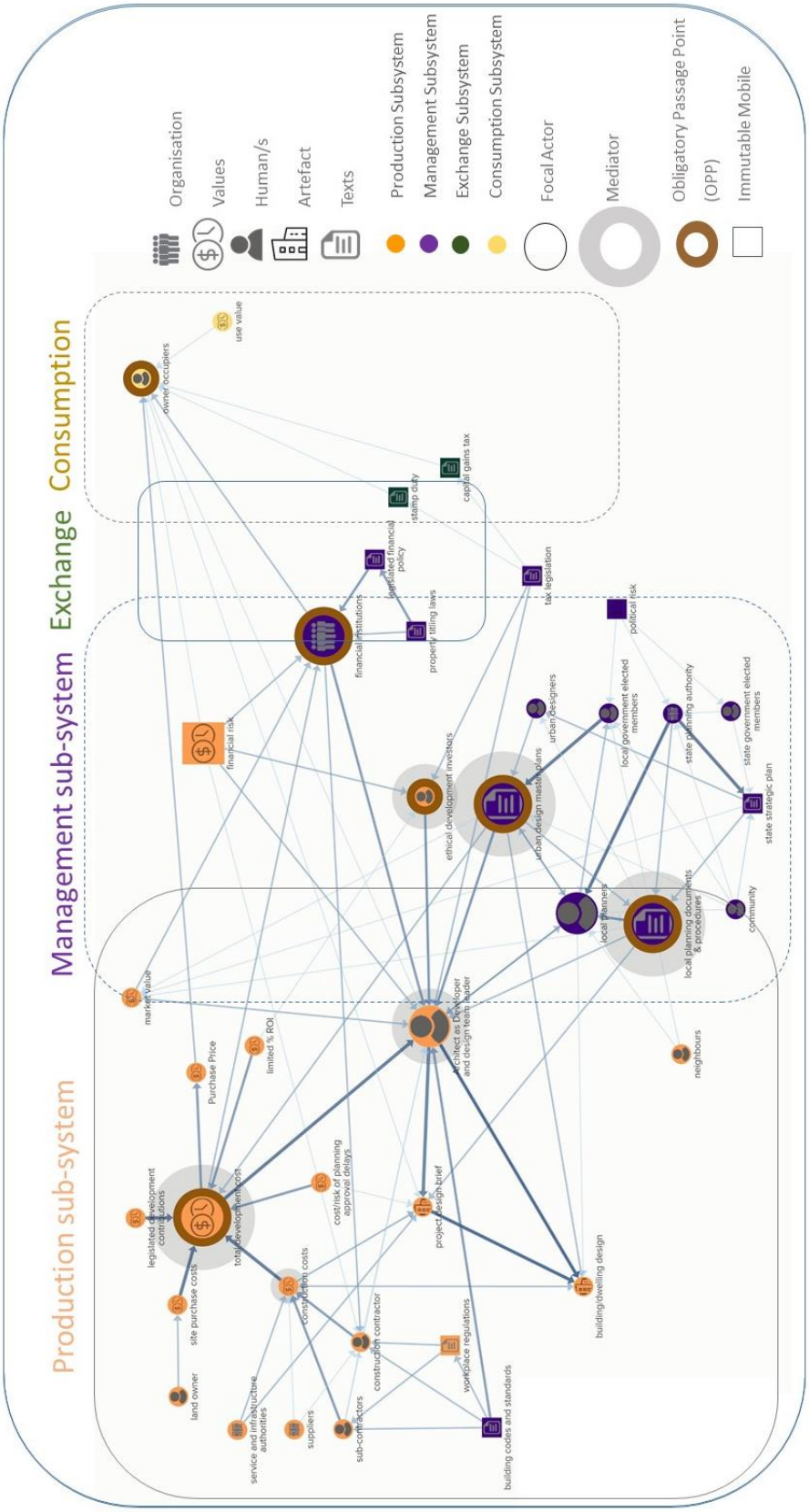


Figure 9.1. Actor-network maps of existing and innovative multi-unit structures of provision. Page 173

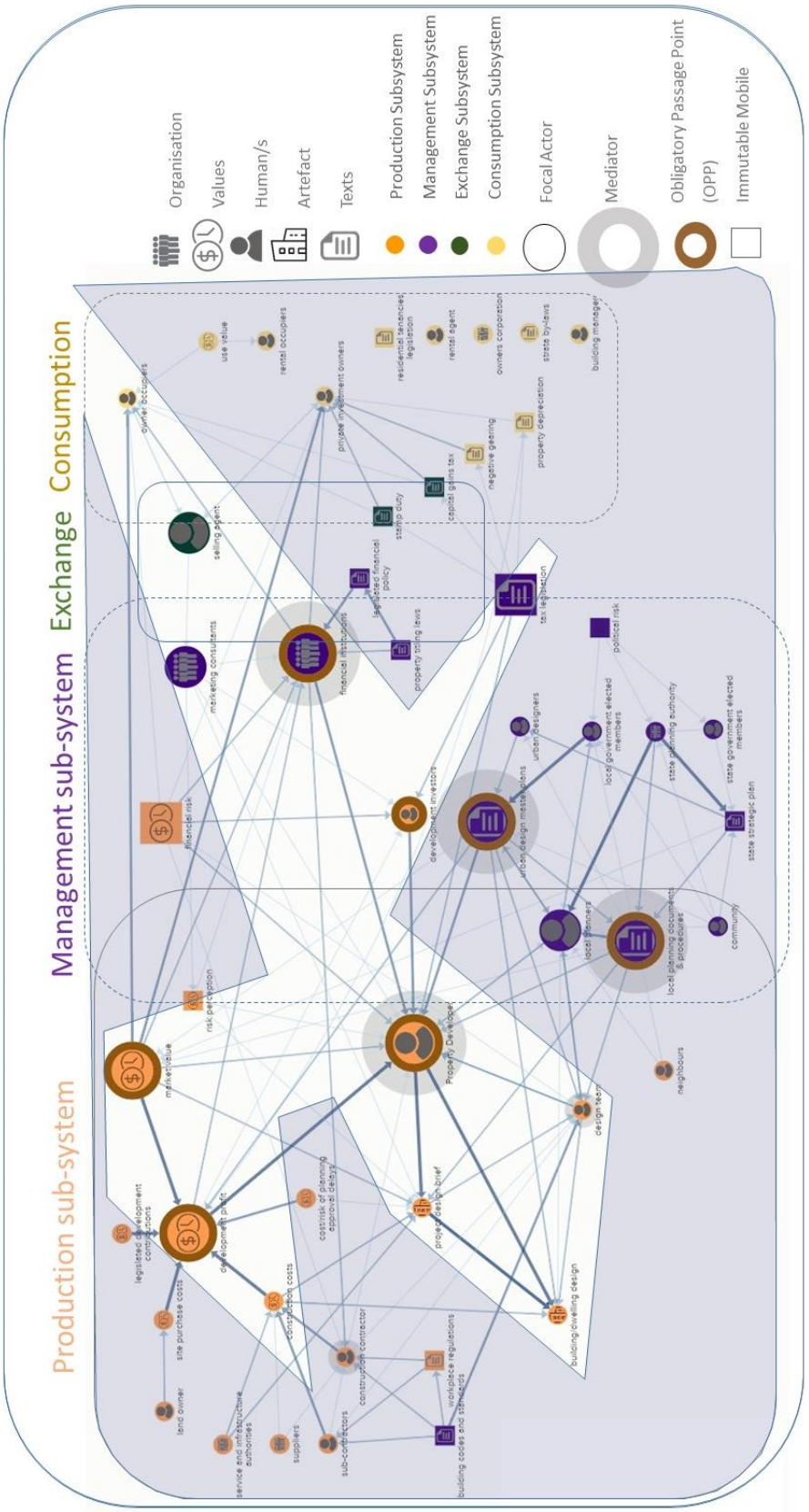
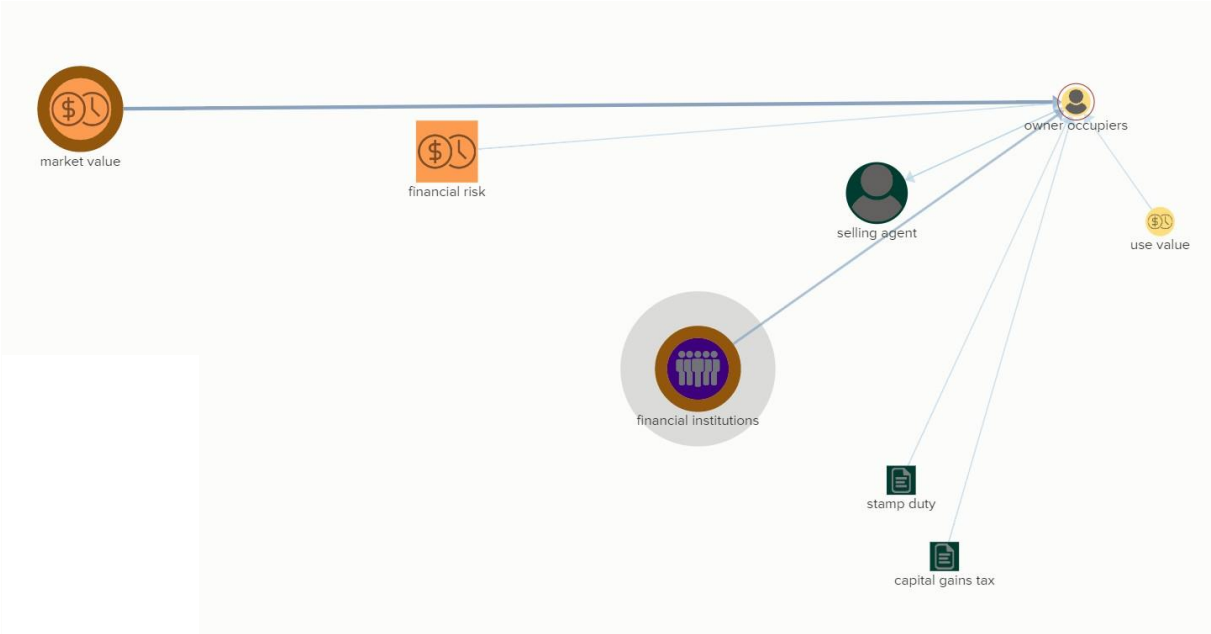


Figure 9.2. Existing multi-unit SoP. Masked actants unchanged across all alternative SoPs. Page 174

Figure 9.3. Ego-network maps of owner-occupiers in alternative multi-unit SoPs. Page 175

Traditional Property Developer: Ego-network of Owner-Occupier



Integrated Property Developer: Ego-network of Owner-Occupier

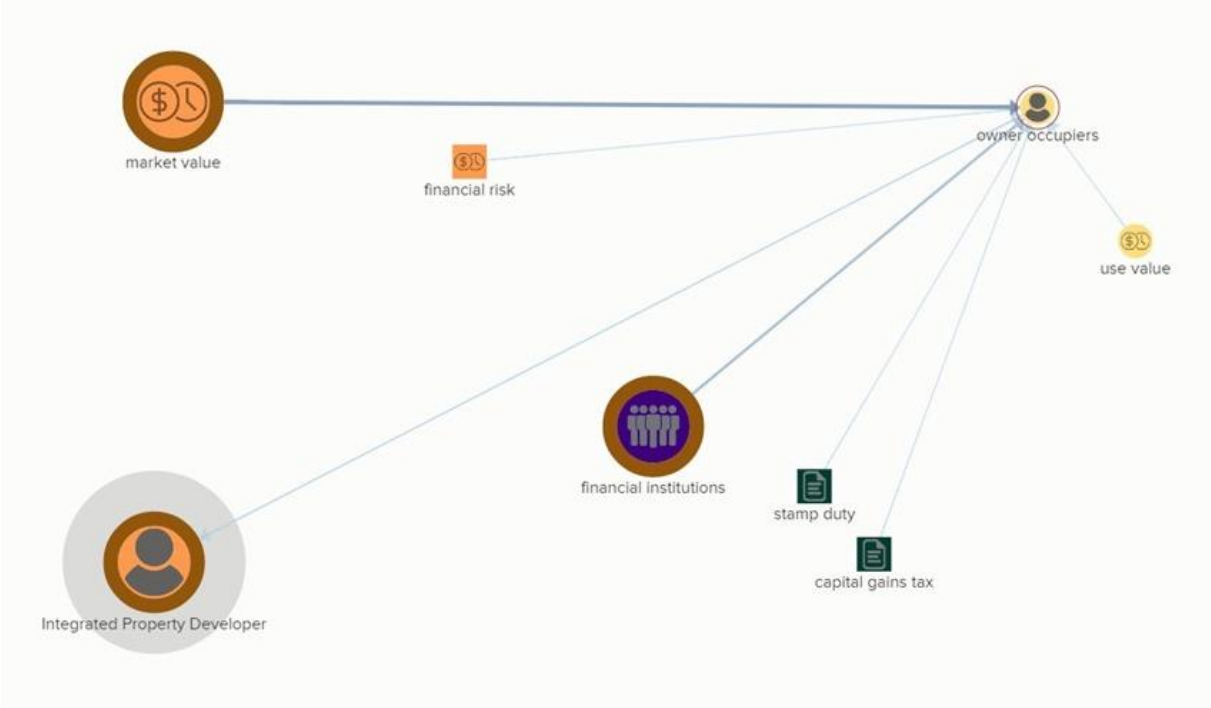
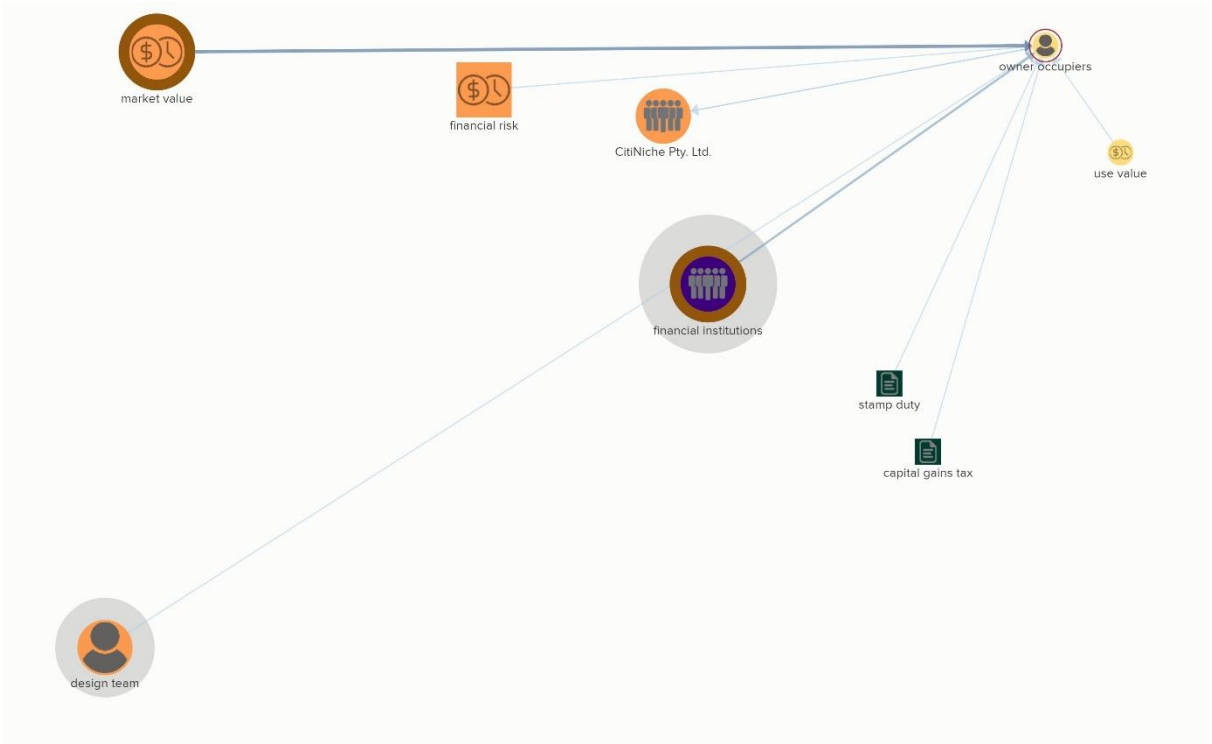


Figure 9.3. Ego-network maps of owner-occupiers in alternative multi-unit SoPs. Page 175

CitiNiche: Ego-network of Owner-Occupier



Property Collectives: Ego-Network of Project Specific Development Collective as client group

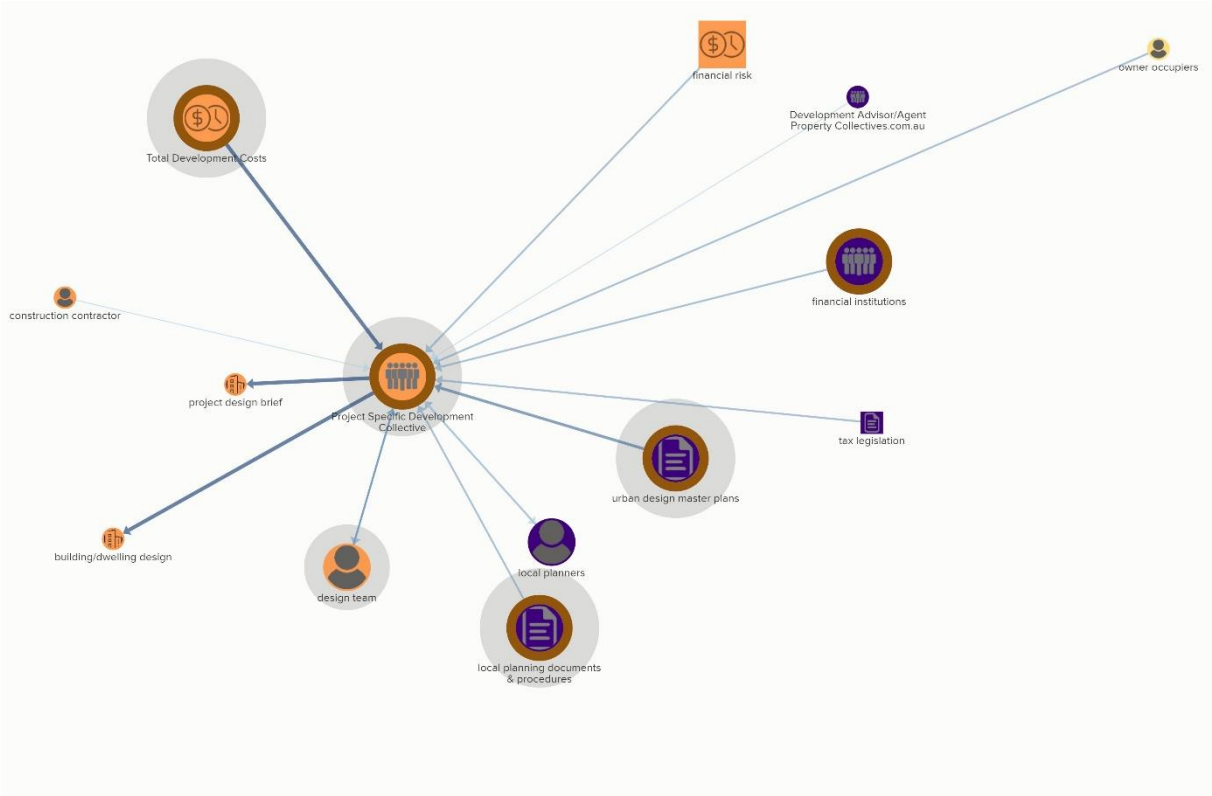
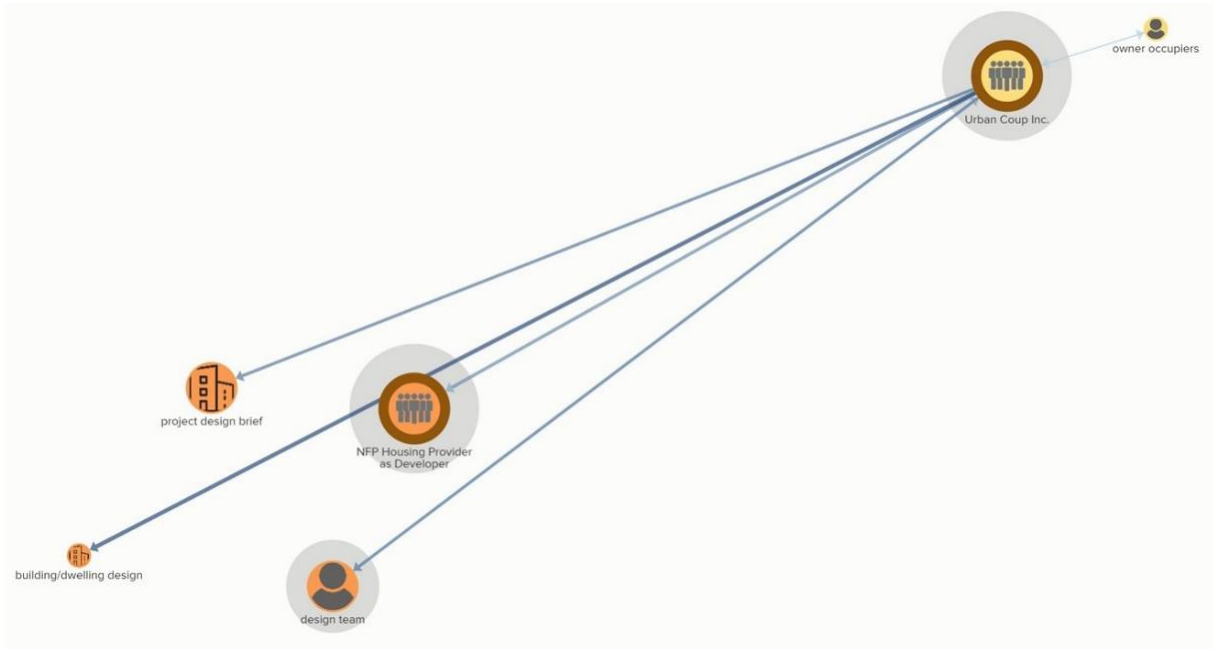
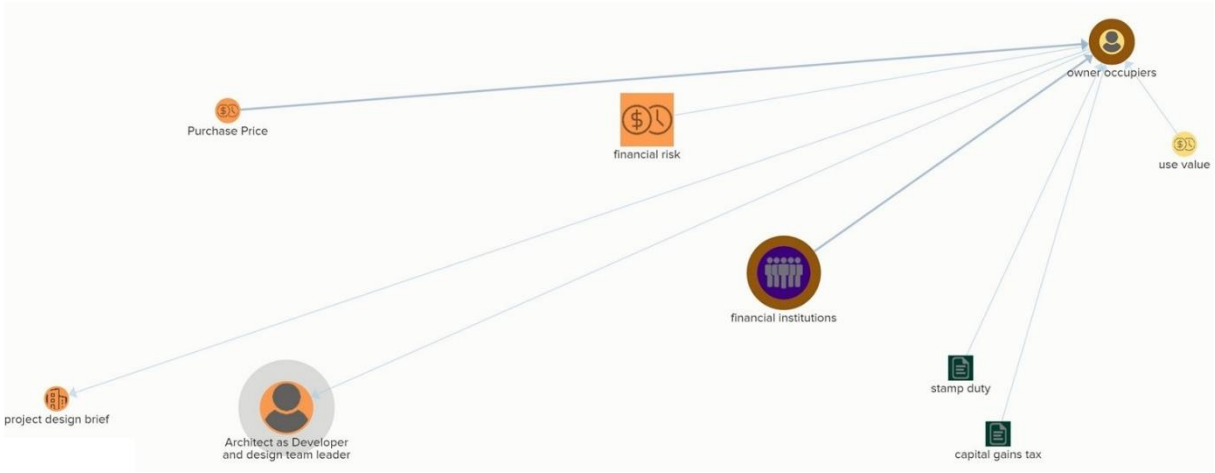


Figure 9.3. Ego-network maps of owner-occupiers in alternative multi-unit SoPs. Page 175

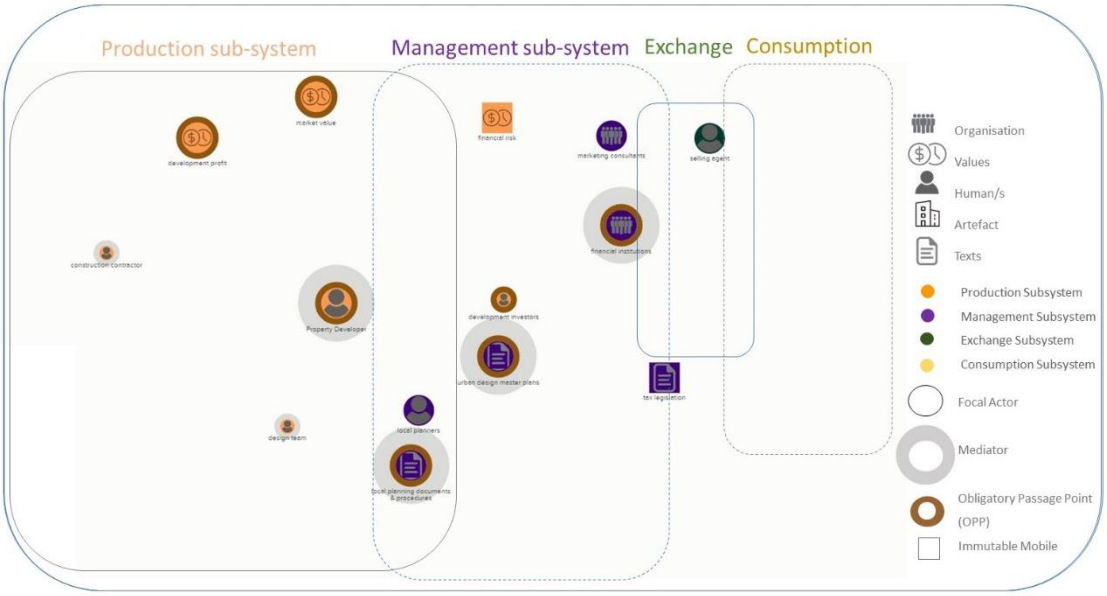
Urban Coup: Ego-Network of Urban Coup as client group



The Nightingale Model: Ego-network of Owner-Occupier



Traditional Property Developer



Integrated Property Developer

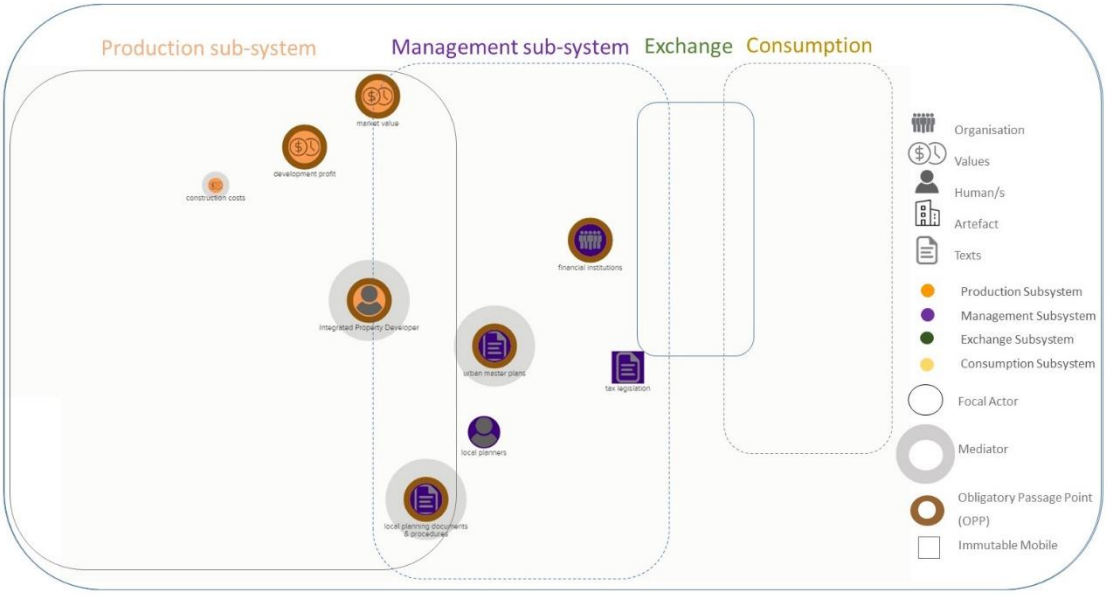
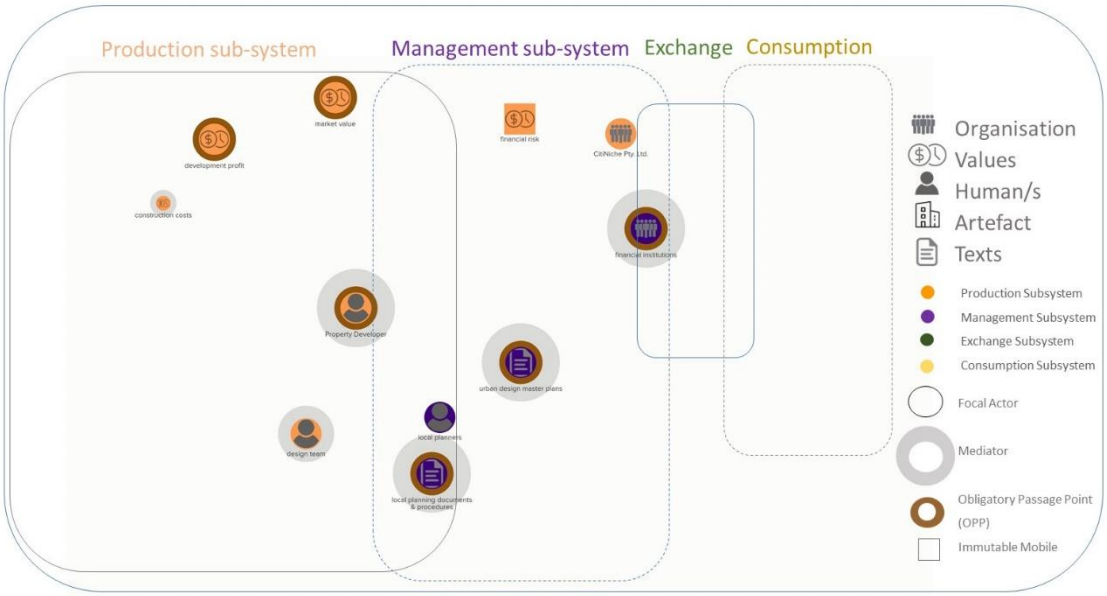


Figure 9.4. Key Actants of existing and innovative multi-unit structures of provision. Page 177

CitiNiche



Property Collectives

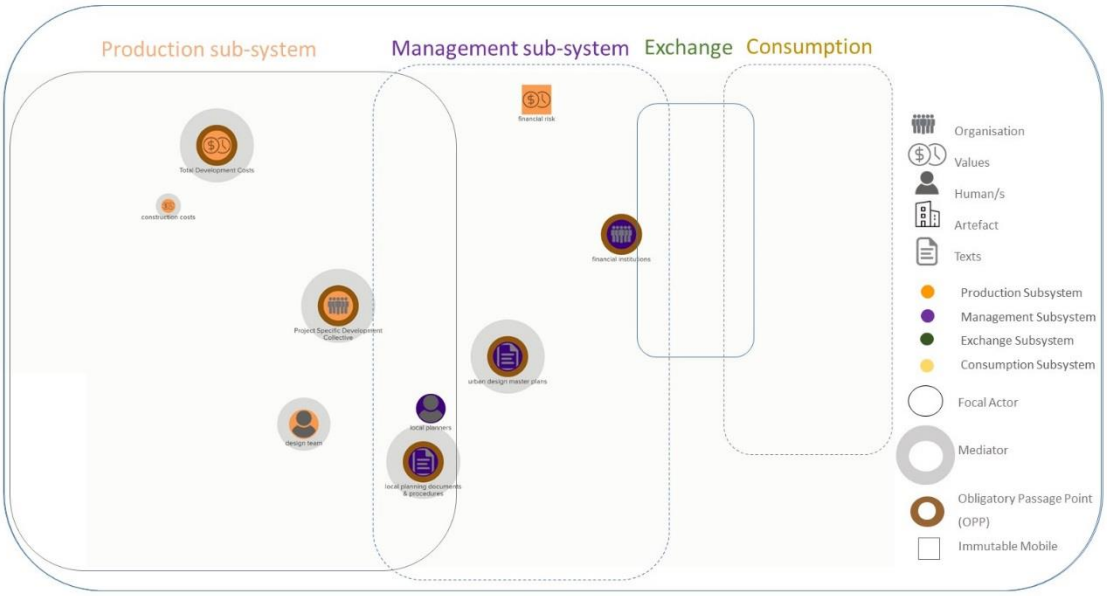
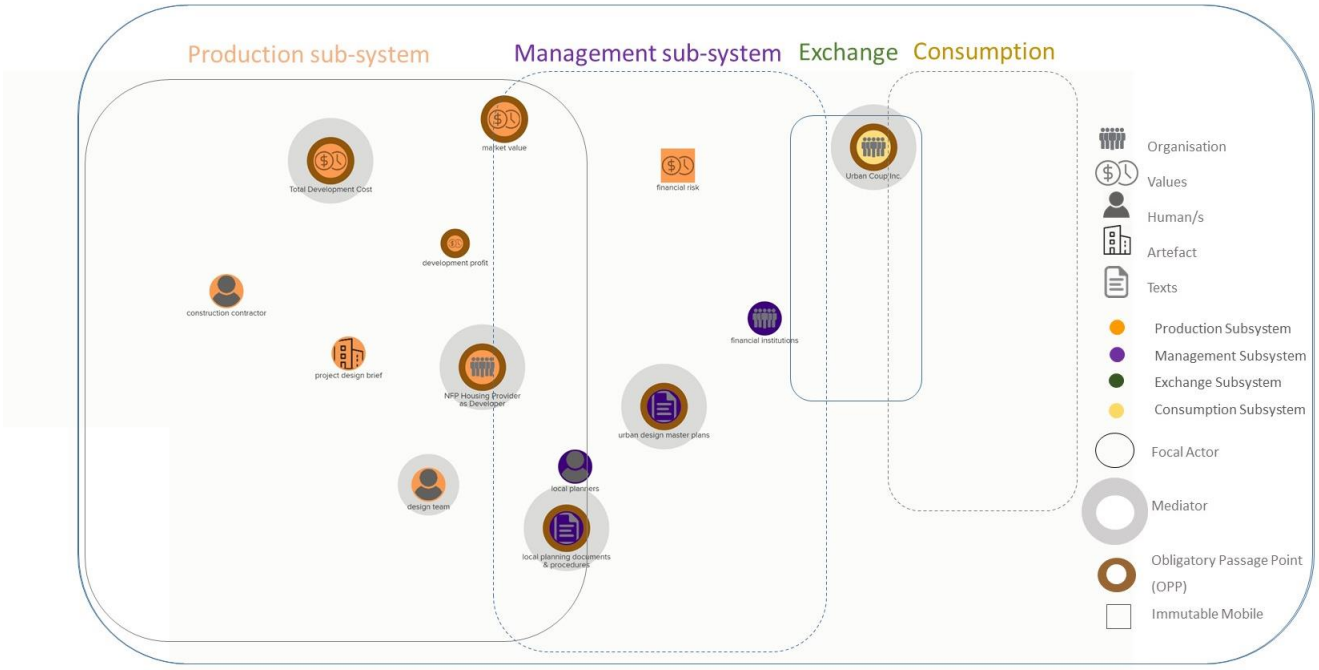


Figure 9.4. Key Actants of existing and innovative multi-unit structures of provision.
Page 177

Urban Coup



The Nightingale Model

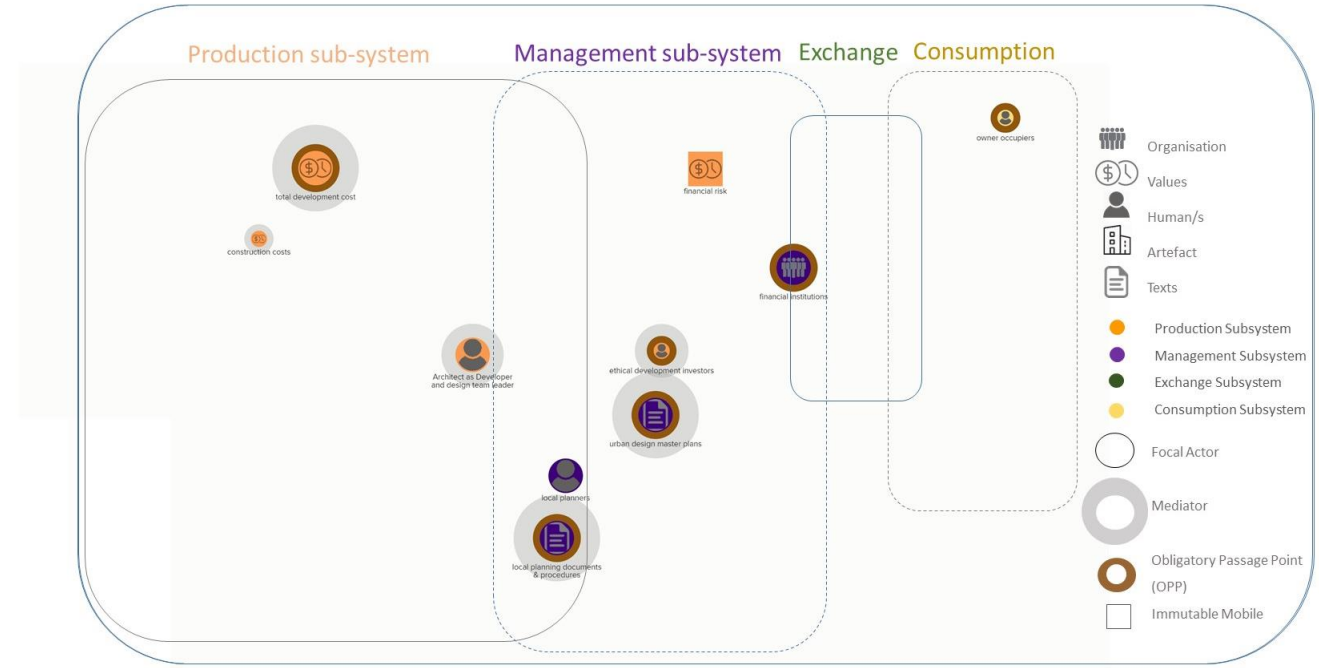


Figure 9.4. Key Actants of existing and innovative multi-unit structures of provision. Page 177

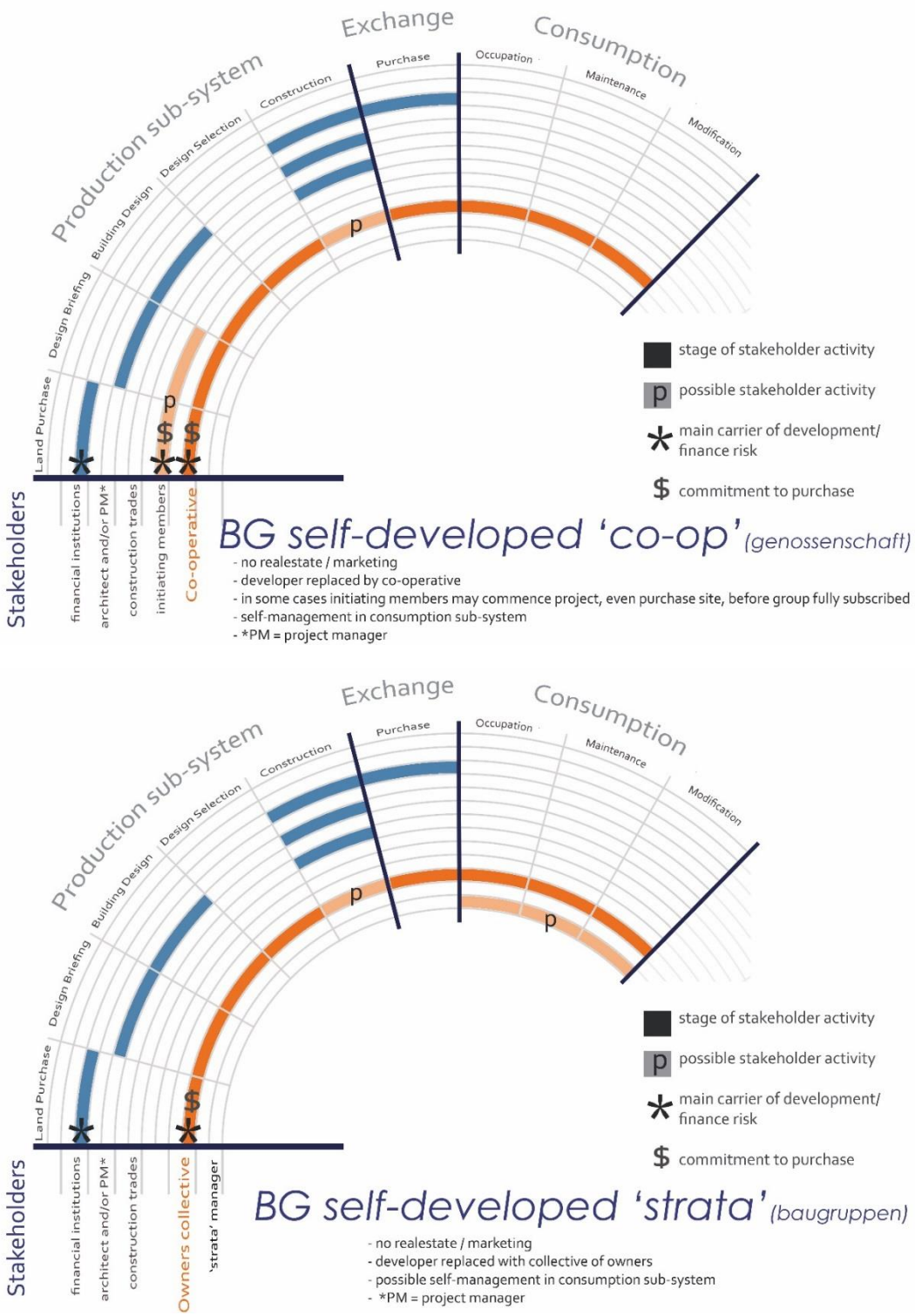
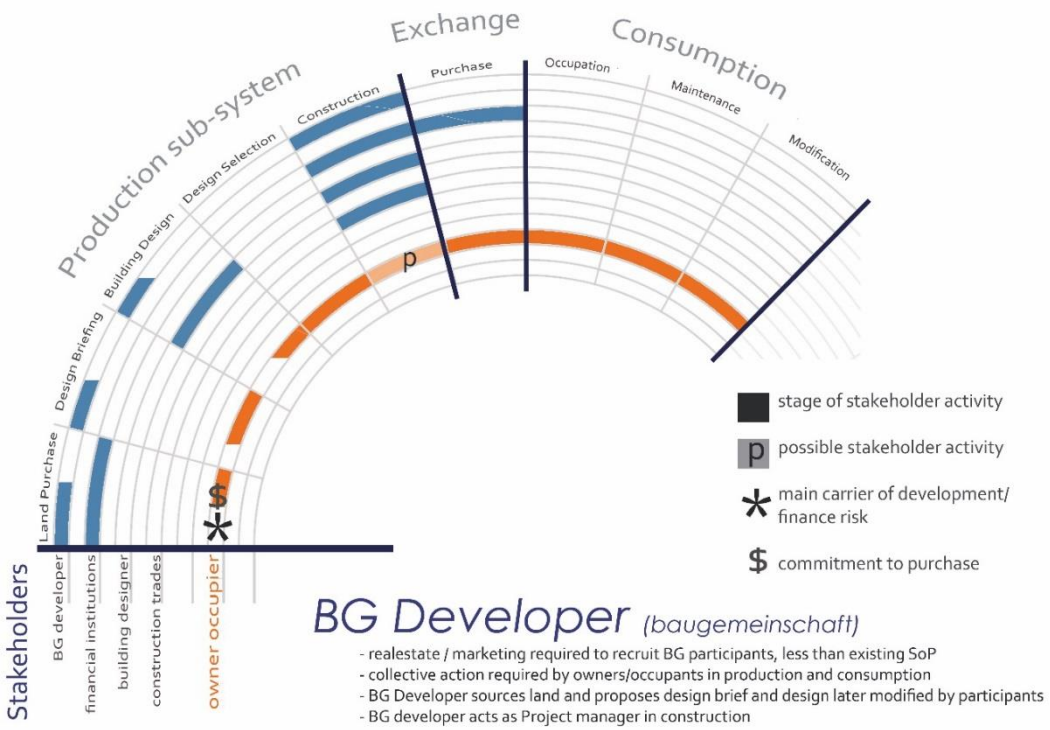


Figure 11.2. Comparison of stakeholders and stakeholder activity in alternative multi-unit SoPs. Page 257



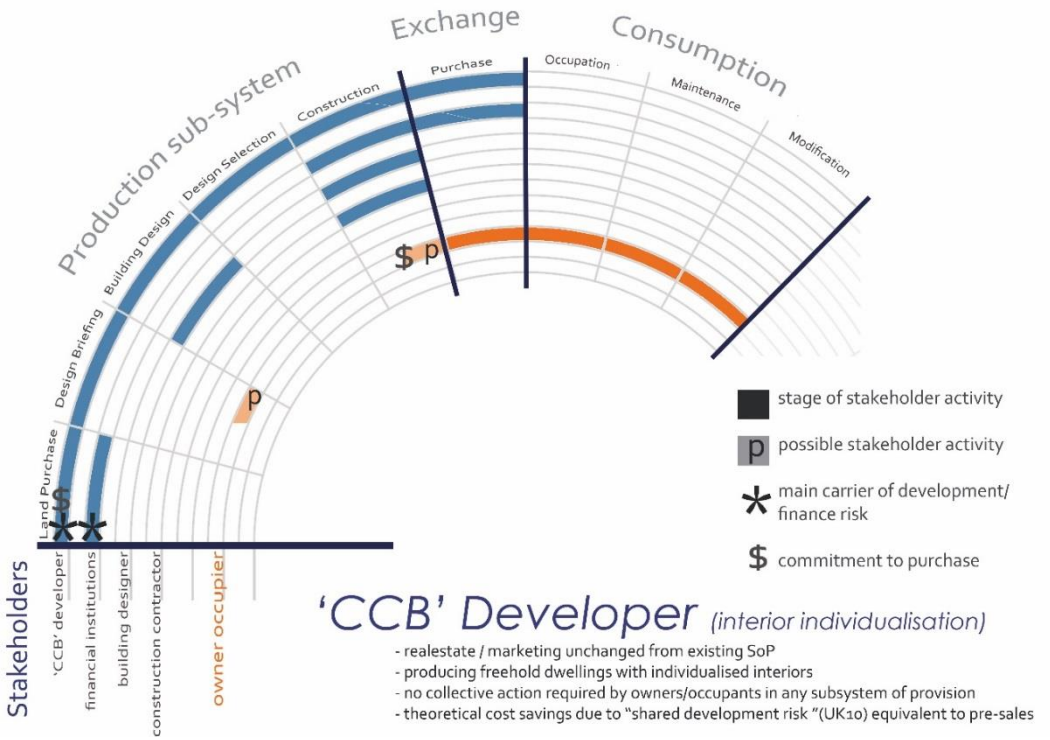


Figure 11.2. Comparison of stakeholders and stakeholder activity in alternative multi-unit SoPs. Page 257

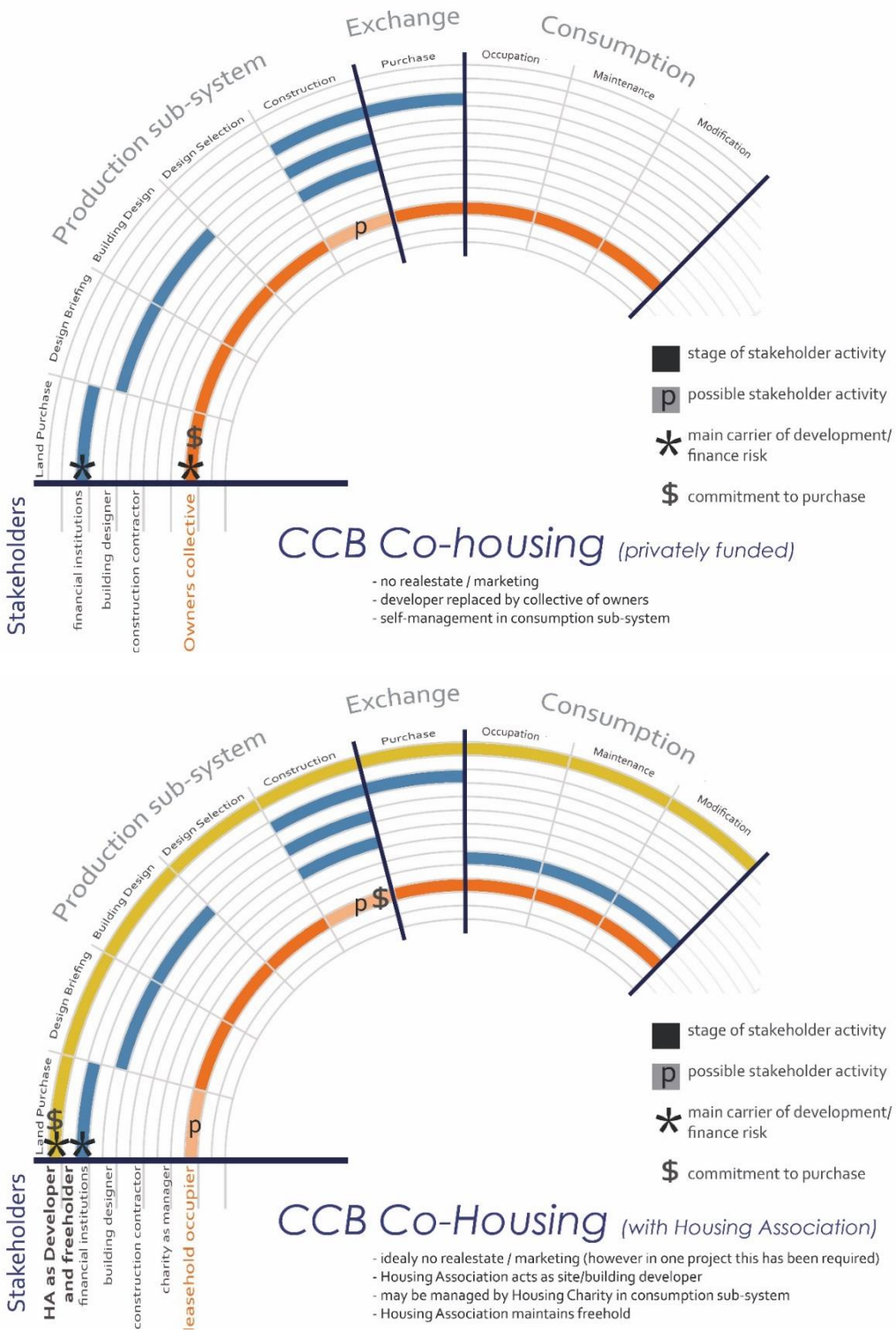


Figure 11.2. Comparison of stakeholders and stakeholder activity in alternative multi-unit SoPs. Page 257

References

Abrahams, T (2012), 'Little Map of Horrors', *Architects' Journal*, vol. 235, no. 12, pp. 76-77.

Ache, P & Fedrowitz, M (2012), 'The Development of Co-Housing Initiatives in Germany', *Built Environment*, vol. 38, no. 3, pp. 395-412.

Achtenberg, EP & Marcuse, P (1986), 'Toward the Decommodification of Housing', in R.G. Bratt, C. Hartman & A. Meyerson (eds), *Critical Perspectives on Housing*, Temple University Press, Philadelphia, pp. 474-483.

Adamo, S (2014), 'Property Trusts', *Quaderns: D'Arquitectura I Urbanisme Publicacio del Collegi D'Arquitectes de Catalunya*, no. 265.

Altmann, E (2015), 'Policy Implications for Governing Australia's Apartment Communities: Tenants, committees of management and strata managers ', in R. Dufty-Jones & D. Rogers (eds), *Housing in 21st-Century Australia: People, practices and policies*, Ashgate, Surry, England, pp. 121-136.

Alves, T (2006), 'Managing Medium Density Housing Development: A municipal case study', Institute for Social Research, Doctor of Philosophy thesis, Swinburne University of Technology.

Alves, T & London, G (2012), 'New Housing for a Shifting Urban Paradigm', paper presented at 6th Australasian Housing Researchers' Conference, Adelaide, Australia.

Anderson, B & McFarlane, C (2011), 'Assemblage and Geography', *Area*, vol. 43, no. 2, pp. 124-127.

Anderson, JC, Håkansson, H & Johanson, J (1994), 'Dyadic Business Relationships within a Business Network Context', *Journal of Marketing*, vol. 58, no. 4, pp. 1-15.

Anderton, F (2015), *Does Germany have the Answer to Affordable Living?,* Radio Interview, F. Anderton & C. Chamberlain, 28 July 2015, KCRW, viewed 24 November 2015, <http://www.kcrw.com/news-culture/shows/design-and-architecture/is-berlins-cohousing-a-model-for-la-a-german-board-game-pits-east-and-west>.

Andre, C (2011), *Improving the Functioning of the Housing Market in the United Kingdom: OECD Economics Department Working Paper No.867*, OECD Publishing.

Andrews, D & Sanchez, AC (2011), 'The Evolution of Homeownership Rates in Selected OECD Countries: Demographic and public policy influences', *OECD Journal: Economic Studies*, vol. 2011, no. 1, pp. 207-243.

Arendt, H (1970), *On Violence*, Harcourt, Brace, Jovanovich.

Atkinson, P & Coffey, A (2011), 'Analysing Documentary Realities', in D. Silverman (ed.), *Qualitative Research*, 3rd edn, Sage, London, pp. 77-92.

Aust, S & Rosenbladt, S (eds) (1981), *Hausbesetzer: Wofür sie kämpfen, wie sie leben und wie sie leben wollen*, Hoffmann und Campe, Hamburg.

Australian Bureau of Statistics (2010), *Australian Social Trends December 2010: Moving house*, Canberra.

—— (2011), *Census of Population and Housing*, ABS, Canberra.

—— (2012), *Dwelling Tenure - Australia and capital city fact sheet*, ABS, Canberra.

—— (2015), *Cat. No. 8731.0 Building Approvals, Australia*, February 2015, ABS, Canberra.

Australian Design Review (2015), 'Breathe Architecture Reveals New Plans for The Nightingale', *News*, viewed 10 February 2015, <http://www.australiandesignreview.com/news/51516-breathe-architecture-designs-a-new-model-for-apartment-living>.

Australian Institute of Architects (2014), *2014 Frederick Romberg Award for Residential Architecture: Multiple Housing, The Commons, Breathe Architecture*, https://www.youtube.com/watch?v=IBps5BRywds, 10 November 2014.

Badcock, BA & Beer, A (2000), *Home Truths: Property ownership and housing wealth in Australia*, Melbourne University Press, Carlton, Vic.

Ball, M (1981), 'The Development of Capitalism in Housing Provision', *International Journal of Urban and Regional Research*, vol. 5, pp. 145-177.

—— (1983), *Housing Policy and Economic Power : The political economy of owner occupation*, Methuen, London.

—— (1986a), 'The Built Environment and the Urban Question', *Environment and Planning D: Society and Space*, vol. 4, pp. 447-464.

—— (1986b), 'Housing Analysis: Time for a theoretical refocus?', *Housing Studies*, vol. 1, no. 3, pp. 147-166.

—— (1988), *Rebuilding Construction: Economic change in the British construction industry*, Routledge, London.

—— (1998), 'Institutions in British Property Research: A review', *Urban Studies*, vol. 35, no. 9, pp. 1501-1517.

—— (2003), 'Markets and the Structure of the Housebuilding Industry: An international perspective', *Urban Studies*, vol. 40, no. 5-6, pp. 897-916.

—— (2006), *Markets & Institutions in Real Estate & Construction*, Blackwell, Oxford.

—— (2010), 'Cities and Housing Markets: Changes and continuities in the aftermath of the 2007-08 World Financial Crisis', *Urban Studies*, vol. 47, no. 5, pp. 931-944.

—— (2011), 'Planning Delay and the Responsiveness of English Housing Supply', *Urban Studies*, vol. 48, no. 2, February 2011, pp. 349-362.

—— (2012), *European Housing Review 2012*, RICS Research, London.

—— (2014), *Rebuilding Construction: Economic Change and the British Construction Industry*, 2nd edn, Routledge, London.

—— (2016), 'Housing Provision in 21st Century Europe', *Habitat International*, vol. 54, no. 3, pp. 182-188.

Ball, M & Harloe, M (1992), 'Rhetorical Barriers to Understanding Housing Provision: What the "Provision Thesis" is and is not', *Housing Studies*, vol. 7, no. 1, pp. 3-15.

Ball, M, Harloe, M & Martens, M (1988), *Housing and Social Change in Britain and the USA*, Routledge, London.

Ballhausen, N (2014), 'Spreefeld: Wir verstehen es auch als Debattenbeitrag', *Bauwelt*, no. 39.2014, pp. 14-23.

Banham, J, Faulkner, K, Graef, R & MacDonald, M (2012), *The Future Homes Commission: Building the homes and communities Britain needs*, Royal Institute of British Architects, London.

Barlow, J, Jackson, R & Meikle, J (2001), *Homes to DIY for: The UK's self-build housing market in the twenty-first century*, Joseph Rowntree Foundation, York.

Barnes, A (2015), 'Introducing Co-Housing: Australia's urban housing solution', *domain.com.au*, 24 April 2015.

Barry, A (2001), *Political Machines: Governing a technological society*, Athlone, London.

Bartholomew, J (2015), *The Welfare of Nations*, Biteback Publishing, London.

Bearman, P, Faris, R & Moody, J (1999), 'Blocking the Future', *Social Science History*, vol. 23, no. 4, pp. 501-533.

Bearman, P & Stovel, K (2000), 'Becoming a Nazi: A model for narrative networks', *Poetics*, vol. 27, no. 2, pp. 69-90.

Beer, A, Kearins, B & Pieters, H (2007), 'Housing Affordability and Planning in Australia: The challenge of policy under neo-liberalism', *Housing Studies*, vol. 22, no. 1, pp. 11-24.

Bektas, E, Brouwer, J, Di Giulio, R, Bennicelli Pasqualis, M & Quentin, C (2014), 'A Sustainable Design Methodology for Collective-Self-Organized Housing Projects to Build Sustainable Districts', in *World Sustainable Building Congress WSB14,* Green Building Council Espana, Barcelona, Spain.

Bengtsson, F & Eriksson Lundstrom, J (2013), 'ANT-Maps: Visualising perspectives of business and information systems', in *Thirty Fourth International Conference on Information Systems,* Milan, Italy.

Bennett, J (2004), 'The Force of Things: Steps toward an ecology of matter', *Political Theory*, vol. 32, pp. 347-372.

Benson, M (2014), *Creating a Nation of Selfbuilders: An interim report from the project Selfbuilding: the production and consumption of new homes from the perspective of*

households. Economic and Social Research Council Grant ES/K001078/1, Goldsmiths University of London, Department of Sociology, London.

—— (2015), *The Social in Self Build*, Goldsmiths University of London, Economic & Social Research Council, London.

Bentley, RJ, Pevalin, D, Baker, E, Mason, K, Reeves, A & Beer, A (2016), 'Housing Affordability, Tenure and Mental Health in Australia and the United Kingdom: a comparative panel analysis', *Housing Studies*, vol. 31, no. 2, pp. 208-222.

Berliner Morgenpost (2016), 'Bericht: "Möckernkiez" kann offenbar fertig gebaut werden', *Berliner Morgenpost*, 19 February 2016.

Bernheim, L & ADAM Architecture Limited (2014), *Tomorrow's Home: Emerging social trends and their impact on the built environment*, ADAM Publishing, Hampshire.

Bevan, WJ & Lu, S (2012), 'A Multidisciplinary Literature Review of Low and Zero Carbon Technologies into New Housing', in *Proceedings of the 28th Association of Researchers in Construction Management Conference,* Edinburgh, UK, pp. 1435-1444.

Bian, Y (1997), 'Bringing Strong Ties Back In: Indirect ties, network bridges, and job searches in China', *American Sociological Review*, vol. 62, pp. 366-385.

Bijker, W & Law, J (eds) (1992), *Shaping Technology/Building Society, Studies in Sociotechnological Change*, MIT Press, Cambridge, Mass.

Birchall, J (1988), *Building Communities the Co-operative Way*, Routledge & Kegan Paul, London.

Birrell, B & Healy, E (2013), *Melbourne's High Rise Apartment Boom*, Centre for Population and Urban Research, Monash University, Melbourne.

Bliss, N (2009), *Bringing Democracy Home*, The Commission of Co-operative and Mutual Housing, Accord Housing Group, West Bromwich, London.

Bloor, D (1999), 'Anti-Latour', *Studies in History & Philosophy of Science Part A*, vol. 30A, no. 1, pp. 81-112.

Blundell, L (2010), 'Co-housing Concept Comes of Age', *The Fifth Estate*, 29 July 2010.

Blunden, H (2016), 'Discourses Around Negative Gearing of Investment Properties in Australia', *Housing Studies*, vol. 31, no. 3, pp. 340-357.

Bodenschatz, H, Heise, V & Korfmacher, J (1983), *Schluss mit der Zerstörung? Stadterneuerung und städtische Opposition in Amsterdam, London und West-Berlin*, (An end to destruction? Urban renewal and urban opposition in Amsterdam, London and West Berlin), trans. V. Heise, Anabas, Giessen.

Boelens, L & Coppens, T (2015), 'Actor-Relational Planning in Deprived Areas: Challenges and opportunities in Luchtbal Antwerpen, Belgium', *Planning Practice & Research*, vol. 30, no. 4, pp. 410-423.

Boelens, L & Visser, A-J (2011), 'Possible Futures of Self-construction: Post-structural reflections on ten-years of experimentation with (C)PC', in L. Qu & E. Hasselaar (eds), *Making Room for People: Choice, voice and liveability in residential places*, Techne Press, Amsterdam, pp. 103-128.

Borch, OJ & Arthur, MB (1995), 'Strategic Networks Among Small Firms: Implications for strategy research methodology', *Journal of Management Studies*, vol. 32, no. 4, pp. 419-441.

Borgatti, SP (2002), *Netdraw Network Visualization*, Analytic Technologies, Harvard, Mass.

—— (2006), 'Identifying Sets of Key Players in a Social Network', *Computational & Mathematical Organization Theory*, vol. 12, no. 1, pp. 21-34.

Borgatti, SP, Brass, DJ & Halgin, DS (2014), 'Social Network Research: Confusions, criticisms, and controversies', *Research in the Sociology of Organizations*, vol. 40, pp. 1-29.

Borgatti, SP, Everett, MG & Freeman, LC (2002), *Ucinet 6 for Windows: Software for social network analysis*, Analytic Technologies, Harvard, Mass.

Borgatti, SP, Everett, MG & Johnson, JC (2013), *Analysing Social Networks*, Sage, London.

Borgatti, SP & Halgin, DS (2011), 'On Network Theory', *Organization Science*, vol. 22, no. 5, pp. 1168-1181.

Borgatti, SP, Mehra, A, Brass, DJ & Labianca, G (2009), 'Network Analysis in the Social Sciences', *Science*, vol. 323, no. 5916, pp. 892-895.

Borsch-Supan, A & Quinn, C (2016), 'Working Paper 2016/11: Taxing pensions and retirement benefits in Germany', ARC Centre of Excellence in Population Ageing Research.

Bourret, P, Mogoutov, A, Julian-Reynier, C & Cambrosio, A (2006), 'A New Clinical Collective for French Cancer Genetics: A heterogeneous mapping analysis', *Science, Technology, & Human Values*, vol. 31, no. 4, pp. 431-464.

Bowler, M & Brass, DJ (2006), 'Relational Correlates of Interpersonal Citizenship Behavior: A social network perspective', *Journal of Applied Psychology*, vol. 91, pp. 70-82.

Bradley, Q & Sparling, W (2016), 'The Impact of Neighbourhood Planning and Localism on House-building in England', *Housing, Theory and Society*, pp. 1-13.

Brand, S (2008), *Clock of the Long Now: Time and responsibility*, Basic Books, New York.

Braun, V & Clarke, V (2006), 'Using Thematic Analysis in Psychology', *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77-101.

Breathe Architecture (2014a), 'Nightingale Brochure', unpublished.

—— (2014b), *Nightingale Purchaser Interviews*, unpublished.

Breiger, RL (2004), 'The Analysis of Social Networks', in M. Hardy & A. Bryman (eds), *Handbook of Data Analysis*, Sage, London, pp. 505-526.

Breiger, RL (2007), 'Cultural Holes: Networks, meanings, and formal practices', paper presented at American Sociological Association 102nd Annual Meeting New York, 11-14 August 2007.

Brenner, N, Marcuse, P & Mayer, M (eds) (2012), *Cities for People, Not for Profit: Critical urban theory and the right to the city*, Routledge, London.

Brenton, M (2013), *Senior Cohousing Communities – An alternative approach for the UK?*, JRF Programme Paper A Better Life, Joseph Rowntree Foundation, London.

—— (2016), 'Can We or Can't We?', *Cohousing Woodside News,* 25 Jannuary 2016, <https://cohousingwoodside.co.uk/2016/01/25/can-we-or-cant-we/>.

Bresson, S & Denèfle, S (2015), 'Diversity of Self-Managed Co-Housing Initiatives in France', *Urban Research & Practice*, vol. 8, no. 1, pp. 5-16.

Brezet, J, Vergragt, P & Ven Der Horst, T (2001), *Vision on Sustainable Product Innovation*, BIS Publishers, Amsterdam.

Bridger, J (2015), 'Don't Call it a Commune', *Metropolis*, May 2015, viewed 29 January 2016, <http://www.metropolismag.com/May-2015/Dont-Call-It-A-Commune/>.

Bright Green Futures (n.d.), *The Courtyard*, viewed 23 May 2015, <http://www.brightgreenfutures.co.uk/projects/courtyard/>.

Brightman, J (2003), 'Mapping Methods for Qualitative Data Structuring', paper presented at Strategies in Qualitative Research: Methogological issues and practices using QSR NVivo and NUD*IST, London, 8-9 May 2003.

Brisbane City Council (2014), *Brisbane City Plan 2014*, Brisbane City Council, Brisbane.

Broer, S & Titheridge, H (2010), 'Eco-Self-Build Housing Communities: Are they feasible and can they lead to sustainable and low carbon lifestyles?', *Sustainability*, vol. 2, no. 7, pp. 2084-2116.

Brouwer, J & Bektas, E (2014), 'Exploring Existing Grassroots Housing Movements for Energy Efficient Districts', in *Association of European Schools of Planning (AESOP) Congress: From control to co-evolution,* Utrecht/Delft, The Netherlands.

Brouwer, J, Gerohazi, E, Luig, KT & Szemzo, H (2014), 'Market Potential for Collective Self-Organised Housing Interventions in Europe', in *40th International Association for Housing Science (IAHS) World Congress on Housing,* Funchai, Portugal.

Brown, S, Cerulli, C & Stevenson, F (2013), *Motivating Collective Custom Build Report*, University of Sheffield, University of Sheffield, Sheffield.

Brunoro, S (2013), 'The Collective Self-Organized Housing Approach: Improving the quality of life towards nearly zero energy strategies', in *Sustainable Building 13 Portugal,* Guimaraes, Portugal.

Bryant, L (2010), 'Housing Supply in Australia: The impact of the availability of development finance', in *China Architecture & Building Press 2010 International Conference on Construction and Real Estate Management,* Queensland University of Technology, Brisbane, Queensland, pp. 386-391.

—— (2012), 'An Assessment of Development Funding for New Housing Post GFC in Queensland, Australia', *International Journal of Housing Markets and Analysis*, vol. 5, no. 2, pp. 118-133.

BuenosAiresHabitat (2010), *Argentina Real Estate Trusts: Investments in construction at cost in Argentina*, Argentina Real Estate News, viewed 14 July 2014, <http://www.buenosaireshabitat.com/argentina-real-estate/trusts.html>.

Burgess, G, Monk, S & Whitehead, C (2010), *How can the Planning System Deliver More Housing? Solutions, lessons for practice and policy*, Joseph Rowntree Foundation, York, UK.

Burgess, R (1978), 'Petty Commodity Housing or Dweller Control? A critique of John Turner's views on housing policy', *World Development*, vol. 6, no. 9/10, pp. 1105-1133.

Burke, T (2012), 'The Australian Residential Housing Market: Institutions and actors', in R. Tomlinson (ed.), *Australia's Unintended Cities*, CSIRO Publishing, Collingwood, pp. 35-49.

Burke, T & Hayward, D (2000), *Housing Past. Housing Futures.*, Technical Report 4, Planning Melbourne for the 21st Century, Swinburne Institute for Social Research, Melbourne.

Burke, T & Hulse, K (2010), 'The Institutional Structure of Housing and the Sub-prime Crisis: An Australian case study', *Housing Studies*, vol. 25, no. 6, pp. 821-838.

Buxton, M, Goodman, R & March, A (2012), 'Planning Systems, Urban Form and Housing', in R. Tomlinson (ed.), *Australia's Unintended Cities*, CSIRO Publishing, Collingwood, pp. 103-116.

Byard, R (2015), 'Chaucer Enterprises Pty Ltd v Moreland CC', Planning and Environment List edn, no. P539/2015, Victorian Civil and Administrative Tribunal (VCAT), Melbourne, Victoria.

Cahn, A (2011), 'Cohousing Offers a Healthier Way to Live and a More Sustainable Business Model', *The Guardian*, 14 October 2011.

Çakin, S (1991), 'Assessment of Co-operative Housing Turkey', *Habitat International*, vol. 15, no. 1-2, pp. 39-50.

Callon, M (1986a), 'The Sociology of an Actor Network: The case of the electric vehicle', in M. Callon, J. Law & A. Rip (eds), *Mapping the Dynamics of Science and Technology*, MacMillan, London.

—— (1986b), 'Some Elements of a Sociology of Translation: Domestication of the scallops and the fishermen of St Brieuc Bay', in J. Law (ed.), *Power, Action and Belief: A new sociology of knowledge?*, Routledge, London, pp. 196-223.

—— (1987), 'Society in the Making: The study of technology as a tool for sociological analysis', in W. Bijker, T.P. Hughes & T.J. Pinch (eds), *The Social Construction of Technological Systems*, MIT Press, Cambridge, pp. 83-106.

—— (1991), 'Techno-economic Networks and Irreversibility', in J. Law (ed.), *A Sociology of Monsters: Essays on power, technology and domination*, Routledge, New York, pp. 132-164.

—— (1999), 'Actor-Network Theory: The Market Test', in J. Hassard & J. Law (eds), *Actor-Network Theory and After*, Blackwell, Oxford, pp. 181-195.

—— (2006), 'Can Methods for Analysing Large Numbers Organize a Productive Dialogue with the Actors they Study?', *European Management Review*, vol. 3, no. 1, pp. 7-16.

Callon, M & Latour, B (1981), 'Unscrewing the Big Leviathan: How actors macro-structure reality and how sociologists help them to do so', in K. Knorr-Cetina & A.V. Cicouvel (eds), *Advances in Social Theory and Methodology: Towards an integration of micro and macro-sociology*, Routledge London, pp. 277-303.

Callon, M & Law, J (1997), 'After the Individual in Society: Lessons on collectivity from science, technology and society', *Canadian Journal of Sociology*, vol. 22, no. 2, pp. 165-182.

Callon, M, Law, J & Rip, A (eds) (1986), *Mapping the Dynamics of Science and Technology: Sociology of science in the real world*, MacMillan, London.

Callon, M, Millo, Y & Muniesa, F (2007), *Market Devices*, Blackwell, Oxford.

Cambrosio, A, Keating, P & Mogoutov, A (2004), 'Mapping Collaborative Work and Innovation in Biomedicine: A computer-assisted analysis of antibody reagent Workshops', *Social Studies of Science*, vol. 34, no. 3, pp. 325-364.

Carley, K (1997), 'Network Text Analysis: The network position of concepts', in C.W. Roberts (ed.), *Text Analysis for the Social Sciences*, Lawrence Erlbaum, Hillsdale, New Jersey, pp. 79-100.

Carlson, WB & Gorman, ME (1992), 'Socio-Technical Graphs and Cognitive Maps: A response to Latour, Mauguin and Teil', *Social Studies of Science*, vol. 22, no. 1, pp. 81-91.

Carroll, N (2012), 'Service Science: An empirical study of the socio-technical dynamics of public sector service network innovation', Doctor of Philosophy thesis, University of Limerick.

—— (2014), 'Actor-Network Theory: A bureaucratic view of public service innovation', in A. Tatnall (ed.), *Technological Advancements and the Impact of Actor-Network Theory*, IGI Global, Hershey, Pennsylvania, pp. 115-144.

Carroll, N, Richardson, I & Whelan, E (2012), 'Service Science: An actor-network theory approach', *International Journal of Actor-Network Theory and Technological Innovation*, vol. 4, no. 3, July- September 2012, pp. 51-69.

Chan, K & Liebowitz, J (2006), 'The Synergy of Social Network Analysis and Knowledge Mapping: A case study', *International Journal of Management and Decision Making*, vol. 7, no. 1, pp. 19-35.

Chan, WY-P (2010), 'The Phenomenon of Building Group (Baugruppe) in Berlin: What changes when a community starts building?', Dessau Institute of Architecture Graduate School, Master of Architecture thesis, Anhalt University of Applied Sciences, Unpublished, <https://issuu.com/winnie/docs/thesis_book>.

Chapman, E (2015), 'Housing Revolution: Lessons from Berlin', *Australian Design Review*, 20 November 2015, viewed 11 December 2015, <http://www.australiandesignreview.com/architecture/62312-housing-revolution-lessons-from-berlin>.

Chatterton, P (2013), 'Toward an Agenda for Post-carbon Cities: Lessons from LILAC, the UK's first ecological, affordable cohousing community', *International Journal of Urban and Regional Research*, vol. 37, no. 5, pp. 1654-1674.

—— (2015), *Low Impact Living: A field guide to ecological, affordable community building*, Routledge, Oxon.

Chua, G (2015), 'Melbourne Architects Invest in New Project that could Revolutionise Apartment Living', *Architecture & Design*, infolink, viewed 10 February 2015, <http://www.architectureanddesign.com.au/news/melbourne-architects-invest-in-new-project-that-co>.

CitiNiche Pty Ltd (2013a), *CitiNiche*, viewed 26 January 2015, <http://citiniche.com.au/>.

—— (2013b), *CitiNiche Introduction Video*, viewed 7 March 2013, <http://citiniche.com.au/>.

City of Melbourne (2013), *Understanding the Quality of Housing Design*, City of Melbourne, Melbourne.

City of Melbourne, CGS Economics & Planning & Australian Housing and Urban Research Institute (2013), *Understanding the Social Outcomes of Housing*, City of Melbourne, Melbourne.

Clapham, D (2005), *The Meaning of Housing: A pathways approach*, Policy Press, University of Bristol.

Co-operatives UK (2008), *Meeting Housing Needs the Co-operative Way*, Co-operatives UK, Manchester.

Cohousing Woodside (2016), 'Our Prices', 12 May 2016, <https://cohousingwoodside.co.uk/our-prices/>.

Colini, L & Czischke, D (2015), 'Tackling Socio-spatial Segregation: Opportunities and challenges for cohesion policy in 2014-2020', *European Structural and Investment Funds Journal*, vol. 3, no. 3, pp. 163-172.

Collins, H & Yearly, S (1992a), 'Epistemological Chicken', in A. Pickering (ed.), *Science as Practice and Culture*, University of Chicago Press, Chicago, pp. 301-326.

—— (1992b), 'Journey into Space', in A. Pickering (ed.), *Science as Practice and Culture*, University of Chicago Press, Chicago, pp. 390-428.

Collinson, P (2011), 'Self-build: It's time to go Dutch', *The Guardian*, 26 November 2011.

Comber, A, Fisher, P & Wadsworth, R (2003), 'Actor–Network Theory: A suitable framework to understand how land cover mapping projects develop?', *Land Use Policy*, vol. 20, pp. 299-309.

Commonwealth Housing Commission Australia & O'Connor, LPD (1944), *Final Report Commonwealth Housing Commission*, Ministry of Post-war Reconstruction, Sydney.

Cooper, S (2008), 'Regulating Hybrid Monsters?: The limits of Latour and actor network theory', *Arena Journal*, vol. 29/30, pp. 305-330.

Coudroy de Lille, L (2015), 'Housing Cooperatives in Poland. The origins of a deadlock', *Urban Research & Practice*, vol. 8, no. 1, pp. 17-31.

Coviello, NE (2005), 'Integrating Qualitative and Quantitative Techniques in Network Analysis', *Qualitative Market Research: An International Journal*, vol. 8, no. 1, pp. 39-60.

Cowan, D, Morgan, K & McDermont, M (2009), 'Nominations: An actor-network approach', *Housing Studies*, vol. 24, no. 3, pp. 281-300.

Cox, W & Pavletich, H (2016), *12th Annual Demographia International Housing Affordability Survey*, Demographia, Belleville, Illinois.

Crabtree, L (2008), 'Christie Walk: A co-operative ecocity development', paper presented at Living Co-operatively Symposium: Affordable Housing- Sustainable Communities, Sydney, 13-14 February 2008.

Crafti, S (2014), *Talking Design Episode 1: Architect Jeremy McLeod*, https://www.youtube.com/watch?v=HYP3ELzDiwo, 27 July 2014, RMIT University.

Crawford, CS (2005), 'Actor Network Theory', in G. Ritzer (ed.), *Ritzer Encyclopedia*, Sage, Thousand Oaks, California, pp. 1-4.

Cressman, D (2009), 'A Brief Overview of Actor-Network Theory: Punctualization, heterogeneous engineering and translation', ACT Lab/Centre for Policy Research on Science & Technology (CPROST) School of Communications, Simon Fraser University, Burnarby, British Columbia.

Critchley, C (2014), 'The Economies of Sharing, Part One: Cohousing', *The New Daily*, 2 October 2014.

Cronbach, LJ (1975), 'Beyond the Two Disciplines of Scientific Psychology', *American Psychologist*, vol. 30, no. 2, pp. 116-127.

Crosby, A, Lorber-Kasunic, J & Vanni, I (2014), 'Mapping Hybrid Design Participation in Sydney', paper presented at Arte-Polis 5 International Conference- Reflections on Creativity: Public engagement in the making of place, Institute of Technology Bandung, Indonesia, 8-9 August 2014.

Cuperus, Y (2002), 'The Almere Monitor: An evaluation of 19 consumer oriented housing projects in the Netherlands', in *The Tenth Conference of the International Group for Lean Construction,* Gramado, Brazil.

Daley, J & Wood, D (2016), *Hot Property: Negative gearing and capital gains tax reform*, Grattan Institute, Melbourne.

Dalton, T (2009), 'Housing Policy Retrenchment: Australia and Canada compared', *Urban Studies*, vol. 46, no. 1, January 1, 2009, pp. 63-91.

Danielewic, M (2015), 'Personal Communication with Author. Email 14 May 2015'.

de Haan, H (2011), 'Collective Client Controlled Development of Space: Examples from an Amsterdam practice', in L. Qu & E. Hasselaar (eds), *Making Room for People: Choice, voice and liveability in residential places*, Techne Press, Amsterdam, pp. 129-152.

Debarre, A & Steinmetz, H (2012), '(Re-)Inventing Self-build Housing in Strasbourg ', *Metropolitics*, 17 October 2012, viewed 12 January 2015, < http://www.metropolitiques.eu/Re-Inventing-self-build-housing-in.html>.

Deleuze, G & Guattari, F (1988), *A Thousand Plateaus: Capitalism and schizophrenia*, Athlone Press, London.

Deleuze, G & Guattari, Fl (1980), *Mille Plateaux*, Editions de minuit, Paris.

Department for Communities and Local Government (2011), *Laying the Foundations: A housing strategy for England*, November 2011, HM Government, London.

—— (2012a), *Increasing the Number of Available Homes*, Government Digital Service, viewed 18 July 2013, <https://www.gov.uk/government/policies/increasing-the-number-of-available-homes/supporting-pages/self-builders>.

—— (2012b), *National Planning Policy Framework*, March 2012, DCLG, London.

—— (2014a), 'DCLG Housing Statistics Table 104: Live tables on housing stock', viewed 1 February 2016.

—— (2014b), *Increasing the Number of Available Homes - Update*, 16 May 2014, Government Digital Service.

—— (2014c), *Planning Practice Guidance Community Infrastructure Levy Relief: Self build*, viewed 16 April 2015, <http://planningguidance.planningportal.gov.uk/blog/guidance/community-infrastructure-levy/relief/self-build-exemption/#paragraph_135>.

—— (2014d), *Right to Build: Supporting custom and self build consultation*, October 2014, DCLG, London.

—— (2015a), 'Richard Bacon's Self-build and Custom Housebuilding Bill will become Law', *Building Construction Design*, netMAG media, viewed 4 May 2015, <http://www.buildingconstructiondesign.co.uk/news/richard-bacons-self-build-and-custom-housebuilding-bill-will-become-law/>.

—— (2015b), *Right to Build: Supporting custom and self build government response to consultation*, March 2015, DCLG, London.

—— (2016), *Dwelling Stock Estimates: 2015 England*, April 2016, DCLG, London.

Department for Communities and Local Government & Brandon Lewis MP (2014), 'New Right to Build Areas at Forefront of Helping Aspiring Self-builders', 30 September 2014 edn, DCLG, London, viewed 12 January 2015, <https://www.gov.uk/government/news/new-right-to-build-areas-at-forefront-of-helping-aspiring-self-builders>.

Department for Communities and Local Government, The Right Honourable Sir Eric Pickles MP & Homes and Communities Agency (2012), *2010 to 2015 Government Policy: Housebuilding*, last updated 8 May 2015, Gov.UK.

Department of Transport Planning and Local Infrastructure (2013), *Plan Melbourne Metropolitan Planning Strategy*, DTPLI, Melbourne.

DNA Homes (2015), *DNA New Homes as Individual as You Are*, DNA Homes, London.

Dodson, J (2010), 'In the Wrong Place and the Wrong Time? Assessing some planning, transport and housing market limits to urban consolidaiton policies', *Urban Policy & Research*, vol. 28, no. 4, pp. 487-504.

—— (2012), 'Transforming Australia's "Housing Solution": How we can better plan suburbia to meet our future challenges', in R. Tomlinson (ed.), *Australia's Unintended Cities*, CSIRO Publishing, Collingwood, pp. 19-32.

Dodson, J & Sipe, N (2008), *Shocking the Suburbs: Oil vulnerability in the Australian city*, University of New South Wales Press, Sydney.

Dolin, AJ, London, GL & McQuoid, KH (1992), *Sector 4 Housing: A concept to address the need for urban consolidation and better communities*, A report to The Office of the Family, Government of Western Australia, The Rowland Company, Perth.

Doling, J (1997), *Comparative Housing Policy: Government and housing in advanced industrialized countries*, Palgrave Macmillan, Basingstoke.

Donald, A (2013), 'How an Argentinian Housing Model could Benefit UK Architecture', *British Council Blog*, British Council, <http://blog.britishcouncil.org/2013/04/26/fideicomiso-uk-argentina-architecture/>.

Dr. Klein & Co (2016), 'DTI Trend Indicator', 26 April 2016 edn, Dr. Klein & Co, Luebeck, Germany, viewed 4 May 2016, <https://www.drklein.de/dti-immobilienpreise.html>.

Droste, C (2015), 'German Co-housing: An opportunity for municipalities to foster socially inclusive urban development?', *Urban Research & Practice*, vol. 8, no. 1, pp. 79-92.

Droste, C & Knorr-Siedow, T (2012), 'CoHousing Europe and Berlin: Examples how to support a variety of actors', Communal Living Seminar Presentation, urban plus Droste&Partner, Tampere, Finland.

Dudhwala, F (2009), 'What is Actor-Network Theory? What are its strengths and limitations as a form of sociological theory?', Corpus Christi College, Cambridge.

Dunning, R (2014), 'Meaning and Measurement in Comparative Housing Research', *Urban Policy and Research*, vol. 32, no. 2, pp. 242-244.

East Thames Housing Association (2015), 'DNA Homes: Helping Londoners design their dream home', *East Thames Housing Asssociation News,* 12 March 2015, viewed 17 March 2015, <http://www.east-thames.co.uk/news/mar2015/dna-homes-helping-londoners-design-their-dream-home>.

Easthope, H (2014), 'Making a Rental Property Home', *Housing Studies*, vol. 29, no. 5, pp. 579-596.

Easthope, H & Randolph, B (2016), 'Principal–agent Problems in Multi-unit Developments: The impact of developer actions on the on-going management of strata titled properties', *Environment and Planning A*, May 19 2016, viewed May 19 2016, DOI 10.1177/0308518x16650894, <http://epn.sagepub.com/content/early/2016/05/19/0308518X16650894.abstract>.

Easthope, H, Randolph, B & Judd, S (2012), *Governing the Compact City*, City Futures Research Centre, University of New South Wales, Sydney.

Easthope, H & Tice, A (2011), 'Children in Apartments: Implications for the compact city', *Urban Policy and Research*, vol. 29, no. 4, pp. 415-434.

Easthope, H, Warnken, J, Sherry, C, Coiacetto, E, Dredge, D, Guilding, C, Johnston, N, Lamminmaki, D & Reid, S (2014), 'How Property Title Impacts Urban Consolidation: A life cycle examination of multi-title developments', *Urban Policy and Research*, vol. 32, no. 3, pp. 289-304.

Edgar, R (2013), 'Standing Out in a Crowd', *The Age* 12 April 2013.

Edwards, M (2016), 'The Housing Crisis and London', *City*, vol. 20, no. 2, pp. 222-237.

Egero, B (2014), 'Puzzling Patterns of Co-housing in Scandinavia', unpublished, viewed 12 January 2016, <http://www.kollektivhus.nu/pdf/Bertil%20Lidewij%20article%20corr%20aug%2014.pdf>.

Eisenhardt, KM & Graebner, ME (2007), 'Theory Building from Cases: Opportunities and challenges', *Academy of Management Journal*, vol. 50, no. 1, pp. 25-32.

Elsinga, M (2014), 'The Qualitative Comparative Approach to the Role of Housing Equity in the Life Cycle', in M. Stephens & M. Norris (eds), *Meaning and Measurement in Comparative Housing Research*, Routledge, Oxon, pp. 45-62.

Engels, B & Liu, G-J (2011), 'Social exclusion, location and transport disadvantage amongst non-driving seniors in a Melbourne municipality, Australia', *Journal of Transport Geography*, vol. 19, no. 4, pp. 984-996.

Eshuis, J, van Dam, R, van Twist, M & Anquetil, V (2013), 'Understanding Social Cohesion Differences in Common Interest Housing Developments', *Housing, Theory and Society*, vol. 31, no. 3, pp. 235-253.

Eurostat (2011), 'Statistical Atlas, Census 2011', http://ec.europa.eu/eurostat/statistical-atlas/gis/viewer/?config=census.json, viewed 1 February 2016.

Eyrich, S (2014), 'Network Agency Generational Living: Consulting service for cohousing in Berlin', Presentation 22 October 2014, Netzwerkagentur GenerationenWohnen, Berlin.

Fallan, K (2008), 'Architecture in Action: Travelling with actor-network theory in the land of architectural research', *Architectural Theory Review*, vol. 13, no. 1, pp. 80-96.

—— (2010), 'An ANT in Our Pants? A design historian's reflections on actor network theory', in J. Glynne, F. Hackney & V. Minton (eds), *2008 Annual International Conference of the Design History Society (UK),* Universal Publishers, pp. 46-52.

Farías, I (2009), 'Interview with Stephen Graham', in I. Farı´as & T. Bender (eds), *Urban Assemblages: How actor-network theory changes urban studies*, Routledge, Abingdon, pp. 197-206.

—— (2011), 'The Politics of Urban Assemblages', *City*, vol. 15, no. 3-4, pp. 365-374.

Farías, I & Bender, T (eds) (2010), *Urban Assemblages: How actor-network theory changes urban studies*, Routledge, Abingdon.

Fincher, R (2004), 'Gender and Life Course in the Narratives of Melbourne's High-rise Housing Developers', *Australian Geographical Studies*, vol. 42, no. 3, pp. 325-338.

Fischer, H & Ayturk, DG (2011), *Residential Density (Liveable Communities) Market Perceptions*, Final Report, 5 August 2011, Adelaide Thinkers in Residence Program, Adelaide.

Fitzsimons, J (2014), *The German Private Rented Sector: A holistic approach*, The Knowledge Centre for Housing Economics, Copenhagen.

Forsemalm, J (2007), *Bodies, Bricks and Black Boxes: Power practices in city conversion*, Digressiv Produktion, Goteborg.

Forster, C (2006), 'The Challenge of Change: Australian cities and urban planning in the new millennium', *Geographical Research*, vol. 44, no. 2, pp. 173-182.

Foucault, M (1983), 'The Subject and Power', in H. Dreyfus & P. Rabinow (eds), *Michel Foucault: Beyond Structuralism and Hermeneutics*, The University of Chicago Press, Chicago, pp. 208-226.

Fouss, F, Renders, J-M & Saerens, M (2004), 'Some Relationships between Kleinberg's Hubs and Authorities, Correspondence Analysis, and the Salsa Algorithm', paper presented at International Conference on the Statistical Analysis of Textual Data (JADT 2004), Louvain-la-Neuve, Belgium.

Franklin, B (2006), *Housing Transformations*, Routledge, New York.

Freeman, LC (1979), 'Centrality in Social Networks: Conceptual clarification', *Social Networks*, vol. 1, pp. 215-239.

Freeman, LC, Borgatti, SP & White, DR (1991), 'Centrality in Valued Graphs: A measure of betweenness based on network flow', *Social Networks*, vol. 13, pp. 141-154.

Friedkin, NE (1991), 'Theoretical Foundations for Centrality Measures', *American Journal of Sociology*, vol. 96, pp. 1478-1504.

Fromm, D (2012), 'Seeding Community: Collaborative housing as a strategy for social and neighbourhood repair', *Built Environment*, vol. 38, no. 3, pp. 364-394.

Gabriel, M & Jacobs, K (2008), 'The Post-Social Turn: Challenges for housing research', *Housing Studies*, vol. 23, no. 4, pp. 527-540.

Ganapati, S (2008), 'A Century of Differential Evolution of Housing Co-operatives in Mumbai and Chennai', *Housing Studies*, vol. 23, no. 3, pp. 403-422.

Gargiulo, M (1993), 'Two-step Leverage: Managing constraint in organizational politics ', *Administrative Science Quarterly*, vol. 38, pp. 1-19.

Gartner, J & Wagner, I (2009), 'Mapping Actors and Agendas: Political frameworks of systems design and participation', *Human-Computer Interaction*, vol. 11, no. 3, pp. 187-214.

Geertz, C (1973), 'Thick Description: Toward an interpretive theory of culture', in C. Geertz (ed.), *The Interpretation of Cultures*, Basic Books, New York.

Geraedts, R, Cuperus, Y & Shing, K (2011), 'Timeless Flexible Building: Matching demand and supply in flexible housing', in *Joint Conference of CIB W104 and W110 - Architecture in the Fourth Dimension,* in-house publishing, Rotterdam, Netherlands, pp. 178-193.

Gerohazi, E, Hegedius, J & Szemzo, H (2014), *CSO Housing Market Study*, Metropolitain Research Institute, Budapest.

Gieryn, TF (2002), 'What Buildings Do', *Theory and Society*, vol. 31, pp. 35-74.

Gilmour, T (2012), *We're all Landlords and Tenants: Contemporary housing cooperatives building sustainable communities*, Housing Action Network, Sydney, Australia.

Glass, AP (2012), 'Elder Co-Housing in the United States: Three case studies', *Built Environment*, vol. 38, no. 3, pp. 345-363.

Gleeson, B, Dodson, J & Spiller, M (2012), 'Governance, Metropolitain Planning and City-building: The case for reform', in R. Tomlinson (ed.), *Australia's Unintended Cities: The Impact of Housing on Urban Development*, CSIRO Publishing, Collingwood.

Golbeck, J (2013), 'Understanding Structure Through User Attributes and Behavior', in J. Golbeck (ed.), *Analyzing the Social Web*, Morgan Kaufmann, Boston, pp. 91-105.

Goodman, R, Maginn, PJ, Gurran, N & Ruming, K (2013), 'Simpler, Faster, Cheaper: Australia's urban aspirations and the planning reform agenda', in K. Ruming, B. Randolph & N. Gurran (eds), *State of Australian Cities Conference*, State of Australian Cities Research Network, Sydney.

Government, NSW (2013), *Your Future Sydney: Metropolitan Strategy for Sydney to 2031*, Department of Planning and Infrastructure, Sydney.

Government of South Australia (2010), *The 30-Year Plan for Greater Adelaide: A volume of the South Australian planning strategy*, Department of Planning and Local Government, Adelaide.

—— (2011), *Understanding Residential Densities: A pictorial handbook of Adelaide examples*, 2nd edn, Department of Planning and Local Government, Adelaide.

—— (2012), *Inner Metro Rim Structure Plan*, September 2012, Department of Planning, Transport and Infrastructure, Adelaide.

Government of Western Australia (2010), *Directions 2031 and Beyond*, Western Australian Planning Commission, Perth.

Graef, R (2012), 'The British Don't Want to Live in New-build Homes. No Wonder', *The Guardian*, 26 October 2012.

Greater London Authority (2012), *Build Your Own Home - the London Way: Supporting custom build housing and community right to build funding prospectus*, July 2012, GLA, London.

—— (2014), *Homes for London: The London housing strategy*, June 2014, GLA, London.

Groat, LN & Wang, D (2013), *Architectural Research Methods*, 2nd edn, John Wiley & Sons, Sommerset, NJ.

GSW & GBRE (2014), *Housing Market Report Berlin 2014*, GSW Immobilien AG, Berlin.

Gulati, R & Srivastava, SB (2014), 'Bringing Agency Back into Network Research: Constrained agency and network action', *Contemporary Perspectives on Organizational Social Networks*, vol. 40, pp. 73-93.

Gurran, N (2008), 'Affordable Housing: A dilema for metropolitan planning?', *Urban Policy and Research*, vol. 26, no. 1, pp. 101-110.

Gurran, N & Phibbs, P (2013), 'Housing Supply and Urban Planning Reform: The recent Australian experience 2003–2012', *International Journal of Housing Policy*, vol. 13, no. 4, pp. 381-407.

—— (2016), ''Boulevard of Broken Dreams': Planning, housing supply and affordability in urban Australia', *Built Environment*, vol. 42, no. 1, pp. 55-71.

Habraken, NJ (1972), *Supports: An alternative to mass housing*, trans. B. Valkenburg, Architectural Press, London.

Haertel, W (2014), *Winfried Haertel Projektentwicklung*, viewed 19 September 2014, <http://www.winfriedhaertel.de/e58/e146/index_eng.html>.

Haffner, M & Brunner, D (2014), *German Cooperatives: Property right hybrids with strong tenant security*, OTB Working Papers 2014-07, OTB Research for the Built Environment, Delft University of Technology, Delft.

Hall, P (2001), 'Sustainable Cities or Town Cramming?', in A. Layard, S. Davoudi & S. Batty (eds), *Planning for a Sustainable Future*, Taylor & Francis, London, pp. 101-114.

Hamiduddin, I & Daseking, W (2014), 'Community-based Planning in Frieburg, Germany: The case of Vauban', in N. Gallent & D. Ciaffi (eds), *Community Action and Plannning: Contexts, Drivers and Outcomes*, Policy Press, Bristol, pp. 241-256.

Hamiduddin, I & Gallent, N (2015), 'Self-build Communities: The rationale and experiences of group-build (baugruppen) housing development in Germany', *Housing Studies*, 9 October 2015, pp. 1-19.

Hammersley, M & Gomm, R (2000), 'Introduction', in R. Gomm, M. Hammersley & P. Foster (eds), *Case Study Method*, Sage, London, pp. 1-16.

Hammersley, M, Gomm, R & Foster, P (2000), 'Case Study and Theory', in R. Gomm, M. Hammersley & P. Foster (eds), *Case Study Method*, Sage, London, pp. 234-258.

Haraway, D (1992), 'The Promise of Monsters: A regenerative politics for inappropriate/d others', in L. Grossberg & J. Radway (eds), *Cultural Studies*, Routledge, London.

Harty, C (2008), 'Implementing Innovation in Construction: Contexts, relative boundedness and actor-network theory', *Construction Management and Economics*, vol. 26, no. 10, pp. 1029-1041.

Hasanov, M & Beaumont, J (2016), 'The Value of Collective Intentionality for Understanding Urban Self-organization', *Urban Research & Practice*, 24 February 2016, pp. 1-19, viewed 11 April 2016, DOI 10.1080/17535069.2016.1149978, <http://dx.doi.org/10.1080/17535069.2016.1149978>.

Hassard, J (2008), 'Actor Network Theory', in R. Thorpe & R. Holt (eds), *The SAGE Dictionary of Qualitative Management Research*, Sage, London.

Healey, P (1997), *Collaborative Planning: Shaping places in fragmented society*, Palgrave, Basingstoke.

Heitel, S, Kämpf-Dern, A & Pfnür, A (2015), 'Integration of Stakeholder Interests in Housing Companies' Strategic Management', *Property Management*, vol. 33, no. 3, pp. 224-244.

Henley Halebrown Rorrison (2014), '1-6 Copper Lane London', viewed 12 September 2014, <http://hhbr.co.uk/wp-content/uploads/2014/02/Copper-Lane-Pamphlet.pdf>.

Hesse-Biber, SN & Leavy, P (2011), *The Practice of Qualitative Research*, 2nd edn, Sage, Thousand Oaks, California.

Heuss, A (2006), 'Wichtigster Vorteil ist der Preis', *Frankfurter Allgemeine Sonntagszeitung*, vol. 19, pp. 10-16.

Heyden, M (2007), 'Berlin - Wohnen in eigener Regie! Gemeinschaftsorientierte Strategien für die Mieterstadt', in Bildungswerk Berlin der Heinric-Böll-Stiftung & M. Heyden (eds), *Berlin - Wohnen in eigener Regie* Bildungswerk Berlin, Berlin, pp. 31-44.

Higgins, D & Moore, T (2015), 'What Gives to Keep That Price Point? High-density residential developments', *Pacific Rim Property Research Journal*, vol. 21, no. 1, pp. 37-49.

Hill, S (2015), *Property Justice & Reason: Reconnecting the citizen and state through community land trusts and land reform in nine narratives*, Winston Churchill Memorial Trust, London.

Hillier, J (2010), 'Strategic Navigation in an Ocean of Theoretical and Practice Complexity', in J. Hillier & P. Healey (eds), *The Ashgate Research Companion to Planning Theory: Conceptual challenges for spatial planning*, Ashgate Publishing Limited, Surrey, England.

HM Treasury (2016), *Higher Rates of Stamp Duty Land Tax (SDLT) on Purchases of Additional Residential Properties: Summary of consultation responses*, HM Treasury, London.

Hobbes, T (1985), *Leviathan*, Penguin, London.

Hochstadter, AK & Scheck, B (2014), *Mapping the Social Impact Investing Market in Germany: An overview of opportunities in the education space*, The Impact Investing Policy Collaborative, Hamburg.

Holm, A & Kuhn, A (2010), 'Squatting and Urban Renewal: The interaction of squatter movements and strategies of urban restructuring in Berlin', *International Journal of Urban and Regional Research*, vol. 35, no. 3, pp. 644-658.

Home Owners Alliance (2014), *Leasehold v Freehold – What's the Difference?*, viewed 18 November 2015, <http://hoa.org.uk/advice/guides-for-homeowners/i-am-buying/leasehold-v-freehold-whats-the-difference/>.

Homes and Communities Agency (2012), *Custom Build Homes Fund Prospectus*, July 2012, HCA, London.

Horelli, L & Vaspa, K (1994), 'In Search of Supportive Structures for Everyday Life', in I. Altman & A. Churchman (eds), *Women and the Environment*, 1st edn, Springer Science+Business Media, New York, pp. 201-226.

Horne, R, London, G, Moore, T, Martel, A & Alves, T (2014), 'Placing a value on good design for cities: evidence and prospects', paper presented at 7th Making Cities Livable Conference Kingscliff NSW, 10-11 July 2014.

Hossmann, I, Karsch, M, Klingholz, YK, Kroehnert, S, Pietschmann, C & Sutterlin, S (2008), *Europe's Demographic Future: Growing imbalances*, Berlin Institute for Population and Development, Berlin.

id22 (2012), *CoHousing Cultures: Handbook for self-organized, community-oriented and sustainable housing*, id22: Institute for Creative Sustainability: experimentcity, Berlin.

Inhabit Homes (2014), *Custom Build Routes for Groups with Inhabit*, Advertising Brochure, Inhabit Homes, London.

—— (2015), *Introducing... Blenheim Grove*, Advertising Brochure, January 2015, Inhabit Homes, London.

—— (2016), *Option Layouts: Apartments @ Blenheim Grove*, Advertising Brochure, 11 April 2016, Inhabit Homes, London.

—— (n.d.), *Inhabit Homes*, viewed 23 May 2015, <http://www.inhabithomes.co.uk/>.

Initiative Mockernkiez (2013), *Modellprojekt Möckernkiez: Ein Projekt für Jung und Alt sozial, interkulturell, ökologisch, barrierefrei.*, Mockernkiez eG, Berlin.

—— (2015), 'Chronik Mockernkiez', 10 September 2015, <http://www.moeckernkiez.de/quartier-moeckernkiez/chronik/>.

—— (2016), 'Chronik Mockernkiez', 22 June 2016, <http://www.moeckernkiez.de/quartier-moeckernkiez/chronik/>.

Initiative Neuer Kommunaler Wohnungsbau (2014), 'Public Development Instead of Subsidies for Private Investors', 11 May 2014 edn, Initiative neuer kommunaler wohnungsbau / Initiative for New Council Housing, http://www.inkw-berlin.de/wohnungsbau.html, viewed 11 September 2015.

Jacobs, JM (2006), 'A Geography of Big Things', *cultural geographies*, vol. 13, pp. 1-27.

—— (2012), 'Urban Geographies I: Still thinking cities relationally', *Progress in Human Geography*, vol. 36, pp. 412-422.

Jacobs, JM & Cairns, S (2011), 'Ecologies of Dwelling: Maintaining high-rise housing in Singapore', in G. Bridge & S. Watson (eds), *The New Blackwell Companion to the City*, John Wiley & Sons, Sommerset, New Jersey, pp. 79-95.

Jacobs, JM, Cairns, S & Strebel, I (2007), '"A Tall Storey ... but, a Fact Just the Same": The Red Road high-rise as a black box', *Urban Studies*, vol. 44, pp. 609-628.

Jacobs, K & Manzi, T (2016), '"The Party's Over": Critical junctures, crises and the politics of housing policy', *Housing Studies*, 18 April 2016, pp. 1-18, viewed 22 April 2016, DOI 10.1080/02673037.2016.1171829, <http://dx.doi.org/10.1080/02673037.2016.1171829>.

Jakoby Rechtsanwälte (n.d.), *Jakoby Rechtsanwälte Rechtsanwalte Notar*, viewed 20 April 2015, <http://jakobyrechtsanwaelte.de/tatigkeiten/immobilienrecht-privates-baurecht/baugruppenrecht/>.

James, O & Lodge, M (2003), 'The Limitations of 'Policy Transfer' and 'Lesson Drawing' for Public Policy', *Political Studies Review*, vol. 1, no. 2, pp. 179-193.

Jarvis, H (2015a), 'Community-led Housing and 'Slow' Opposition to Corporate Development: Citizen participation as common ground?', *Geography Compass*, vol. 9, no. 4, pp. 202-213.

—— (2015b), 'Towards a Deeper Understanding of the Social Architecture of Co-housing: Evidence from the UK, USA and Australia', *Urban Research & Practice*, vol. 8, no. 1, pp. 93-105.

Johnson, JC & Orbach, MK (2002), 'Perceiving the Political Landscape: Ego biases in cognitive political networks', *Social Networks*, vol. 24, pp. 291-310.

Johnson, JM (2002), 'In-depth Interviewing', in J.F. Gubrium & J.A. Holstein (eds), *Handbook of interview research: Context & method*, Sage, Thousand Oaks, California.

Johnson, P (2008), 'Inductive Analysis', in R. Thorpe & R. Holt (eds), *The Sage Dictionary of Qualitative Management Research*, Sage, London.

Johnston, N (2015), 'Guest Editorial', *International Journal of Housing Markets and Analysis*, vol. 8, no. 4, pp. ii-v.

Jones, A, Geilenkeuser, T, Helbrecht, I & Quilgars, D (2012), 'Demographic Change and Retirement Planning: Comparing households' views on the role of housing equity in Germany and the UK', *International Journal of Housing Policy*, vol. 12, no. 1, pp. 27-45.

Junge, C (2006), 'Developing without Developer: Practice and potential of building cooperatives in urban development - the German case', London School of Economics and Political Science, MSc Regional and Urban Planning Programme thesis, unpublished.

Kafkoula, K (1994), 'In Search of Urban Reform: Co-operative housing in inter-war Athens', *Urban History*, vol. 21, no. 1, pp. 49-60.

Kajuth, F, Knetsch, TA & Pinkwart, N (2013), *Discussion Paper No 46/2013, Assessing House Prices in Germany: Evidence from an estimated stock-flow model using regional data*, Deutsche Bundesbank, Frankfurt am Main.

Kaplan, A (1964), *The Conduct of Inquiry*, Chandler, San Francisco.

Kelly, J-F, Breadon, P & Reichl, J (2011a), *Getting the Housing We Want*, Grattan Institute, Melbourne.

Kelly, J-F, Weidmann, B & Walsh, M (2011b), *The Housing We'd Choose*, Grattan Institute, Melbourne.

Kemeny, J (1981), *The Myth of Home Ownership: Private versus public choices in housing tenure*, Routledge and Kegan Paul, London.

—— (1983), *The Great Australian Nightmare*, Georgian House, Melbourne.

—— (1987), 'Towards Theorised Housing Studies: A counter-critique of the provision thesis', *Housing Studies*, vol. 2, no. 4, pp. 249-260.

—— (2001), 'Comparative Housing and Welfare: Theorising the relationship', *Journal of Housing and the Built Environment*, vol. 16, no. 1, pp. 53-70.

Kemeny, J, Kersloot, J & Thalmann, P (2005), 'Non-profit Housing Influencing, Leading and Dominating the Unitary Rental Market: Three case studies', *Housing Studies*, vol. 20, no. 6, pp. 855-872.

Kemeny, J & Lowe, S (1998), 'Schools of Comparative Housing Research: From convergence to divergence', *Housing Studies*, vol. 13, no. 2, pp. 161-176.

Kennedy, MM (1979), 'Generalizing from Single Case Studies', *Evaluation Quarterly*, vol. 3, no. 4, pp. 661-678.

Kent, C (2013), 'Recent Developments in the Australian Housing Market', Speech, 14 March 2013, Reserve Bank of Australia, Sydney.

Kerimol, L (2012), 'Resident Led Regeneration: Proposals for large scale self-build development', in R.J. Lawrence, H. Turgut & P. Kellett (eds), *Requalifying the Built Environment: Challenges and Responses*, Hogrefe Publishing, Boston, Mass., pp. 161-178.

Kholodilin, KA & Michelsen, C (2015), 'Is There a Bubble in the German Housing Market?', 19 January 2015 edn, German Institute for Economic Research (DIW Berlin Deutsches Institut fur Wirtschaftsforschung e.V.), DIW Roundup: Politik im Fokus, viewed 14 September 2015, <https://www.diw.de/en/diw_01.c.494965.en/press/diw_roundup/is_there_a_bubble_in_the_german_housing_market.html>.

Kholodilin, KA, Michelsen, C & Ulbricht, D (2014), *Discussion Paper No. 1417: Speculative price bubbles in urban housing markets in Germany*, German Institute for Economic Research (DIW Berlin Deutsches Institut fur Wirtschaftsforschung e.V.), Berlin.

King, P (2001), *Understanding Housing Finance*, Routledge, London.

Kleinberg, JM (1999), 'Authoritative Sources in a Hyperlinked Environment', *Journal of the Association for Computing Machinery*, vol. 46, no. 5, pp. 604-632.

Knorr-Siedow, T (2008), 'Innovations From Below? A new concept for social housing in Germany', in K. Scanlon & C. Whitehead (eds), *Social Housing in Europe 2*, London School of Economics and Political Science, London, pp. 131-144.

Kofner, S (2014), 'The German Housing System: Fundamentally resilient?', *Journal of Housing and the Built Environment*, vol. 29, no. 2, pp. 255-275.

Korpela, S (2012), 'Casa Malta: A case study of a contemporary co-housing project in Helsinki', *Built Environment*, vol. 38, no. 3, p. 336.

KPMG in the UK & Shelter (2015), *Building the Homes we Need: A programme for the 2015 Government*, Shelter UK, London.

Krokfors, K (2012), 'Co-housing in the Making', *Built Environment*, vol. 38, no. 3, pp. 309-314.

Labianca, G, Brass, DJ & Gray, B (1998), 'Social Networks and Perceptions of Intergroup Conflict: The role of negative relationships and third parties', *Academy of Management Journal*, vol. 41, pp. 55-67.

Labit, A (2015), 'Self-managed Co-housing in the Context of an Ageing Population in Europe', *Urban Research & Practice*, vol. 8, no. 1, pp. 32-45.

LaFond, M & Haertel, W (2016), *CoHousing Berlin for Cooperative Building and Living*, viewed 7 June 2016, <http://www.cohousing-berlin.de/de>.

Lai, LWC, Chau, KW & Kwong, JWY (2012), 'Surrendering the Environment for Capital Gain and Olson's Group Theory: A case study of the dissolution of housing co-operative societies in Hong Kong', *Habitat International*, vol. 36, no. 2, pp. 261-267.

Lambert, B (2011), 'Financing Co-operative & Mutual Housing', Commission on Cooperative and Mutual Housing, Confederation of Co-operative Housing, National Housing Federation, iN business for neighbourhoods.

Lancaster Cohousing (n.d.), *Lancaster Cohousing*, Lancaster Cohousing Company Ltd., viewed 1 February 2016, <http://www.lancastercohousing.org.uk/>.

Lang, R (2015a), *Bringing Real Localism into Practice Through Co-operative Housing Governance: The prospects for community-led housing in England*, Housing and Communities Research Group, University of Birmingham, Birmingham.

—— (2015b), 'Participation vs Self-determination in Community-led Housing in Austria', in *Housing and Communities Research Group Newsletter*, vol. No. 5 - Winter 2015, University of Birmingham, Birmingham, pp. 5-6.

Lasner, MG (2009), 'Own-your-owns, Co-ops, Town Houses: Hybrid housing types and the new urban form in postwar Southern California', *Journal of the Society of Architectural Historians*, vol. 68, no. 3, pp. 378-403.

Latour, B (1986), 'The Powers of Association', in J. Law (ed.), *Power, Action and Belief*, Routledge & Kegan Paul, Henley on Thames, pp. 264-280.

—— (1987), *Science in Action: How to follow scientists and engineers through society*, Harvard University Press, Cambridge, Mass.

—— (1992a), 'A Reply to Carlson and Gorman', *Social Studies of Science*, vol. 22, no. 1, pp. 91-95.

—— (1992b), 'Where are the Missing Masses? The sociology of a few mundane artifacts', in W. Bijker & J. Law (eds), *Shaping Technology/Building Society: Studies in sociotechnical change*, MIT Press, Cambridge.

—— (1993), *We Have Never Been Modern*, trans. C. Porter, Harvester Wheatsheaf, New York.

—— (1996a), *Aramis, or, The Love of Technology*, Harvard University Press, Cambridge, Mass.

—— (1996b), 'On Actor-Network Theory: A few clarifications plus more than a few complications', *Soziale Welt*, vol. 47, no. 4, pp. 369-381.

—— (1999a), 'On Recalling ANT', in J. Hassard & J. Law (eds), *Actor-Network Theory and After*, Blackwell, Oxford, pp. 15-26.

—— (1999b), *Pandora's Hope: Essays on the reality of science studies*, Harvard University Press, Cambridge, Mass.

—— (2003), 'The Promises of Constructivism', in D. Idhe (ed.), *Chasing Technology: Matrix of materiality*, Indiana University Press, Indiana, pp. 27-46.

—— (2004a), *Politics of Nature: How to bring the sciences into democracy*, trans. C. Porter, Harvard University Press, Cambridge.

—— (2004b), 'Why has Critique Run Out of Steam? From matters of fact to matters of concern', *Critical Inquiry*, vol. 30, pp. 225-248.

—— (2005), *Reassembling the Social: An introduction to actor-network theory*, Clarendon, Oxford.

Latour, B, Mauguin, P & Teil, G (1991), 'Une methode nouvelle de suivi socio-technique des innovations: Le graphe socio-technique', in D. Vinck (ed.), *Gestion de la recherche*, De Boeck Wesmael, Bruxelles, pp. 19-78. Unpublished translation by G.Hecht 'A new method to trace the path of innovations: The socio-technical graph' available at: http://www.bruno-latour.fr/sites/default/files/downloads. Viewed 27 July 2015.

—— (1992), 'A Note on Socio-Technical Graphs', *Social Studies of Science*, vol. 22, pp. 33-57.

Latour, B & Yaneva, A (2008), 'Give Me a Gun and I Will Make All Buildings Move: An ANT's view of architecture', in R. Geiser (ed.), *Explorations in Architecture: Teaching, Design, Research*, Birkhauser, Basel, pp. 80-89.

Law, J (1986), 'On the Methods of Long Distance Control: Vessels, navigation, and the Portuguese route to India', *Power, Action and Belief: A New Sociology of Knowledge? Sociological Review Monograph 32*, pp. 234-263.

—— (1989), 'Technology and Heterogeneous Engineering: The case of Portuguese expansion', in W.E. Bijker, T.P. Hughes & T.J. Pinch (eds), *The Social Construction of Technological Systems*, MIT Press, Cambridge, Mass, pp. 111-134.

—— (1992), 'Notes on the Theory of the Actor-Network: Ordering, strategy and heterogeneity', *Systems Practice*, vol. 5, pp. 379-393.

—— (2002), 'Objects and Space', *Theory, Culture & Society*, vol. 19, no. 5/6, pp. 91-105.

—— (2004), *After Method: Mess in social science research*, Routledge, London.

—— (2007), 'Actor-Network Theory and Material Semiotics', viewed 14th May 2013, <http://www.heterogeneities. net/publications/Law2007ANTandMaterialSemiotics.pdf>.

—— (2009), 'Actor-Network Theory and Material Semiotics', in B.S. Turner (ed.), *The New Blackwell Companion to Social Theory*, Blackwell, Oxford.

Law, J & Callon, M (1992), 'The Life and Death of an Aircraft: A network analysis of technical change', in W. Bijker & J. Law (eds), *Shaping Technology/Building Society: Studies in Sociotechnical Change*, MIT Press, Cambridge, pp. 21-52.

Law, J & Hassard, J (1999), *Actor Network Theory and After*, Wiley-Blackwell, Malden, Mass.

Lawson, J (2001), 'Comparing the Causal Mechanisms Underlying Housing Networks Over Time and Space', *Journal of Housing and the Built Environment*, vol. 16, no. 1, pp. 29-52.

—— (2008), 'Ontology and Causality in Comparative Housing Studies: Explaining the different role of limited profit housing in Vienna and Zurich', paper presented at Housing and Theory Symposium, Melbourne, 5th-6th March 2008.

Lawson, J, Haffner, M & Oxley, M (2009), 'Comparative Housing Research in the New Millennium: Methodological and theoretical contributions from the first decade', in W. Randolph, T. Burke, K. Hulse & V. Milligan (eds), *4th Australasian Housing Researchers Conference,* City Futures Research Centre, University of New South Wales, Sydney.

Lawson, J & Milligan, V (2007), *International Trends in Housing and Policy Responses*, Australian Housing and Urban Research Institute, Melbourne.

Li, T, Corcoran, J & Burke, M (2012), 'Disaggregate GIS Modelling to Track Spatial Change: Exploring a decade of commuting in South East Queensland, Australia', *Journal of Transport Geography*, vol. 24, pp. 306-314.

Lincoln, YS & Guba, EG (2000), 'The Only Generalization Is: There is No Generalization', in R. Gomm, M. Hammersley & P. Foster (eds), *Case Study Method*, Sage, London, pp. 27-44.

Lindenthal, T & Eichholtz, P (2011), 'Prolonged Crisis: Housing in Germany and Berlin', in A. Bardhan & R.K. Edelstein, Cynthia (eds), *Global Housing: Markets, Crises, Institutions, and Policies*, John Wiley & Sons, pp. 69-100.

Linz, M (2016), *Gemeinschaftswohnprojekt oder Baugemeinschaft?*, Baugemeinschaft Berlin, Berlin, viewed 18 March 2016, <http://baugemeinschaft-berlin.de/die-baugemeinschaft-berlin/alternativen/wohnprojekt-oder-bg.html>.

Lloyds Banking Group & Commission on Housing (2015), *The Report of the Lloyds Banking Group Commission on Housing*, The Cambridge Centre for Housing and Planning Research, Cambridge.

London, KA, Pablo, Z & Khalfan, M (2015a), 'Innovation in Offsite Manufacturing in the Field of Housing: A case study using Bourdivian and actor-network approaches', in *Proceedings of the 2015 Going north for sustainability: Leveraging knowledge and innovation for sustainable construction and development Conference,* London.

—— (2015b), 'A Multilevel Analysis of Collaboration in Offsite Manufacturing Supply Chains Using Actor Network Theory', paper presented at International Conference on Innovative Production and Construction, Perth, Western Australia, 28-31 July 2015.

Long-Lendorff, A (2015), 'Berliner Genossenschaft droht Pleite: Teures Lehrstück in bester Lage', *BERLIN taz*, 11 June 2015.

Long, S (2016), *UK's First Senior Co-housing Project*, http://www.bbc.com/news/uk-35480989, 3 February 2016.

Lovell, H (2014), *The Making of Low Carbon Economies*, Taylor & Francis, New York.

Lovell, H & Smith, SJ (2010), 'Agencement in Housing Markets: The case of the UK construction industry', *Geoforum*, vol. 41, pp. 457-468.

Lucas, C (2015a), 'Architects and Investors Hope to Revolutionise Apartment Living in Melbourne', *The Age*, 10 February 2015.

—— (2015b), 'Green building with no car parking thrown out by VCAT for having no car parking', *The Age*, 23 October 2015.

—— (2016), 'Walls to Building Green Housing Tumble in Berlin', *The Age*, 8 April 2016.

Lujanen, M (2010), 'Legal Challenges in Ensuring Regular Maintenance and Repairs of Owner-occupied Apartment Blocks', *International Journal of Law in the Built Environment*, vol. 2, no. 2, pp. 178-197.

Lukes, S (2005), *Power: A radical view*, 2nd edn, Palgrave, London.

Lunn, E (2014), 'Why Commonhold, the Alternative to Leasehold, has Failed', *Media City*, Mortgages and Home, viewed 26 March 2014, <https://www.lovemoney.com/news/27586/commonhold-own-a-flat-alternative-to-leasehold>.

Lyytinen, K & King, JL (2002), 'Around the Cradle of the Wireless Revolution: The emergence and evolution of cellular telephony', *Telecommunications Policy*, vol. 26, pp. 97-100.

MacDonald, M, Rodsjo, A, Soetanto, D & McKeever, E (2014), *Energy Efficiency Policy in Europe: Review of existing loans, incentives and subsidies*, The Proficient Project The European Commission, Lancaster University, United Kingdom & Husbanken, Norway.

Madden, DJ (2010), 'Urban ANTs: A review essay', *Qualitative Sociology*, vol. 33, pp. 583-589.

Maller, C, Strengers, Y, Moloney, S & Nicholls, L (2013), 'The Great Australian Nightmare? The problem of escalating housing aspirations and climate change', in N. Osbaldiston, C. Strong & H. Forbes-Mewett (eds), *The Australian Sociological Association (TASA) Conference: Reflections, Intersections and Aspirations, 50 years of Australian Sociology,* TASA, Melbourne, Australia.

Manchester School of Architecture (n.d.), *Mapping Controversies*, London 2012 Olympic Stadium, viewed 9 September 2014, <http://www.msa.ac.uk/mac/london/>.

Mandell, M & Keast, R (2007), 'Evaluating Network Arrangements: Toward Revised Performance Measures', *Public Performance & Management Review*, vol. 30, no. 4, June 2007, pp. 574-597.

Manzini, E & Francois, J (2003), 'Sustainable Everyday: Scenarios of urban life', Edizione Ambiente, Milan.

Marckmann, B, Gram-Hanssen, K & Christensen, TH (2012), 'Sustainable Living and Co-Housing: Evidence from a case study of eco-villages', *Built Environment*, vol. 38, no. 3, pp. 413-429.

Marquand, B, Mortimer, C & Dickinson, S (2015), 'The Halifax House Price Per Square Metre Survey ', 23 June 2015 edn, Halifax Press Team, viewed 4 May 2016, <http://www.lloydsbankinggroup.com/globalassets/documents/media/press-releases/halifax/2015/150623-house-prices-per-sqm-final.pdf>.

Martel, A (2013), *Getting to Yes: Overcoming barriers to affordable family friendly housing in inner Melbourne Literature review*, Melbourne University, Melbourne.

Martel, A, Whitzman, C, Fincher, R, Woodcock, I & Tucker, D (2013a), 'Getting to Yes: Overcoming barriers to affordable family friendly housing in inner Melbourne', in K. Ruming, B. Randolph & N. Gurran (eds), *State of Australian Cities,* State of Australian Cities Research Network, Sydney, pp. 1-11.

Martel, A, Woodcock, I & Whitzman, C (2013b), 'Getting There Together: Affordable family-friendly housing as catalyst for partnerships and place making', in C. Axisa (ed.), *6th International Urban Design Conference: Urbanisation, Agitation, Imagination,* Urban Design Australia, Sydney.

Martin, JL (2000), 'What Do Animals Do All Day? The Division of Labor, Class, Bodies, and Totemic Thinking in the Popular Imagination', *Poetics*, vol. 27, no. 2-3, pp. 195-231.

Matusik Property Insights Pty Ltd (2015), *Housing Investor Profile: Housing demographics*, Matusik Property Insights Pty Ltd, Brisbane, Queensland.

McCamant, K & Durrett, C (2011), *Creating Cohousing: Building sustainable communities*, New Society Publishers, Gabriola Island, Canada.

McCamant, K, Durrett, C & Hertzman, E (1994), *Cohousing: A contemporary approach to housing ourselves*, 2nd edn, Ten Speed Press, Berkeley, California.

McCrea, R & Walters, P (2012), 'Impacts of Urban Consolidation on Urban Liveability: Comparing an inner and outer suburb in Brisbane, Australia ', *Housing, Theory & Society*, vol. 29, no. 2, pp. 190-206.

McFarlane, C (2011), 'The City as Assemblage: Dwelling and urban space', *Environment and Planning D: Society and Space*, vol. 29, pp. 649-671.

McKenny, L (2015), 'Addressing Housing Affordability, German Style', *Sydney Morning Herald*, 18 July 2015.

McLeod, J (2015a), 'Presentation of Nightingale Project to Melbourne Lord Mayor's Charitable Foundation', 28 April 2015.

—— (2015b), *Sustainable Apartments: A new model for the future*, 29 March 2015, TEDxStKilda.

McMahon, N (2013), 'The Share Market', *The Sydney Morning Herald*, 10 February 2013.

McNelis, S (2014), *Making Progress in Housing : A framework for collaborative research*, Taylor and Francis, Florence, Kentucky.

—— (2015), 'Book review: Meaning and Measurement in Comparative Housing Research', *Urban Studies*, August 17, 2015.

Meadows, DH (2008), *Thinking in Systems: A primer*, Chelsea Green, White River Junction.

Merrick, J (2015), 'Copper Lane by Henley Halebrown Rorrison', *Architects Journal*, 27 March 2015.

Metropolitan Region Planning Authority (1970), *The Corridor Plan for Perth*, Metropolitan Region Planning Authority W.A. Government, Perth.

Milligan, V, Gurran, N, Lawson, J, Phibbs, P & Phillips, R (2009), *Innovation in Affordable Housing in Australia: Bringing policy and practice for not-for-profit housing organisations together*, Australian Housing and Urban Research Institute, Melbourne.

Millington, AF (2000), *Property Development*, Estates Gazette, London.

Mohr, JC & Mohr, R (2011), *KUMU*, Kumu, Inc., Palo Alto, California.

Mohr, JW & Duquenne, V (1997), 'The Duality of Culture and Practice: Poverty relief in New York City, 1888-1917', *Theory and Society*, vol. 26, pp. 305-356.

Mol, A (2002), *The Body Multiple: Ontology in medical practice*, Duke University Press, London.

—— (2010), 'Actor-Network Theory: Sensitive terms and enduring tensions', *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, vol. 50, no. 1, pp. 253-269.

Molloy, S (2012), 'Making Massive Profits with Niche-market Strategies', *Australian Property Investor*, pp. 32-40.

Morgan, F & O'Sullivan, D (2009), 'Residential Developers: Competition, behaviour and the resulting urban landscape', in B.G. Lees & S.W. Laffan (eds), *Proceeding of the 10th International Conference on GeoComputation,* UNSW, Sydney.

Muller, M (2015), 'Assemblages and Actor-networks: Rethinking socio-material power, politics and space', *Geography Compass*, vol. 9, no. 1, pp. 27-41.

Muller, R (2012), *Towards a New City: A guide to the Elbe Islands and the projects of the IBA Hamburg*, trans. M. Fitzpatrick, Internationale Bauausstellung, Hamburg.

Mullins, D (2014), 'The Potential for Community-led Housing: Recent developments in England', Seminar Presentation to the City Futures Research Centre, University of New South Wales, Sydney.

Mullins, D & Rhodes, ML (2007), 'Special Issue on Network Theory and Social Housing', *Housing, Theory & Society*, vol. 24, pp. 1-13.

Munir, K & Jones, M (2004), 'Discontinuity and After: The social dynamics of technology evolution and dominance', *Organization Studies*, vol. 25, no. 4, pp. 561-581.

Murie, A & Williams, P (2015), 'A Presumption in Favour of Home Ownership? Reconsidering housing tenure strategies', *Housing Studies*, vol. 30, no. 5, pp. 656-676.

Mutzel, S (2009), 'Networks as Culturally Constituted Processes: A comparison of relational sociology and actor-network theory', *Current Sociology*, vol. 57, no. 6, pp. 871-887.

National Capital Development Commission (1970), *Tomorrow's Canberra*, National Capital Development Commission, Canberra.

National Custom and Self Build Association (2014), *The Simple Guide to the Section 106 Exemption*, December 2014.

—— (2016a), *Custom and Self Build Toolkit: Case Studies*, viewed 6 June 2016, <http://customandselfbuildtoolkit.org.uk/case-studies/#>.

—— (2016b), *NaCSBA website: About Us*, viewed 18 April 2016, <http://www.nacsba.org.uk/about-us>.

—— (n.d.), *The Self Build Portal: Routes to building your own home*, viewed 30 September 2014, <http://www.selfbuildportal.org.uk/supported-community-self-build-group>.

National Self Build Association (2011), *An Action Plan to promote the growth of self build housing*, July 2011, Government-Industry Self Build Working Group, UK.

Netzwerkagentur GenerationenWohnen (2008), 'Vermarktungsstart für Baugruppenportfolio', 9 July 2008 edn, viewed 12 August 2013, <http://www.stadtentwicklung.berlin.de/aktuell/pressebox/archiv_volltext.shtml?arch_0807/nachricht3125.html>.

Newton, P, Murray, S, Wakefield, R, Murphy, C, Khor, L-A & Morgan, T (2011), *Towards a New Development Model for Housing Regeneration in Greyfield Residential Precincts*, AHURI Final Report; no.171, Australian Housing and Urban Research Institute, Melbourne, Australia.

Newton, PW (2013), 'Regenerating Cities: Technological and design innovation for Australian suburbs', *Building Research & Information*, vol. 41, no. 5, pp. 575-588.

Nicol, LA (2013), *Sustainable Collective Housing: Policy and practice for multi-family dwellings*, Routledge, Oxon.

Nilsson, A (2010), 'Karen Deegan: Always talk to the people who think your idea is crazy, and listen carefully!', *Pencil & Pipette,* 11 June 2010, viewed 2 October 2014, <https://pencilandpipette.wordpress.com/>.

North, M (2013), *The Property Imperative III: Results from the September 2013 DFA household survey*, Digital Finance Analytics, Melbourne.

Novy-Huy, R & Large, M (2013), 'How to Obtain Land and Remove it From the Market', Stiftung Trias, Hattingen, viewed 10 October 2014, <http://www.stiftung-trias.de/uploads/media/trias_introduction_landlease_June2013_01.pdf>.

O'Donnell, A & Cummins, D (1999), 'The Use of Qualitative Methods to Research Networking in SME's', *Qualitative Market Research: An International Journal*, vol. 2, no. 2, pp. 82-91.

O'Hanlon, S (2012), 'The Reign of the "Six-Pack": Flats and flat-life in Australia in the 1960s', in S. Robinson & J. Ustinoff (eds), *The 1960s in Australia: People, power and politics*, Cambridge Scholars Publishing, Newcastle upon Tyne.

Office for Design and Architecture SA (n.d.), *ODASA Website: About*, Government of South Australia, viewed August 11 2014, <http://odasa.sa.gov.au/#/5000+>.

Oltermann, P (2014), 'Unaffordable Cities: Berlin the renters' haven hit by green fog of eco-scams', *The Guardian*, 11 February 2014.

Oxley, M (1991), 'The Aims and Methods of Comparative Housing Research', *Scandinavian Housing and Planning Research*, vol. 8, no. 2, pp. 67-77.

—— (2004), *Economics, Planning and Housing*, Palgrave Macmillan, Basingstoke.

Parke, T (2015), 'Personal Communication with Author. Email 8 May 2015'.

Parvin, A (2008), 'The Profit Function: Navigating architecture's bottom line', School of Architecture, Masters thesis, University of Sheffield, Unpublished.

Parvin, A, Saxby, D, Cerulli, C & Schneider, T (2011), *A Right to Build: The next mass-housebuilding industry*, University of Sheffield School of Architecture, viewed 3/4/2013, <http://issuu.com/alastairparvin/docs/2011_07_06_arighttobuild>.

Peck, J (2015), 'Cities Beyond Compare?', *Regional Studies*, vol. 49, no. 1, pp. 160-182.

Pittini, A, Ghekiere, L, Dijol, J & Kiss, I (2015), *The State of Housing in the EU 2015*, Housing Europe, European Federation for Public, Cooperative and Social Housing, Brussels.

Plassman, F (2012), *R50 Collaborative Residential Project in Berlin-Kruezberg*, OFFscreen, http://www.architekturclips.de/r50/, December 2012, arkitectureclips.

Pope, J (2013), 'New Online Development Platform', *ArchitectureAU*, 5 April 2013, <http://architectureau.com/articles/citiniche-launch/>.

Powell, WW, Gammal, DL & Simard, C (2005), 'Close Encounters: The circulation and reception of managerial practices in the San Francisco Bay area nonprofit community', in B. Czarniawska & G. Sevon (eds), *Global Ideas: How Ideas, Objects and Practices Travel in the Global Economy*, Daleke Grafiska, Malmo, Sweden, pp. 233-258.

Power, E (2015), 'You Get to Buy With a Little Help From Your Friends', *Domain.com.au*, 20 September 2015.

PricewaterhouseCoopers & Urban Land Institute (2015), *Emerging Trends in Real Estate: Europe 2015*, PwC and the Urban Land Institute, London.

Property Collectives (n.d.), *Property Collectives*, viewed 26 January 2015, <http://propertycollectives.com.au/>.

Pullen, S, Zillante, G, Arman, M, Wilson, L, Zuo, J & Chileshe, N (1999), *Ecocents Living, Affordable and Sustainable Housing for South Australia*, University of South Australia, Adelaide.

Queensland Government (2009), *South East Queensland Regional Plan 2009-2031*, Queensland Department of Infrastructure and Planning, Brisbane.

Radder, H (1992), 'Normative Reflexions on Constructivist Approaches to Science and Technology', *Social Studies of Science*, vol. 22, no. 1, February 1, 1992, pp. 141-173.

Radford, A & Sarris, T (2002), *Affordable Medium Density Housing Solutions for Adelaide*, Australian Housing and Urban Research Institute (Southern), Adelaide.

Randall, D, Harper, R & Rouncefield, M (2007), *Fieldwork for Design: Theory and practice*, Springer London.

Randolph, B & Easthope, H (2014), 'The Rise of Micro-government: Strata title, reluctant democrats and the new urban vertical policy', in B.B. Beza & B. Gleeson (eds), *Public City: Essays in the honour of Paul Mees*, Melbourne University Press, Melbourne, pp. 210-224.

Randolph, B & Tice, A (2013), 'Who Lives in Higher Density Housing? A study of spatially discontinuous housing sub-markets in Sydney and Melbourne', *Urban Studies*, vol. 50, no. 13, pp. 2661-2681.

Rapley, T (2011), 'Some Pragmatics of Qualitative Data Analysis', in D. Silverman (ed.), *Qualitative Research: Issues of theory, method and practice*, 3rd edn, Sage, Los Angeles, pp. 273-290.

Rathaus Stern Projekt GmbH (2013), *Rathausstern Lichtenberg*, https://www.youtube.com/watch?v=fPw6NL7URi4, 26 August 2013.

—— (n.d.), *Rathausstern Lichtenberg*, viewed 26 April 2016, <http://www.rathausstern-lichtenberg.de/>.

REA Group (2015), *Northcote, Victoria 3070*, REA Group, https://www.realestate.com.au/neighbourhoods/northcote-3070-vic, viewed 15 October 2015.

Redstone, E & Mihotich, M (2012), 'Travesia por la Argentina', *Plot Blog*, viewed 15 August 2014, <http://www.revistaplot.com/travesia-por-la-argentina-elias-redstone/>.

Rerat, P (2012), 'Housing, Compact City and Sustainable Development: Some insights from recent urban trends in Switzerland', *International Journal of Housing Policy*, vol. 12, no. 2, pp. 115-136.

Rijavec, I (2013), 'Why CitiNiche?', *News & Updates*, CitiNiche, viewed 4th March 2013, <http://citiniche.com.au/blog/why-citiniche/>.

Rijavec, I & Shaw, B (2013), 'Personal Communication with Author 19 September 2013'.

Rijavec, I, Smith, A, Oxnam, D & Ashton, B (2013), *CitiNiche Media Kit*, CitiNiche Pty Ltd, Melbourne.

Riley, T (2013a), 'Citiniche: A crowdsourcing model for residential property development', *PropertyCollectives,* 13 April 2013, viewed 7 October 2013, <http://propertycollectives.com.au/2013/04/citiniche-a-crowdsourcing-model-for-residential-property-development/>.

—— (2013b), 'Personal Communication with Author 30 September 2013'.

—— (2015), 'The Next Collective: Be a partner in our next property development', *Property Collectives, Joint Venture Property Development*, viewed 27 September 2015, <http://propertycollectives.com.au/2015/09/next-collective-property-development/>.

—— (n.d.), 'Property Collectives Video', http://propertycollectives.com.au/ , https://player.vimeo.com/video/19583189?title=1&byline=1&portrait=0&fullscreen=1, viewed 11 November 2014.

Ring, G (2014), *Gunnar Ring Baugruppen*, Lecture to National Self Build Forum May 2014, Sam Oxley, viewed 23 June 2014, <https://www.youtube.com/watch?v=L19VPDbu81s>.

Ring, K (2013), *Self Made City*, jovis, Berlin.

Robert-Hughes, R (2011), *The Case for Space: The size of England's new homes*, Royal Institute of British Architects, London.

Rodgers, K, Moore, SA & Newsome, D (2009), 'Wildlife, Tourism and Actor-Network Theory', *Annals of Tourism Research*, vol. 36, no. 4, pp. 645-666.

Rose, G (2013), 'A Visual Method for Mapping Controversies', *visual/method/culture*, 2014, <http://visualmethodculture.wordpress.com/2013/10/04/a-visual-method-for-mapping-controversies/>.

Rowley, S & Phibbs, P (2012), *Delivering Diverse and Affordable Housing on Infill Development Sites*, AHURI Final Report no. 193, Australian Housing and Urban Research Institute, Melbourne.

Ruming, K (2007), 'Planning, Property, and Positionality: An actant network analysis of "Smart Planning" at Wyong, New South Wales', Centre for Urban and Regional Studies, Doctor of Philosophy thesis, The University of Newcastle, Australia.

—— (2008), 'A New Network Direction in Housing Studies: The case of actor-network theory', in *Australasian Housing Researchers' Conference 2008,* Melbourne.

—— (2009a), 'Developer Typologies in Urban Renewal in Sydney: Recognising the role of informal associations between developers and local government', *Urban Policy and Research*, vol. 28, no. 1, pp. 65-83.

—— (2009b), 'Following the Actors: Mobilising an actor-network theory methodology in geography', *Australian Geographer*, vol. 40, no. 4, pp. 451-469.

Ruonavaara, H (2005), 'How Divergent Housing Institutions Evolve: A comparison of Swedish tenant co-operatives and Finnish shareholders' housing companies', *Housing, Theory and Society*, vol. 22, no. 4, pp. 213-236.

Rydin, Y (2013), 'Using Actor-Network Theory to Understand Planning Practice', *Planning Theory*, vol. 12, no. 1, pp. 23-45.

Ryghaug, M (2003), 'Towards a Sustainable Aesthetics: Architects constructing energy efficient buildings', PhD thesis, Norwegian University of Science and Technology (NTNU), Unpublished.

Saar, M (2010), 'Power and Critique', *Journal of Power*, vol. 3, no. 1, pp. 7-20.

Sahleström, K & Spence, D (2015), 'Co-housing: Learning from Sweden', *ArchitectureAU*, 9 June 2015, viewed 14 July 2015, <http://architectureau.com/articles/co-housing-learning-from-sweden/>.

Sandstedt, E & Westin, S (2015), 'Beyond Gemeinschaft and Gesellschaft: Cohousing life in contemporary Sweden', *Housing, Theory and Society*, vol. 32, no. 2, pp. 131-150.

Sargut, G & McGrath, RDG (2010), 'Towards a Model of Market Disruption', in G.D. Markman & P.H. Phan (eds), *The Competitive Dynamics of Entrepreneurial Market Entry*, Edward Elgar, Cheltenham, UK, pp. 325-346.

Scanlon, K & Arrigoitia, MF (2015), 'Development of New Cohousing: Lessons from a London scheme for the over-50s', *Urban Research & Practice*, vol. 8, no. 1, pp. 106-121.

Schnegg, M & Bernard, HR (1996), 'Words as Actors: A method for doing semantic network analysis', *Field Methods*, vol. 8, no. 2, pp. 7-10.

Schroder, M, Ekins, P, Power, A, Zulauf, M & Lowe, R (2011), *The KfW Experience in the Reduction of Energy Use in and CO2 Emissions from Buildings: Operation, impacts and lessons for the UK*, London School of Economics, Housing and Communities, London.

Scott, JK (1992), 'Exploring Socio-Technical Analysis: Monsieur Latour is not joking!', *Social Studies of Science*, vol. 22, no. 1, pp. 59-80.

Scotthanson, C & Scotthanson, K (2005), *The Cohousing Handbook: Building a place for community*, Revised edn, New Society Publishers, Gabriola Island, Canada.

Seelig, T, Thompson, A, Burke, T, Pinnegar, S, McNelis, S & Morris, A (2009), *Understanding What Motivates Households to Become and Remain Investors in the Private Rental Market*, Australian Housing and Urban Research Institute, Melbourne.

Seemann, A-K, Renner, S, Drevs, F & Dietrich, M (2014), 'Ownership Status, Symbolic Traits, and Housing Association Attractiveness: Evidence from the German residential market', *International Journal of Housing Policy*, vol. 14, no. 4, pp. 411-426.

Senatsverwaltung fur Stadtentwicklung und Umwelt (2014), *Stadtentwicklungsplan Wohnen 2025*, beBerlin, Berlin.

Sevaldson, B (2013), 'System Oriented Design: The Emergence and development of a designerly approach to address complexity', in J.B. Reitan, P. Lloyd, E. Bohemia, L.M. Nielsen, I. Digranes & E. Lutnaes (eds), *Cumulus 2013: 2nd International Conference for Design Education Researchers,* Design Research Society, Oslo, Norway, vol. 4, pp. 1765-1786.

Sharam, A & Bryant, L (2016), 'Can an Uber [digital disruption] for Multi-owned Housing Solve Some Common Housing Problems?', paper presented at 9th Australian Housing Researchers Conference, Auckland, New Zealand, 17-19 February 2016.

Sharam, A, Bryant, L & Alves, T (2014), *De-risking Development of Medium Density Housing to Improve Housing Affordability and Boost Supply*, Submission to the Senate Economics References Committee Inquiry into Affordable Housing.

—— (2015a), 'De-risking Development of Medium Density Housing to Improve Housing Affordability and Boost Supply', *Australian Planner*, vol. 52, no. 3, pp. 210-218.

—— (2015b), 'Identifying the Financial Barriers to Deliberative, Affordable Apartment Development in Australia', *International Journal of Housing Markets and Analysis*, vol. 8, no. 4, pp. 471-483.

—— (2015c), *Making Apartments Affordable: Moving from speculative to deliberative development*, Swinburne University of Technology, Australian Policy Online.

Sharam, A, McShane, I, Alves, T, Bryant, L & Shihab-Smith, A (2012), 'Smarten Up! Applying market design theory to greyfields housing supply', paper presented at Housing Melbourne: Innovation for good design, urban renewal and affordable supply, Melbourne, November 7th 2012.

Shearer, H, Coiacetto, E, Dodson, J & Taygfeld, P (2016), 'How the structure of the Australian housing development industry influences climate change adaptation', *Housing Studies*, 17 March 2016, pp. 1-20, viewed 20 April 2016, DOI 10.1080/02673037.2016.1150430, <http://www.tandfonline.com/doi/abs/10.1080/02673037.2016.1150430>.

Shedroff, N (2009), *Design is the Problem*, Louis Rosenfeld, New York.

Shelter (2015), *Homes for our Children. How Much of the Housing Market is Affordable?* , Shelter, London.

Shirley, J (2015), 'Personal Communication with Author. Email 12 May 2015'.

Simons, H (1996), 'The Paradox of Case Study', *Cambridge Journal of Education*, vol. 26, no. 2, pp. 225-240.

Skifter Andersen, H (1985), 'Danish Low-rise Housing Co-operatives (Bofaellesskaber) as an Example of a Local Community Organization', *Scandinavian Housing & Planning Research*, vol. 2, no. 2, pp. 49-66.

Smith, PAC & Cockburn, T (2013), *Dynamic Leadership Models for Global Business: Enhancing digitally connected environments*, IGI Global, Hershey, Pennsylvania.

Smith, RG (2003), 'World City Actor-networks', *Progress in Human Geography*, vol. 27, no. 1, pp. 25-44.

Smith, SJ (2008), 'Owner-occupation: At home with a hybrid of money and materials', *Environment and Planning A*, vol. 40, pp. 520-535.

—— (2011), 'Home Price Dynamics: A behavioural economy?', *Housing, Theory and Society*, vol. 28, no. 3, pp. 236-261.

Sørvoll, J & Bengtsson, B (2016), 'The Pyrrhic Victory of Civil Society Housing? Co-operative housing in Sweden and Norway', *International Journal of Housing Policy*, 4 April 2016, pp. 1-19, viewed 10 April 2016, DOI 10.1080/14616718.2016.1162078, <http://dx.doi.org/10.1080/14616718.2016.1162078>.

Spinks, M (2015), 'Understanding and Actioning BRE Environmental Assessment Method: A socio-technical approach', *Local Environment*, vol. 20, no. 2, pp. 131-148.

Stake, RE (2005), 'Qualitative Case Studies', in N.K. Denzin & Y.S. Lincoln (eds), *Sage handbook of qualitative research*, 3rd edn, Sage, Thousand Oaks, California, pp. 443-466.

State of Western Australia (2013), *The Housing We'd Choose: A study for Perth and Peel*, Department of Housing, Perth.

STATTBAU GmbH (2012), *Living in a Community: From the idea to the joint home*, Netzwerkagentur GenerationenWohnen, Berlin.

Steele, W (2012), 'Do We Need a 'Slow Housing' Movement?', *Housing, Theory and Society*, vol. 29, no. 2, pp. 172-189.

Stephan, A, Crawford, RH & de Myttenaere, K (2013), 'Multi-scale Life Cycle Energy Analysis of a Low-density Suburban Neighbourhood in Melbourne, Australia', *Building and Environment*, vol. 68, pp. 35-49.

Stephens, M (2014), 'Comparative Housing Research: A 'system-embedded' approach', in M. Stephens & M. Norris (eds), *Meaning and Measurement in Comparative Housing Research*, Routledge, Oxon, pp. 25-43.

Stephens, M, Elsinga, M & Knorr-Siedow, T (2008), 'The Privatisation of Social Housing: Three different pathways', in K. Scanlon & C. Whitehead (eds), *Social Housing in Europe 2*, London School of Economics and Political Science, London, pp. 105-130.

Stevens, T (2013), 'Self Build: Turning your dream into a reality', Presentation to National Self Build Week, London, 4-12 May 2013.

Stone, W (2015), 'Reshaping Housing Consumption and Production from the Bottom Up: Insights from interpretivist housing research', in R. Dufty-Jones & D. Rogers (eds), *Housing in 21st-Century Australia: People, practices and policies*, Ashgate, Surry, pp. 89-104.

Stoop, J (2014), *Challenges to the Investigation of Occurrences. Concepts and Confusion, Metaphors, Models and Methods*, Kindunos Safety Consultancy Ltd and ESReDA Project Group, Gorinchem, The Netherlands.

Sudiyono, G (2013), 'Learning from the Management and Development of Current Self-organized and Community-oriented Cohousing Projects in Berlin: Making recommendations for the IBA Berlin 2020', Master of Urban Management thesis, Berlin University of Technology, Unpublished.

Syben, W (2013), 'Making Use of Vacant Urban Space: A study of Christchurch after the earthquakes of 2010/11', Department of Geography, Honours thesis, University of Canterbury, Unpublished.

Tarde, G (1902), *Psychologie Economique*, Félix Alcan, Paris.

Temel, R, Lorbek, M, Ptasynska, A & Wittinger, D (2009), *Baugemeinschaften in Wien*, Project MA 50 - Mi 922/09, June 2009, Social Institute for Research and Analysis, Stadt Wien Magistratsabteilung 50 Wohnbauförderung, Schlichtungsstelle für wohnrechtliche Angelegenheiten & Referat für Wohnbauforschung und internationale Beziehungen, Wien.

Thakara, J (2006), *In the Bubble: Designing in a complex world*, The MIT Press, Cambridge, Mass.

Thapa, D (2011), 'The Role of ICT Actors and Networks in Development: The case study of a wireless project in Nepal', *Electronic Journal on Information Systems in Developing Countries*, vol. 49, no. 1, pp. 1-16.

The Building and Social Housing Foundation (2009), *The Future of Housing: Rethinking the UK housing system for the twenty-first century. Consultation at St.George's House, Windsor Castle 23rd-25th June 2009.*, Building and Social Housing Foundation, Leicestershire.

The Fifth Estate (2013), 'Ivan Rijavec in Crowd Sourcing Resi Offer to Urban Greys, Gay Greys, Uber Greens and More', *The Fifth Estate*, 28 February 2013.

The Nightingale Model (2015), 'News 23 October 2015', *Nightingale News*, viewed 23 October 2015, <http://static1.squarespace.com/static/54bf1b4ce4b0058d7a0fd26a/t/564152ade4b00a9a1605fd1b/1447121581784/Nightingale+Update+10_Rev2.pdf>.

—— (n.d.-a), *The Nightingale 1*, http://www.nightingale.melbourne/nightingale-1, viewed 27 October 2015.

—— (n.d.-b), *The Nightingale Model*, Nightingale Melbourne Website, http://www.nightingale.melbourne/, viewed 23 February 2015.

The Urban Developer (2015), 'Breathe Architecture Revolutionises Melbourne Apartment Design', *TheUrbanDeveloper,* 21 January 2015, viewed 10 February 2015, <http://www.theurbandeveloper.com/breathe-architecture-challenges-melbourne-apartment-design/>.

Thomas, G (2011a), *How to do your Case Study: A guide for students and researchers*, Sage, London.

—— (2011b), 'A Typology for the Case Study in Social Science Following a Review of Definition, Discourse, and Structure', *Qualitative Inquiry*, vol. 17, no. 6, pp. 511-521.

Thompson, GF (2003), *Between Hierarchies and Markets: The logic and limits of network forms of organization*, Oxford University Press, Oxford Scholarship Online.

Toffler, A (1970), *Future Shock*, Random House, New York.

—— (1980), *The Third Wave*, Bantam Books, New York.

Tomlinson, R (ed.) (2012), *Australia's Unintended Cities: The impact of housing on urban development*, CSIRO Publishing, Collingwood.

Tomlinson, R (2013), 'Plan Melbourne: A critique and a review of its implications for housing', in K. Ruming, B. Randolph & N. Gurran (eds), *State of Australian Cities Conference,* State of Australian Cities Research Network, Sydney.

Tripp, DH (1985), 'Case Study Generalization: An agenda for action', *British Educational Research Journal*, vol. 11, no. 1, pp. 33-43.

Tummers, L (2011a), 'Intentional Communities: Methods for reviewing the rise of citizens' housing initiatives in a European perspective', paper presented at European Network of Housing Researchers Conference, Toulouse, France, 5-8 July 2011.

—— (2011b), 'Self-managed Co-housing: Assessing urban qualities and bottlenecks in the planning system', in L. Qu & E. Hasselaar (eds), *Making Room for People: Choice, voice and liveability in residential places*, Techne Press, Amsterdam, pp. 153-176.

—— (2015a), 'The Re-emergence of Self-managed Co-housing in Europe: A critical review of co-housing research', *Urban Studies*, vol. 1, no. 18, pp. 1-18.

—— (2015b), 'Understanding Co-housing From a Planning Perspective: Why and how?', *Urban Research & Practice*, vol. 8, no. 1, pp. 64-78.

Turner & Townsend (2016), *International Construction Market Survey 2016*, Turner & Townsend, London.

Turner, JFC (1976), *Housing by People: Towards autonomy in building environments*, Marion Boyars, London.

UK Cohousing Network (2016a), *UK Cohousing Network: Cohousing groups directory*, viewed 4 April 2016, <http://cohousing.org.uk/groups>.

—— (2016b), *Will Your Cohousing Group Need to Pay More Tax? Respond to the consultation on changes to SDLT before 1 February 2016.*, viewed 4 April 2016, <http://cohousing.org.uk/news/will-your-cohousing-group-need-pay-more-tax%C2%A0-respond-consultation-changes-sdlt-1-february-2016>.

UK Government (2011), *Localism Act 2011*, United Kingdom.

—— (2015), *Self-build and Custom Housebuilding Act 2015*, United Kingdom.

Unknown (2015), 'R50 Cohousing: ifau und Jesko Fezer und Heide & von Beckrath', *ArchDaily*, viewed 6 April 2015, <http://www.archdaily.com/?p=593154>.

Urban Coup Inc. (2015), 'Urban Coup Introduction', http://www.urbancoup.org/sites/default/files/docs/IntroductionUrbanCoup.pdf, viewed 8 October 2015.

—— (n.d.), *Urban Coup*, viewed 2 September 2014, <http://www.urbancoup.org/>.

Urban Melbourne (2015), *Project Database*, viewed 10 February 2015, <https://urban.melbourne/projects/moreland/nightingale-apartments-6-florence-street-brunswick>.

Urbis (2011), *National Dwelling Cost Study*, National Housing Supply Council, Canberra.

van der Heijden, H (2013a), *West European Housing Systems in a Comparative Perspective*, Sustainable Urban Areas, IOS Press, Amsterdam.

van der Heijden, H, Dol, K & Oxley, M (2011), 'Western European housing systems and the impact of the international financial crisis', *Journal of Housing and the Built Environment*, vol. 26, no. 3, pp. 295-313.

van der Heijden, J (2013b), 'Is New Governance the Silver Bullet? Insights from the Australian buildings sector', *Urban Policy and Research*, vol. 31, no. 4, pp. 453-471.

Vandenberghe, F (2002), 'Reconstructing Humants: A humanist critique of actant-network theory', *Theory, Culture & Society*, vol. 19, no. 5-6, pp. 51-67.

Venkatesh, V, Morris, MG, Davis, GB & Davis, FD (2003), 'User Acceptance of Information Technology: Toward a unified view', *MIS Quarterly*, vol. 27, no. 3, pp. 425-478.

Venturini, T (2010), 'Diving in Magma: How to explore controversies with actor-network theory', *Public Understanding of Science*, vol. 19, no. 3, pp. 258-273.

Vestbro, DU (2010a), 'Concepts and Terminology', in D.U. Vestbro (ed.), *Living Together - Cohousing Ideas and Realities Around the World, International Collaborative Housing Conference,* Royal Institute of Technology, Stockholm.

—— (2010b), 'Living Together: Cohousing ideas and realities around the world', in D.U. Vestbro (ed.), *International Collaborative Housing Conference,* Royal Institute of Technology, Stockholm.

Vestbro, DU & Horelli, L (2012), 'Design for Gender Equality: The history of co-housing ideas and realities', *Built Environment*, vol. 38, no. 3, pp. 315-335.

Wainwright, O (2013), 'Housing Without Developers: Argentina's architects show the way', *the guardian.com*, 19 April 2013.

Wallace, A, Ford, J & Quilgars, D (2013), *Build-it-yourself? Understanding the changing landscape of the UK self-build market*, The University of York, York.

Walsham, G (1997), 'Actor-Network Theory and IS Research: Current status and future prospects', in A.S. Lee, J. Liebenau & J.I. DeGross (eds), *Information Systems and Qualitative Research*, Chapman & Hall, London, pp. 466-480.

Wankiewicz, H (2015), 'The Potential of Cohousing for Rural Austria', *Urban Research & Practice*, vol. 8, no. 1, pp. 46-63.

Warzynski, CC & Krupenikava, A (2010), 'Creating Macro Actors for Sustainable Development', in T. Thatchenkery, D.L. Cooperrider & M. Avital (eds), *Positive Design and Appreciative Construction: From Sustainable Development to Sustainable Value*, Emerald Group Publishing Limited, pp. 319 - 337.

Watt, P & Minton, A (2016), 'London's Housing Crisis and its Activisms', *City*, vol. 20, no. 2, pp. 204-221.

Weber, M (1978), *Economy and Society: An outline of interpretive sociology*, 2 edn, eds G. Roth & C. Wittch, University of California Press, Berkeley, California.

Whittle, A & Spicer, A (2008), 'Is Actor Network Theory Critique?', *Organization Studies*, vol. 29, no. 4, pp. 611-629.

Wickramasinghe, N & Bali, RK (2009), 'The S'ANT Imperative for Realizing the Vision of Healthcare Network Centric Operations', *International Journal of Actor-Network Theory and Technological Innovation*, vol. 1, no. 1, pp. 45-58.

—— (2011), 'The Need for Rich Theory to Realize the Vision of Healthcare Network Centric Operations: The case for combining ANT and social network analysis', in A. Tatnall (ed.), *Actor-Network Theory and Technology Innovation: Advancements and new concepts*, Information Science Reference, Hershey, Pennsylvania, pp. 41-51.

Wickramasinghe, N, Bali, RK & Goldberg, S (2009), 'The S'ANT Approach to Facilitate a Superior Chronic Disease Self-Management Model', *International Journal of Actor-Network Theory and Technological Innovation*, vol. 1, no. 4, pp. 21-34.

Williamson, W & Parolin, B (2013), 'Application of Socio-Technical Research Methods in Understanding the Genesis and Potential Sustainability of Planning Support Systems', in S. Geertman, F. Toppen & J. Stillwell (eds), *Planning Support Systems for Sustainable Urban Development, Lecture Notes in Geoinformation and Cartography*, Springer-Verlag, Berlin Heidelberg.

Wilson, W & Heath, S (2014), *Standard Note SN 06784: Self-build and custom build housing sector*, House of Commons Library.

Wirtschaftsministerium Baden-Wuerttemberg (1999), *Baugemeinschaften - Ein moderner Weg zum Wohneigentum*, Wirtschaftsministerium Baden-Wuerttemberg, Stuttgart.

Wolf, P & Troxler, P (2015), 'Look Who's Acting! Applying actor network theory for studying knowledge sharing in a co-design project', *International Journal of Actor-Network Theory and Technological Innovation*, vol. 7, no. 3, pp. 15-33.

Women's Property Initiatives (2015), *Women's Property Initiatives Website*, Womens Property Initiatives, viewed 26 January 2015, <http://www.wpi.org.au/>.

Wrigley Solicitors LLP (2013), *Co-housing: The Legal Path* viewed 2 November 2015, <https://prezi.com/qcz4zorhxoqi/co-housing-summary-of-legal-structures/>.

Yaneva, A (2012), *Mapping Controversies in Architecture*, Ashgate Publishing Company, Farnham UK.

Yaneva, A & Heaphy, L (2012), 'Urban Controversies and the Making of the Social', *Architectural Research Quarterly*, vol. 16, no. 1, pp. 29-36.

Yanotti, MB (2013), *A Review of the Australian Mortgage Market*, Discussion Paper Series N 2014-01, Tasmanian School of Business and Economics, University of Tasmania.

Yates, J (2013), 'Evaluating Social and Affordable Housing Reform in Australia: Lessons to be learned from history', *International Journal of Housing Policy*, vol. 13, no. 2, pp. 111-133.

—— (2015), 'Explainer: What's really keeping young and first home buyers out of the housing market', *The Conversation*, August 12 2015.

Yin, RK (2014), *Case Study Research: Design and methods*, 5th edn, Sage, Thousand Oaks, California.

Zang, C, Aguinaga, F & Poffo, IM (2009), 'Real Estate in Argentina: Adaptation of the legal structures to the current market', *Euromoney*, pp. 1-3.

Image Credits

Adaptation of Property Collectives Logo.
Original Logo Source: http://propertycollectives.com.au/
Last Accessed: 7 August 2016

CitiNiche logo.
Source: http://citiniche.com.au/
Last Accessed: 7 August 2016

Adaptation of the Urban Coup Logo.
Original Logo Source: http://www.urbancoup.org/
Last Accessed: 7 August 2016

Adaptation of the Nightingale Model Logo.
Original Logo Source: http://nightingalehousing.org/
Last Accessed: 7 August 2016

Symbol used to represent Community Instigated, Cooperatively titles building group developments in Berlin.
Incorporates photograph of Spreefeld Cooperative.
Image sourced from http://www.uncubemagazine.com/blog/14986603 , Photo credit to: Die Überflieger
Last Accessed 7 August 2016

Symbol used to represent Community Instigated, Privately Funded, strata titled building group developments in Berlin. Incorporates photograph of Baugruppen project "A52 – TEN IN ONE" by roedig.schop architects, Berlin. Image sourced from http://www.roedig-schop.de/projekte/neubau-a52/ , Photo credits to: Gianni Plescia, Andrea Kroth, Stefan Müller Die Überflieger. Last Accessed 7 August 2016

Symbol used to represent Professionally instigates, Privately Funded, strata titled building group developments in Berlin.
Incorporates architectural image of Baugruppen "WAC" proposal by zoomarchitekten
Image sourced from http://www.zoomarchitekten.de/baugemeinschaften/

Symbol used to represent Developer led Collective Custom Build developments in UK.
Incorporates architectural image of Blenheim Grove project designed by Poulsom Middlehurst Architecture & Design for InHabitHomes, London.
Image sourced from Inhabit Homes (2015)

Symbol used to represent Community Instigated, Privately Funded, strata titled Collective Custom Build Developments in UK.
Incorporates architectural image of 1-6 Copper Lane Co-housing project designed by Henley Halebrown Rorrison Architects, London.
Image sourced from Henley Halebrown Rorrison (2014)

Symbol used to represent community instigated collective custom build projects in the UK partnering with Not-For-Profit Developers. Incorporates architectural image of Older Womens Co-Housing project designed by Pollard Thomas Edwards Architects, London
Image sourced from http://www.owch.org.uk/. Last Accessed 7 August 2016